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Improving Employment and Earnings in Twenty-First Century Labor Markets

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IN MEMORIAM
Alan B. Krueger

Our good friend and colleague Alan Krueger passed away on March 16, 2019. Before his death, he coauthored the article in this volume on alternative staffing arrangements with Professor Lawrence Katz of Harvard.

Alan was the James Madison Professor of Political Economy at Princeton University. An outstanding labor economist, he made innovative contributions to the empirical literature on many topics, including the effects of minimum wages, the importance of financial resources in generating schooling outcomes, the relationship between economic growth and the environment, the causes of declining employment among less-educated workers, and many more.

Alan also was a distinguished public servant. He served in three federal leadership positions: chief economist of the Department of Labor in the Clinton administration, and after that assistant secretary for economic policy in the Treasury Department and chair of the Council of Economic Advisers in the Obama administration. He cared deeply about the real-life circumstances of American workers, and these concerns drove both his research and his policy activities.

We both had the pleasure of coauthoring papers with Alan earlier in our careers, and always found him to be a hardworking, conscientious, and pleasant research partner.

For all of these reasons, he will be sorely missed.

We dedicate this volume to his memory.

—Erica L. Groshen and Harry J. Holzer

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Improving Employment and Earnings in Twenty-First Century Labor Markets

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Erica L. Groshen, Cornell University
Harry J. Holzer, Georgetown University

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Improving Employment and Earnings in Twenty-First Century Labor Markets: An Introduction

ERICA L. GROSHEN AND HARRY J. HOLZER

How have U.S. workers fared recently? Broadly speaking, not so well. The employment and earnings outcomes of most Americans in the late twentieth and early twenty-first century have been disappointing. Over the past four decades, average real wage growth has been modest; wage inequality has risen dramatically; and labor-force activity has declined, especially among less-educated workers. Indeed, looking at five-year intervals over this span, only during the mid to late 1990s—when the U.S. economy was enjoying its dot-com boom—has the United States seen significant real earnings growth or increases in labor-force activity, especially among less-educated men.

What accounts for the modest real wage growth, rising wage inequality, and falling labor-force activity that we have experienced? Looking forward, should we expect more of the same? How will new developments, like the automation of workplaces associated with artificial intelligence (AI) and demographic shifts, affect these outcomes? What should sensible public policy look like to enable us to adjust to the coming changes and improve outcomes for most workers?

Given their centrality to most American families' future economic well-being, these questions warrant attention. Thus, the Russell Sage Foundation sponsored a conference titled "Improving Employment and Earnings in Twenty-First Century Labor Markets" on September 21, 2018. The articles presented there appear in this volume. We hope that these descriptions of the labor market's trajectories and policy options will spur conversations, analysis, and action by academics, policymakers, employers, and the public. We believe that course corrections are possible and advisable. Appropriate policies and employer choices could improve outcomes for all, and particularly for those who are disadvantaged and whose employment outcomes have deteriorated in recent years.

In this introduction, we set the stage for the ten topical articles that follow by describing the three key U.S. labor-market trends in recent decades and what we know about their determinants. We also speculate a bit about the likely impacts of coming changes in automation and demographics, and then consider policy choices available to respond to the economic forces in play. After reviewing these

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 Groshen, Erica L., and Harry J. Holzer. 2019. "Improving Employment and Earnings in Twenty-First Century Labor Markets: An Introduction." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 1–19. DOI: 10.7758/RSF.2019.5.5.01. Direct correspondence to: Harry J. Holzer at hjh4@georgetown.edu, 401 Old North, Georgetown University, Washington, D.C. 20057.

contributions to our understanding of current trajectories and policy options, we outline several key takeaways.

RECENT LABOR-MARKET OUTCOMES AND THEIR DETERMINANTS

First we describe and consider sources of the most apparent broad labor-market outcomes in employment and earnings since the late 1970s: modest real wage growth, rising wage inequality, and declining labor-force activity, especially among less-educated Americans. After that, we speculate on how likely these trends are to continue throughout the twenty-first century.

Modest Real Wage Growth

Since 1979, most U.S. workers' real (that is, inflation-adjusted) wages have stagnated. Figure 1 presents the dismal pattern of mean and median real wages from 1979 to 2016.[1] Indeed, only the second half of the 1990s shows any sustained real wage growth.[2] The general flatness of wages for the average U.S. worker over nearly four decades is quite astounding and historically unprecedented.

What might account for the recent flatness of wages? In a strict accounting sense, three factors largely account for the pattern:

- low productivity growth,
- a decline in workers' share of U.S. income, and
- rising health-care benefit costs as a share of total compensation.[3]

Labor-productivity growth has averaged under 2 percent per year since 1973, well below its average in the years after World War II. Indeed, excluding the decade around the dot-com boom, it averages just 1.5 percent, and in the decade after 2007 it was 1.2 percent (Baily and Montalbano 2016).

Given such slow growth in output per worker, it is perhaps not surprising that growth in worker wages has lagged as well—because real wage growth remains quite correlated with, though lower than, productivity growth in this period (Stansbury and Summers 2017). Yet, because compensation growth has been at least somewhat decoupled from productivity growth since the late 1970s, higher productivity growth alone is apparently not enough for raising wages. It may not even be necessary for such growth, though rising real wages would require some redistribution away from profits (or lower benefit costs) absent higher productivity growth.

Thus, the recent decline in labor's share of output (from 64 percent in 1973 to 58 percent in 2016) also clearly contributes to low overall wage growth. Likewise, the growth of the share of worker compensation accounted for by health-care costs also reduces wages, though this factor does not appear to have been consistently larger in the decades since 1979 than in those before that year.[4]

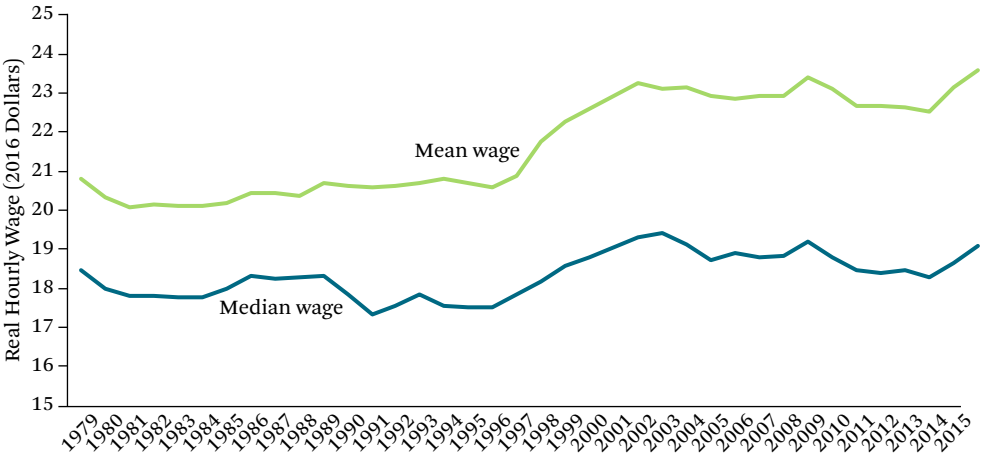
1. The figures we use have been generously provided to us by Jay Shambaugh and Ryan Nunn of the Hamilton Project at the Brookings Institution (Shambaugh et al. 2017). Wages are deflated by the CPI-U-RS in figure 1. The CPI-U-RS is not constructed to accurately measure cost-of-living differences over such a long time. Thus, it is more appropriate to compare the pace of real earnings growth over short periods. Note, however, that real wage trends using other price indices, like the chain-weighted GDP deflator for personal consumption expenditures show qualitatively similar though somewhat larger real wage increases over time (Holzer and Hlavac 2014).

2. The stronger real wage growth we observe in the mid to late 1990s occurs due to a temporary confluence of strong productivity growth, tight labor markets, and low inflation that have not been observed at any other time in the past four decades.

3. These three factors would not exactly account for wage trends, at least partly because productivity and earnings are based on price indices that have trended quite differently in the past few decades, with that for productivity rising by much less (and thereby inflating productivity growth relative to that in earnings). They also differ partly because other benefits besides health care affect the extent to which total compensation growth differs from that in wages.

4. Data show that increases in the share of compensation accounted for by health insurance premia rose during

Figure 1. Mean and Median Wages, 1979–2016



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).
Note: Wages are deflated using the CPI-U-RS. Sample includes workers age twenty-five to fifty-four.

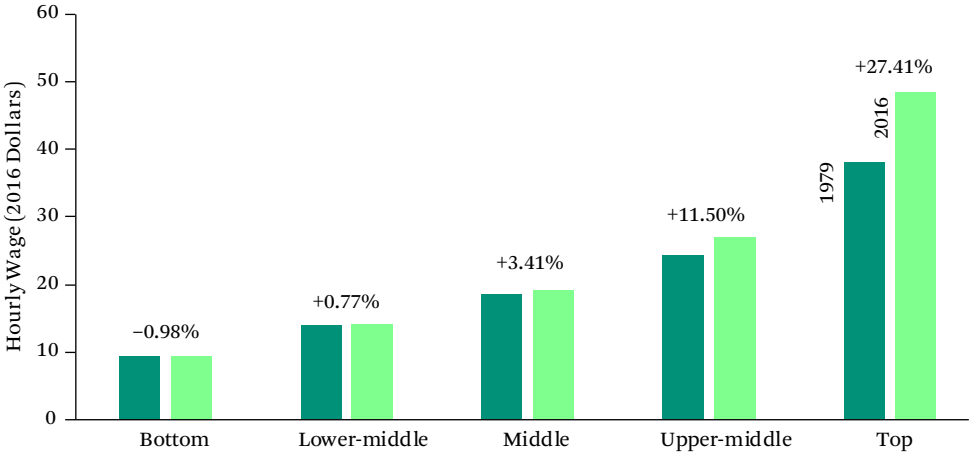
The questions of why productivity growth has slumped and why the share of productivity improvements going to labor has declined remain open. Several hypotheses help explain one or both developments:

- rising automation in the labor market (Acemoglu and Restrepo 2018; Autor 2018);
- growth of nearly winner-take-all product markets where capital-intensive firms have gained substantial market share relative to those more labor-intensive (Autor et al. 2017);
- relatively weak aggregate demand (relative to potential output) in the U.S. economy since 1980 (Bernstein 2018);
- a slowdown of the rate of growth of education in the workforce (Goldin and Katz 2008);
- declining dynamism of the labor market, as measured by geographic and occupational mobility of labor as well as declining numbers of business startups (Shambaugh, Breitwieser, and Liu 2018); and
- rising labor-market power of employers relative to workers and declining mechanisms for worker voice.[5]

the 1980s but then declined in the next two decades, with the post-1979 average roughly similar to that for the three decades of the 1950s through the 1970s (Burtless and Milusheva 2013).

5. Jay Shambaugh, Audrey Breitwieser, and Patrick Liu (2018) note growing evidence of employer monopsony power in local labor markets, especially in rural and smaller metropolitan areas, though it is not clear that such power is itself growing nationally. But when these areas experience losses in local labor demand, especially through technology or globalization, such market power of employers likely imposes even greater costs on workers who face little alternative demand for their labor and may not be inclined to relocate geographically. Under these circumstances, employer monopsony power could lower labor-market efficiency and productivity as well as raise inequality. There has also been some evidence of rising product market concentration of firms and higher markups above costs that, all else equal, might create opportunities for workers to share in product market rents. Of course, the ongoing implementation of digital technologies, globalization, deunionization, and deregulation limit worker abilities to share them. Finally, Shambaugh, Breitwieser, and Liu also note recent evidence of growing anticompetitive behaviors by employers such as noncompete and nondisclosure agreements in worker contracts, which could affect both worker productivity and inequality.

Figure 2. Real Wage Levels and Growth by Wage Quintile, 1979–2016



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).

Note: Wages are deflated using the CPI-U-RS. Sample includes workers age twenty-five to fifty-four.

Rising Wage Inequality

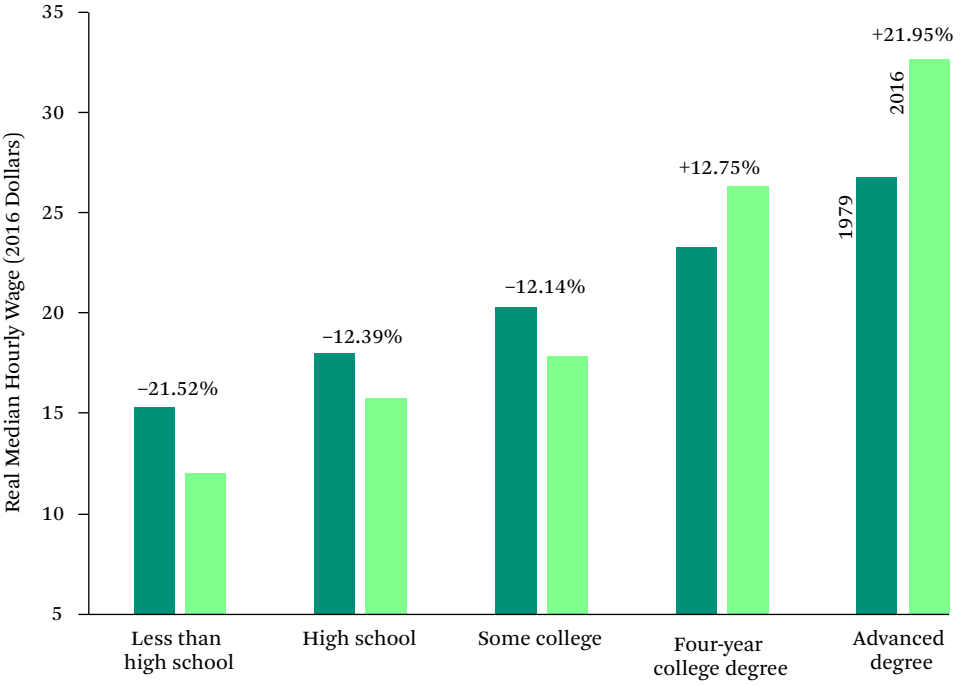
As overall wage growth slowed, inequality widened. The rise in wage inequality overall and across education groups has been frequently researched and documented. Figures 2 through 4 summarize trends that we know from this work. Figure 2 presents rates of wage growth between 1979 and 2016 across different quintiles of the wage distribution; figures 3 and 4 do so across education and racial-gender groups respectively. The bars show the real median hourly wage (in 2016 dollars) in 1979 and 2016 for each group; above the bars are the percentage change in wages for each group. As an example, the real median wage for the bottom quintile of workers fell by 0.98 percent from 1979 to 2016 and grew by 27.41 percent for the top quintile. And, although benefits such as health insurance have expanded since the passage of the Affordable Care Act in 2010, trends in benefit availability over a longer time suggest that inequality has grown in broader compensation measures as well as in earnings alone (Pierce 2001).

The three figures show well-known patterns of rising wage inequality in the labor market over this time. Wage growth has very clearly been highest in the top quintile of the earnings distribution; and other data show it being increasingly higher for the top 10 percent, 1 percent, and 0.1 percent of that distribution (Gould 2019).[6] Although the third quintile enjoyed more wage growth over the entire four-decade period than the bottom quintile did, other data suggest that much of this occurred during the 1980s (Autor, Katz, and Kearney 2008). Beyond that point, inequality rose mostly between the middle and top earners, rather than between the middle and bottom earners. Real wage growth has also been substantially higher for those with bachelor's or higher education degrees than for those without college, and for women relative to men.[7] Wage growth among Hispanics lags that of whites and is even lower

6. The changes in inequality at different points of the earnings distribution are often summarized in this literature by the ratios of earnings at the 99th, 90th, 50th, and 10th percentiles—so the 99:50 and 90:50 ratios measure inequality between the top and middle, while the 50:10 measures it between the middle and bottom. These measures trend somewhat differently over the past four decades, with the 99:50 ratio rising the most.

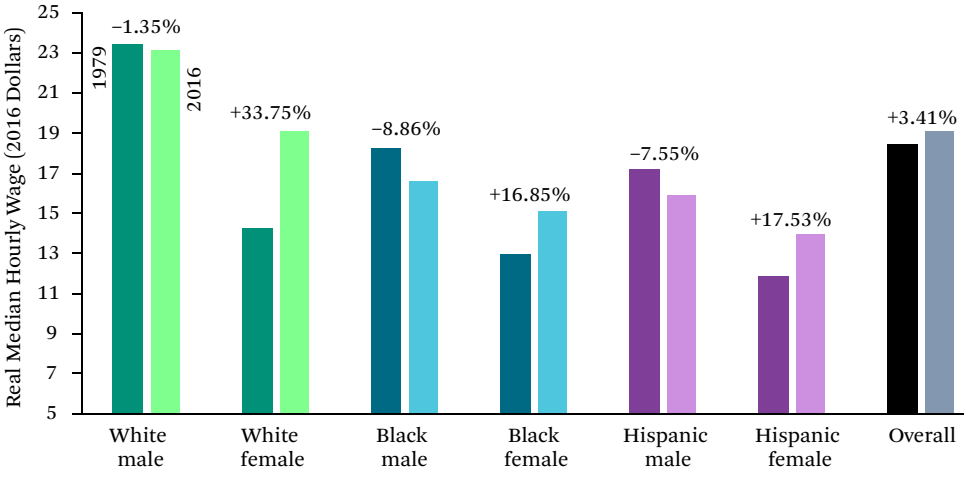
7. On the other hand, David Autor (2014b) clearly indicates that the growth of the college–high school ratio within the bottom 99 percent of the income distribution accounts for four times the relative loss of income for high school graduates as does the rise in income for the top 1 percent.

Figure 3. Real Wage Levels and Growth by Educational Attainment



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).
Note: Wages are median hourly earnings and deflated using the CPI-U-RS. Sample includes those age twenty-five to fifty-four.

Figure 4. Real Wage Levels and Growth by Race and Gender



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).
Note: Wages are median hourly earnings and deflated using the CPI-U-RS. Sample includes those age twenty-five to fifty-four.

among black men. But, if anything, these calculations understate the degree of earnings loss among men and especially black men, whose labor-force participation and employment rates have also declined a great deal.

A substantial literature tries to explain these increases in labor-market inequality. Even though most analysts agree that both labor-market and institutional factors are important, they continue to debate the relative importance of each (see Autor, Katz, and Kearney 2008; Card and Dinardo 2008; Fortin, Lemieux, and Lloyd 2018). The most important labor-market forces shifting demand away from less-educated workers include automation, in the form of skill-biased technical change (SBTC), which raises the demand for highly educated workers as it replaces the less educated; and globalization, which includes trade as well as immigration. To a great extent, these forces have generated polarization in the labor market, as employment and (to some extent) wages have risen in the highest- and lowest-paying jobs, and non-college-educated workers in the middle deciles of the wage distribution—especially in jobs consisting mostly of easily automatable routine tasks, such as production and clerical work—saw the greatest losses in both outcomes.[8] Nevertheless, skeptics of the importance of SBTC and polarization note that the broadly weak employment outcomes after 2000, even among college-educated workers whose real earnings have been flat in this period, may undercut these hypotheses (see, for example, Schmitt, Shierholz, and Mishel 2013). Not surprisingly, SBTC proponents read this evidence quite differently (see, for example, Autor 2014a).[9]

However, trade and technology alone do not determine any particular employment outcome. A range of policies influence how technology and trade affect workers. In particular, the failure of the supply of highly educated labor to more substantially rise in response to higher returns to education has allowed inequality across education groups to persist. This stands in sharp contrast to earlier periods in the United States, when education policies helped raise the supply of skills more vigorously in response to increases in the demand for them (Goldin and Katz 2008; Autor 2014b).[10] Policy responses can also mitigate (or not) the harm caused to workers displaced by automation. In the United States, the large wealth losses (Davis and von Wachter 2011), substantial unemployment spells, and frequent labor-force exits (Farber 2017) sustained by displaced workers attest to a workforce development system that does not adequately protect workers from high, long-lived costs if they lose their jobs.

8. Harry Holzer (2015) points out that employment in middle-wage categories has not declined uniformly; instead, it has declined primarily in production and clerical jobs requiring no postsecondary education, while it has risen in other categories (such as health care) where postsecondary credentials are required. The net decline in middle-wage employment reflects the fact that the decline of employment in the former category is larger than the rise in the latter.

9. The flatness of real wages for college graduates since 2000 might reflect the fact that the growth of the supply of college graduates has finally caught up with weakening growth in demand for them (Beaudry, Green, and Sand 2013), though not by enough to reduce the still very high premium to college degrees to any real extent. Autor also acknowledges that employment after 2000 has mostly grown only in the lowest-wage occupations and shrunk in the others, apparently in contrast to the polarization story that works better in the 1990s. But he notes that job growth resumed in the highest-wage categories after 2007, and mostly attributes the shrinking of employment in this sector in the 2000 to 2007 period to the bursting of the internet bubble in 2000 and after. In addition, he argues that the "China shock" to manufacturing and then the Great Recession also contributed to very low real wage growth for all workers in the decade after 2000. The very high ongoing returns to cognitive skills in the United States (Autor 2014b) are also consistent with the SBTC and polarization hypotheses.

10. Goldin and Katz (2008) show that the rise in demand for high school labor early in the twentieth century led to rapidly rising supplies of such labor within a few decades, and corresponding declines in inequality between those who had and did not have such diplomas. The greater rise in high school attainment in that period at least partly reflects policy responses, such as the movement for universal public high schools.

In addition to market forces and policy mattering for outcomes, the same technology can be implemented by employers in very different ways with very different consequences, certainly for jobs and skills.[11] At various times, automation has led to deskilling, upskilling and sometimes both.[12] Automation operates on specific tasks, not entire jobs, which are composed of tasks. Thus, automation will have a partial impact on jobs, increasing interactions between humans and machines. When employers redefine jobs as tasks are automated, creative approaches to managing the human-machine interface are often possible and efficient.[13]

At the same time, institutional factors such as shrinking coverage of workers by collective bargaining and declining minimum wages (relative to median wages) have also contributed to rising wage inequality, perhaps playing a greater role than many economists had previously thought.[14] Other institutional changes, including various forms of labor-market "fissuring" have likely added to such inequality, and threaten to do so even more in the future (Weil 2014). These institutional forces also suggest lower prevalence of employment in high-road firms that pay their workers a wage premium above standard market rates.[15]

Rising inequality in earnings and household income has characterized virtually all industrialized economies since the 1970s. This suggests an important role for factors like SBTC and globalization that affect all such economies (Autor 2014b). At the same time, that increases in inequality have generally been greater in the United States than in most other countries implies an important role for institutional and policy effects that are more uniquely American (Autor and Katz 1999; OECD 2011).

Declining Labor-Force Activity

Whether people work also matters. Less equal earnings over time reflect not only trends in wage inequality, but also changes in labor-force activity. Figure 5 documents trends in labor-force activity since 1979, separately for men versus women and for youth (ages sixteen through twenty-four) versus prime-age adults (ages twenty-five through fifty-four). Although participation among prime-age women has risen since 1979, a closer look at annual trends shows that rising participation among adult women in the United States ended around 2000 and declined somewhat after that. Notably, the end of increases in labor-force participation for American women, although it continued to increase in many other industrial countries, suggests that factors such as family-work life imbalance and the rarity of paid family leave in the United States limits the workforce potential of American women in important ways (Black, Schanzenbach, and Breitwieser 2017).

In addition, youths' and prime-age men's labor-force activity have trended down consis-

11. Maryellen Kelley and Susan Helper (1999) provide examples of how technology adoption can vary among employers with divergent impacts for the workers involved (for more discussion, see Groshen et al. 2018).

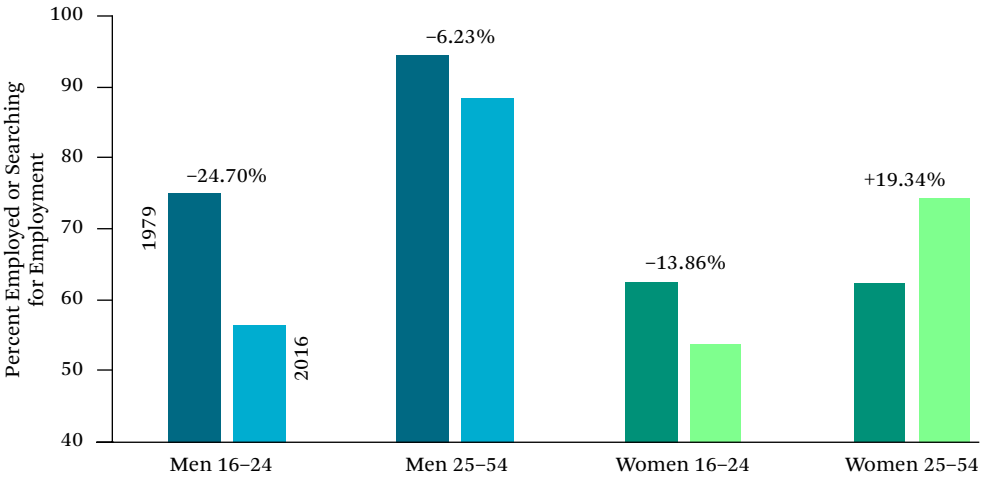
12. For example, Autor, Frank Levy, and Richard Murnane (2002) find that automation in banking in the United States in the 1990s had both effects, leading to polarization in wages among bank employees.

13. Haruo Shimada and John MacDuffie (1998) find that when humans work near machines, their observations can yield improvement ideas that "give wisdom to the machine," which can help capital equipment appreciate (rather than depreciate) in value.

14. Nicole Fortin, Thomas Lemieux, and Neil Lloyd (2018) argue that, with a new way of measuring the spillovers of minimum wage increases and collective bargaining for workers not directly affected by those factors, the extent to which declines in those factors account for rising earnings inequality may be quite large.

15. Both, for instance, John Abowd and Francis Kramarz (1999) and Fredrik Andersson, Holzer, and Julia Lane (2011) offer evidence on firm-level wage effects that measure the payment of earnings premia above or below market levels for workers of a given skill set. Zeynep Ton (2014) presents industry case studies showing strategies used by firms to improve worker productivity and earnings in "good job" settings. "High-road" firms presumably can compete with others on the basis of higher worker productivity and performance, whereas "low-road" firms compete based on cost minimization; evidence remains limited on the extent to which the former can fully compete with the latter, however (Osterman 2017).

Figure 5. Changes in Labor-Force Participation Rates, 1979–2016



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).

tently since the 1980s.[16] Only workers age fifty-five and older have increased their labor-force participation recently. In particular, many college-educated workers (whose health and longevity are clearly improving) apparently want longer working lives.

Figures 6 and 7 present separate changes in labor-force participation among prime-age men by education levels and race. Clearly, less-educated men (and especially black men) account for a disproportionate share of declining activity. If anything, declines for the latter group are understated due to the underrepresentation of low-income or black men in census survey data (U.S. Census Bureau 2012). We might not be too concerned if these declines reflected choices by the most educated workers (except from a fiscal perspective, where the ratio of working to nonworking populations is essential to our ability to fund our retirement programs). However, its concentration among the young or least educated implies large losses of earnings and wealth for these populations over time, and perhaps permanently.

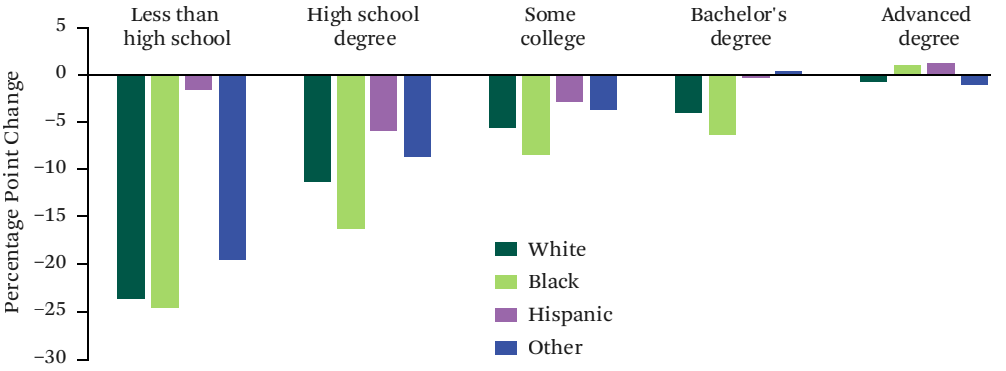
That labor-force activity has declined most among the groups bearing the greatest wage declines suggests that these workers face less demand for their labor over time (Autor and Wasserman 2013; Abraham and Kearney 2018).[17] Exacerbating this impact, the concentration of less-educated men in regions hard hit by manufacturing job losses since 2000 also suggests a role for a persistent lack of job availability in those regions, coupled with a lack of regional relocations by these men (Austin, Glaeser, and Summers 2018).[18] In addition, other factors such as the availability of transfer income, especially from disability insurance, and opioid dependency likely contribute to these declines as well (Krueger 2017; Doar, Holzer, and Orrell

16. At least some of the growing nonparticipation of youth in the labor force reflects higher rates of college enrollment over time (Krueger 2017). But data not presented here also show greater declines in participation among those age twenty-five to thirty-four than thirty-five to fifty-four, suggesting that other factors than enrollment are causing these declines.

17. That is, the decline in participation traces out worker movements along a labor supply function in response to shifting demand.

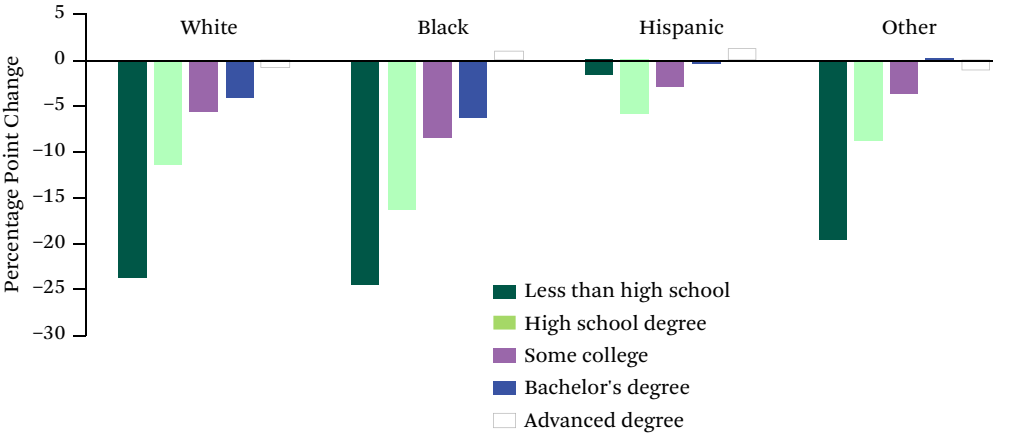
18. Olivier Blanchard and Lawrence Katz (1992) present evidence of regional mobility of workers in response to labor demand shocks. However, John Bound and Holzer (2000) show that such responsiveness has long been lower among less-educated than highly educated workers.

Figure 6. Labor-Force Participation Changes, Prime-Age Men by Education



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).
Note: Sample includes men age twenty-five to fifty-four.

Figure 7. Labor-Force Participation Changes, Prime-Age Men by Race



Source: Authors' calculations based on Current Population Survey data (U.S. Census Bureau 1979–2016).
Note: Sample includes men age twenty-five to fifty-four.

2017). Among black men, these forces have been compounded by low educational achievement and early work experience, as well as high rates of incarceration. These factors result in few job offers and low wages for these men, driving them out of the workforce in even larger numbers (Neal 2008).

Looking Ahead

The preceding discussion suggests that labor market and institutional forces, employer choices, as well as the extent and effectiveness of policy responses, all contribute to the modest real wage growth, rising inequality, and declining labor-force activity observed in the United States over the past four decades. How will these and other factors evolve over the coming decades and what would constitute appropriate policy responses?

That automation will continue seems scarcely in question, and its labor-market effects may well accelerate as robotics and AI be-

come more prevalent in American workplaces. Frank Levy (2018), among others, argues that such technologies will likely have large impacts on workplaces and employment within the next decade, as motor vehicles, manufacturing production, and customer service centers become more fully automated.

Over a longer time, AI adoption in workplaces will likely have both positive and negative effects on workers. On the one hand, automation should raise worker productivity and potentially average compensation; on the other hand, it could well further depress labor's share of national income, especially in the absence of worker "voice" and policy changes. It will likely cause continuing worker displacement, imposing associated costs on affected workers. Younger or more-educated workers will likely adapt to these changes by getting new forms of education and training, though older or less-educated workers are more likely to simply accept lower-wage jobs or leave the labor force entirely. The disruptions to work will likely affect workers at all levels of education. Yet, the skill bias we have observed in recent decades will likely persist (Nedelkoska and Quintini 2018). This bias tends to disadvantage lower-skilled workers because the most routine forms of work will remain the easiest to automate. Furthermore, more-skilled displaced workers may have an edge in gaining new skills and "bumping" lower-skilled workers out of their opportunities.[19] All else equal, these forces suggest ongoing increases in wage inequality in the future.

However, everything need not remain equal. For example, the abilities of workers to retrain, and perhaps keep their jobs, in the presence of automation will depend on a range of institutional and policy factors, as noted. Private employers' practices and public-sector policies will help determine how easily entering and continuing workers can obtain the skills they need for these new or reconfigured jobs, and the speed of these transitions.[20]

Interestingly, the effects of automation in industries like retail trade to date have perhaps increased the quality of jobs but not greatly diminished their quantity (Mandel 2017).[21] Still, if the scope and speed of displacement as the new technologies are implemented greatly exceed those of the past, it is possible for the adjustment processes that economists emphasize to be overwhelmed, or for the net quality of jobs to be reduced at least temporarily. Indeed, as noted, the high and uncompensated costs borne by U.S. displaced workers suggest that current policy and employer actions are not enough to manage the likely future pace of job destruction without harm to families and communities. All of this will likely have political as well as economic implications, perhaps feeding the rising populism observed over the past few years in the United States and the European Union and fueling resistance to technological change on the shop floor (West 2018).

On a different issue, both the pace and composition of future immigration remain unclear at the moment as controversies rage over potential changes in our immigration law. The impact of immigration on the earnings of native-born workers remains heavily contested. In addition, workforce demographics will likely change, especially as immigrants replace retiring baby boomers in the labor force. Whether the retirements of baby boomers create widespread labor market shortages, as was once widely forecast (Judy and D'Amico 1997), now seems doubtful (Freeman 2007). But the growth of minority populations and the aging of the U.S. workforce might well further limit the levels of educational attainment of the workforce overall, absent major policy efforts to offset these changes (Frey 2015). Lower educational

19. Autor (2015) describes how the magnitudes of labor cost savings, price, and income elasticities of demand help determine whether new jobs are created in the automating industries or elsewhere.

20. For other discussions of the adjustment process of workers to robotics, see Levy and Murnane (2013); Holzer (2017).

21. Michael Mandel (2017) argues that employment growth in fulfillment centers, where goods are stocked for online shopping, plus that in transportation/logistics for workers who deliver them, pay higher wages and are large enough in quantity to offset most job loss in brick-and-mortar retail trade in the past several years.

attainment, in turn, can limit productivity growth and raise earnings inequality.

The ability of our more diverse workforce to become better educated and adaptable to coming changes in automation will also depend on future trends in federal and state education policy and funding at all levels, from prekindergarten programs through higher education. The effectiveness of the nation's labor exchange and workforce development system, including its American job centers and unemployment insurance, could also help determine the extent to which displaced workers learn about new job opportunities and get the skills necessary to obtain them.[22] Policies to encourage employers to provide more on-the-job training, especially to workers at risk of technological displacement, could be important too.

Another set of policy choices in the future will affect how workers share in productivity gains associated with automation. The degree of sharing will certainly depend on employer adoption of practices such as profit-sharing (Blasi, Freeman, and Kruse 2014) and various forms of worker "voice," including collective bargaining or other alternatives (Freeman, Hersch, and Mishel 2004). Legal decisions, such as the recent Supreme Court ruling in *Janus v. AFSCME* (which struck down the ability of public-sector unions to collect dues from nonmembers), will also affect the extent to which unions remain vital forces in the private and public sectors. In addition, new efforts to ensure protections and benefits coverage for workers in a wide variety of settings, including alternative staffing arrangements like contracting, will likely be crucial too (Harris and Krueger 2015; Katz, Poo, and Waxman 2018).

Of course, statutory minimum wages (at the federal, state, and local levels) and overtime laws can affect the distribution of earnings and employment. Other efforts to make work pay, such as expansions of the Earned Income Tax Credit (EITC) and wage insurance, could improve both earnings and labor-force participation among less-educated or displaced workers as well.

Finally, more targeted policy choices can affect employment outcomes of specific groups of workers, and perhaps their labor-force participation, such as paid leave for women (or caregivers more broadly) and enhanced childcare subsidies. Efforts to help less-educated men could include opioid addiction prevention and treatment, policies limiting incarceration or helping offenders reenter the workforce, or Social Security Disability Insurance (SSDI) reform.[23] Efforts to combat "disconnection" from school and work among youth can also include a range of education and training policies in high schools and community colleges.

In short, the forces of automation and globalization are not likely to subside any time soon, potentially leading to further flat wages, rising inequality, and lower labor-force participation. Mitigating these consequences will require changes in policy and employer choices. Evidence in favor or against at least some of these future policy options appears in the articles that follow.

ARTICLES IN THIS VOLUME

What does the best current research say about these key issues? We asked the conference authors to use past experience to look forward and consider policy options. In line with our review, authors wrote on the following topics:

- labor demand and the supply of skilled workers,
- labor-market institutions and policies,
- alternative staffing, informal work, and fissuring, and

22. For discussions of potential reforms in the workforce system and unemployment insurance to help workers gain better skills and new jobs, see Van Horn, Edwards, and Greene (2015) and Kugler (2015) respectively.

23. Alan Krueger (2017) argues that large percentages of non-employed prime-age men use painkillers regularly. Holzer, Steven Raphael, and Michael Stoll (2006) argue that incarceration limits subsequent employment of offenders, especially employer demand for labor, while garnishing wages for those in arrears on child support likely reduces their supply. Katharine Abraham and Melissa Kearney (2018) estimate relatively large impacts of previous incarceration on subsequent employment losses of workers. For discussions on how SSDI likely reduces employment among prime-age men and women, see Autor and Duggan (2006) and Liebman (2015).

- improving labor-force attachment and outcomes for three particular demographic groups.

Labor Demand and the Supply of Skilled Workers

We begin with considering the effects of automation and immigration on jobs and the supply of workers with higher education.

In the first article, George Borjas and Richard Freeman (this issue, 2019) estimate the impact of industrial automation and immigration intensity, across industries or states, on the short-term employment and earnings of workers between 2004 and 2016. They find large negative effects of automation on employment—each robot displacing as many as four to five workers—as well as wages; immigrant impacts on workers are also sometimes negative (especially for less-educated workers) but much smaller.

These findings are based only on their analysis of manufacturing industries, where virtually all industrial robots have been used to date, but they will no doubt spread to other sectors and grow in intensity and productivity over time. The results thus suggest the potential for automation to generate considerable employment disruption and worker displacement in future years.

John Bound, Breno Braga, Gaurav Khanna, and Sarah Turner (this issue, 2019) focus on the supply of college-educated workers in the United States, and how the quantities of college graduates might be affected by declining state appropriations to public colleges and universities, which are the backbone of U.S. higher education. They estimate that declining fiscal appropriations at the state level for public universities cause some categories of these universities to reduce institutional expenditures, enroll fewer students, and reduce patenting activity (a sign of declining research productivity), but also raise tuition and private funding to offset lost public dollars. As state budgets in the future will continue to feel pressure from rising Medicaid costs and legislative reluctance to increase revenues, declining fiscal support for public institutions of higher education will likely continue to restrict their ability to produce college graduates and economically valuable research.

Putting together the conclusions of both articles, we see a strong warning against complacency. Without improvements in our public education and workforce development system, the ability of workers to gain more higher education and training in response to rising displacements from automation will likely be sorely tested in the coming decades.

Labor Institutions and Policies

Other factors affecting workplace outcomes include the extent of collective bargaining, other voice mechanisms, high-road employment practices, and statutory minimum wage and overtime regulations.

Thomas Kochan and William Kimball's article in this issue (2019) analyzes the role of collective bargaining over time in generating not only higher compensation for workers, but also worker voice and broader economic benefits in the United States in the form of higher productivity. They find that, since about 1980, positive union impacts on worker wages have fallen, and that the type of important partnerships between labor and management that generate high-performance workplaces has become increasingly rare.

Survey evidence suggests that many more workers want representation or other forms of worker voice than currently have it. Other attempts to spur high-road employment practices, through public financial incentives or technical assistance, can be pursued in non-union settings but are more difficult to generate and sustain. Kochran and Kimball (this issue, 2019) conclude that dramatic changes are needed in labor-management legislation and regulations to generate a new social contract between workers and their employers that could boost performance and productivity in U.S. workplaces.

Charles Brown and Daniel Hamermesh in this issue (2019) review the literature on how wage and hour laws—specifically higher minimum wages and overtime pay regulations—affect the employment and earnings of affected workers. They find that, as the federal government has allowed its statutory minimum wage to decline in recent years (relative to median wages in the private and public sectors), many states and localities have raised their own min-

imum wages, creating much more variation across states than has existed historically. The federal government has also failed to raise the ceiling on earnings that are covered by overtime rules, so the real earnings ceiling (after allowing for inflation) has diminished over time.[24]

Their review of estimated impacts of minimum wages suggests quite small negative impacts on the employment of young or less-educated workers, although long-term effects (as well as those associated with minimum wages at or near $15 an hour) might be considerably larger. Overtime laws also seem to reduce hours worked yet raise employment and wages. Accordingly, the failure of the federal government to adjust minimum wages and overtime ceilings results in large differences in minimum wages across states that could reduce employment in certain states, and hours worked per employee rise and weekly earnings decline due to diminishing overtime coverage.

These articles together show a need to reexamine the relevance and efficacy of current labor-market regulations and employer practices in light of the changing U.S. labor market.

Alternative Staffing, Informal Work, and Fissuring

Another evolving aspect of the labor market concerns the relationship between employers and workers, including the growth of independent contracting, temporary jobs and informal work, and fissuring.

Lawrence Katz and Alan Krueger (this issue, 2019) address a recent puzzle about the extent to which independent contracting has risen over time. On the one hand, evidence they generated in a widely cited article based on the Rand-Princeton Continuous Work Survey, in comparison with earlier estimates, suggested a substantial rise in the use of independent contracting among workers between 2005 and 2015 (Katz and Krueger 2016). On the other hand, the most recent data from the Contingent Worker Survey (CWS) suggested no such increase over time (BLS 2018).

Katz and Krueger (this issue, 2019) analyze a range of hypotheses about why the discrepancy has occurred and conclude that employment as independent contractors has likely risen by just 1 to 2 percentage points in this period, considerably lower than the 5 percentage point increase they had found earlier. This brings their findings closer to those from other sources. Also in line with others, they find discrepancies in measured self-employment activity between CWS and other sources, such as data from the Internal Revenue Service and Amazon MTurk. They conclude that alternative staffing arrangements are growing more slowly than they had previously thought, but that casual and part-time, secondary work is likely more important and deserves further study over time.

Apropos of this conclusion, Katharine Abraham and Susan Houseman (this issue, 2019) examine the characteristics of informal jobs. They analyze self-reported data from the Survey of Household Economics and Decisionmaking (SHED) administered by the Federal Reserve Bank Board of Governors in 2015 and 2016. The data reveal that informal work is a frequent activity, with about 28 percent of workers participating in informal work in any given month. Furthermore, significant fractions of workers report the income generated by such work to be important in their household finances. Yet benefits and legal protections are generally absent in informal work. Workers holding these jobs tend to be in vulnerable situations, including minorities, the less educated, those with lower incomes or experiencing financial stress, those in nonstandard work arrangements, and the unemployed. The authors conclude that the prevalence and nature of informal work requires developing a better understanding of its characteristics in order to design appropriate policies for part-time and nonemployee workers.

Finally, David Weil (this issue, 2019) considers the role of *fissuring*—a term coined in his 2014 book—in today's labor market. Fissuring occurs when employees in the same establishment work for multiple employers, in alternative staffing arrangements (such as independent contracting or temping) but also in more regular arrangements, including franchising.

24. The Obama administration attempted to raise the ceiling in its second term, but the effort was struck down by the courts.

Thus the CWS data will not fully capture its prevalence. Other data sources or redesign of the CWS will be needed to track this trend more fully.

Such fissuring practices disrupt many long-standing employment norms within workplaces, such as the historic tendency for large firms or those in high-wage industries to pay all their workers relatively higher wages, and the tendency of employers to share product market "rents" with their workers. Employers also have fewer incentives to invest in training such workers.

Thus, fissuring tends to raise earnings inequality and weaken benefit and regulatory coverage. This suggests that further fissuring will lead to even more inequality and lack of legal protection for workers in coming decades. Weil therefore encourages both more research and policy experimentation on issues such as with whom responsibility for labor practices should reside, how pay norms might be established in fissured workplaces, and how benefits and legal protections can be provided as well to these workers.

The three articles together also underline the need for data improvements to guide policy and for a reconsideration of how employer-employee relationships are defined in regulations that are intended to protect workers.

Improving Labor-Force Attachment and Outcomes for Three Demographic Groups

The final three articles consider trends and policies to help women, African Americans, and disadvantaged youth remain attached to the workforce and achieve progress.

Elizabeth Doran, Ann Bartel, and Jane Waldfogel (this issue, 2019) analyze data from the American Time Use Survey (ATUS) and the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97) on male and female access to family-friendly practices at work such as paid leave, childcare, and flexible schedules—all of which seem related to higher female labor-force participation across industrialized nations. They find that male employees in the United States have more access to paid leave overall, though female employees have more access to paid parental leave. Neither men nor women at work have much access to childcare, and flexible scheduling is much more available for highly educated workers than for others.

The authors argue that, to increase female labor-force participation, we should increase the provision of family-friendly policies at work. These, though, should be funded by a payroll tax mechanism rather than a mandate on employers, because the latter can be more burdensome to particular employers. Acknowledging the costs of such policies (in taxes or workplace disruption), they argue that public provision of such policies in several states has been successful and cost-effective.

William Rodgers's article in this issue (2019) considers recent trends in relative labor-force participation, employment, and earnings between whites and blacks. Relative earnings rose for blacks until around 1980, but employment and labor-force activity declined for black men. Large racial gaps therefore persist in all these measures.

Rodgers attributes these changes to a wide set of causes, potentially including education and achievement gaps, declining unionism and manufacturing employment, and rising incarceration rates. Accordingly, he argues that no single policy effort will reverse these trends. He advocates for a set of policies, including several that are race-neutral but would disproportionately benefit African Americans in the labor market.

Pamela Loprest, Demetra Nightingale, and Shayne Spaulding (this issue, 2019) examine trends in labor-force activity among teens and young adults. Observed declines in such activity overall are mostly attributable to rising school enrollments over time; but substantial rates of low activity and disconnection from both school and work still appear among low-income and minority youth. Causes of these trends include poor schooling and lack of early work experience, opioid dependency, incarceration, and other barriers to well-paid work.

Loprest, Nightingale, and Spaulding therefore argue for education and training policies in secondary school, community colleges, and workplaces to better connect young people with the labor market and improve their work-related skills and experience. Reducing the barriers associated with opioid use and criminal records could be important as well.

All three articles make the similar point that no single policy silver bullets can improve outcomes for these groups. Yet evidence suggests that a set of policies crafted with reference to data and program evaluations offer promise to improve outcomes for workers in vulnerable situations.

CONCLUSION

Our review of U.S. labor-market trends highlights three broad disappointing outcomes in recent decades: modest real wage growth, rising inequality, and declining labor-force activity among key groups—including women recently but especially African American and young or less-educated men over longer periods. These trends reflect labor-market and institutional forces that are likely to persist throughout coming decades. Thus, the outcomes for workers in the twenty-first century will hinge on whether policy and employer decisions translate these forces into opportunities or more limitations for vulnerable workers.

To advance our national conversation about these issues, the authors in this volume addressed forward-looking topics in four broad categories: labor demand and supply factors (such as automation and college attainment), institutional factors (such as collective bargaining or minimum wage and hour rules), alternative staffing arrangements (including informal work and fissured workplaces) and trends facing particular worker groups (such as women, African Americans, and disadvantaged youth).

Major findings from these articles emphasize the relentless nature of the forces at play:

- Labor-market automation may accelerate over time, potentially increasing worker dislocation and inequality.
- Declining state subsidies for public higher education (given ongoing budgetary pressures caused by rising Medicaid costs and legislature refusal to raise revenues) will likely lessen the abilities of workers to obtain new postsecondary credentials in response to changing demands for skill.
- Private collective bargaining has been disappearing with no alternative voice mechanisms taking its place to encourage high-performance workplace practices.
- Federal minimum wage levels and restrictions on overtime hours are not being updated, leading to greater variation across states and localities as well as overall lower wages and employment.
- Alternative staffing arrangements such as online work and independent contracting are growing quite modestly as informal work and fissuring of workplaces become more important—potentially increasing workplace inequality and diminishing benefit coverage and legal protections for workers.
- Female (and often male) employees have limited access to family-friendly policies at work, such as paid leave, childcare, and flexible scheduling that might raise female labor-force activity.
- Low and declining labor-force activity among African Americans and disadvantaged youth reflects many ongoing factors, including education and achievement gaps, little access to early employment and training, and the negative effects of incarceration and opioid dependency.

The authors also point to policies, within the broad set described earlier, that could help translate the forces at play into improved employment outcomes for U.S. workers in the coming years. These include

- workforce development policies that enable workers to better adapt to workplace automation (perhaps including lifelong learning accounts, subsidized on-the-job training, and robust workforce services);
- more financial support for public higher education at the state and federal levels;
- updated federal wage and hour laws;
- stronger federal protections for collective bargaining or alternative mechanisms of worker voice, as well as rewards and technical assistance for employers creating high-road jobs and high-performance workplaces;

- portable benefits and expanded protections for workers in alternative staffing, informal, and fissured work situations;
- family-friendly workplaces and payroll tax-supported programs that cost-effectively provide paid family leave, subsidize childcare, and encourage flexible scheduling; and
- better employment and training options for disadvantaged youth and adults, along with efforts to reduce negative effects of criminal records and opioid dependency.

In addition, we note a major recommendation that implicitly underlies this volume. Policy must support a comprehensive ability to monitor and analyze labor-market developments via gold standard official statistics, administrative data, and program evaluations. Such support includes adequate funding of statistical agencies, expanded safe access to administrative data, and sponsorship of policy experiments and evaluations. Regardless of how conditions and policies evolve, our ability to monitor key trends and evaluate policy experiments will greatly affect whether we can generate effective labor-market policies and desired outcomes for U.S. workers. For the best chance of success, decisions should be based on solid evidence, at many levels of aggregation, to inform policymakers, program administrators, workers, and employers, and allow further research into causes and consequences.

We hope that as this volume sheds light on critical labor-market forces now affecting the lives of many millions of Americans (especially among non-college-educated workers whose fortunes have badly lagged in recent years), it will stimulate discussion, careful analysis, and policy actions to address the challenges in store for us all during the twenty-first century.

REFERENCES

Abowd, John, and Francis Kramarz. 1999. "The Analysis of Labor Markets Using Matched Employer-Employee Data." In *The Handbook of Labor Economics*, vol. 3C, edited by Orley Ashenfelter and David Card. Amsterdam: North Holland.

Abraham, Katharine G., and Susan N. Houseman. 2019. "Making Ends Meet: The Role of Informal Work in Supplementing Americans' Income." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 110–31. DOI: 10.7758/RSF.2019.5.5.06.

Abraham, Katharine G., and Melissa Kearney. 2018. "Explaining the Decline in the U.S. Employment-to-Population Ratio: A Review of the Evidence." *NBER* working paper no. 24333. Cambridge, Mass.: National Bureau of Economic Research.

Acemoglu, Daron, and Pascual Restrepo. 2018. "AI, Automation and Work." *NBER* working paper no. 24196. Cambridge, Mass.: National Bureau of Economic Research.

Andersson, Fredrik, Harry J. Holzer, and Julia Lane. 2011. *Where Are All the Good Jobs Going?* New York: Russell Sage Foundation.

Austin, Benjamin, Edward Glaeser, and Lawrence Summers. 2018. "Saving the Heartland: Place-Based Policies in 21st Century America." Policy Brief. Washington, D.C.: Brookings Institution.

Autor, David. 2014a. "Polanyi's Paradox and the Shape of Employment Growth." *NBER* working paper no. 20485. Cambridge, Mass.: National Bureau of Economic Research.

———. 2014b. "Skills, Education and the Rise of Earnings Inequality Among the 99 Percent." *Science* 344(6186): 843–51.

———. 2015. "Why Are There Still So Many Jobs?" *Journal of Economic Perspectives* 29(3): 3–30.

———. 2018. "Is Automation Labor-Displacing? Productivity, Employment and Labor's Share." Policy Brief. Washington, D.C.: Brookings Institution.

Autor, David, David Dorn, Lawrence Katz, Christina Patterson, and John Van Reenen. 2017. "The Fall of the Labor Share and the Rise of Superstar Firms." *NBER* working paper no. 23396. Cambridge, Mass.: National Bureau of Economic Research.

Autor, David, and Mark Duggan. 2006. "The Growth of the Social Security Disability Rolls: A Fiscal Crisis Unfolding." *NBER* working paper no. 12436. Cambridge, Mass.: National Bureau of Economic Research.

Autor, David, and Lawrence F. Katz. 1999. "Changes in the Wage Structure and Earnings Inequality." In *The Handbook of Labor Economics*, vol. 3A, edited by Orley Ashenfelter and David Card. Amsterdam: North Holland.

Autor, David, Lawrence F. Katz, and Melissa Kearney. 2008. "Trends in US Wage Inequality: Revising

the Revisionists." *Review of Economics and Statistics* 90(2): 300–323.

Autor, David, Frank Levy, and Richard Murnane. 2002. "Upstairs, Downstairs: Computers and Skills on Two Floors of a Large Bank." *Industrial and Labor Relations Review* 55(3): 432–47.

Autor, David, and Melanie Wasserman. 2013. *Wayward Sons: The Emerging Gender Gap in Labor Markets and Education*. Washington, D.C.: The Third Way.

Baily, Martin, and Nicholas Montalbano. 2016. "Why Is US Productivity Growth So Slow? Possible Explanations and Policy Responses." Policy Brief. Washington, D.C.: Brookings Institution.

Beaudry, Paul, David Green, and Benjamin Sand. 2013. "The Great Reversal in the Demand for Skills and Cognitive Tasks." *NBER* working paper no. 18901. Cambridge, Mass.: National Bureau of Economic Research.

Bernstein, Jared. 2018. "The Importance of Strong Labor Demand." Hamilton Project. Washington, D.C.: Brookings Institution.

Black, Sandra, Diane Whitmore Schanzenbach, and Audrey Breitwieser. 2017. "The Recent Decline in Women's Labor Force Participation." Hamilton Project. Washington, D.C.: Brookings Institution.

Blanchard, Olivier, and Lawrence F. Katz. 1992. "Regional Evolutions." *Brookings Papers on Economic Activity* 1992, no. 1. Washington, D.C.: Brookings Institution.

Blasi, Joseph, Richard Freeman, and Douglas Kruse. 2014. *The Citizen's Share*. New Haven, Conn.: Yale University Press.

Borjas, George J., and Richard B. Freeman. 2019. "From Immigrants to Robots: The Changing Locus of Substitutes for Workers." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 22–42. DOI: 10.7758/RSF.2019.5.5.02.

Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner. 2019. "Public Universities: The Supply Side of Building a Skilled Workforce." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 43–66. DOI: 10.7758/RSF.2019.5.5.03.

Bound, John, and Harry J. Holzer. 2000. "Demand Shifts, Population Adjustments and Labor Market Outcomes in the 1980s."' *Journal of Labor Economics* 18(1): 20–54.

Brown, Charles C., and Daniel S. Hamermesh. 2019. "Wages and Hours Laws: What Do We Know? What Can Be Done?" *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 68–87. DOI: 10.7758/RSF.2019.5.5.04.

Burtless, Gary, and Sveta Milusheva. 2013. "Effects of Employer-Sponsored Health Insurance Costs on Social Security Taxable Wages." *Social Security Bulletin* 73(1): 83–108.

Card, David, and Jonathan Dinardo. 2006. "The Impact of Technological Change on Low-Wage Labor Markets: A Review." In *Working and Poor: How Economic and Policy Changes Are Affecting Low-Wage Workers*, edited by Rebecca Blank, Sheldon Danzinger, and Robert F. Schoeni. New York: Russell Sage Foundation.

Davis, Steven, and Till von Wachter. 2011. "Recessions and the Costs of Job Loss." *Brookings Papers on Economic Activity 2011*, no. 2. Washington, D.C.: Brookings Institution. Accessed July 1, 2019. https://www.brookings.edu/bpea-articles/recessions-and-the-costs-of-job-loss/.

Doar, Robert, Harry J. Holzer, and Brent Orrell. 2017. *Getting Men Back to Work: Solutions from the Left and Right*. Washington, D.C.: American Enterprise Institute.

Doran, Elizabeth L., Ann P. Bartel, and Jane Waldfogel. 2019. "Gender in the Labor Market: The Role of Equal Opportunity and Family-Friendly Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 168–97. DOI: 10.7758/RSF.2019.5.5.09.

Farber, Henry. 2017. "Employment, Hours, and Earnings Consequences of Job Loss: U.S. Evidence from the Displaced Workers Survey." *Journal of Labor Economics* 35(S1): S235–S272.

Fortin, Nicole, Thomas Lemieux, and Neil Lloyd. 2018. "Labor Market Institutions and the Distribution of Wages: The Role of Spillover Effects." Working Paper. Vancouver: University of British Columbia.

Freeman, Richard. 2007. "Is a Great Labor Shortage Coming? Replacement Demand in the Global Economy." In *Reshaping the American Workforce in a Changing Economy,* edited by Harry J. Holzer and Demetra Smith Nightingale*.* Washington, D.C.: Urban Institute Press.

Freeman, Richard, Joni Hersch, and Lawrence Mishel, eds. 2004. *Emerging Labor Market Institutions for the 21st Century*. Chicago: University of Chicago Press.

Frey, William. 2015. *Diversity Explosion*. Washington, D.C.: Brookings Institution.

Goldin, Claudia, and Lawrence F. Katz. 2008. *The*

Race Between Education and Technology. Cambridge, Mass.: Harvard University Press.

Gould, Elise. 2019. "Decades of Rising Inequality in the U.S." Testimony before U.S. House of Representatives, Ways and Means Committee. March 27. Economic Policy Institute. Accessed July 1, 2019. https://www.epi.org/publication/decades-of-rising-economic-inequality-in-the-u-s-testimony-before-the-u-s-house-of-representatives-ways-and-means-committee.

Groshen, Erica L., Susan Helper, John Paul MacDuffie, and Charles Carson. 2018. *Preparing U.S. Workers and Employers for an Autonomous Vehicle Future*. Washington, D.C.: Securing America's Future Energy.

Harris, Seth, and Alan Krueger. 2015. "A Proposal for Modernizing Labor Laws for the 21st Century: The 'Independent Worker.'" *Hamilton Project* discussion paper no. 2015-10. Washington, D.C.: Brookings Institution.

Holzer, Harry J. 2015. "Job Market Polarization and Worker Skills: A Tale of Two Middles." Policy Brief. Washington, D.C.: Brookings Institution.

———. 2017. "Will Robots Make Job Training (and Workers) Obsolete? Workforce Development in an Automating Labor Market." Policy Brief. Washington, D.C.: Brookings Institution.

Holzer, Harry J., and Marek Hlavac. 2014. "A Very Uneven Road: U.S. Labor Markets in the Past 30 Years." In *Diversity and Disparities*, edited by John Logan. New York: Russell Sage Foundation.

Holzer, Harry J., Steven Raphael, and Michael A. Stoll. 2006. "Perceived Criminality, Criminal Background Checks, and the Racial Hiring Practices of Employers." *Journal of Law and Economics* 49(2): 451–80.

Judy, Richard, and Carol D'Amico. 1997. *Workforce 2020: Work and Workers in the 21st Century*. Indianapolis, Ind.: Hudson Institute.

Katz, Lawrence F., and Alan B. Krueger. 2016. "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015." *NBER* working paper no. 22667. Cambridge, Mass.: National Bureau of Economic Research.

———. 2019. "Understanding Trends in Alternative Work Arrangements in the United States." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 132–46. DOI: 10.7758/RSF.2019.5.5.07.

Katz, Lawrence F., Ai-jen Poo, and Elaine Waxman. 2018. "Imagining a Future of Work That Fosters Mobility for All." Washington, D.C.: U.S. Partnership on Mobility from Poverty.

Kelley, Maryellen, and Susan Helper. 1999. "Firm Size and Capabilities, Regional Agglomeration, and the Adoption of New Technology." *Economics of Innovation and New Technology* 8(1–2): 79–103. Accessed July 1, 2019. https://pdfs.semanticscholar.org/3d40/ebf41076da32747f48d4fbbcd078ffc04b60.pdf.

Kochan, Thomas A., and William T. Kimball. 2019. "Unions, Worker Voice, and Management Practices: Implications for a High-Productivity, High-Wage Economy." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 88–108. DOI: 10.7758/RSF.2019.5.5.05.

Krueger, Alan. 2017. "Where Have All the Workers Gone?" *Brookings Papers on Economic Activity* 2017, no. 1. Washington, D.C.: Brookings Institution.

Kugler, Adriana. 2015. "Strengthening Reemployment in the Unemployment Insurance System." *Hamilton Project* discussion paper no. 2015-02. Washington, D.C.: Brookings Institution.

Levy, Frank. 2018. "Computers and Populism: Artificial Intelligence, Jobs and Politics." *Oxford Review of Economic Policy* 34(3): 393–417.

Levy, Frank, and Richard Murnane. 2013. *Dancing with Robots*: Washington, D.C.: The Third Way.

Liebman, Jeffrey. 2015. "Understanding the Increase in Disability Insurance Benefit Receipt in the United States." *Journal of Economic Perspectives* 29(2): 123–50.

Loprest, Pamela, Shayne Spaulding, and Demetra Smith Nightingale. 2019. "Disconnected Young Adults: Increasing Engagement and Opportunity." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 221–43. DOI: 10.7758/RSF.2019.5.5.11.

Mandel, Michael. 2017. *How Ecommerce Reduces Inequality and Creates Jobs*. Washington D.C.: Progressive Policy Institute.

Neal, Derek. 2008. "Black-White Labor Market Inequality in the United States." In *The New Palgrave Dictionary of Economics,* edited by Steven Durlauf and Lawrence Blume. New York: Stockton Press.

Nedelkoska, Ljubica, and Glenda Quintini. 2018. "Automation, Skills Use and Training." *OECD Social, Employment and Migration* working paper no. 202. Paris: Organization for Economic Cooperation and Development.

Organization for Economic Cooperation and Development (OECD). 2011. *An Overview of Growing Income Inequalities in OECD Countries: Main Findings*. Paris: Organizationn for Economic Cooperation and Development.

Osterman, Paul. 2017. "In Search of the High Road: Meaning and Evidence." *Industrial and Labor Relations Review* 71(1): 1–32.

Pierce, Brooks. 2001. "Compensation Inequality." *Quarterly Journal of Economics* 116(4): 1493–525.

Rodgers, William M., III. 2019. "Race in the Labor Market: The Role of Equal Employment Opportunity and Other Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 198–220. DOI: 10.7758/RSF.2019.5.5.10.

Schmitt, John, Heidi Shierholz, and Lawrence Mishel. 2013. *Don't Blame the Robots: Assessing the Job Polarization Explanation of Growing Wage Inequality*. Washington, D.C.: Economic Policy Institute.

Shambaugh, Jay, Audrey Breitwieser, and Patrick Liu. 2018. "The State of Competition and Dynamism: Facts about Concentration, Startups and Related Policies." Hamilton Project. Washington, D.C.: Brookings Institution.

Shambaugh, Jay, Ryan Nunn, Patrick Liu, and Greg Nantz. 2017. "13 Facts About Wage Growth." Hamilton Project. Washington, D.C.: Brookings Institution.

Shimada, Haruo, and John Paul MacDuffie. 1998. "Industrial Relations and 'Humanware': Japanese Investments in Automobile Manufacturing in the United States." In *The Japanese Enterprise*, edited by Schon Beechler. London: Routledge.

Stansbury, Anna, and Lawrence Summers. 2017. "Productivity and Pay: Is the Link Broken?" *NBER* working paper no. 24165. Cambridge, Mass.: National Bureau of Economic Research.

Ton, Zeynep. 2014. *The Good Jobs Strategy*. Cambridge, Mass.: MIT Press.

U.S. Bureau of Labor Statistics (BLS). 2018. "Contingent and Alternative Work Arrangements." Economic News Release, June 7. Washington: U.S. Department of Labor. Accessed July 1, 2019. https://www.bls.gov/news.release/conemp.nr0.htm.

U.S. Census Bureau. 1979–2016. *Current Population Survey*. Washington: Government Printing Office.

———. 2012. "Census Bureau Releases Estimates of Undercount and Overcount in the 2010 Census." Press Release, May 22. Washington: U.S. Department of Commerce. Accessed July 1, 2019. https://www.census.gov/newsroom/releases/archives/2010_census/cb12-95.html.

Van Horn, Carl, Tammy Edwards, and Todd Greene, eds. 2015. *Transforming the Workforce Development System for the 21st Century.* Kalamazoo, Mich.: W.E. Upjohn Institute for Employment Research.

Weil, David. 2014. *The Fissured Workplace*. Cambridge, Mass.: Harvard University Press.

———. 2019. "Understanding the Present and Future of Work in the Fissured Workplace Context." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 147–65. DOI: 10.7758/RSF.2019.5.5.08.

West, Darrell. 2018. *The Future of Work: Robots, AI, and Automation*. Washington, D.C.: Brookings Institution.

PART I

Trends in Labor Demand and Supply

From Immigrants to Robots: The Changing Locus of Substitutes for Workers

GEORGE J. BORJAS AND RICHARD B. FREEMAN

Using numbers of industrial robots shipped to primarily manufacturing industries as a supply shock to an industry labor market, we estimate that an additional robot reduces employment by roughly two to three workers overall and by three to four workers when robots are likely to be good substitutes for humans. The supply shock also reduces wages. The estimates far exceed those of an additional immigrant on employment and wages. While growth of robots in the 2000s was too modest to be a major determinant of wages and employment, the estimated effects suggest that continued exponential growth of industrial robots could disrupt job markets in the foreseeable future and thus merit attention from analysts and policymakers concerned about the economic well-being of workers.

Keywords: robots, robotics, automation, immigration, labor market, employment, wages, manufacturing

Every week, the media reports on new developments in robotics or artificial intelligence (AI) that expand the ability of robots or computers to perform work traditionally done by humans. Diverse organizations ranging from academic think tanks to business consultants to national and international agencies have estimated the number of workers whose jobs are potentially at risk from advances in digitalization and robotization.[1] Although the estimated numbers vary by occupation, forecast period, and methodology, the headline message is clear: "Robots

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1. In January 2018, Erin Winick (2018) reviewed more than a dozen projections of the impact of technology on employment, nearly all which focused on occupations as the unit of study.

are coming and they are going to massively transform the world of work."

Reacting to the headlines, researchers who look for clues to the future in past and recent labor statistics dismiss the forecasts of a job cataclysm as media hype rather than as plausible scenarios of the future (Mishel and Bivens 2017). Some note that all past automation scares failed to materialize. Historically, new technologies have invariably obsolesced some jobs but have also opened the door for new jobs, usually at higher pay and under better conditions. The occupational structure has shifted toward more skilled work, from farm laborers to factory workers to white-collar jobs in offices. Why should the most recent robotics technology differ drastically from past technological shocks?

Others note that the modest growth of productivity, the high level of employment to population, and the low unemployment rate after the recovery from the Great Recession are the opposite of what one would expect if technology were upending the world of work. To paraphrase Robert Solow's (1987) observation about computers everywhere but in the productivity statistics, today we see robots taking jobs from humans in the media but not in real world labor markets. Reports that "the robots are coming" are not, however, about today's labor market but about whether robotics technology has the *potential* to shake the world of work in the foreseeable future.

Our analysis addresses this question by examining whether the past two decades of exponential growth in the number of robots has left enough of a footprint on labor outcomes to support the concerns behind the media headlines or has had such a small impact as to validate the views of skeptical analysts. We treat the rapid deployment of robots in U.S. industries at the turn of the twenty-first century as a supply shock to the U.S. labor market and compare its effects on employment and wages to the effects of a more widely studied supply shock that also generates social concern—the entry of millions of immigrants over the same period.

Specifically, we combined data on the number of industrial robots shipped to each industry in the United States and other countries compiled by the International Federation of Robotics (IFR), with data on the number of immigrant workers by industry and state, and on employment and earnings of all workers, from the American Community Survey (ACS). Since 1993, the IFR has collected data on the shipments of industrial robots from the firms that produced those robots. The data are reported at the level of the industry that purchased the robots. We use the ACS to calculate the analogous influx of immigrants into those industries by state. Our analysis of employment and earnings outcomes rests on 19.5 million observations of individual workers between 2004 and 2016 for which the IFR reports sufficiently detailed industry figures to allow for a cross industry-time series analysis.

Because a firm's decision to purchase robots and an immigrant's decision of where to locate are likely to be influenced by labor-market conditions, we face a potential simultaneity bias in using ordinary least squares (OLS) to estimate the impact of robots or immigrants on employment and wages. On the company side, a higher wage should increase the firm's incentive to invest in robots, imparting an upward bias in OLS estimates of the effect of the demand shock. To address this problem, we instrument U.S. purchases of robots using the number of robots shipped in the same industry and year in Japan and Germany in the IFR data. Ideally, this isolates the part of the growth of robots due to exogenous technological change that affects all countries similarly.

Immigrant choice of location and sector will also depend on labor-market conditions. We deal with the endogeneity of immigrant choice of working in a particular state and industry by using the 1970 distribution of immigrants from different sending countries by area and industry to create an instrument for current flows—a period sufficiently far from the 1990s and 2000s to provide a reasonably valid exogenous instrument.

We present three findings:

1. The influx of industrial robots into an industry over time is associated with a substantial fall in employment and earnings that is concentrated on less-educated workers and on those in oc-

cupations that experts view as automatable.

2. The entry of an additional robot reduces employment and wages by more than the entry of an additional immigrant, suggesting that one industrial robot is comparable to two to three human workers and upward of three to four in particular groups.

3. Although the number of robots per worker is too modest to be a major determinant of wages and employment patterns in the period covered by our study, our estimates suggest that continued exponential growth of robots could disrupt job markets in the next decade or so and thus merits monitoring and analysis by labor analysts.

Our empirical analysis has several weaknesses. Our measure of robotics technology is limited to *industrial robots* reported by the IFR, which follows the International Organization for Standardization (ISO) definition of robots, to be described shortly. The vast majority of industrial robots are found in manufacturing. We do not have data on other machines in manufacturing or elsewhere that may substitute for workers in the same way as robots but fall outside the ISO industrial robot classification, nor of service robots nor of software that can substitute for human workers in office or other digital settings. This biases our results toward finding robot effects on blue-collar workers but not on white-collar or service-sector workers.

In addition, the IFR data on the robot supply shock relates to units shipped to industries nationally and thus lacks geographic detail on the deployment of robots. This leads us to give each state an estimated number of robots proportionate to the state's share of employment—creating measurement error in the robot variable in cross-state calculations. To the extent that the measurement error is random, this will bias our estimated coefficients on the impact of robots on labor-market outcomes toward zero. If firms in states with high or more rapidly rising wages or expansion of employment were induced by those conditions to invest more in robots than firms in other states, this would likely produce a positive correlation between robots and wages and employment, biasing our estimates of the impact on robots in a positive direction. We use an instrumental variables analysis to address these statistical problems.

Finally, the IFR data also do not record the particular types of robots that different industries purchase nor the price of those robots. Lack of this information is also likely to bias downward our estimated coefficients of the impact of robots on wages and employment.

MODELING ROBOT AND IMMIGRANT SUPPLY SHOCKS

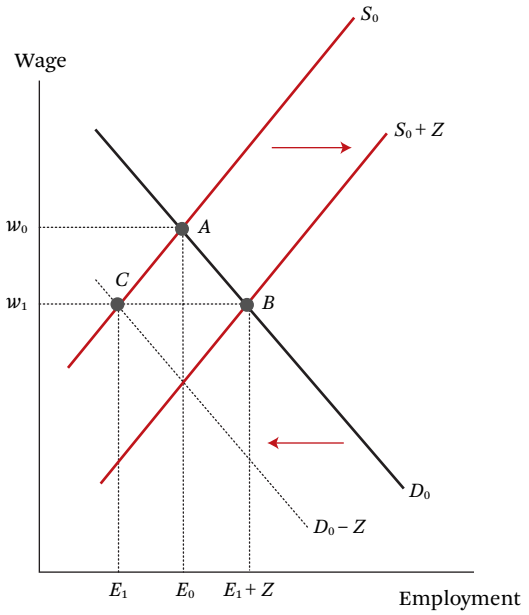
Changes in the number of robots or immigrants that substitute for workers can be analyzed as a supply shock that shifts the labor supply curve by the productivity equivalence between the robots or immigrants and the workers in the affected labor market. Figure 1 displays this point in a simple supply-demand framework in which a supply shock adds Z efficiency units to the workforce without affecting the demand for labor.

If immigrants M have the productivity of θ existing workers, an increase in the number of immigrants by ΔM shifts the supply curve to the right by $\theta\ \Delta M$ efficiency units so that $Z = \theta\ \Delta M$. This lowers the wage in the market and increases overall employment while reducing the number of workers exclusive of the new immigrants below the pre-shock employment level.

Similarly, if a single robot R has the productivity of γ workers, the supply shock due to a ΔR change in robots would change the number of efficiency units in the labor market by $\gamma\ \Delta R$, so that $Z = \gamma\ \Delta R$. The increased "employment" of efficiency units forces wages to fall to clear the market and reduces the employment of workers below its pre-shock level.[2] If $\gamma > \theta$, the increase of one robot has a larger impact on wages and employment of pre-shock workers than the increase of one immigrant.

2. We can also use the supply-demand framework in figure 1 to model the influx of robots or immigrants as an inward shift in the demand for existing workers by Z efficiency units, with equivalent impacts on wages and employment.

Figure 1. Impact of a Robot or Immigration Supply Shock that Adds *Z* Efficiency Units to the Workforce



Source: Authors' graph.

Given that immigrants in a job market are likely to resemble existing workers in terms of their work skills reflected by education, age, or occupation, the equivalence parameter θ between new immigrants and existing workers is likely to be close to 1 (or modestly lower than 1 if the negative estimated coefficient on an immigrant dummy variable in a log earnings equation reflects productivity differences between immigrants and natives rather than discrimination against immigrants). By contrast, the equivalence parameter γ between robots and existing workers could differ greatly from 1 because technological change improves robot efficiency more than it does human efficiency. Implicit in the diverse forecasts of AI robots' greatly displacing human workers is an assumption that γ is substantially greater than one, because a robot can do far more work than a human if only because it can operate twenty-four hours a day.

The impact of the two shocks on the employment and earnings of existing workers in figure 1—in which the numbers of robots and immigrants are measured in efficiency units—has a simple algebraic structure that guides our analysis. Measured as a vertical shift in the supply curve, the robot shock increases the "labor" supply as a percentage relative to the initial stock of workers L by $\gamma\,(\Delta R)/L$, while the immigrant shock increases labor supply relative to L by $\theta\,(\Delta M)/L$. Let w be the wage of workers, σ be the elasticity of supply, and δ be the absolute value of the elasticity of demand. Then the impact of the two supply shocks on the total percent change in wages will be

$$\frac{\Delta w}{w} = -\frac{1}{(\delta+\sigma)}\left[\frac{\theta\Delta M}{L} + \frac{\gamma\Delta R}{L}\right]. \qquad (1)$$

Equation (1) shows that the impact of the two shocks is proportionate to their equivalent increase in the number of efficiency units relative to the size of the initial workforce. A regression of the change in wages on the change in the number of immigrants relative to base employment and on the change in the number of robots relative to base employment will yield a larger coefficient on robots than on immigrants if $\gamma > \theta$ and, conversely, if $\theta > \gamma$. The contribution of the two shocks to the change in wages will also depend on the magnitude of the shocks. If, as turns out to be the case, the change in the number of immigrants exceeds the change in the number of robots in a particular period, θ ΔM could make a greater contribution to the change in the wage than γ ΔR even if $\gamma > \theta$.

The effect on the size of the initial workforce is given by

$$\frac{\Delta L}{L} = -\frac{\sigma}{(\delta+\sigma)}\left[\frac{\theta\Delta M}{L} + \frac{\gamma\Delta R}{L}\right]. \qquad (2)$$

Both supply shocks reduce the number of current workers employed while increasing the total number of efficiency units and output in the industry. As with the wage impact, the difference between the two coefficients in equation (2) reflects the difference in the equivalence value of robots and immigrants with the existing workforce.

Our empirical analysis measures what happens to *total* employment (including immigrants) as a result of the robot and immigration supply shocks. The equation relating the

change in the total number of workers to the supply shocks is

$$\frac{\Delta L+\Delta M}{L}=\left(1-\frac{\sigma\theta}{(\delta+\sigma)}\right)\left[\frac{\Delta M}{L}\right]-\frac{\sigma\gamma}{(\delta+\sigma)}\left[\frac{\Delta R}{L}\right]. \quad (3)$$

The impact of immigration on total employment will have a coefficient equal to one if the labor supply curve is inelastic ($\sigma = 0$), and will have a coefficient less than one if some of the initial workers (typically called natives) are displaced from their jobs.

This simple model provides the analytical framework for our empirical work. It is a schematic model that uses the equivalence framework to provide a clear interpretation of the calculations in terms of supply shocks, leaving aside factors that may further differentiate robot effects from immigrant effects (that is, different elasticities of substitution with existing workers across tasks, different complementarities with physical capital or R&D that also enter the production function, and constraints imposed by labor relations practices). The virtue of the supply shock framework is that it offers a way to examine the potential of robotic technologies to affect work relative to the benchmark of a shift in supply of workers captured by immigrants.

Measuring the Robot Shock

The key variable in our analysis of the labor-market impact of the robot shock uses data compiled by the IFR on the *number* of industrial robots shipped to firms by the producers of robots in a given year. About 90 percent of the machines in 2016 were purchased by manufacturing firms, the automobile sector being the lead industry and accounting for about half of the shipments.[3]

The IFR uses the International Standard Organization (ISO) definition of a robot (code 8373:2012) in its request for information from manufacturers. ISO defines an industrial robot as an automatically controlled, reprogrammable, multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications.[4] The IFR reports shipments of robots for enough U.S. industries from 2004 to 2016 to allow us to estimate the impact of changes on employment and earnings using a time-series–cross-section design that exploits the variation in robot supply over time and across industries.

To get a sense of the types of machines included in the industrial robot category, the annual report of the IFR lists categories of applications that the robots perform.[5] These include handling operations, machine-tending assistant processes for the primary operation, welding and soldering, dispensing, processing (where the robot leads the workplace or the tool in material removal), and assembling and disassembling.

These applications make it clear that industrial robots are likely to be direct substitutes for manual workers in factories—both skilled workers, such as welders, and less-skilled workers along an assembly line. They should have little direct impact on office workers or professionals, though impacts may spill over: a machine that reduces factory employment could, for example, shift white-collar employment from human resources to engineering.

The IFR survey collects data on the number of units shipped with no information on the price of robots or the value of shipments that

3. The IFR also has a separate data set on the number of service-sector robots (World Robotics Service Robots) which shows that number to be growing rapidly (https://ifr.org/ifr-press-releases/news/why-service-robots-are-booming-worldwide, accessed June 27, 2019). But these data are limited over time and lack enough sectoral detail to be added to our current database.

4. Reprogrammable means a machine whose motions or functions can be changed without physical alteration. Multipurpose means a machine that can be applied to different applications. Physical alteration is alteration of the mechanical system as opposed to storage media, ROMs, and so on. Axis direction specifies the robot motion in a linear or rotary mode.

5. IFR 2017.

could be used to generate an average price. The survey also does not provide any information on the specific attributes of the shipped products over time. The absence of value and attributes data rules out using the IFR survey to develop a hedonic price index that would transform the number of shipped units into a measure of effective units of fixed quality. Assuming that technological change improves the quality of robots over time, a fixed-quality measure of the number of robots would presumably grow more rapidly than the number of units reported by the IFR. If, for example, technological change improved the quality of each robot unit by 10 percent per year, the fixed-quality measure would increase by 10 percent more per year than the number of units. The number of robots sold is thus almost certainly a downward biased estimate of the effective supply of labor embodied in the machine.

The industry coverage of the IFR data varies over time. In the early years of the survey, the IFR reported a large unspecified category in its industry classification. Beginning in 2004, it gathered shipments by detailed industries for the United States that shrank the unspecified category substantially. We deal with the missing data problem by allocating the unspecified shipments in earlier years according to the 2004 industry share.

Because robots are a form of capital stock comparable to the capital stock of plant and equipment that enter standard production functions, the annual shipments have to be cumulated into a stock to measure their impact on output, wages, and employment.[6] The IFR also produces an estimated "operational stock" of robots in a given year by summing shipments over the preceding twelve years with a depreciation assumption that "the average service life is 12 years and that there is an immediate withdrawal of the robots after 12 years."[7] Under this assumption, twelve years of shipments data are needed to obtain an estimate of the stock of robots in a given industry, which implies that a larger proportion of the estimated stock fits into the nonspecified category than of the estimated shipments, which substantially reduces the time series for analysis.

We deal with this problem by calculating our own estimates of the stock S of robots in an industry from the shipments data, applying the standard capital stock accumulation formula to the annual shipments. In particular, we write the stock of operating robots in year t, $S(t)$, in terms of the depreciated pre-existing stock and the volume of new shipments, $R(t)$, as

$$S(t) = (1 - \delta)\, S(t - 1) + R(t), \tag{4}$$

where δ is the depreciation rate, which could perhaps be on the order of 10 to 15 percent.

Equation (4), however, has a major problem. It ignores the likely improvement in the quality of robots over time. If robot manufacturers improve their product regularly, say by ψ percent per year, the number of quality-adjusted robots shipped in year t would be larger than the number shipped in year 0 even if the reported number of robot shipments were the same. Let $R^*(t)$ be the "effective" number of robots shipped in year t. The effective number of robots shipped in year t, relative to the number of robots shipped in year 0, would then be $R^*(t) = (1 + \psi)^t R(t)$.

Taking account of both the depreciation of robot capital over time and its appreciation due to technological change yields the following equation defining the robot stock at time t:

$$S^*(t) = (1 - \delta)\, S^*(t - 1) + (1 + \psi)\mathrm{t}\, R(t). \tag{5}$$

If depreciation were due solely to obsolescence, δ would be a function of ψ and the stock would depreciate or appreciate depending on the difference between the two values and the rate of investment in robots relative to the stock. Absent information on the rate of depreciation of robots and on the rate of appreciation of robot efficacy over time, we calculated the

6. Indeed, expenditures on robots are included in surveys that ask for spending on plant and equipment as part of equipment. What differentiates robots from other plant and equipment is that robots are assumed to be more substitutable for human labor than other forms of capital. This assumption is the starting point for analyzing their impact on employment and wages separately from other inanimate factors of production.

7. IFR 2017, 28.

effects of robots under the simplifying neutrality assumption that the rate of depreciation and rate of appreciation roughly balance each other out.[8] This makes our stock measure equal to the simple sum of the shipments to industries over time. We replicated our empirical analysis using alternative measures of a net depreciation rate (such as 10 percent) and obtained results that are similar to those reported below. The trend in the adjusted measures of the stock, regardless of the depreciation-appreciation rate assumed, is mainly driven by the rapid increase in the number of robots deployed by firms in the period studied.

Finally, the IFR data has no regional breakdown of shipments of robots within the United States. The lack of regional information is an important difference between our measures of the robot supply shock and the immigrant supply shock. Our econometric specification assumes that robots are distributed across areas within an industry proportional to employment in that industry.[9] Without access to detailed data on the geographic distribution of robots, it is difficult to ascertain the potential biases introduced by this assumption.

Measuring the Immigrant Shock

Our data on the number of immigrants and on the employment and earnings of workers are drawn from the 2004–2016 American Community Surveys. We restrict our analysis to the sample of persons who worked at some point during the calendar year of each survey. We use the sampling weights reported in the ACS throughout the analysis, so that the weighted number of observations in our ACS sample estimates the size of the workforce.

Analyzing the link between the IFR's reported number of robots in an industry and the ACS's information on an industry's employment and earnings requires a crosswalk between the industry classifications in the two data sources.[10] Comparing the classifications, we developed a crosswalk that matches twenty-six industries, encompassing the entire workforce. Table 1 lists the industries and reports the total employment in each in the latest (2016) ACS cross-section. Because industrial robots are used primarily in manufacturing, the IFR distinguishes manufacturing industries in some detail and places most other workers in a residual category labeled as "all other non-manufacturing branches." This residual category made up almost 68.4 percent of the workforce in 2016. Given this uneven distribution of workers across industries, we performed a regression analysis that excluded the residual category from our calculations. Despite its size, the exclusion of this industry from the analysis does not change the key results, primarily because this industry has effectively no data on robots and thus adds little information about how robots impact labor-market outcomes.

We define our measure of robot intensity in an industry-year cell as the ratio of the stock of robots to the number of workers in the industry. In particular, let $S_i(t)$ be the stock of robots in industry i in year t; and $L_i(t)$ be the number of workers in that industry. We define the robot intensity index as

$$r_i(t) = \frac{S_i(t)}{L_i(t)}. \tag{6}$$

Table 1 shows that robot intensity varied substantially among industries in 2016. The industries with the highest intensity are computers and peripheral equipment, which has a robot intensity index of 15.9 percent, and auto-

8. Ilaski Barañano and Diego Romero-Ávila (2015) provide some macroeconomic evidence of a positive relation between growth and depreciation. John Fisher and Robert Pry (1971) developed a model in which technological change obsolesces older capital.

9. The U.S. Census Bureau (2017) developed a set of experimental questions on robots in its 2017 Census of Manufacturing that could be used to apportion robots within an industry by geographic location but the results are not yet publicly available.

10. The matching uses the industry variable in the Integrated Public Use Microdata Series (IPUMS) version of the ACS, *IND1990*, which reports a worker's industry of employment based on the 1990 Census Bureau industrial classification scheme.

Table 1. Summary Statistics in 2016, by Industry (Ranked by Robot Intensity)

Industry	Total Employment (1,000s)	Robot Intensity (%)	Immigrant Intensity (%)	13+ Years of School (%)	Log Hourly Wage
Computers and peripheral equipment	163.6	15.9	25.9	84.1	3.536
Automotive	1536.9	12.3	11.3	55.1	3.018
Rubber and plastic products (non-auto)	668.2	3.2	14.7	47.9	2.924
Metal products (non-auto)	1,025.9	2.2	14.0	48.0	2.966
Electrical machinery n.e.c. (non-auto)	1,051.4	2.2	25.5	71.6	3.272
Basic metals	547	1.1	11.1	49.0	3.066
Pharmaceuticals, cosmetics	724.1	1.0	23.3	78.4	3.442
Food and beverages	1961	0.8	26.1	43.7	2.899
All other manufacturing branches	1,247.6	0.8	21.8	51.0	2.909
Household–domestic appliances	80.1	0.6	15.4	56.0	2.987
Info communication equipment	161.9	0.6	26.7	77.8	3.416
Industrial machinery	595.3	0.5	11.8	60.0	3.132
Medical, precision, optical instruments	935.3	0.2	20.9	73.3	3.324
Glass, ceramics, stone, mineral products (non-auto)	472.6	0.1	16.1	45.6	2.967
Other vehicles	1,116.2	0.1	14.1	70.8	3.372
Agriculture, forestry, fishing	3,822.5	0.0	30.2	38.1	2.683
Mining and quarrying	925.1	0.0	10.3	55.2	3.288
Textiles	530.9	0.0	34.9	42.7	2.827
Wood and furniture	1,033.2	0.0	15.7	37.3	2.780
Paper	1,504	0.0	13.0	61.9	3.035
Other chemical products	998.1	0.0	11.8	63.7	3.282
Metal, unspecified	1,206	0.0	15.4	56.0	3.063
Electricity, gas, water supply	1,989.2	0.0	10.8	60.7	3.265
Construction	10,550.8	0.0	24.0	40.4	3.016
Education, research, development	13,389.1	0.0	11.0	85.7	3.000
All other nonmanufacturing branches	104,145.2	0.0	16.7	66.9	2.974

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.

motive, with a robot intensity index of 12.3 percent. In contrast, the robot intensity measure in many other industries, ranging from agriculture, forestry, and fishing, to textiles to construction, is near zero.

We measure the immigrant supply shock by defining an immigrant as a person residing in the United States who is either a naturalized citizen or a noncitizen. The ACS also reports the immigrant's year of arrival in the United States, which allows us to define the number of immigrant workers who arrived in a particular year, an annual flow comparable to the IFR data on the annual shipments of robots. We define the number of *new* immigrants in the ACS survey in year t as the number of immigrant workers who reported they arrived in year t–1.[11] The *immigrant stock* is the total number of immigrants working in that year and reflects the most recent year's flow of immigrant workers

11. Because the annual file of the ACS is obtained from a series of monthly samples, the number of immigrants in survey year t who report arriving in that calendar year does not correctly estimate the total number of immigrants who arrived in that calendar year.

and any changes in the number who came earlier.

Our measure of the immigrant *shock* is the immigrant share of workers in a state-industry-year cell. In particular, let $Mis(t)$ be the number of immigrants in industry i, state s, and year t; and let $Lis(t)$ be the corresponding number of workers in that cell. The immigrant share is defined by

$$m_{is}(t) = \frac{M_{is}(t)}{L_{is}(t)}. \quad (7)$$

The third column of table 1 reports the immigrant share at the national level. It shows that the immigrant supply shock ranges from about 10 percent in mining and quarrying, basic metals, and automotive, to about 25 percent in construction, computers and peripheral equipment, and food and beverages and peaks at 30 percent in agriculture and nearly 35 percent in textiles.

We also use the ACS data to measure the number of workers and the earnings of workers in each industry-state-year cell. The employment measure is the total number of workers adjusted by hours of work.[12] The earnings measure is the ratio of a worker's wage and salary income to annual hours worked, which we refer to as hourly earnings. To better approximate changes in the price of skills, the earnings analysis is restricted to workers age twenty-five to fifty-nine who are not in school. Further, to avoid the contamination of hourly earnings trends by changes in sample composition between immigrant and native-born workers, the earnings analysis uses only the sample of native-born workers. Finally, because of potential measurement error, we excluded from the earnings analysis all workers who report hourly earnings in the bottom 1 or top 1 percentile of hourly earnings.[13]

ESTIMATING EFFECTS OF ROBOT AND IMMIGRATION SHOCKS

We used the merged IFR and ACS data on robots, immigration, employment, and wages to estimate the impact of the two supply shocks on labor-market outcomes. We begin with OLS estimates of the wage and employment equations and then turn to instrumental variable (IV) estimates that seek to identify the effect of robots and immigrants on wages and employment corrected for the simultaneous decision of firms to deploy robots and immigrants to supply labor to an area-industry. We exclude the (large) residual industry of all other nonmanufacturing branches defined by the IFR in the regressions as providing little insight into the effect of the industrial robots in the IFR data.[14] Throughout the analysis, we estimate the regression models for all workers, for workers divided into three education groups, and for men and women separately.

OLS Estimates

To estimate the impact of the two supply shocks on the hourly earnings of workers, we aggregated the individual-level data in the ACS to the level of an industry-state-year cell, and calculated the mean skill-adjusted log hourly earnings in each cell. We first estimated earnings regressions at the individual level on a vector of variables giving the worker's age, gender, and educational attainment. The residual from this regression gives the worker's skill-adjusted wage. The mean skill-adjusted wage in a state-industry-year cell is then given by the average residual among workers in that cell. The second-stage regression model is given by

12. In particular, a worker's sampling weight is multiplied by the fraction of the year that the person worked (defined as annual hours of work divided by two thousand). The ACS reports only the number of weeks worked for a small number of bracketed categories. Our calculation of the hourly earnings assigns a value of 7.4 to those who report working between one and thirteen weeks, 21.3 to those who report fourteen to twenty-six weeks, 33.1 to those who report working twenty-seven to thirty-nine weeks, 42.4 to those who report forty to forty-seven weeks, 48.2 to those who report forty-eight to forty-nine weeks, and 51.9 to those who report fifty-one to fifty-two weeks.

13. This removes persons with less than $2.60 and those with more than $154.70, in 2016 dollars.

14. We also estimated all regressions including the residual industry and the results were similar to those reported.

Table 2. OLS Estimates of the Impact of Robots and Immigration on Log Hourly Earnings, 2004–2016

	All Workers, by Years of Education					
	All Workers	Less Than Twelve Years of School	Twelve to Fifteen Years of School	Sixteen or More Years of School	Gender	
					Male	Female
Robots	−0.976	−1.586	−1.706	0.538	−1.268	−0.600
	(0.327)	(0.399)	(0.401)	(0.147)	(0.331)	(0.377)
Immigrants	−0.046	−0.263	−0.093	0.140	−0.081	0.100
	(0.043)	(0.062)	(0.048)	(0.053)	(0.048)	(0.045)
Number of observations	15,996	12,215	15,746	14,921	15,802	15,098
R^2	0.842	0.378	0.808	0.805	0.804	0.805

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The log earnings regressions are estimated at the grouped state-industry-year level. The dependent variable is the skill-adjusted mean log hourly wage in a state-industry-year cell, where the skill adjustment controls for individual differences in age, gender, and educational attainment. All regressions include vectors of fixed effects giving the worker's state of residence, industry of employment, and survey year. The number of cells varies between the groups due to the absence of workers with the specified characteristics in small cells. The regressions are weighted by the number of observations used to calculate the dependent variable.

$$\log w_{is}(t) = \alpha_0 r_i(t) + \alpha_1 m_{is}(t) + \theta_i + \theta_s + \theta_t + \text{other variables}, \quad (8)$$

where θ_i gives a vector of industry fixed effects, θ_s gives the vector of state fixed effects, and θ_t gives a vector of year fixed effects. The coefficients of the robot and immigrant intensity variable capture the impact of the supply shocks on the "average" worker after standardizing for socioeconomic characteristics. To avoid composition effects due to the changing immigrant population, the earnings regression uses only the sample of native workers. The standard errors in the regression are clustered at the state-industry level.[15]

Table 2 presents OLS regression estimates of the impact of robots and immigrants on log of hourly earnings. The first column's estimates for the full sample of workers shows a markedly larger and statistically more significant negative impact of robots per worker on earnings than of immigrants. This pattern replicates with differing magnitudes in all of our regressions with hourly earnings as the dependent variable. Interpreted as indicating the differing equivalence of robots and immigrants for existing workers in our model, the larger coefficient in the regressions on the number of robots than on the number of immigrants implies a larger equivalence parameter for robots, or $\gamma > \theta$.

The estimates in the next three columns present the coefficients and standard errors from regressions for workers in specified education groups. They also show a pattern that will replicate with differing magnitudes in en-

15. We also estimated regression models that include two-way interactions between industry and state, as well as between state and year. These models, however, tend to saturate the information in the data because we have no state variation in our measure of robot intensity and have much less time variation in the size of the immigrant supply shock in the post-2004 ACS data than in the immigration studies that use information spanning several decades beginning in 1960 and that thus compare periods of high immigration with periods of low immigration. Despite these data issues, the inclusion of two-way interactions leads to estimates for the robot effect that resemble those reported here.

suing calculations—a larger estimated impact of robots on the least educated group than on the more-educated groups and a negative estimated impact of immigrants on the wages of the least skilled workers with a positive impact on the most skilled. This pattern of coefficients likely reflects the extent of substitution and complementarity between the different skill groups of natives and the typical immigrant. The immigrant population in the past two decades has been disproportionately low skill, hence the reduction in the wage of the least skilled natives and the modest positive impact on the wage of the most skilled natives. The OLS results are broadly consistent with the modest negative effect of immigration on the average worker and larger negative effect on the least skilled found in many immigration studies (Blau and Mackie 2016).

The final two columns present the results for women and men separately. They show modest gender differences in the relation of robots to earnings and a larger impact of immigrants on female earnings than on male earnings—a pattern that does not replicate in other calculations.

To estimate the impact of robots and immigrants on employment, we again aggregate the individual ACS data to calculate the size of the workforce in an industry-state-year cell as described earlier. The analogous regression model is then given by

$$\log L_{is}(t) = \beta_0\, r_i(t) + \beta_1\, m_{is}(t) + \theta_i + \theta_s + \theta_t, \qquad (9)$$

where $L_{is}(t)$ gives the *total* number of workers (both natives and immigrants) employed in industry i, state s, at time t. We also conducted the aggregation separately for three education groups, and use these as alternative dependent variables. The regressions are weighted by the number of observations in the state-industry-year cell and the standard errors are again clustered at the state-industry level.[16]

Table 3 reports the estimated coefficients and standard errors for the robot and immigrant shock variables on employment. Because the dependent variable gives total employment in the industry-state-year cell, and includes immigrants, the baseline value of the coefficient of the immigrant supply shock is equal to *one*. Thus it is deviations from 1.0 in the estimated regression coefficient that tell us whether immigration led to a crowding out of the existing native workers.

The estimated regression coefficient in table 3 linking employment to robot intensity is negative, which in conjunction with the negative estimated coefficients of robots on wages in table 2 supports our schematic model that treats robots as shifting the supply curve of equivalent labor. Viewing the estimated coefficient on robots as estimates of the human worker equivalence of robots, the column 1 regression suggests that one robot does the work of about two workers. The estimates for the different education groups show a slightly larger negative effect of robots on less-educated than on more-educated workers, though the differences are not statistically significant. The estimates by gender show a larger impact on female workers than on male workers.

The estimated coefficient of the immigrant intensity variable on employment of all workers is +0.80, which is modestly below the no-change baseline of 1.0. It suggests that an additional immigrant increases the total number of workers by 0.80 persons, which effectively reduces the number of native workers by 0.20 persons.

The regressions for education groups yield smaller coefficients for persons with twelve to fifteen years of schooling and sixteen or more years of schooling, which imply larger displacement of existing workers. But the large positive coefficient of the immigration variable for the least educated workers is anomalous. The anomaly arises partly because the small samples for this low-skill group in many of the state-industry-year cells force us to exclude

16. Division bias is possible because the denominator of the robot and immigrant intensity variables gives employment in the industry-year cell (for the robot intensity variable) or in the industry-state-year cell (for the immigrant intensity variable). To avoid the bias, we redefined the two regressors by using the average level of employment in the industry or in the state-industry cell in 2001 through 2003 prior to the sample in estimating the regressions.

Table 3. OLS Estimates of the Impact of Robots and Immigration on Log Employment, 2004–2016

	All Workers, by Years of Education					
	All Workers	Less Than Twelve Years of School	Twelve to Fifteen Years of School	Sixteen or More Years of School	Gender	
					Male	Female
Robots	−2.223	−3.476	−2.484	−1.265	−1.268	−3.924
	(0.717)	(1.119)	(0.867)	(0.885)	(0.331)	(0.828)
Immigrants	0.797	1.917	0.339	0.372	−0.081	0.763
	(0.194)	(0.412)	(0.127)	(0.169)	(0.048)	(0.208)
Number of observations	16,125	13,770	15,942	15,351	15,802	15,475
R^2	0.926	0.914	0.914	0.934	0.804	0.960

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The log employment regressions are estimated at the grouped state-industry-year level, with a vector of fixed effects for states, industries, and year but without any other measures of the attributes of workers within a cell. The number of cells varies between the groups due to the absence of workers with the specified characteristics in small cells. All regressions are weighted by the number of observations in the state-industry-year cell.

many of the cells from the log employment regressions, while small numbers in non-empty cells add substantial measurement error to those cells. The small sample size reported in the regression for the least educated workers reflects the fact that more than 15 percent of the potential cells are empty (yielding an estimate of zero measured employment) relative to only 5.8 percent for workers with twelve to fifteen years of education. The small sample problem persists even in the cells that have a positive number of observations. In half of the cells for the least educated workers, our estimate of total employment is based on a sample of fewer than eleven persons. In contrast, the median number of observations in the non-empty cells for workers with twelve to fifteen years of education is seventy-four.

The small sample size in many cells, therefore, introduces a great deal of volatility in measured employment both within and across state-industry groups, particularly for the low-skill workforce. This sampling issue also partially affects the calculation of the immigration intensity variable for the state-industry-year cell, as the immigrant share is also calculated from the ACS data. In short, measurement error contaminates both the dependent variable (log employment in a state-industry-year-education cell) and the regressor measuring the immigration supply shock, generating a potentially severe bias because the number of working immigrants in a cell appears on both sides of the employment regression equation.

One way to reduce the spurious correlation is to estimate the regressions using the log number of working *natives* as the dependent variable. Although this specification does not measure the impact of robot intensity on total employment (after all, robots affect the employment of both immigrants and natives), the measured impact of immigration on low-skill employment should be less contaminated by the measurement error. Table A1 reports the regression results using this alternative dependent variable. The coefficients of the robot intensity variable resemble those obtained when using total employment as the dependent variable, but the OLS coefficient of the immigration intensity variable for the least educated workforce, while still positive, falls dramatically, indicating that the anomalously

high coefficient for that group reported in table 3 reflects measurement error due to sample size.

Dealing with Simultaneity

Treating robots and immigrants as exogenous factors that shift the equivalent supply of labor in a market ignores the likely impact of labor-market conditions on the firms' introduction of robots to an industry and on immigrants seeking work in a particular area and industry. The decisions of firms should produce a positive relation between wages and the number of robots as high wages induce firms to substitute more robots for workers.[17] Similarly, high earnings in an industry-area are likely to attract immigrants to the industry-area. In both cases, the endogenous decisions to purchase robots or to immigrate will create a positive relation between the numbers of robots or immigrants and wages, biasing downward OLS estimates of the negative effects of the shocks along a given demand curve we seek to identify.

We deal with the simultaneity problem through a two-stage instrumental variable analysis. We instrument shipments of robots on the number of robots shipped in the same industry and year in Japan and Germany as reported by the IFR. Ideally, this isolates the part of the growth of robots due to exogenous technological change and economic conditions that affects the same industry in all advanced countries similarly. Given that Germany and Japan are leaders in robot technologies and top exporters of robots in the world,[18] including to the United States,[19] the instrument seems well suited to identify the part of U.S. purchases due to the supply shift of robots globally.

We deal with the endogeneity of immigrant choice with a variant of the shift-share instrument widely used in the immigration literature. We first calculate the state-industry distribution of immigrants who originated in a specific country in the 1970 Census. The key assumption is that this initial placement influences the state-industry distribution of later waves of immigrants from that same country, perhaps because of network effects. We allocate current immigrants from each country across the state-industry cells according to the country's 1970 state-industry distribution. We then obtain the predicted number of current immigrants in each state-industry cell as the sum of the predicted number across all national origin groups. To the extent that the conditions that encouraged immigrants in 1970 to "settle" in particular cells persist over time, the instrument does not fully address the endogeneity problem. David Jaeger, Joakim Ruist, and Jan Stuhler (2018) examine the resulting biases and

17. A firm will substitute a robot for a worker whenever the unit cost of having the robot do the work falls below the unit cost of the worker doing it, which will depend on the wage and the cost of the robot as well as their relative productivity. Technological change that produces more effective robots at a given cost or lowers the price of robots will induce firms to shift to robots unless wages fall commensurately. Robotworx estimates the cost of a robot: "Complete with controllers and teach pendants, new industrial robotics cost from $50,000 to $80,000. Once application-specific peripherals are added, the robot system costs anywhere from $100,000 to $150,000" (https://www.robots.com/faq/how-much-do-industrial-robots-cost, accessed June 27, 2019). If it costs $50,000 per year to run a system, including depreciation, the robot cost would rise to $150,000 to $200,000. At the average U.S. wage and salary of about $50,000, and benefits raising labor costs by 50 percent, the average worker costs the firm about $75,000. If the robot replaces two people, the robot would pay off in less than two years. Hence, the exponential growth of robots.

18. In 2017, about half of world exports in robots came from Japan (36.6 percent of total industrial robot exports) and Germany (14.2 percent). The United States was in fifth place (5 percent of exports), behind Italy and France (Daniel Workman, "Top Industrial Robots Exporters," WTEx, June 4, 2019, http://www.worldstopexports.com/top-industrial-robots-exporters, accessed June 27, 2019).

19. More than half of robot sales in the United States are imports, Germany, Japan, and Switzerland being major sources of industrial robots (ExportUSA, "Sell and Export Industrial Robots in the United States: Industrial Automation Robotics in America," June 10, 2017, https://www.exportusa.eu/export-industrial-robots-united states.php, accessed June 27, 2019).

Table 4. IV Estimates of the Impact of Robots and Immigration on Log Hourly Earnings, 2004–2016

	All Workers, by Years of Education				Gender	
	All Workers	Less Than Twelve Years of School	Twelve to Fifteen Years of School	Sixteen or More Years of School	Male	Female
Robots	−1.209	−1.876	−2.025	1.136	−1.628	−0.697
	(0.347)	(0.431)	(0.404)	(0.322)	(0.321)	(0.388)
Immigrants	−0.392	−0.714	−0.464	−0.363	−0.537	−0.204
	(0.098)	(0.133)	(0.121)	(0.120)	(0.136)	(0.076)
Number of observations	15,996	12,215	15,746	14,921	15,802	15,098
R^2	0.829	0.365	0.795	0.790	0.784	0.797

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The log wage regressions are estimated at the grouped state-industry-year level. The dependent variable is the skill-adjusted mean log hourly wage in a state-industry-year cell, where the skill adjustment controls for individual differences in age, gender, and educational attainment. All regressions include vectors of fixed effects giving the worker's state of residence, industry of employment, and survey year. The number of cells varies between the groups due to the absence of workers with the specified characteristics in small cells. The regressions are weighted by the number of observations used to calculate the dependent variable.

propose alternative methods of addressing the persistent endogeneity.[20]

Table 4 presents the IV estimates of the impact of the robot and immigration supply shocks on the log hourly wage. Consistent with the notion that simultaneity produces a positive bias on estimates of the impact of robots on earnings, the table 4 estimated coefficients are almost all more negative than the comparable table 2 OLS estimates. The IV estimated impact of an increase in robot intensity for all workers, for example, increases the effect on wages from −0.98 in table 2 to −1.21 in table 4. The sole exception is the coefficient on robots for college graduate workers, which becomes more positive, indicative of complementarity rather than substitution between the robots and the most highly educated group. The estimated coefficient on immigrants in the table 4 IV regression also becomes more negative than in the corresponding table 2 OLS regression. In the sample of all workers, the insignificant OLS effect of −0.05 turns into a −0.39 significant effect.

Finally, replicating the OLS finding, the estimated IV coefficients on robots are substantially larger than those on immigrants, which in the context of our supply shock model suggests that the efficiency value of a robot exceeds that of an immigrant. For all workers, the effect of robots on the wage is about three times larger than the effect of immigrants on the wage, so that if an immigrant has approximately the same productivity of a native worker, a robot is equivalent to three workers.

Table 5 presents IV estimates of the impact of robots and immigrants on employment. The estimated coefficients for all workers are more negative compared to the corresponding estimates in table 3. The estimated negative coefficient on robots increased in absolute value for all workers from about −2.2 to −2.5 and increased a bit more in some of the least skilled groups. The IV estimate of the immigrant shock

20. The first-stage regressions show that the robot intensity measure in the United States is strongly predicted by the robot stocks in Japan and Germany, and that the number of immigrant workers in each state-industry cell in the ACS is strongly predicted by the presence of immigrants in those cells in the 1970 Census.

Table 5. IV Estimates of the Impact of Robots and Immigration on Log Employment, 2004–2016

	All Workers, by Years of Education					
	All Workers	Less Than Twelve Years of School	Twelve to Fifteen Years of School	Sixteen or More Years of School	Gender	
					Male	Female
Robots	−2.480	−4.341	−2.865	−1.389	−1.693	−4.287
	(0.955)	(1.287)	(1.114)	(1.163)	(1.098)	(0.967)
Immigrants	−0.188	1.646	−1.344	−0.551	−0.316	−0.085
	(0.580)	(0.592)	(0.622)	(0.476)	(0.678)	(0.576)
Number of observations	16,114	13,768	15,934	15,346	15,986	15,470
R^2	0.923	0.914	0.900	0.932	0.903	0.959

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The log employment regressions are estimated at the grouped state-industry-year level, with a vector of fixed effects for states, industries, and year but without any other measures of the attributes of workers within a cell. The number of cells varies between the groups due to the absence of workers with the specified characteristics in small cells. All regressions are weighted by the number of observations in the state-industry-year cell.

on total employment changes from the 0.80 found in the OLS regression to a coefficient of −0.19, which implies a more sizable displacement of the current workforce from the 1.0 neutrality (although the standard error is large). But as in the OLS regressions, we get an anomalous result for the least educated group of workers with an estimated coefficient that is larger than one (though not statistically different from one). Per the earlier discussion, we attribute this to the measurement error that arises from the large number of industry-state-year cells that were excluded from the analysis and to the small sample size in many other cells. As table A1 shows, the use of the log of native employment as the dependent variable shows a crowding-out effect of immigration on native workers in all education groups, the adverse effect being larger for natives with less than a college education.

Bringing Occupations In

The media reports and projections of robot effects on jobs focus on how robots substitute for people in particular occupations or work tasks—ranging from assembling items along an assembly line, or spraying paint, or conducting surgery, and so on. The projections of Carl Frey and Michael Osborne (2013, 2017) that gained widespread attention for the claim that 47 percent of all U.S. employment was at risk of being computerized was, for example, based on an analysis of the probability that work would be computerized in 702 detailed occupations. Most other projection studies have similarly built their analysis on the basis of how technology is expected to affect occupations, not on industry purchases of robots (as in our tables 2 through 5).

That firms in any given industry hire workers in many occupations, some of whom may be affected by robots or other technological changes while others may not, creates a disconnect between the occupations/work tasks analysis and the industry analysis. The occupation data have an occupation subscript regardless of industry and our robot sales data have an industry subscript but no occupation subscript. To some extent, the limitation of the IFR data to industrial robots that primarily affect blue-collar workers and our exclusion of the all other nonmanufacturing branches part of the IFR data bound the occupation-industry problem by focusing on manufacturing. Still, our esti-

mate of employment and earnings at the industry level almost surely understates the impact of robots on the subset of occupations within an industry whose work the robots are designed to perform. For instance, industrial robots could replace nearly all the welders in automobile production but have no effect on office workers in the industry, so that the effect on total employment would understate the impact on the workers actually given the "robot treatment."

To bring occupations into our analysis, we examined measures of the characteristics of occupations from the U.S. Department of Labor's Occupational Information Network (O*NET) data set, which measures the attributes of hundreds of occupations along diverse dimensions.[21] From the huge array of O*NET measures of occupational attributes, we selected one statistic as being most likely connected to robotization. This is the degree of automation of occupations that scores the extent of automation in an occupation on a scale from zero (no automation) to one hundred (most automated).[22] An industry with a large influx of robots is more likely to have a supply shock for occupations with greater degrees of automation than occupations the O*NET data views as relatively immune from automation. Similarly, the high automation occupation should have a greater supply shock in an industry with a large robot shock than in one with a modest increase in robots.

To incorporate the automation variable in our data, we attached to every worker in the ACS file the score of their occupation on the O*NET automation scale and then divided the occupations into three groups: those in the top quartile of the index (high automation); those between the 25th and 75th percentile of the index (medium automation); and those in the bottom quartile (low automation) of the O*NET index.

To the extent that the O*NET categories correctly identify the proneness of occupations to automation and that the robots contribute to automation, the regression of wages and employment on robot intensity should give large coefficients on robots for occupations in the top automation quartile and small coefficients on robots for occupations in the bottom quartile. This is effectively a double difference methodology that identifies robot effects by comparing wages and employment in automatable occupations in industries with large numbers of robots compared to workers in the least automatable occupations in industries with few robots. By contrast, we expect no clear pattern of differences in coefficients on the immigrant supply shock across occupations varying by the automation variable.

Table 6 summarizes the results from this analysis. It shows larger estimated negative effects of robots on hourly earnings and employment for workers in the top automation quartile group than in the lowest automation quartile. Estimates of robot effects for the middle group are closer to those of the top quartile group: a bit larger in the wage regressions but a bit lower in the employment regression. Both the earnings and employment regressions show a larger negative effect of immigrants for the high automation group, suggesting that some occupations experienced both a technology and immigrant shock.[23]

Given the attention given to the Frey and Osborne (2013, 2017) analysis of the likelihood of computerization of work on the future of jobs, we also examined the relation between their

21. O*NET contains on the order of one hundred measures of the skills and knowledge required in every occupation; the abilities, interests, and values needed to perform the work; the training and level of licensing and experience needed for the work; the work activities; and the physical, social, and organizational factors involved in the work (https://www.onetonline.org, accessed June 27, 2019).

22. We took the index for occupations on O*NET and transformed them into the *OCC1990* occupation code available in the ACS available at IPUMS.

23. We also examined the relation between two other variables that some analysts view as indicating the likelihood of an occupation being prone to automation by robots and other technology—the routineness of cognitive work and the routineness of manual work (Autor, Levy, and Murnane 2003). These measures were largely independent of the automation variable and did not differentiate the effect of robots well.

Table 6. Estimates of the Impact of Robots and Immigration, by O*Net Degree of Automation in the Worker's Occupation, 2004–2016

	Automated		Medium Automation		Not Automated	
	OLS	IV	OLS	IV	OLS	IV
Log hourly wage						
Robots	−1.069	−1.274	−1.301	−1.721	0.059	0.352
	(0.285)	(0.301)	(0.349)	(0.335)	(0.347)	(0.420)
Immigrants	−0.065	−0.424	−0.060	−0.416	−0.096	−0.140
	(0.046)	(0.106)	(0.042)	(0.107)	(0.054)	(0.088)
Number of observations	15,111	15,271	15,111	15,794	12,236	12,236
R^2	0.607	0.621	0.793	0.778	0.769	0.769
Log employment						
Robots	−2.311	−3.096	−2.282	−2.419	−0.446	0.480
	(0.813)	(1.109)	(0.883)	(1.136)	(1.155)	(1.603)
Immigrants	0.610	−1.722	1.179	0.375	0.168	−0.025
	(0.1902)	(0.913)	(0.299)	(0.802)	(0.133)	(0.224)
Number of observations	15496	14,494	15,981	15,970	13,124	13,123
R^2	0.869	0.843	0.899	0.897	0.972	0.984

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The jobs that are automated include workers whose occupation is in the top quartile of the O*NET index of automation. The jobs that are not automated include workers whose occupation is in the bottom quartile of the index. The jobs with medium automation include workers whose index is between the 25th and 75th percentile. All regressions are estimated at the grouped state-industry-year level, with a vector of fixed effects for states, industry, and year. The wage regressions are weighted by the number of observations used to calculate the skill-adjusted mean wage of a state-industry-year cell, and the employment regressions are weighted by the number of observations in the cell.

probability of computerization, which they derived making extensive use of O*NET data, on earnings and employment. We transformed their 702 occupations into a smaller grouping consistent with the ACS occupational category and found that their measure was positively correlated at 0.30 with the O*NET automation variable, suggesting that the two variables were capturing somewhat similar attributes of occupations. Some of the difference between the measures is presumably due to automation's having primarily affected manual jobs in the past, whereas the impact of computerization extends to white-collar jobs. We then categorized occupations into the upper quartile, middle two quartiles, and lowest quartile of the probability of computerization of work.

Table 7 presents the OLS and IV regression coefficients on wage and employment equations for the three groups of occupations. As in our other calculations, the estimated robot effects are considerably larger than the estimated immigrant effects and become more negative with the IV analyses. The estimated effects of robots differ between the O*NET automation variable and the Frey and Osborne Probability of Computerization. The estimates presented in table 7 show that increased robot intensity reduced employment and wages even for workers in occupations having low probability of computerization.

In short, dividing the data by attributes of occupations confirms our basic findings that an increase in one robot reduces wages and em-

Table 7. Estimates of the Impact of Robots and Immigration, by Frey-Osborne Probability of Computerization in the Worker's Occupation, 2004–2016

	High Probability		Medium Probability		Low Probability	
	OLS	IV	OLS	IV	OLS	IV
Log hourly wage						
Robots	−0.883	−1.148	−1.817	−2.149	−0.411	−0.607
	(0.359)	(0.431)	(0.398)	(0.398)	(0.147)	(0.206)
Immigrants	−0.094	−0.465	−0.181	−0.181	0.053	−0.234
	(0.048)	(0.118)	(0.052)	(0.052)	(0.037)	(0.111)
Number of observations	15,434	15,434	15,192	15,192	15,108	15,108
R^2	0.739	0.726	0.751	0.736	0.801	0.796
Log employment						
Robots	−2.680	−3.000	−1.895	−2.295	−2.373	−1.878
	(0.782)	(1.041)	(0.914)	(1.280)	(0.765)	(0.985)
Immigrants	0.765	−0.438	1.037	−1.339	0.647	0.550
	(0.199)	(0.555)	(0.302)	(0.930)	(0.193)	(0.568)
Number of observations	15,713	15,706	15,575	15,569	15,451	15,447
R^2	0.952	0.947	0.924	0.908	0.858	0.858

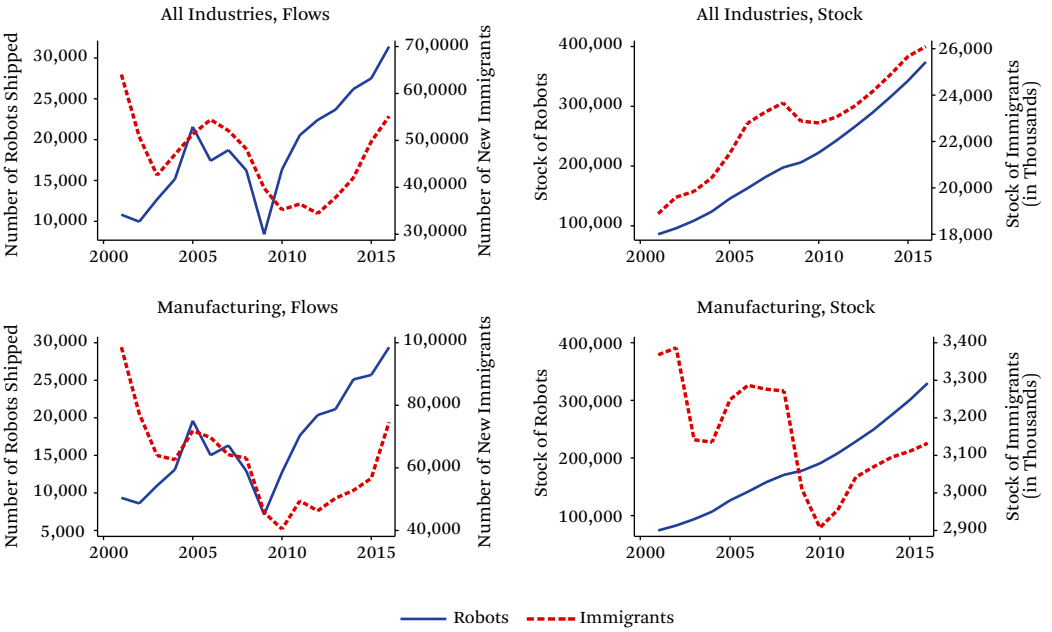
Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The jobs that are automated include workers whose occupation is in the top quartile of the Frey and Osborne (2013, 2017) estimated probability of computerization in the worker's occupation. The jobs that are not automated include workers whose occupation is in the bottom quartile of the index. The jobs with medium automation include workers whose index is between the 25th and 75th percentile. All regressions are estimated at the grouped state-industry-year level, with a vector of fixed effects for states, industry, and year. The wage regressions are weighted by the number of observations used to calculate the skill-adjusted mean wage of a state-industry-year cell, and the employment regressions are weighted by the number of observations in the cell.

ployment more than an increase in one immigrant does and gives plausible patterns across the groupings. The variation in occupational attributes beyond automation and computability suggests the value of investigating the link between those other occupational attributes and the impact of industrial robots on employment and wages.

CONCLUSION

Treating the deployment of industrial robots as a supply shock in a demand-supply model that includes the influx of immigrants as a separate measure of changes in supply offers a unique perspective on the development of technological substitutes for labor. It highlights the critical importance of the displacement parameter that connects the numbers of robots to the shift in supply of equivalent workers and provides a natural comparison metric in terms of the shift in supply due to immigrants. In our calculations, robots reduced wages and employment overall and in most groups, with substantially larger effects than that of immigrants. Taking the table 4 and 5 IV calculations for all workers as the best estimate of the overall impacts, the displacement effects of robots are on the order of two to three times the effects of immigrants. Honing down to narrower groups suggests that the impacts are larger for less-educated work-

Figure 2. The Robots and Immigration Supply Shocks, 2001–2016



Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.

ers, for female workers, and for workers in occupations viewed as more automatable, ranging upward to robot displacement effects of three to four times.

Our estimated effects on wages and employment in the United States are close in magnitude to the estimates of Daron Acemoglu and Pascal Restrepo (2017), who examine the IFR data in a shorter period with a different methodology. They organized the data into commuting zone areas with the robot shock dependent on the industry mix in the area rather than on effects within impacted industries. That two different empirical approaches yield the same qualitative and similar quantitative results, robots reducing employment and wages for the most highly affected groups, suggests that the finding is "in the data" rather than in any particular modeling structure.[24]

Finally, our analysis provides a useful way to bridge the disagreement between the skepticism of traditional labor-market analysts, who regard fears of robot or other technologies impacting the job market as speculation with no evidentiary backing, and the analysis and projections by more technologically oriented researchers that warn of future labor-market dislocation.

On the one side, our comparison of the magnitude of the robot shock and the immigrant shock in figure 2 supports the skepticism of labor analysts. Despite the media uproar about robots, the robot supply shock has been too modest through the mid-2010s to disrupt the labor market.

On the other side, the evidence that the increased supply of industrial robots has depressed employment and wages in affected in-

24. The estimated coefficients reported in Acemoglu and Restropo (2017, table 3) for private-sector employment vary between –0.60 and –1.4 and for hourly wages between –1.5 and –2.5. Just as we report greater effects on earnings than on employment, their calculations show similarly larger impacts on earnings in most comparisons.

dustries, a robot adding the equivalent of two to three workers to labor supply on average and three to four workers in particular groups, suggests that it would be foolhardy to dismiss the concerns about the future of work. Reasonably large supply shock effects of technology and exponential growth of robots and related technologies have the potential to shake up the world of work in the foreseeable future.

To predict the effects of robots or indeed any other form of technological change or investment in machines that alters the world of work over the longer term requires analysis of how the technology affects the comparative advantage of workers over machines. In a market-clearing model, this is likely to have a greater impact on the structure of wages than on employment as workers displaced by the technology find other jobs and as the technology creates new forms of work and potentially raises the rate of economic growth enough to absorb any employment lost to machines.

Finally, since our data are limited to industrial robots, we do not examine thus treat the possible impact of service robots or of other type of machines (automation writ large) that can also affect the world of work. These limitations notwithstanding, our calculations provide evidence that concerns about the future impact of robots on the labor market have some basis in economic reality and thus merit further monitoring and analysis.

Table A1. Impact of Robots and Immigration on Native Employment, 2004–2016

		All Native Workers, by Years of Education		
	All	Less Than Twelve Years of School	Twelve to Fifteen Years of School	Sixteen or More Years of School
OLS				
Robots	−2.223	−2.947	−2.350	−1.993
	(0.717)	(1.352)	(0.928)	(0.898)
Immigrants	0.797	0.388	−0.096	0.095
	(0.196)	(0.153)	(0.129)	(0.158)
Number of observations	16,125	13,229	15,906	15,257
R^2	0.926	0.888	0.908	0.935
IV				
Robots	−2.480	−4.366	−2.935	−2.132
	(0.955)	(1.544)	(1.229)	(1.160)
Immigrants	−0.188	−1.595	−2.276	−0.897
	(0.580)	(0.710)	(0.724)	(0.471)
Number of observations	16,114	13,229	15,898	15,252
R^2	0.923	0.873	0.884	0.932

Source: Authors' tabulations based on American Community Survey data (U.S. Census Bureau 2004–2016) for immigrant data and International Federation of Robotics data (2017) for robot data.
Note: Standard errors are clustered at the state-industry level. The log employment regressions are estimated at the grouped state-industry-year level, with a vector of fixed effects for states, industries, and year but without any other measures of the attributes of workers within a cell. The number of cells varies between the groups due to the absence of workers with the specified characteristics in small cells. All regressions are weighted by the number of observations in the state-industry-year cell.

REFERENCES

Acemoglu, Daron, and Pascal Restrepo. 2017. "Robots and Jobs: Evidence from US Labor Markets." *NBER* working paper no. 23285. Cambridge, Mass.: National Bureau of Economic Research.

Autor, David, Frank Levy, and Richard Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics* 188(4) (November): 1279–333.

Barañano, Ilaski, and Diego Romero-Ávila. 2015. "Long-Term Growth and Persistence with Obsolescence." *Economic Modelling* 51(C): 328–39.

Blau, Francine D., and Christopher Mackie, eds. 2016. *The Economic and Fiscal Consequences of Immigration*. Washington, D.C.: National Academies Press.

Fisher, John C., and Robert H. Pry. 1971. "A Simple Substitution Model of Technological Change." *Technological Forecasting and Social Change* 3(1): 75–88.

Frey, Carl Benedict, and Michael A. Osborne. 2013. "The Future of Employment: How Susceptible Are Jobs to Computerization?" Oxford: Oxford Martin School. Accessed June 27, 2019. https://www.fhi.ox.ac.uk/wp-content/uploads/The-Future-of-Employment-How-Susceptible-Are-Jobs-to-Computerization.pdf.

———. 2017. "The Future of Employment: How Susceptible Are Jobs to Computerization?" *Technological Forecasting and Social Change* 114(C): 254–80.

International Federation of Robotics (IFR). 2017. *World Robotics 2017 Industrial Robots*. Frankfurt-am-Main: IFR.

Jaeger, David A., Joakim Ruist, and Jan Stuhler. 2018. "Shift-Share Instruments and the Impact of Immigration." *NBER* working paper no. 24285. Cambridge, Mass.: National Bureau of Economic Research.

Mishel, Lawrence, and Josh Bivens. 2017. "The Zombie Robot Argument Lurches On: There Is No Evidence That Automation Leads to Joblessness or Inequality." *EPI* report no. 126750. Washington, D.C.: Economic Policy Institute. Accessed November 11, 2018. https://www.epi.org/files/pdf/126750.pdf.

Solow, Robert. 1987. "We'd Better Watch Out." *New York Times Book Review*, July 12, 36.

U.S. Census Bureau. 2004–2016. "American Community Survey." Accessed June 27, 2019. https://www.census.gov/programs-surveys/acs.

———. 2017. *2016 Annual Survey of Manufacturers*. Washington: U.S. Department of Commerce. Accessed November 11, 2018. https://www.census.gov/programs-surveys/asm/data/tables.html.

Winick, Erin. 2018. "Every Study We Could Find on What Automation Will Do to Jobs, in One Chart: There Are About as Many Opinions as There Are Experts." *MIT Technology Review*, January 25. Accessed November 11, 2018. https://www.technologyreview.com/s/610005/every-study-we-could-find-on-what-automation-will-do-to-jobs-in-one-chart.

Public Universities: The Supply Side of Building a Skilled Workforce

JOHN BOUND, BRENO BRAGA, GAURAV KHANNA, AND SARAH TURNER

Over the past few decades, public universities have faced significant declines in state funding per student. We investigate whether these declines affected the educational and research outcomes of these schools. Declining funding induced public universities to shift toward tuition as their primary source of revenue. Selective research universities enrolled more out-of-state and international students who pay full fare and increased in-state tuitions, moderating impacts on expenditures. Public universities outside the research sector had fewer options to replace stagnating state appropriations, requiring diminished expenditures and increased in-state tuitions. We find suggestive evidence that cuts have negatively affected research, and more definitive evidence that they adversely affected degree attainment at both the undergraduate and graduate levels.

Keywords: public universities, state appropriations, research outputs

Public colleges and universities have been major drivers of growth in college education over the past century (Goldin and Katz 1999); today, these institutions enroll 77 percent of all undergraduate students (67 percent of those at the four-year level) and award 64 percent of all bachelor's degrees. Public research universities award 72 percent of doctorate degrees in science and engineering fields and receive roughly half of the federal research funds devoted to academic institutions. Thus, public universities serve a central role in producing college-educated workers and scientific innovations. Yet an increasingly common refrain over the past decade from knowledgeable experts is that "public higher education appears to be in a state of crisis" (Ehrenberg 2006).

The overall amount of subsidy per student

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enrolled in higher education from states has eroded over the past quarter century, and the financial health and educational quality of these institutions would appear challenged by reductions in state appropriations. On a per student basis, constant dollar appropriations from state governments to higher education have decreased by 16 percent since 1990, with the bulk of this decline in the last decade (SHEEO 1980–2018). It seems natural to imagine that the reduction in state support for public research universities would manifest itself in a decline in both the educational effectiveness and the research capacity of these institutions. Declining subsidies might be projected to impact a host of activities that are part of universities' portfolios that are not fee-for-service or revenue generating, including: doctorate education, need-based financial aid, and research.

In this article, we use available data to examine the impact of declining state support for public research universities on both their educational and research functions. Heterogeneity across states in the decline gives us econometric leverage for studying the impact of these declines. We find evidence that the more highly ranked research universities have been able to adapt to declining subsidies by raising tuition, attracting out-of-state students and international students, and, to some extent, raising funding from philanthropic sources. Outside the top tier of research universities, our evidence suggests that public universities—particularly those that do not emphasize research and doctorate education as part of their missions—have not been able to replace lost dollars. The evidence suggests that budget cuts have affected the quantity of undergraduate and graduate degrees awarded. As has been widely demonstrated, it is degrees at the bachelor's level and above that have garnered the greatest increases in labor-market returns over the past three decades (Autor 2014). Evidence on the impact of budget cuts on research output from these universities is somewhat mixed, though many public universities remain to this day some of the most highly ranked research universities in the world (Shanghai Ranking 2018). Going forward, there is reason for concern that continued stagnation of state support for public universities will adversely impact the supply of skilled workers with undergraduate and graduate degrees to the workforce, along with the long-term research capacity that contributes to economic growth.

PUBLIC UNIVERSITIES IN THE CONTEXT OF U.S. HIGHER EDUCATION

Significant public subsidies for colleges and universities from state sources in the first three-quarters of the twentieth century brought about the transformation in American higher education on two margins. The first was a dramatic expansion in the scale and breadth of higher education—the shift to "mass higher education"—which encompassed not only the growth of existing public universities but also the expansion and upgrading of a large network of community colleges and broad-access institutions. In addition, states invested in "research universities" to engage in the production of knowledge and scientific excellence. The investments in public research universities could be viewed as a way for states to not only grow the stock of college-educated labor but to also build scientific expertise complementary to local industry (Goldin and Katz 1999).

Some public universities received greater support from states than others. As Claudia Goldin and Lawrence Katz (1999) document, those states with the strongest public university sectors were those without established private universities and those with a broad potential middle class and industries dependent on agriculture and mining likely to benefit from scientific innovation. States in the Midwest and western United States entered the postwar era with the strongest research universities.

Resources for higher education were especially plentiful in the two decades following World War II, a period sometimes referred to as the Golden Years of higher education. One study cites an average annual growth rate of 8 percent in education and general expenditures per student during the 1960s (Cheit 1971). The post–World War II era not only defines the period of a massive increase in access to U.S. higher education in terms of increased enrollment rates, but it also captures a rise to preeminence in graduate education and research innovation.

Within-State Markets

The overall public sector of higher education includes a much broader range of institutions that provide mass higher education and often offer courses of study with strongly vocational or professional orientations. For these institutions, the primary mission is the dissemination of knowledge, not the production of knowledge via research. Given the massive increase in demand for higher education and the public commitment to increasing collegiate opportunities in the post–World War II era, states added new four-year colleges and community colleges. Between 1950 and 1980, the number of public four-year institutions increased from 344 to 464, and the number of two-year community colleges by a factor of nearly three, from 297 to 846 (table 317.10, *Digest of Education Statistics* [Snyder, de Brey, and Dillow 2019]).

At public colleges and universities, the tuition price for in-state students is often appreciably less than the cost of instruction, implying substantial across-the-board subsidies that are afforded by appropriations from the state government. Historically, the gap between tuition paid and cost of instruction was greater at research universities than at the community colleges or broad-access four-year institutions (Winston 2000).

Community colleges tend to focus on local markets, essentially within commuting distance, whereas comprehensive universities may draw from a regional area encompassing a quadrant of a state and, in some cases, may have particular subject-level expertise. The research universities generally draw students from across the state and, in some cases, may draw students from the national and international market, these out-of-state students paying much higher tuition levels that are far closer to the market levels that private institutions charge. Later in this article, we present empirical evidence on the changing stratification within states in tuition levels and appropriations from the state.

Public Research Universities in a Mixed Market

The categorization of institutions as research universities is neither discrete nor static. Research intensity spans a continuum among universities in both the public and private sectors and, to the extent that higher education competes along the margins of quality and prestige, some institutions face incentives to become research universities (Labaree 2017). In this analysis of public research universities, we focus attention on three categorizations that distinguish public universities: the first is membership in the American Association of Universities (AAU), representing the most resource-intensive and selective public research universities.[1] Today, of the sixty-two universities that form the AAU, thirty-four are public universities.

The second and third categories depend on the taxonomy used by the Carnegie Foundation for the Advancement of Education, which classifies institutions based on sponsored research funding, doctorates awarded, and other metrics.[2] Research universities (which include the AAU schools) are the 136 public, doctorate-granting universities with high or very high research activity according to the 2010 Carnegie definition. Nonresearch universities are 292 broad-access public institutions, which are a combination of those that grant master's degrees as their highest degree and those that grant doctorate degrees but are not classified by the 2010 Carnegie definition as having high or very high research activity. We refer to nonresearch schools as broad-access universities,

1. At the start of the twentieth century, with U.S. doctoral education still in its infancy, the presidents of leading institutions moved to reduce disarray and develop uniform standards for doctorate education and founded the American Association of Universities.

2. The Carnegie Classification taxonomy classifies institutions by the highest level of degrees awarded and research intensity, measured by factors such as research expenditures, doctorates awarded, and number of research-focused faculty. Among institutions awarding doctorate degrees are three categories: very high research activity, high research activity, and doctoral universities. The combination of the first two form the basis of our high research activity group. The third, along with master's institutions, make up the nonresearch category of four-year colleges and universities.

even though the sample excludes institutions that grant only bachelor's degrees and other specialized four-year institutions.

Both research and doctorate education became less concentrated in a few institutions over the course of the twentieth century. In 1900, AAU members awarded 90 percent of doctorates. By 2000, that proportion had slipped to 50 percent. Over the century, the number of institutions awarding doctorates grew to nearly four hundred, and the annual number of doctorates to more than forty thousand. This growth tended to favor public universities. Public doctorate-granting institutions outnumbered private institutions by 1952, and by the 1970s, public universities accounted for about two-thirds of doctorates awarded (Thurgood, Golladay, and Hill 2006).

The institutions distinguished as research universities for their production of doctorate education and research output exist in a mixed market in which public and private institutions compete directly for students, faculty, and research support. The two most salient distinctions between research universities in the public and private sectors are scale and funding structures. Not only do the AAU public universities award more doctorate degrees than their private counterparts, but, on average, they also enroll 250 percent more students at the undergraduate level. The top twenty-four largest AAUs by undergraduate enrollment are all public, and in the top thirty, the only private university is NYU. This greater scale generally follows with lower per student resource intensity. The typical disciplinary department is generally not much larger in terms of tenure-track faculty size in a public university than in a private university.[3]

Sources of revenue support also differ with institutional control. Whereas private institutions rely on tuition revenues and (among the elite) endowment returns, public universities draw on state subsidies and tuition revenues with a more modest role for endowment returns. In exchange for funds provided by the state government, public universities have a mandate to provide collegiate opportunities to in-state students, which is usually manifested in below-cost tuition rates and preferential treatment in admissions. Public research universities face constraints and incentives tied directly to state funding, while they also compete at the national (and international) levels for faculty and research innovation with marquee-name private universities. In the next section, we turn to the examination of changing public support for public universities across states.

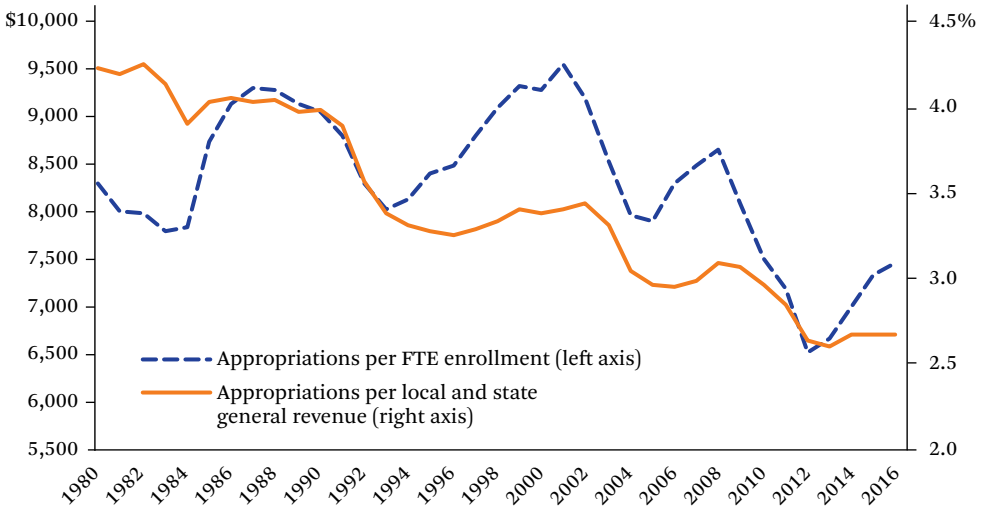
DECLINES IN STATE SUPPORT AND IMPLICATIONS FOR PUBLIC UNIVERSITIES

We start by documenting trends in aggregate state expenditures on public colleges and universities in the United States. Figure 1 plots appropriations per full-time equivalent enrollment (FTE) and local and state revenue from 1980 through 2017.[4] Since the early 1990s, the decline in appropriations per student has been substantial, from about $9,000 per FTE in 1990 to about $7,600 in 2017. The secular decline is punctuated by clear downward cycles following recessions in 1990, 2001, and 2008. This downward trend reflects, in part, a growth in FTE enrollment relative to the size of the working-age population and in part, the increase in the relative costs of higher education. In other words, the increase in college enrollment during the period implies more students per taxpayer, which could lead to less higher education funding per student. That said, as also clear in figure 1, an important contributor to this decline was the drop in the share of state

3. In terms of the quality of undergraduate education, five public universities typically appear among the top thirty in the United States: the University of California, Berkeley, UCLA, the University of Michigan–Ann Arbor, the University of Virginia, and the University of North Carolina at Chapel Hill (*U.S. News and World Report* 2018).

4. We use the Higher Education Cost Adjustment (HECA) index, which was designed to reflect changes in the cost of higher education. Primarily because the higher education sector is dependent on college-educated labor, the HECA has risen roughly 30 percent more than the CPI (3.6 percent per year versus 2.8 percent per year between 1980 and 2015).

Figure 1. Constant Dollar Higher Education Appropriations



Source: Authors' compilation based on State Higher Education Finance reports (SHEEO 1980–2016) and Tax Policy Center (1980–2016).

Note: Higher education appropriations are local and state appropriations net of special-purpose, research, and medical appropriations measured in 2017 dollars. We use HECA (Higher Education Cost Adjustment) deflator. FTE is the full-time equivalent enrollment net of medical students. Years in the x-axis are fiscal years.

general fund expenditures devoted to higher education. Indeed, based on our calculations, had this share remained constant at its early 1990s level, appropriations per FTE at public universities would have remained essentially constant over the past twenty-five years.[5]

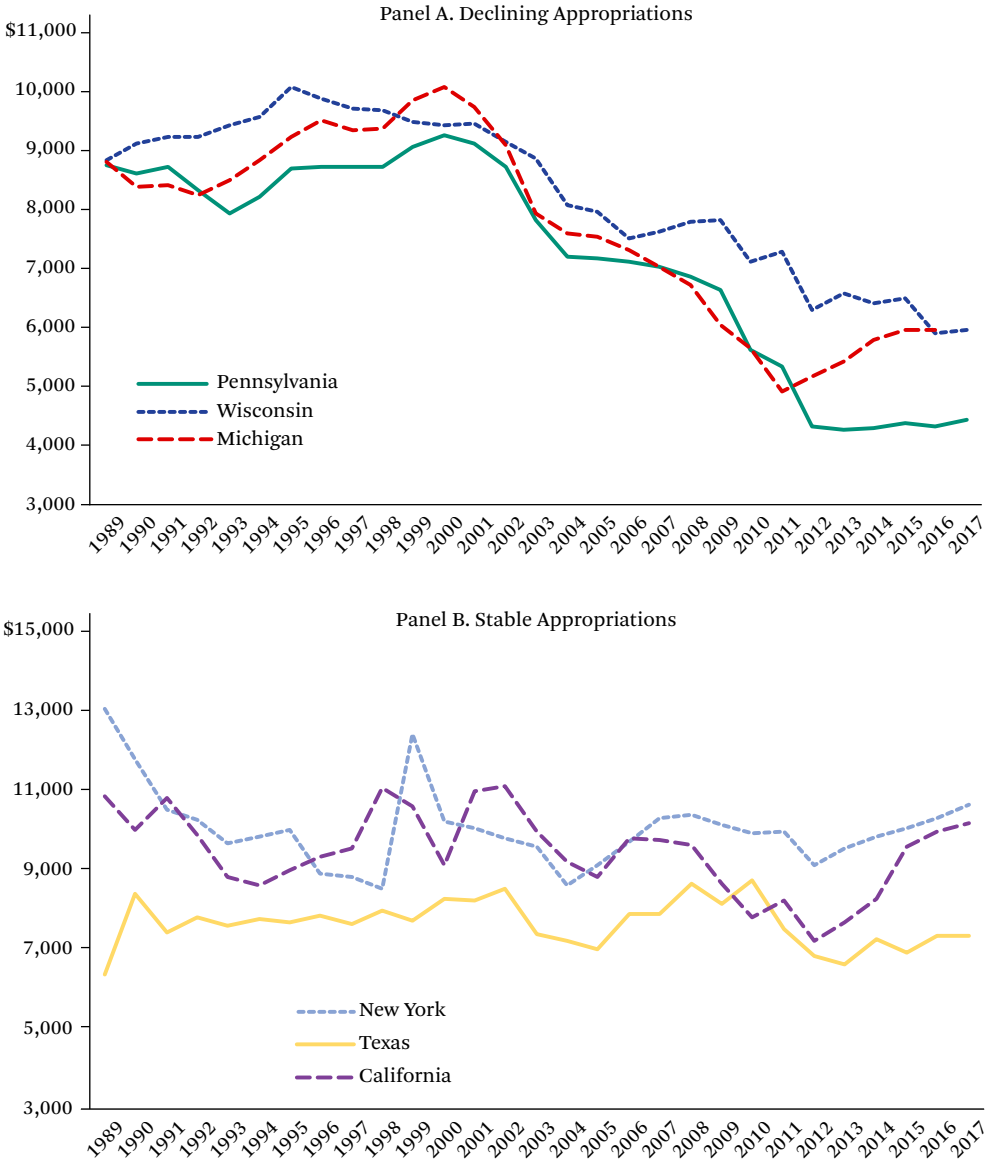
It is worth emphasizing that variation among states is substantial in the changes over time in state appropriations per FTE. Figure 2 illustrates this for a subset of states between 1989 and 2017.[6] States such as New York are among the relative winners, even as traditionally well-funded systems of higher education in Michigan and Wisconsin continue to lose funds. Historically, the more research-intensive universities have received more generous funding from states. In 1997, the public research universities received on average a bit over $16,000 per undergraduate student in state appropriations; the nonresearch institutions received on average just under $9,000. Over the next two decades, cuts would be approximately proportional, narrowing the difference in support measured in levels (figure A2).

Various factors have plausibly contributed to the decline in appropriations as a share of state budgets. The higher education budget is often described as a "balance wheel" of state budgets, as many states determine the amount of appropriations to colleges and universities by what is left over after other spending priorities (Bell 2008). Research suggests that the variation in higher education budgets is derived from the interplay between a state's revenue cycle and spending obligations, such as Medicaid (Kane, Orszag, and Apostolov 2005).

5. Between 1980 and 2016, appropriations as a share of state general revenue fell from 0.042 to 0.027. All else equal, had the share remained at 0.042, appropriation in 2016 would have been over 58 percent higher than they were, at a little bellow $12,000 per FTE.

6. Figure A1 shows changes between 2001 and 2017 for all states. Additional tables and figures, designated in text with a leading A, are available via the online appendix at https://www.rsfjournal.org/content/5/5/43/tab-supplemental.

Figure 2. Constant Dollar Appropriations per FTE, Selected States



Source: Authors' compilation based on State Higher Education Finance reports (SHEEO 1980–2018), years 1989 to 2017.

Note: Appropriations by FTE is total appropriations to higher education in the state divided by full-time equivalent enrollment net of medical students. All measures are in 2017 dollars using the HECA index. Years are fiscal years.

Indeed, in the aggregate, the increase in the share of state spending on Medicaid closely matches the decline in the share devoted to tertiary education. Other factors broadly associated with the decline in state funding for higher education include increased expenditures on elementary to secondary education, often mandated by school finance litigation (Labaree 2017), and increased expenditures for corrections.

However, despite the fact that Medicaid put fiscal pressure on state budgets, the empirical

evidence using more recent data does not support the centrality of Medicaid in explaining the decline in higher education expenditures. Using data from 1980 to 2014, we regress state-level appropriations per capita on Medicaid expenditures per capita (table A1). The coefficient on per capita Medicaid expenditures is –0.026 (0.014), which suggests that the increase in Medicaid expenditures accounts for a bit less than 20 percent of the decline in state appropriations for higher education. Although point estimates are not precise, we find that changes in expenditures on Medicaid can account for only a modest fraction of the total decline in state appropriations, suggesting other important forces must be at work.

Beyond fiscal pressure on state budgets, several factors could plausibly lead to a decline in the willingness of state legislatures to support public universities. The national integration of the market for higher education has meant that high-achieving students increasingly go out of state for their education (Hoxby 2009). Historically, many of the states that provided significant public support for higher education were in the Midwest, such as Michigan, Wisconsin, Indiana, Minnesota, and Iowa, and these states have been losing college graduates (Bound and Holzer 2000; Bound et al. 2004; Moretti 2013). In addition, it seems likely that states enjoy a smaller share than they used to of the economic returns to research activity. These factors are likely to have decreased the political will of state legislators to support higher education. Although these factors may reduce the political will to support higher education, it is difficult to find credible statistical support for these hypotheses with only fifty states in interdependent economies.

ADAPTING REVENUES OF PUBLIC UNIVERSITIES

How do public universities accommodate changes in state appropriations? As a basic accounting identity, expenditures must fall with a decline in appropriations or other sources of support must increase. We examine the link between expenditures, revenue sources, and appropriations, both graphically and in a regression context, comparing research universities with other four-year institutions.

Given the unit of analysis at the level of the university and academic year, our main data are drawn from the Department of Education's Integrated Postsecondary Data System (IPEDS) survey modules and the American Survey of Colleges assembled by the College Board, which are surveys of institutions that record information on finances, student characteristics, and institutional outcomes. In providing an empirical characterization of outcomes, we focus on three groups of public universities that are not mutually exclusive, as described earlier: AAU universities (34), research (136), and nonresearch (292). In the analysis that follows, we distinguish expenditures by type (excluding auxiliary enterprises like university hospitals) and revenues by source, with particular attention to tuition levels and total tuition revenues.

Our primary interest is in the impact of budget cuts on educational and research outcomes, which is inherently a question of causal inference. Related to the study of the effect of budget changes on educational outcomes are accounting relationships illustrating the financial adjustments and choices made in response to declines in state appropriations. We present the accounting relations as descriptive regressions using ordinary least squares (OLS). In measuring the effect of appropriation changes on educational outcomes, we recognize that the state appropriations to specific universities may reflect some endogeneity, and we emphasize an instrumental variable (IV) strategy based on plausibly exogenous state-level aggregate variation. As long as a state's aggregate appropriations do not depend on a specific institution's enrollment decisions or research output, our instrumental variable estimates should represent consistent estimates of the causal effect of appropriations on student outcomes.[7] To be precise, we use appropriations to all institutions in a state as an

7. We have used this strategy (Bound et al., forthcoming), as have other authors (Deming and Walters 2018; Chakrabarti, Gorton, and Lovenheim 2018). Authors often use total state appropriations net of an institution's appropriations. Estimating using such instruments produces results similar to the ones we report here.

instrument for observed institutional appropriations.

Expenditure Adjustments

We regress university-level expenditures (and, later, revenues, endowments, tuition rates, and patenting output) on appropriations, cohort size, and state economic conditions such as the unemployment rate in some specifications. With observations at the level of the university (i) and the year (t), we follow the specification

$$Ln\, y_{it} = \beta_0 + \beta_1 Ln\, App_{it} + X_{it}\lambda + \gamma_t + \delta_i + \varepsilon_{it}, \quad (1)$$

where the outcome of interest (y_{it}) and institution-level appropriations (App_{it}) are specified in logs. The vector X_{it} includes state-level controls such as state population at age eighteen, and unemployment rate in some specifications, which capture some of the in-state demand for higher education. With year and institution fixed effects (γ_t and δ_i), we abstract from secular changes in the entire economy and institution-specific, time-invariant characteristics. The year fixed effects control for the overall increase in the demand for a college education from domestic and foreign applicants, with year fixed effects in specifications for each group of universities accounting for overall changes in demand for universities in the group.

In table 1, we study the relationship between appropriations and expenditures. Although certain types of expenditures, like institutional support—which includes expenses for general administrative services and management—are more responsive to changes in appropriations across the board, research expenditures are less sensitive to such changes.[8] For the resource-intensive AAU institutions, there is essentially no systematic relationship between overall university academic expenditures (E&G) and state appropriations. The elasticity for the sample of all research universities is higher, but statistically indistinguishable from zero, at 0.156. The public colleges and universities outside of this research-intensive sector provide strong contrast, with a positive association between appropriations changes and total expenditures [0.301 (0.031)]. Similarly, nonresearch universities display a meaningful relationship between instructional expenditures and appropriations, whereas for AAUs no relationship is detectable.

In turn, three functional categories capture most university expenditures: instruction, research, and institutional support, the last capturing many of the centralized operational components of university activities. It is only in the institutional support category that a link to appropriations across all types of public universities is consistent and positive. Presumably, university-wide infrastructure projects and investments are sensitive to the availability of general support from the state. On the other hand, research expenditures show little sensitivity to state appropriations. To the extent that these are funded by the federal government and private sponsors, this may be unsurprising. Yet some evidence indicates that some start-up and faculty support costs are shouldered from institutional funds (Ehrenberg, Rizzo, and Jakubson 2007). It would appear that these expenditures are largely insulated from appropriations changes.

The AAU universities show essentially no link between appropriations and instructional expenditures, of which the number of faculty and their salaries is the largest expense, suggesting that few adjustments are made in class size or faculty hiring in response to changes in appropriations. At the other extreme of nonresearch universities is a significant and positive elasticity for instructional expenditures: a 10 percent decrease in state support ties to a 2.93 percent decrease in instructional expenditures, implying that the quantity and quality of instruction offered to students varies directly with state appropriations.

8. *Institutional support* is defined by IPEDS as a functional expense category that includes expenses for the day-to-day operational support of the institution such as "general administrative services, central executive-level activities concerned with management and long-range planning, legal and fiscal operations, space management, employee personnel and records, logistical services such as purchasing and printing, and public relations and development. Also includes information technology expenses related to institutional support activities."

Table 1. Effects of Appropriations on Expenditures, 1996–2012

	AAU	Research	Nonresearch
Panel A Dependent Variable	Log(Total Ed. and General Expenditure)		
Log(state appropriations)	0.014 (0.051)	0.156 (0.095)	0.301 (0.031)
Panel B Dependent Variable	Log(Institutional Support Expenditure)		
Log(state appropriations)	0.239 (0.121)	0.338 (0.101)	0.392 (0.064)
Panel C Dependent Variable	Log(Expenditure for Research)		
Log(state appropriations)	−0.015 (0.135)	0.012 (0.170)	0.050 (0.181)
Panel D Dependent Variable	Log(Expenditure for Instruction)		
Log(state appropriations)	−0.008 (0.068)	0.142 (0.091)	0.293 (0.035)
Observations	505	1,969	4,036
Universities	32	126	262

Source: Authors' compilation based on IPEDS (U.S. Department of Education 1996–2012).
Note: All models are estimated using linear least squares. All regressions include year and university fixed effects, a control for the size of the cohort age eighteen, and the unemployment rate. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

What the expenditure changes show are striking differences within the public university sector: the top public research universities have demonstrated resilience to changes in state funding, and the expenditures at the nonresearch universities are strongly tied to state-level fortunes. How, then, have these research institutions adjusted revenues?

Potential Sources of Revenue

Alternative sources of revenue to state appropriations include tuition flows, private gifts, and federal (and private) funds for research.[9] The capacity to tap these sources to replace lost state appropriations depends on market conditions and the fungibility of funds from alternative sources. Because state appropriations are broadly unrestricted, it is more difficult to use either federal research funding or private philanthropy to replace state funds, as these sources are often—though not always—restricted to specific purposes.

Tuition revenue has been the primary source of funds to replace lost state appropriations. The main dimension of differentiated pricing occurs at the undergraduate level, with in-state students paying a lower tuition than out-of-state students.[10] As an accounting matter, tu-

9. In addition, a typical university will have some auxiliary services lines on its income statement, which represent flows from activities such as hospitals or athletic facilities.

10. Also, institutions typically charge different tuitions among program areas, with graduate programs in professional fields generally priced most closely to the rates charged by peers in the private sector.

ition revenues can increase by changing either increasing tuition levels or changing the relative quantities of students paying high and low tuition levels.

As an economics matter, the capacity of institutions to raise tuition revenue by adjusting price or quantities is determined within a market context. Universities are not perfect substitutes, but evidence is ample that many public research universities operate in a national market where students are choosing among public and private options.[11] In this sense, universities will have only limited scope to adjust the prices charged to out-of-state students in response to changes or stagnation in state funding. On the other hand, universities have much more scope to raise in-state tuition charges, subject to constraints imposed by state political actions. A public university weighs added tuition revenue against the potentially endogenous legislative response of reduced funding (see Bound et al., forthcoming). Because the outside option for many in-state students is a nonprofit private institution of comparable (or greater) quality but at a much higher price, public universities have the capacity to increase prices for these students without a significant impact on demand.

Public universities can adjust total tuition revenues as well as price changes by changing the quantity and composition of students. To increase revenue, an institution must add (or substitute) a student for whom the net revenue will exceed marginal cost, leading to an emphasis on recruiting out-of-state domestic and foreign students. The ease (or difficulty) of drawing revenue generating students depends in large part on institutional quality and the overall supply pool. Expansion in demand from abroad, particularly the increased capacity of families in China to pay for a college education, and growth in the college-age population in states where in-state options are limited (Bound, Hershbein, and Long 2009; Bound et al., forthcoming) generate a potential pool from which universities can expand on the extensive margin.

Tuition Revenue Response

Figure 3 shows the coincident changes in appropriations and tuition shares as a fraction of expenditures between 1997 and 2012. Because total expenditures are larger in magnitude than revenues from appropriations and tuition, these fractions together are less than 1.[12] Figure 3 highlights the sharp increase in tuition shares relative to decreases in appropriations shares across the sample of AAU, research, and nonresearch universities.

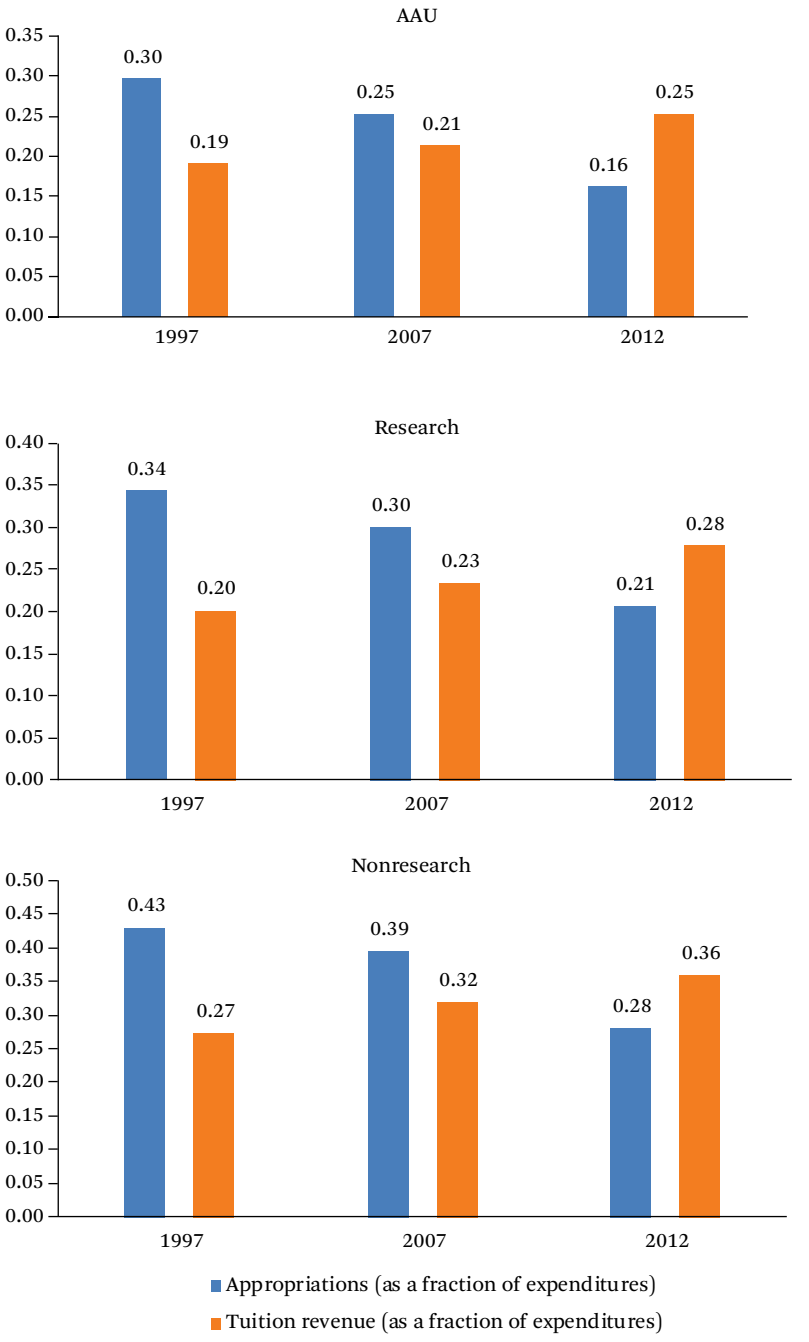
The quantitative link between total tuition revenues and appropriations changes is strong at all public research universities, with a 10 percent decrease in appropriations producing an increase of 3.1 percent at the AAU institutions, and a more modest 1.8 percent increase at the general set of research universities, when estimated in a regression with year fixed effects and controls for enrollment and cohort size (table 2). Outside the research sector, however, public colleges and universities display an elasticity that is less than half the size than that at AAUs, showing somewhat limited capacity in replacing lost funding with higher tuition revenues.

These changes in tuition revenue are—by construction—the combination of price changes and changes in relative quantities. Focusing on the undergraduate level, the relative importance of price and quantity changes differs for in-state and out-of-state students. For in-state students, price effects dominate, with in-state charges responding markedly to changes in appropriations. As shown in table A2, the elasticity of in-state price response is –0.289 for the AAU institutions, –0.203 for research universities, and –0.166 for nonresearch universi-

11. For any student, the demand for an out-of-state university will likely depend on the quality, price, and admission probability at his in-state option and the net price and quality of the private options where he is likely to receive offers of admission.

12. Other sources of revenue not shown in this figure, but which we examine later, include private gifts, grants, and earnings from investments or endowments

Figure 3. Changes in Appropriations and Tuition Revenue as a Fraction of Expenditures



Source: Appropriations, total educational expenditures, and tuition revenue data from IPEDS (U.S. Department of Education 1996–2012), years 1997 to 2012.
Note: Sample of public four-year degree granting universities. AAU represents members of the American Association of Universities. Research sample is of doctoral universities with high or very high research activity (Carnegie classification). Nonresearch is sample of master's universities or doctoral universities with low research activity.

Table 2. Effects of Appropriations on Tuition Revenues, 1996–2012

	Log(Tuition Revenue)		
Dependent Variable	AAU	Research	Nonresearch
Log(state appropriations)	−0.311	−0.190	−0.117
	(0.075)	(0.047)	(0.046)
Log(FTE undergraduate)	0.457	0.557	0.685
	(0.190)	(0.092)	(0.084)
Log(FTE graduate)	0.230	0.216	0.059
	(0.081)	(0.047)	(0.020)
Observations	538	2,221	4,763
Number of universities	34	137	293

Source: Authors' compilation based on IPEDS (U.S. Department of Education 1996–2012).
Note: Enrollment data from IPEDS includes both graduate and undergraduate students. Revenue data from IPEDS (1996 to 2012). All models are estimated using linear least squares. All regressions include year and university fixed effects, and a control for the size of the cohort age eighteen. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

ties.[13] This result is consistent with much of the literature that indicates that appropriation changes have a significant impact on tuition decisions (Baum et al. 2018). Not only is the elasticity somewhat larger at the AAU universities, but the greater baseline levels of in-state tuition for the research-oriented institutions also yield greater changes in the absolute level of in-state tuition. A 10 percent decrease in state appropriations is associated with an $840 increase in tuition at an AAU research university, relative to an increase of about $340 at a broad-access nonresearch institution.[14] These differences in price responses may well reflect differences in the price elasticity of demand in the respective student markets, given that the research universities draw more affluent students who are likely to be less price elastic than students at the broad-access nonresearch institutions.

Yet, even as in-state charges adjust markedly, out-of-state charges do not move significantly in response to changes in tuition. We interpret this as consistent with a greater price elasticity of demand of out-of-state students, who typically have choices that include other out-of-state options of similar quality (both public and private), along with a discounted home-state university option. For public research universities, we also see adjustments in the composition of students. In the most recent decade, a strong shift to foreign students is evident, particularly among institutions that are nationally strong but not among the highest ranked universities. In contrast, the highest ranked universities are able to attract domestic out-of-state students. This is in fact the focus of a study showing that public research universities disproportionately hurt by state funding declines were more likely to turn to full-fee paying students from abroad (Bound et al., forthcoming). Leveraging variation in state budgetary cycles, that article examines the sharp rise in undergraduate enrollment, mostly from China, between 1996 and 2012. Instrumental variable estimates highlight that a 10 percent decrease in state funding was associated with a 16 percent rise in foreign enrollment at public research universities, with little change in the enrollment mix outside the research sector.

13. Bound and his colleagues (forthcoming) also go to considerable lengths to investigate the timing of the changes in tuition relative to appropriations and are able to demonstrate that the timing aligns with appropriations changes impacting tuition levels, rather than the reverse.

14. Douglas Webber (2017) also finds evidence that declining public funding leads to increases in attendance costs to students.

Table 3. Effects of Appropriations on Private Gifts and Endowment, 1996–2012

	Log(Private Gifts and Endowment)		
Dependent Variable	Research	AAU	Nonresearch
Log(state appropriations)	−0.641	−1.229	0.068
	(0.202)	(0.345)	(0.165)
Observations	1,919	488	3,399
Number of universities	126	32	266

Source: Authors' compilation based on IPEDS (U.S. Department of Education 1996–2012).
Note: Gifts and endowments data from IPEDS (1996 to 2012). All regressions include year and university fixed effects and a control for the size of the cohort age eighteen. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

A natural question that follows from the large increases in in-state tuition at the public research universities is whether these institutions have become less affordable to low-income students, particularly from within the state. Evidence from Emily Cook and Sarah Turner (2018) points to a substantial response in institutional financial aid, which is concentrated among the more research- (and resource-) intensive universities. Indeed, by 2015, the average net tuition defined as "tuition and fees less grant aid" was lower at the flagship than at broad-access public colleges for the lowest-income students, that is, from families with income less than $30,000. Moreover, changes in sticker price translate about dollar for dollar to increases in net price for low-income students at broad-access institutions, but changes in net price are small, if not zero, at many research universities for such students.[15]

The overall increase in in-state tuition levels and the increased stratification in pricing structures among public colleges and universities has increased unmet need—that is, cost of attendance not covered by grants or expected family resources—markedly among moderate-income students as well as low-income students. Comparing students entering public four-year colleges and universities between 2004 and 2016, data from the National Postsecondary Student Aid Study show that unmet need increased by about $6,800 for dependent students from families in the $48,000 to $75,000 income range, with increases of about $5,000 for those with lower incomes. The net effect in the short run is increased borrowing, though recent evidence suggests that declines in state appropriations have longer-term effects on student debt, car ownership, and homeownership (Chakrabarti, Gorton, and Lovenheim 2018).

Other Sources of Financial Support

Beyond tuition revenues and state appropriations, other sources of support for colleges and universities include local grants, federal support for research activities, earnings from investments and endowments, and private philanthropic support, which may include current spendable gifts or endowment funds. Although a meaningful source of funds for AAU institutions, such funding is largely unavailable to universities outside the research sector.

In table 3, we examine the impact of appropriations on the revenues from private gifts, grants, contracts, and earnings from investments and endowments. At AAU universities, a strong relationship indicates that a 10 percent reduction in appropriations is associated with

15. Given little change in net price, the minimal link between the changes in posted tuition and the level of enrollment of in-state, low-income students should not be a surprise. For public research universities, these discounts are generally regarded as institutional investments, as they represent forgone expenditures in other areas. In addition to expanding need-based aid, some indications are that public research universities are also increasing merit aid awards in order to keep the highest achieving students, many of whom would be eligible for need or merit awards from private universities (Bowen and McPherson 2016; Cook and Turner 2018).

Table 4. Effect of Appropriations on In-State Enrollment, 1996–2012

	Panel A Log(In-State UG Freshmen Enrollment)					
	AAU		Research		Nonresearch	
Dependent Variable	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.053	−0.074	0.098	0.139	0.116	0.058
	(0.059)	(0.085)	(0.052)	(0.091)	(0.050)	(0.092)
Observations	547	547	2,121	2,121	3,162	3,162
Number of universities	34	34	136	136	285	285
Partial R^2		0.284		0.270		0.283
F-statistic		26.66		65.59		65.99
	Panel B Log(In-State UG Total Enrollment)					
	AAU		Research		Nonresearch	
Dependent Variable	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.136	0.151	0.147	0.172	0.157	0.151
	(0.069)	(0.129)	(0.042)	(0.061)	(0.043)	(0.052)
Observations	495	495	1,929	1,929	3,174	3,171
Number of universities	34	34	136	136	288	285
Partial R^2		0.309		0.283		0.271
F-statistic		32.18		66.30		55.88

Source: Authors' compilation based on ASC (College Board 1996–2012).
Note: Enrollment data from ASC (1996 to 2012). Overall state appropriations to higher education used as an instrument are used as an instrument for institution-level state appropriations in the IV regressions. All regressions include year and university fixed effects, and a control for the size of the cohort age eighteen. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

a 12 percent increase in private funds. Even among other research universities, the elasticity is a meaningful −0.64, but outside the research sector, no relationship is detectable, highlighting the limited capacity of nonresearch colleges in raising such funds.

EDUCATIONAL OUTCOMES

Changes in state appropriations potentially affect enrollment and attainment on a number of margins. Declining appropriations could induce universities to admit fewer students, or, as discussed, change the composition of the students they admit. Rising tuition and declining resources per student could affect student demand, though this is complicated by the fact that resource-rich universities are increasingly offering both need-based and merit aid.[16] In table 4, we report estimates of the effect of appropriations on in-state undergraduate enroll-

16. The accommodation of cyclical student demand and the enrollment response to changes in appropriations differs markedly across postsecondary institutions, with open access public institutions including community colleges demonstrating a greater supply-side elasticity in enrollment than research universities (Bound and Turner 2007; Barr and Turner 2013).

ment.[17] Both our OLS and IV estimates suggest modest and statistically insignificant effects of appropriations in first-year enrollment, but with somewhat larger and statistically significant effects on total undergraduate enrollment. IV estimates suggest a 10 percent drop in appropriations would reduce in-state undergraduate enrollment by about 1.7 percent at research universities.

In table 5, we turn our attention to degree attainment, distinguishing between undergraduate and graduate degrees, which may respond to funding not just via the margin of enrollment but also given the ease of completion when resources are high (Bound, Lovenheim, and Turner 2010). Because degree attainment will likely be affected by appropriations over previous years, we average log appropriations over the previous six years for bachelor's and doctorate degrees and over the previous three years for master's degrees. Our results are not sensitive to the choice of years or to simply not averaging across years as in earlier specifications. Focusing on the IV results, our estimates suggest quite a substantial effect of appropriations on degree attainment. These estimates suggest that a 10 percent drop in state appropriations would induce a 3.6 percent drop in bachelor's degree attainment at both types of research universities. Estimated effects on doctorate degrees are somewhat larger, suggesting that a 10 percent drop in state appropriations would induce a 7.2 percent drop in PhD degrees at research universities. We redid this analysis restricting ourselves to master's and PhDs in STEM fields. If anything, these results suggest somewhat larger effects. Focusing on the results for research universities, our IV estimates suggest that a 10 percent reduction in appropriations would reduce STEM master's granted by 5.0 percent (2.1) and STEM PhDs by 10.2 percent (3.3).[18] David Deming and Christopher Walters (2018), using somewhat different samples and specifications than ours, also find significant effects of appropriations on enrollment and degree completion at both two- and four-year institutions. Interestingly, they present evidence suggesting that the effect of appropriations on enrollments is primarily not being mediated by the effect of appropriations in tuitions.

We have little evidence of the quality of education college students receive. One way universities can accommodate declines in appropriations per FTE is to substitute lecturers for tenure-track professors; however, it is unclear what effects this might have on academic achievement. The little available evidence we have suggests that the increased use of instructors has negatively affected graduation rates (Ehrenberg and Zang 2005); some evidence even suggests that instructors are less likely to motivate students to continue in a field, though these effects are small and may vary across fields (Bettinger and Long 2004).

Declines in state appropriations that affect institutional quality, capacity, and tuition price might be expected to affect college choice on different margins for different groups of students. First, for nontraditional students, and for those who are likely to have close attachments to local markets, one might expect to see shifts from the public four-year sector to the community college sector. Some of these students may be on the extensive margin, forgoing enrollment altogether. For students from relatively affluent families and those with high levels of academic preparation, loss of resources and increased prices in the public sector may shift student enrollment decisions to the private sector. The hypothesis that declines in state appropriations, and thus declines in subsidies going to students at four-year public institutions, induce students to attend private institutions is supported by evidence that the quality of public colleges in a state affects student application behavior (McDuff 2007). Although selectivity among public universities has increased among the few colleges and universities that compete for students in the national market, overall selectivity has been stagnant or declining in much of the public sec-

17. The OLS specification used in table 4 for first-year in-state enrollment is used in an earlier study (Bound et al., forthcoming). The IV speciation diverges somewhat from this study because we use total state appropriations rather than total state appropriations net of an institution's own appropriations as the instrumental variable.

18. We do not report these results in the table, but they are available on request.

Table 5. Effect of Appropriations on Degrees Awarded, 1996–2012

	Panel A Dependent Variable: Log(Bachelor's Degrees)					
	AAU		Research		Nonresearch	
	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.385 (0.118)	0.089 (0.226)	0.262 (0.060)	0.361 (0.092)	0.205 (0.044)	0.060 (0.138)
Observations	546	546	2,177	2,177	4,742	4,742
Number of universities	34	34	136	136	292	292
	Panel B Dependent Variable: Log(Master's Degrees)					
	AAU		Research		Nonresearch	
	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.428 (0.140)	0.575 (0.182)	0.248 (0.065)	0.301 (0.152)	0.157 (0.086)	0.296 (0.189)
Observations	558	558	2,219	2,219	4,775	4,775
Number of universities	34	34	136	136	294	294
	Panel C Dependent Variable: Log(PhD Degrees)					
	AAU		Research		Nonresearch	
	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.386 (0.126)	0.590 (0.226)	0.532 (0.117)	0.719 (0.223)	1.088 (0.483)	2.306 (0.725)
Observations	546	546	2,176	2,176	1,313	1,313
Number of universities	34	34	136	136	116	116
Partial R^2		0.218		0.249		0.264
F-statistic		9.197		35.78		34.95

Source: Authors' compilation based on IPEDS (U.S. Department of Education 1996–2012).
Note: Degree data from IPEDS (1996 to 2012) via the Urban Institute Data Portal. Overall state appropriations to higher education used as an instrument are used as an instrument for institution-level state appropriations in the IV regressions. We average log appropriation over the previous six years bachelor's and doctorate degrees and over the previous three years for master's degrees. All regressions include year and university fixed effects and a control for the size of the cohort age eighteen. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

tor (Hoxby 2009; Bound, Hershbein, and Long 2009).

RESEARCH PRODUCTIVITY

Declines in state appropriations may affect the research output of public research universities. We have seen evidence that the top public research universities have been able to replace much of their lost revenue, but the source of this revenue is largely in terms of tuition, and those paying this tuition might want to see their dollars spent on the educational, rather

than the research mission of the university.[19] At the same time, the impact of budget cuts on research output is likely to work with long lags.

Faculty Salaries Between Public and Private Universities

Presumably the most important input to research are talented researchers. Given tight budgets, it is hard for public research universities to offer competitive salaries or, perhaps more importantly in the sciences, generous start-up packages. Previous researchers have found evidence that salaries for tenure-track faculty at public universities have not kept pace with those at private universities and that recessionary forces have long-lasting effects on faculty hiring at public universities (Turner 2014). Using data from the American Association of University Professors (1973–1994), Cindy Zoghi (2003) finds substantial declines in the salaries of public university professors relative to their private university counterparts. Using IPEDS data, Thomas Kane, Peter Orszag, and Emil Apostolov (2005) find a similar pattern for research universities. Stratifying by rank, they determine that as of the mid-1970s, salaries at public and private research universities were roughly comparable. By 1998, full professors at public research universities were, on average, being paid 82 percent of what their counterparts at private research universities were being paid.

Using IPEDS data, we investigate the relationship between state appropriations and average salaries of professors at public universities (table A3). Because we expect effects to work with some lags, we average appropriations over the three previous years. Point estimates using longer lags are similar, though estimated with less precision. The estimates in table 6 suggest significant effects of appropriations on faculty salaries. Overall, we find that appropriation cuts are related to lower salaries for professors in all levels at research and nonresearch universities, with elasticities varying from 0.08 to 0.16.

It is challenging to translate these impacts on wages into estimates of potential research productivity. Faculty are not that mobile, and universities will typically try to hold on to star researchers by matching outside offers. Still, the extent to which universities can shield research faculties from budgetary pressures is constrained. Budgets are limited, and, because salaries are typically in the public domain at public universities, the degree to which universities can engage in compensation practices that produce substantial discrimination in salaries is as well (Card et al. 2012). It seems likely that a more sustained loss in compensation packages to faculty at public colleges and universities would contribute to a flight of talent to private colleges and universities.

It seems natural to also imagine that tight budgets would affect the size of the research faculty at public universities, and, indeed, as we alluded to before (Ehrenberg and Zhang 2005) a trend toward the use of non-tenure-track faculty is evident. In the same vein, postdoctoral scholars are an increasingly important component of university research. With this in mind, we estimated equations similar to those reported in table 6, using the number of postdoctoral scholars, and size of faculty, by rank, as the dependent variable. We find suggestive evidence that falls in appropriations adversely affect both the number of faculty and postdoctoral scholars at research universities.

Changes in Academic Rankings

Since 2003, the Shanghai Ranking Consultancy has been annually presenting the Academic Ranking of World Universities (ARWU), which is a list of the top five hundred universities worldwide. Universities are ranked by an academic score based on several indicators of research performance (including alumni and staff Nobel Prizes and Fields Medals), highly cited researchers, papers published in *Nature* and *Science*, papers indexed in major citation indices, and the per capita academic performance of an institution.

We investigate the relationship between appropriations and the aggregate score used by

19. Because of the potential spillover effects that research universities have on local economies, state legislatures have some incentive to subsidize research. Claudia Goldin and Lawrence Katz (1999) emphasize this was true historically. Philippe Aghion and his colleagues (2009) find evidence that this is still true.

Table 6. Effect of Appropriations on Faculty Salaries, 1996–2012

	Dependent Variable: Log(Assist Prof Salary)					
	AAU		Research		Nonresearch	
	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.017	0.138	0.025	0.081	0.047	0.103
	(0.041)	(0.067)	(0.020)	(0.031)	(0.018)	(0.044)
Observations	390	390	1,714	1,714	3,528	3,528
Number of universities	32	32	131	131	273	273
	Dependent Variable: Log(Associate Prof Salary)					
	AAU		Research		Nonresearch	
	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.056	0.191	0.060	0.109	0.062	0.115
	(0.037)	(0.071)	(0.019)	(0.033)	(0.015)	(0.048)
Observations	390	390	1,714	1,714	3,528	3,528
Number of universities	32	32	131	131	273	273
	Dependent Variable: Log(Full Prof Salary)					
	AAU		Research		Nonresearch	
	OLS	IV	OLS	IV	OLS	IV
Log(state appropriations)	0.033	0.156	0.075	0.135	0.086	0.113
	(0.034)	(0.079)	(0.021)	(0.036)	(0.017)	(0.053)
Observations	390	390	1,714	1,714	3,528	3,528
Number of universities	32	32	131	131	273	273
Partial R^2		0.262		0.325		0.249
F-statistic		12.97		46.72		42.85

Source: Authors' compilation based on IPEDS (U.S. Department of Education 1996–2012).
Note: Salary data from IPEDS includes both graduate and undergraduate students (1996 to 2012). Overall state appropriations to higher education used as an instrument are used as an instrument for institution-level state appropriations in the IV regressions. We average log appropriation over the previous three years. All regressions include year and university fixed effects, a control for the size of the cohort age eighteen, and the unemployment rate. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

the Shanghai Ranking Consultancy to rank universities (table A4). We also look at the three specific components of the score: HiCi score is based on the number of highly cited researchers in twenty-one broad subject categories, N&S score is based on the number of papers published in *Nature* and *Science*, and PUB score depends on the number of papers indexed in the Science Citation Index and Social Science Citation Index.

Overall, regressions of aggregate scores and components on the log of appropriations show positive effects, but with modest magnitudes. Even at its largest, seen in the IV specification for the AAU sample, a 10 percent decrease in appropriations lowers the overall score by only

Table 7. Effect of Appropriations on Patents, 1996–2012

	Log(Patents)			
	AAU		Research	
Dependent Variable	OLS	IV	OLS	IV
Log(state appropriations)	0.437	0.841	0.367	0.910
	(0.335)	(0.383)	(0.236)	(0.585)
Observations	559	559	2,228	2,228
Number of universities	34	34	136	136
Partial R^2		0.319		0.301
F-statistic		50.40		17.18

Source: Authors' compilation based on U.S. Patent and Trademark Office (1996–2012).
Note: Patenting data from National Science Foundation (1996 to 2012), United States Patent and Trademark Office, University Patent Count & Expenditures. Dependent variable is inverse hyperbolic sine of number of patents granted to a university in a year. Overall state appropriations to higher education used as an instrument are used as an instrument for institution-level state appropriations in the IV regressions. We average log appropriation over the previous three years. All regressions include year and university fixed effects and a control for the size of the cohort age eighteen. Regressions weighted by baseline (1996) enrollment. Standard errors clustered at the university level.

0.8 points, off a baseline mean of 30 points.[20] Indeed, comparisons of the distribution of scores and ranks for both public and private research universities show little movement between 2003 and 2018. Although fourteen of the top thirty U.S. universities were public in 2003, thirteen public universities were among the top thirty in 2018.

Federal Support for Science and Patenting

To examine whether federal support responds to state funding, we obtain university-by-year level data on federal support for science from the NSF Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions. We find little association between state appropriations and federal funding support for research. Indeed, the share of federal dollars received by public research universities has remained virtually constant since 1970.

Last, we obtain data from the U.S. Patent and Trademark Office to examine how funding declines are associated with patenting activity. Regressions of the log of the number of patents on log appropriations show sizable, though imprecise, effects: 0.8 for AAU universities and 0.9 for research universities (table 7). Between the late 1990s and the most recent period, the share of patents taken out by universities that went to public universities fell from a bit over 60 percent to just under 50 percent.

Summary of Impacts on Research Productivity

The direct evidence we have assembled on the effect of the decline in state appropriations to public research universities on research output is mixed. Perhaps our most comprehensive measure involves the Shanghai Rankings, which show only modest effects; however, these rankings span a short period. Data on federal research dollars cover a substantially longer time series and show no effects, though this measure reflects expenditures on inputs, not outputs, and one can imagine some endogenous response to budget cuts, with budget cuts at public research universities inducing re-

20. To put these numbers into context: an effect of 0.8 points is small relative to the difference in scores between University of California, Berkeley (70 points), San Diego (48 points), and Davis (31 points).

searchers to increase efforts to secure federal funding. In contrast to the federal dollars awarded for research, the patent data suggest negative effects of appropriation cuts, but not all fields file patents. Last, we have seen evidence of an effect of appropriations on salaries that suggests reason for concern, though, again, these are measures of expenditures on inputs, not output. Although the direct evidence we have is quite mixed, and it would be difficult, if not impossible, to estimate long-term effects of the decline in state appropriations on research output, it seems very likely that such effects exist. Declining resources will make it harder for universities to attract talented researchers or to provide them with the resources to conduct research. In addition, as tuition makes up an increasing share of public university budgets, it seems likely that public universities, including research universities, will put more emphasis on their teaching missions.

DISCUSSION

The long-standing state-based system for funding public higher education is coming under real strain and may be poorly positioned to respond to changes in the nature of the U.S. economy to increase the supply of college-educated workers. Economic forces are working against the old model of higher education funding in which state appropriations covered the majority of instructional expenses across all public institutions and provided subsidies to cover research infrastructure at flagship universities. The economic return to investments in higher education may be less likely to accrue to the state as a whole than in prior decades: college graduates are mobile in a national market, and though the benefits from research infrastructure may be concentrated in the university communities, they also benefit broader markets.

Writing a bit over a decade ago in an article titled "The Perfect Storm and the Privatization of Public Higher Education," Ronald Ehrenberg (2006) raised concerns that the decline in state support for public higher education would increase the stratification between research universities and broad-access public institutions, ultimately eroding the research capacity at the former and educational resources for students at the latter. The evidence assembled in this article suggests that high-research public universities have started to resemble their private counterparts, as they increasingly depend on tuition revenues and private grants and gifts, while state funding now accounts for a minority share of resources. Our evidence suggests that declining state support for higher education has real effects that have long-term implications for economic productivity and the supply of highly skilled workers in the labor market. First, our estimates, consistent with the evidence in Deming and Walters (2018), indicate that declines in state support have had substantial effects on degree attainment at the bachelor's and postbaccalaureate levels. Second, our results, together with those reported by Aghion and his colleagues (2009), suggest that declining state support for higher education is also likely to have an effect on the research output of public universities.

Our current and past work suggests that expanding full-fee student enrollment at the undergraduate level is an important channel through which selective public research universities buffer changes in state appropriations. Research universities also have the capacity to raise gift and endowment funding to complement tuition revenues. Despite the decline in appropriations, public research universities remain some of the most highly ranked research institutions in the world and can still provide substantial aid to their students. On the other hand, public universities outside the research sector have fewer options to replace lost or stagnating state appropriations, requiring moderated expenditures, increased in-state tuition, and decreases in grant aid. The evidence compiled in this article suggests that such actions might have effects on education attainment and on the quality of education students receive.

Although our work does not support the notion that declining public support for higher education has overwhelmed the public higher education sector, there is reason for some concern. First, public research universities may be unable to continue to replace lost revenue, especially if states continue to cut appropriations, and U.S. education becomes less attractive to full-fee international students. Second, nonresearch universities are not successful at insulat-

ing lower and moderate-income students from tuition increases, which may represent a change in the population that can be served by these public institutions.

APPENDIX: DATA SOURCES AND PREPARATION

The data assembled for this project are organized at the university and academic year and draw on multiple sources including the U.S. Department of Education's IPEDS survey modules, the American Survey of Colleges assembled by the College Board, the National Science Foundation, the U.S. Patent and Trademark Office, and the Shanghai Ranking. In addition, we assembled annual state-level data on state revenues, higher education appropriations, demographics and economic conditions from many sources.

We use the 2010 Carnegie Classification to form groups of public universities. The Carnegie Classification taxonomy classifies institutions by the highest level of degrees awarded and research intensity, measured by factors such as research expenditures, doctorates awarded, and number of research-focused faculty. Among institutions awarding doctorate degrees are three categories: very high research activity, high research activity, and doctoral universities. In all, there are 177 public doctorate-granting universities across eighteen years (1997 to 2014) of which 138 universities are in the first two categories. There are an additional 265 master's institutions. We focus our analysis on research universities, which are defined as the combination of very high and high research activity and create a comparison group of nonresearch institutions as the aggregate of doctoral universities and master's institutions.

University Data: Finance Variables and University Characteristics

The finance module of the IPEDS data collection contains detailed financial information on revenues and expenditures by source and use. These data are the source of our measures of total tuition revenue, expenditures by purpose and state appropriations measures. For 2010 and prior, we use the harmonized files assembled as part of the Delta Cost Project and add the subsequent years from the annual IPEDS files. The institutional characteristics module contains data on in-state and out-of-state tuition charges. We do not use data on University of Texas's tuition prior to 2004 because the Texas legislature had the regulatory authority to set tuition rates, generally mandating that the same statutory and designated tuition rate be charged across the state.[21]

Private gifts, grants, and contracts (from IPEDS) includes revenues from private (nongovernmental) entities including revenue from research or training projects and similar activities and all contributions (including contributed services) except those from affiliated entities, which are included in contributions from affiliated entities. We use the sum of the restricted (subject to limitations by a donor-imposed restriction) and unrestricted amounts.

Salary data are from IPEDS. IPEDS distinguishes salary by academic rank (assistant professor, associate professor, full professor, lecturer, instructor, and so on), and by contract length. We use data on the equated nine-month contract. We use data on nonmedical full-time instructional staff only. Instruction or research staff employed full time (as defined by the institution) whose major regular assignment is instruction, including those with released time for research. For the faculty salaries survey, the group includes faculty designated as primarily instruction and instruction combined with research and public service. We use the average across all workers (men and women).

All the monetary variables (including state appropriations, tuitions and expenditures) are deflated by the Higher Education Price Index. Because most of our regression formulations

21. In 2004, the 78th Legislature passed House Bill 3015, amending Texas Education Code §54.0513 to allow governing boards of public universities to set different designated tuition rates. Tuition deregulation became effective September 1, 2003, and universities began increasing designated tuition in spring 2004 (for more information, see Texas Higher Education Coordinating Board, "Overview: Tuition Deregulation and Tuition Set Asides Report," April 2016, http://www.thecb.state.tx.us/reports/PDF/8035.PDF?CFID=52037689&CFTOKEN=47878139, accessed July 17, 2019).

include the logged monetary variable and fixed effects, the method of deflation for these regressions is inconsequential, and the deflation only affects the figures and levels regressions.

University Data: Enrollment Measures

The enrollment measure we employ is first-time undergraduate enrollment; fall enrollment is recorded in both the IPEDS "Fall Enrollment" module and the Annual Survey of Colleges (ASC), which is assembled by the College Board.

To distinguish domestic students by in- or out-of-state status, we use first-time undergraduate enrollment data from the ASC. The ASC has more detail on the characteristics of admitted and matriculating students than IPEDS measures. When this information is missing in the ASC, we complement the data set with institutional sources (see Missing Data section). In addition to total enrollment, the ASC reports the number of foreign freshmen and the fraction of domestic first year students who are from out of state on an annual basis. Given the fraction of out of state, the number of foreign students, and the total enrollment, we compute in-state enrollment for first-year students. We have verified this approach with the examination of independent reporting at the university level.

University Data: Academic Outcomes

Academic score data (2003 to 2018) comes from the ARWU provided by the Shanghai Ranking in the website. The academic score is based on several indicators of research performance (including alumni and staff winning Nobel Prizes and Fields Medals), highly cited researchers, papers published in *Nature* and *Science*, papers indexed in major citation indices, and the per capita academic performance of an institution. We also look at the three specific components of the score: HiCi score is based on the number of highly cited researchers in twenty-one broad subject categories; N&S score is based on the number of papers published in Nature and Science; and PUB score depends on the number of papers indexed in the Science Citation Index and Social Science Citation Index.

University Data: Patents

Patenting data are from the National Science Foundation (1996 to 2012), and the University Patent Count and Expenditures. These sources compile patenting information from the U.S. Patent and Trademark Office. We harmonize university names in the data and match it to the rest of our data.

State Data: Higher Education Appropriations

State-level data on total appropriations comes from the State Higher Education Finance report provided by the State Higher Education Executive Officers. We use appropriations net of special purpose research dollars and full time equivalent enrollment net of medical students.

State Data: Demographic and Labor-Market Variables

In order to control for changes to the local economy, we compile historical census estimates of the population at age eighteen by state, and Bureau of Labor Statistics data on the state unemployment rate. State General Revenue is from the Tax Policy Center. Medicaid Expenditure from the Center for Medicare and Medicaid Services. State population, personal income, and the indicator on whether the governor is a Democrat is from the University of Kentucky Poverty Center.

State Data: Missing Data

When data elements related to tuition and finances were missing from standard institutional surveys, we attempted to locate the missing elements from the universities' Common Data Sets available on their institutional research webpages and the University of California System (http://universityofcalifornia.edu/uc-system). In addition, we consulted the annual university financial statements (annual financial reports) to locate institutional data on appropriations and revenues when missing from IPEDS. By using the complementary data on enrollment and state appropriations, we add 139 observations (at the level of the year-university) to the research university sample, eighty-four to the flagship sample, forty-nine to the AAU sample, and four to the nonresearch

sample. Our main results are robust to excluding the hand-coded data.

REFERENCES

Aghion, Philippe, Leah Platt Boustan, Caroline Minter Hoxby, and J. Vandenbussche. 2009. "The Causal Impact of Education on Economic Growth: Evidence from U.S." Unpublished paper, Harvard University. Accessed July 17, 2019. https://scholar.harvard.edu/files/aghion/files/causal_impact_of_education.pdf.

Autor, David. 2014. "Skills, Education, and the Rise of Earnings Inequality Among the 'Other 99 Percent.'" *Science* 344(6186): 843–51.

Barr, Andrew, and Sarah Turner. 2013. "Expanding Enrollments and Contracting State Budgets: the Effect of the Great Recession on Higher Education." *The ANNALS of the American Academy of Political and Social Science* 650(1): 168–93.

Baum, Sandy, Michael S. McPherson, Breno Braga, and Sarah Minton. 2018. *Tuitions and State Appropriations: Using Evidence and Logic to Gain Perspective.* Washington, D.C.: Urban Institute Press.

Bell, Julie Davis. 2008. "The Nuts and Bolts of the Higher Education Legislative Appropriations Process." Policy Brief. Boulder, Colo.: Western Interstate Commission for Higher Education.

Bettinger, Eric, and Bridget Terry Long. 2004. "Do College Instructors Matter? The Effects of Adjuncts and Graduate Assistants on Students' Interests and Success." *NBER* working paper no. 10370. Cambridge, Mass.: National Bureau of Economic Research.

Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner. Forthcoming. "A Passage to America: University Funding and International Students." *American Economic Journal: Economic Policy.*

Bound, John, Jeffrey Groen, Gábor Kézdi, and Sarah Turner. 2004. "Trade in University Training: Cross-State Variation in the Production and Stock of College-Educated Labor." *Journal of Econometrics* 121(1–2): 143–73.

Bound, John, Brad Hershbein, and Bridget Terry Long. 2009. "Playing the Admissions Game: Student Reactions to Increasing College Competition." *Journal of Economic Perspectives* 23(4): 119–46.

Bound, John, and Harry J. Holzer. 2000. "Demand Shifts, Population Adjustments, and Labor Market Outcomes During the 1980s." *Journal of Labor Economics* 18(1): 20–54.

Bound, John, Michael Lovenheim, and Sarah Turner. 2010. "Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources," *American Economic Journal: Applied Economics* 2(3): 129–57.

Bound, John, and Sarah Turner. 2007. "Cohort Crowding: How Resources Affect Collegiate Attainment." *Journal of Public Economics* 91(5–6): 877–99.

Bowen, William, and Michael S. McPherson. 2016. *Lesson Plan: An Agenda for Change in American Higher Eduacation*. Princeton, N.J.: Princeton University Press.

Card, David, Alexandre Mas, Enrico Moretti, and Emmanuel Saez. 2012. "Inequality at Work: The Effect of Peer Salaries on Job Satisfaction," *American Economic Review* 102(6): 2981–3003.

Chakrabarti, Rajashri, Nicole Gorton, and Michael F. Lovenheim. 2018. "The Effect of State Funding for Postsecondary Education on Long-Run Student Outcomes." Working paper. New York: Federal Reserve Bank of New York.

Cheit, Earl. 1971. *The New Depression in Higher Education: A Study of Financial Conditions at 41 Colleges and Universities.* Berkeley, Calif.: Carnegie Commission on Higher Education.

College Board, Annual Survey of Colleges (ASC), 1996–2012. New York: College Board.

Cook, Emily, and Sarah Turner. 2018. "Pricing Public Higher Education: Responses to Appropriations Changes in a Market Context." Working paper. Charlottesville: University of Virginia.

Deming, David J., and Christopher R. Walters. 2018. "The Impacts of Price and Spending Subsidies on U.S. Postsecondary Attainment." Working Paper. Berkeley: University of California. Accessed July 16, 2019. https://eml.berkeley.edu//~crwalters/papers/deming_walters.pdf.

Ehrenberg, Ronald G. 2006. "The Perfect Storm and the Privatization of Public Higher Education." *Change* 38(1)(January/February): 45–53.

Ehrenberg, Ronald G., Michael J. Rizzo, and George H. Jakubson. 2007. "Who Bears the Growing Cost of Science at Universities." In *Science and the University*, edited by Paula E. Stephan and Ronald G. Ehrenberg. Madison: University of Wisconsin Press.

Ehrenberg, Ronald G., and Liang Zhang. 2005. "Do Tenured and Tenure-Track Faculty Matter?" *Journal of Human Resources* 40(3): 647–59.

Goldin, Claudia, and Lawrence F. Katz. 1999. "The Shaping of Higher Education: The Formative Years in the United States, 1890 to 1940." *Journal of Economic Perspectives* 13(1): 37–62.

Hoxby, Caroline M. 2009. "The Changing Selectivity of American Colleges." *Journal of Economic Perspectives* 23(4): 95–118.

Kane, Thomas, Peter Orszag, and Emil Apostolov. 2005. "Higher Education Appropriations and Public Universities: Role of Medicaid and the Business Cycle." *Brookings-Wharton Papers on Urban Affairs* (2005): 99–146.

Labaree, David F. 2017. *A Perfect Mess: The Unlikely Ascendancy of American Higher Education.* Chicago: University of Chicago Press.

McDuff, DeForest. 2007. "Quality, Tuition, and Applications to In-State Public Colleges." *Economics of Education Review* 26(4): 433–49.

Moretti, Enrico. 2013. "Real Wage Inequality." *American Economic Journal: Applied Economics* 5(1): 65–103.

Shanghai Ranking. 2018. "Academic Ranking of World Universities 2018." Accessed July 16, 2018. http://www.shanghairanking.com/ARWU2018.html.

Snyder, Thomas D., Cristobal de Brey, and Sally A. Dillow. 2019. *Digest of Education Statistics 2017* (NCES 2018-070). Washington: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Accessed August 6, 2019. https://nces.ed.gov pubs2018/2018070.pdf.

State Higher Education Executive Officers (SHEEO). 1980–2018. State Higher Education Finance (SHEF). Accessed June 1, 2018. https://sheeo.org/project/state-higher-education-finance/.

Tax Policy Center. 1980–2016. State and Local Finance Data Query System. Accessed June 1, 2018. https://slfdqs.taxpolicycenter.org/index.cfm.

Thurgood, Lori, Mary J. Golladay, and Susan T. Hill. 2006. "U.S. Doctorates in the 20th Century." NSF 06–319. Arlington, Va.: National Science Foundation, Division of Science Resources Statistics.

Turner, Sarah E. 2014. "The Impact of the Financial Crisis on Faculty Labor Markets." In *How the Financial Crisis and Great Recession Affected Higher Education*, edited by Jeffrey R. Brown and Caroline M. Hoxby. Cambridge, Mass.: National Bureau of Economic Research.

U.S. Department of Education, National Center for Education Statistics. 1996–2012. Integrated Postsecondary Education Data System (IPEDS). Accessed June 1, 2018. https://nces.ed.gov/ipeds/.

U.S. News and World Report. 2018. "Best Colleges." Accessed December 7, 2018. https://www.usnews.com/best-colleges.

U.S. Patent and Trademark Office. 1996–2012. "University Patent Count and Expenditures." Accessed June 1, 2018. https://developer.uspto.gov/visualization/university-patent-count-expenditures.

Webber, Douglas A. 2017. "State Divestment and Tuition at Public Institutions." *Economics of Education Review* 60(1): 1–4.

Winston, Gordon C. 2000. "Economic Stratification and Hierarchy in U.S. Colleges and Universities." DP-58. Williamstown, Mass.: Williams Project on the Economics of Higher Education. Accessed July 16, 2019. https://sites.williams.edu/wpehe/files/2011/06/DP-58.pdf.

Zoghi, Cindy. 2003. "Why Have Public University Professors Done Do Badly?" *Economics of Education Review* 22(1): 45–57.

PART II

Making Work Pay: The Fair Labor Standards Act, Unions, and Firm Compensation Policy

Wages and Hours Laws: What Do We Know? What Can Be Done?

CHARLES C. BROWN AND DANIEL S. HAMERMESH

We summarize recent research on the wage and employment effects of minimum wage laws in the United States and infer from non-U.S. studies of hours laws the likely effects of unchanging U.S. hours laws. The effective minimum wage, increasingly a province of state government, is now closely related to the lower end of a state's wage distribution. Original estimates demonstrate how the forty-five-year failure to increase the exempt earnings level for salaried workers has raised hours of lower-earning salaried workers and reduced their weekly earnings. The overall conclusion from the literature and the original work is that wages and hours laws in the United States have produced impacts in the directions predicted by economic theory, but that these effects have been quite small.

Keywords: minimum wages, overtime, employment, hours, labor regulation

In most markets, we concern ourselves with two dimensions—price and quantity. In labor markets too we concentrate on price (broadly, compensation per hour, of which the hourly wage is the largest component); but in considering quantity we examine both its incidence—the number of employees—and its intensity—hours per employee. In the United States, the Fair Labor Standards Act (FLSA) of 1938 has regulated the wage rate by setting a minimum on what can be paid in covered employment and has mandated premium or penalty pay on weekly hours per worker above some level for nonexempt workers in covered industries and firms.

Here we review recent policy developments and try to synthesize what we know about the economic effects of these two major methods by which we regulate labor markets. Although wages and hours are regulated under the same law, policy developments and research on the law's impacts could not be more different between the two areas. The federal minimum wage has been raised numerous times; and many

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subfederal jurisdictions impose their own wage minima that, where they exceed the federal minimum, supersede it. Perhaps because of this variation, a huge literature examining the effects of minimum wages on the U.S. labor market has arisen and has continued to burgeon. A fair conclusion is that American labor economists have spilled more ink per federal budgetary dollar on this topic than on any other labor-related policy. The opposite is the case for regulating hours. The essential parameters of hours regulation have not changed since passage of the act; and perhaps because of this, the dearth of research on the economic impact of hours regulation in the United States, especially recently, is remarkable.

Because of these contrasts, for the minimum wage we summarize and evaluate recent legislative changes and synthesize the large number of recent studies that have examined the effects of minimum wage laws on wages and employment in the United States. In the case of overtime pay, we evaluate the impact of a provision of the regulations that has not changed in forty-five years, and we synthesize the likely impact of changing other provisions of the law on employment, hours, and wages by examining international evidence.

MINIMUM WAGE LAWS IN THE UNITED STATES: WHAT WE KNOW

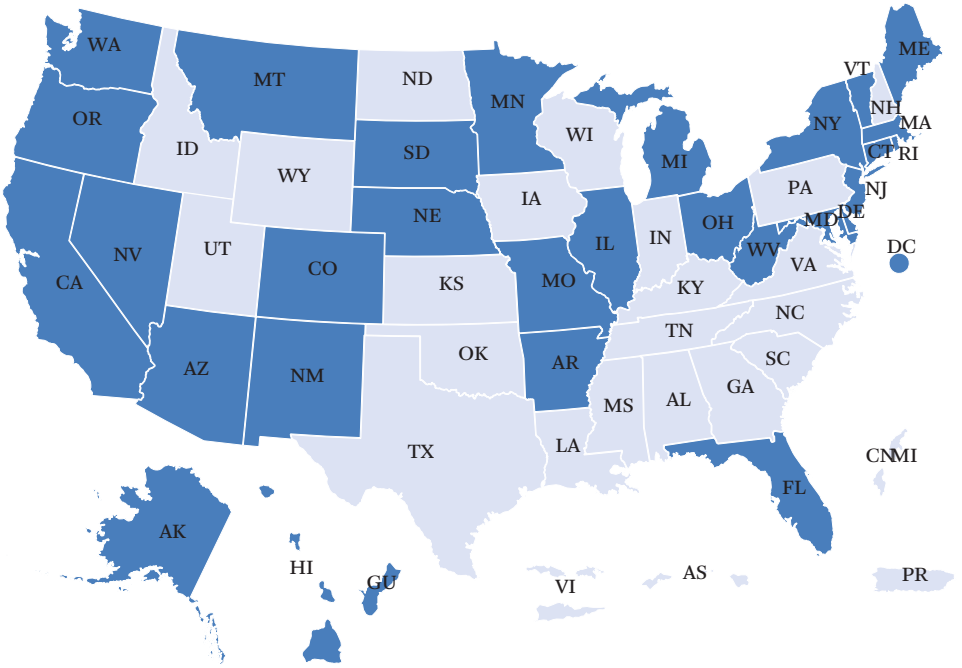
The FLSA initially set the federal minimum wage at $0.25 (roughly $3.50 today, using the personal consumption expenditure deflator), to increase to $0.30 the following year; coverage was limited to workers engaged in or producing goods for interstate commerce. Since then, the nominal minimum has been increased nine times (often in multiyear installments). Given periodic nominal adjustments, the impact of the law has followed a saw-toothed pattern, increasing discretely when a higher minimum wage was mandated and then eroding gradually until the next hike. These adjustments have become less frequent over time—roughly twice a decade in the 1960s and 1970s, once a decade since. Coverage of the law was also expanded, most notably to include workers in construction and large retail trade and service employment in 1961 and 1966 (U.S. Department of Labor 2018).

State legislation can matter in two ways: by extending coverage to small employers who are exempted from the federal law and by requiring a higher minimum than the federal law for existing covered employers. State-level coverage became less important as federal coverage expanded through the 1970s. Over the past thirty years, however, states' decisions to increase their minimum wages have become increasingly important given that the federal minimum has changed less frequently. For example, in 2010 (after the 2007 federal increases had become fully effective) only one-third of the workforce was in states with state minima that exceeded the federal $7.25. By 2016, with the federal minimum still at $7.25, that fraction had risen to nearly two-thirds. As of 2018, twenty-nine states, shown shaded dark in figure 1, had minimum wages above $7.25.

States that have raised their minimum wages above the federal minimum have tended to be high-wage states, and the result has been a minimum wage much more closely (though still imperfectly) aligned with local wages. A simple way of summarizing this relationship is to regress the logarithm of the minimum wage in each state (the higher of the federal or state minimum) on the logarithm of the wage rate at the 25th percentile in the state (from the Occupational Employment Survey). For 2010, this regression yields an elasticity of 0.28, $R^2 = 0.27$. Only six years later, the combination of federal gridlock and state activism had raised the elasticity to 0.98, $R^2 = 0.54$. The pattern is similar, though a bit less dramatic, using the median wage rather than the wage at the 25th percentile as the measure of local market wages.

Supporters of the minimum wage often argue that a skillfully set minimum raises wages at minimal cost to employment, but that further increases threaten unacceptable employment losses (Castillo-Freeman and Freeman 1992; Krueger 2015). It is difficult to imagine that the point at which the wage gain–employment loss trade-off becomes too steep is the same in all states. It seems likely that an ideal minimum wage would vary geographically, in line with wages at some relevant percentile of the local wage distributions. As states seem to have overcome the fear that a higher minimum wage will drive business to other states, they

Figure 1. States with Minimum Wages that Exceed the Federal Minimum (in Darker Shade)



Source: U.S. Department of Labor 2019.

have produced a pattern of minimum wages that approximates a national minimum wage indexed to local wage distributions.[1]

Evolution of Research Strategies for Studying Effects of the Minimum Wage

The increasing role of the states in determining minimum wage policy has led to greater cross-sectional variation in the minimum and provided the basis for a new generation of research on its effects. But the new work has not simply adopted the specifications used in earlier generations of research. Having more years of data and more variation than in earlier years has encouraged researchers to be more ambitious in attempts to control for other factors that may influence low-wage labor markets.

At the time of the Minimum Wage Study Commission, 1979 to 1981, the available literature was based largely on simple aggregate (national) time-series regressions of the teen employment–population ratio on a minimum wage variable and other variables to control for cyclical forces and longer-term trends (Brown, Gilroy, and Kohen 1982). What we used to call the New Minimum Wage research introduced two important advances. First, variation in state minimum wages and in the "bite" of the federal minimum wage in high- versus low-wage states led to estimation based on state-by-year observations. Most of the data came from tabulations from the Current Population Survey (CPS), which included demographic variables, employment status, wages, and state identifiers. A typical study included fixed effects for state and year and a small number of state-by-year variables as controls. Second, based on surveys of samples of employers, David Card and Alan Krueger (1994) and David Neumark and William Wascher (2000) studied the response of New Jersey fast-food restaurants to a 1992 minimum wage increase, com-

1. A recent proposal by Representative Terri Sewell of Alabama would formalize this by grouping metropolitan and nonmetropolitan areas into five tiers based on regional price parity data (Sewell 2019). The federal minimum wage in the highest tier would be about 30 percent higher than in the lowest tier. Each tier would then be indexed, though from a lower base level than under most competing proposals.

paring outcomes there to those of nearby employers in Pennsylvania who were bound only by an unchanging federal minimum—a cross-border approach.

The 2010s have seen significant further developments of both new approaches. As the state-by-year panels became richer—more years and more state-level variation—researchers have been able to control for state-specific trends. And as more states have increased their minimum wages, researchers have extended the cross-border estimation strategy to exploit the large number of experiments provided by employers in adjacent counties in different states facing different minimum wages. In some cases, these studies follow the state-by-year panels in adding area- (typically, county-) specific time trends as controls; others adopt an alternative specification in which each border-county pair in each time period has its own fixed effect. These studies relate differences in wages or employment in border-county pairs to differences in minimum wages across the border.

In the experimental paradigm, each of these approaches can be thought of as comparing outcomes in a treated state or county affected by a minimum wage increase to those in a control area. The border-county approach explicitly identifies the county across the border as the comparison group—that is, as the basis for inferring what would have happened in the treated county but for the higher minimum wage there. But geographic proximity need not be a reliable indicator of underlying similarity. "Synthetic" control groups (Abadie, Diamond, and Hainmueller 2010) have provided an alternative strategy for identifying what would have happened in a state or county absent a change in the minimum wage.[2]

A smaller literature evaluates the effects of local minimum wage laws. We do not focus on these here, for two reasons. First, it is challenging enough to do justice to the large and very diverse literature on state and federal minimum wages; comparisons for local legislation would require a separate study. Second, given the evidence that the estimated effects of individual state-level changes are quite dispersed, as Arindrajit Dube, William Lester, and Michael Reich (2010) have shown, it is not clear that we have enough local ordinances to have any confidence that results from the small number of early adopters would generalize to other cities.

Recent Evidence on the Effects of Minimum Wage Laws on Wages and Employment

Studies of the effects of the minimum wage on employment have generally focused either on teenagers or on workers in the restaurant industry. This focus is largely due to the relatively large share of minimum wage workers in both groups. For example, Dube, Lester, and Reich (2016) report that, during the 2000 to 2011 period they study, 30 percent of teenagers and 23 percent of restaurant workers earned within 10 percent of the minimum wage in effect in their states. Given that a minority of workers are directly affected by the minimum wage even in these relatively minimum wage intensive groups, the elasticity of the average wage with respect to the minimum wage will be much less than one, and the elasticity of employment will be much less than a conventionally estimated elasticity of labor demand (Neumark 2019).

Studies of teenagers have traditionally relied on CPS data. A recent addition to our data arsenal, the Quarterly Workforce Indicators (QWI), matches information about payroll and employer industry from Unemployment Insurance records to a limited set of demographic variables, primarily taken from Social Security records. Researchers who focus on low-wage industries have tended to rely on the Quarterly Census of Employment and Wages (QCEW), which provides data on payroll and employment (but not worker demographics) from essentially all employers. The QWI and QCEW both provide data by county, which are often used to study adjacent counties in states with different minimum wages. The wage measure is weekly earnings and so also captures any changes in hours worked per week.

An overview of recent work is presented in

2. Alberto Abadie and his colleagues had nineteen years of data prior to treatment and thirty-eight untreated states from which to form a synthetic control group (for California, which was treated with an antismoking program in 1989).

Table 1. Elasticities from Recent Studies of the Employment and Wage Impacts of Higher Minimum Wages

				Teenagers		Restaurant Workers	
Authors Year Data[†]	Years	Areas	Controls	E*	W*	E*	W*
Neumark, Salas, and Wascher 2014 CPS	1990–2006	States	Synthetic controls	−0.145[#]			
—— QCEW	1990–2011	Border counties	State and quarter FE			−0.112	
Addison, Blackburn, and Cotti 2015 QCEW	1990–2014	Counties	State and year FE			−0.067	0.222[#]
—— QCEW	1990–2014	Counties	County-specific trends			−0.043[#]	0.171[#]
Dube, Lester, and Reich 2016 QWI	2000–2011	Border counties	Period x pair FE	−0.059	0.222[#]	−0.022	0.207[#]
Allegretto et al. 2017 CPS	1979–2014	States	State-specific trends	−0.062	0.228[#]		
—— CPS	1990–2014	Border counties	Period x pair FE			0.023	0.209[#]
Liu, Hyclak, and Regmi 2016 QWI	2000–2009	Counties	Area-specific trends	−0.173[#]	0.209[#]		
Totty 2017 QCEW	1990–2010	Counties	Factor model			−0.013	0.231[#]
—— CPS	1990–2013	States	Factor model	−0.040	0.097[#]		
Brummund and Strain 2019 QCEW	1990–2016	Border counties	Period and pair FE			−0.153[#]	.236[#]

Source: Authors' compilation.

Note: For detail, see table A1.

[†]CPS = Current Population Survey, QCEW = quarterly census of employment and wages, QWI = quarterly workforce indicators.

*E = employment; W = hourly earnings in CPS, weekly earnings in QCEW and QWI.

[#]Significantly different from zero at the 90 percent level of confidence.

table 1. (Table A1 presents a less condensed summary, with more specifications and with standard errors for each estimate.) A robust finding is that minimum wage laws raise the wages of teenagers, with an elasticity of about 0.20. This is roughly in line with a naïve model in which the wages of teenagers who initially earn less than the minimum are raised up to that level, and better-paid teens are unaffected.

Variation is substantially greater in the estimated effects on employment, which is largely due to the different strategies used to control for the effects of determinants of employment that are not explicitly included in the analysis. The estimates are also often sensitive to the choice of sample period. Thus, for example, Neumark, Ian Salas, and Wascher (2014) begin with what they call a standard panel data model—fixed effects for year and state—and estimate an employment elasticity of −0.165 (SE = 0.041). They then add linear state-specific trends, mirroring Sylvia Allegretto, Dube, and Reich (2011), which leaves a much smaller and statistically insignificant employment elasticity, −0.074 (SE = 0.078). They then consider more flexible polynomials, leading to estimates that approximate those when no state-specific trends are included. Similarly, allowing region by year fixed effects greatly reduces the original Allegretto, Dube, and Reich estimate.

Just when we thought we had discovered a stable pattern of instability, Allegretto and her colleagues (2017) report that when their sample is extended to 1979 through 2014 estimates without state-specific time trends remain negative and significant. But including state-specific trends—whether linear or a higher-order polynomial—greatly reduces the estimated impacts and leaves them statistically insignificant. They then attempt to let the data decide the appropriate set of control variables, using a LASSO procedure. The optimal specification produces estimates similar to those using state-specific trends, but chooses a subset of linear trends and one set of region-period fixed effects. Perhaps this is optimal for prediction, but it certainly does not allow any understanding of what economic factors the chosen set of controls might represent.

Although variations in specification matter, so does the period being considered: Neumark, Salas, and Wascher (2014) report that a model with linear state-specific trends produces an employment–minimum wage elasticity of −0.229 (SE = 0.095) with data from 1994 to 2007, but only −0.074 (SE = 0.078) when the sample period is extended to 1990 to 2011.

The sensitivity of the estimates to the introduction of these additional control variables has led researchers to consider an alternative strategy—synthetic controls. For a state experiencing a minimum wage increase in year t (that is, treated in t), the procedure selects a set of untreated states that are similar in terms of teen employment or other related variables. The difference between teen employment in the treated state and a weighted average of the nontreated states (the synthetic control) is an estimate of the effect of treatment.

When analyzing the minimum wage, the set of untreated states is constantly changing, and identifying untreated states requires a relatively short memory. (Operationally, in these studies *untreated* means not treated recently, given that even currently untreated states might have seen changes in minimum wages in the past.) It is therefore perhaps not surprising that the results of studies using these synthetic (data-driven) controls vary greatly depending on the criteria for choosing the controls. David Powell (2017) proposes estimating the control group weights and the treatment (that is, minimum wage) effects simultaneously, making it "unnecessary to make the distinction between ever-treated and never-treated units." The resulting employment–minimum wage elasticity, −0.45, is larger than the typical estimate, but the 95 percent confidence interval extends almost up to 0. Although his method allows for inclusion of traditional time-varying controls, Powell does not include them on grounds that they are potentially affected by the minimum wage.

The rightmost columns of table 1 show estimates of the effect of the minimum wage on employment in the restaurant industry. Once again, minimum wage increases raise wages, again with an elasticity of about 0.20. The employment elasticities are somewhat less varied than those for teenagers, although in specifications with county-specific trends, matched border-pairs, or synthetic control groups the estimates are often not significantly different

from zero. In a broader sample of low-wage industries, Radhakrishnan Gopalan and his colleagues (2018) report a larger elasticity (–0.026 [SE 0.012]), all of which comes from changes in tradeable goods industries.[3] Doruk Cengiz and his colleagues (2019) report a broadly similar pattern.

What one makes of the wealth of estimates in table 1 may depend on why one is interested in them. If the goal is to test predictions of standard labor demand theory, we might view an estimated elasticity of –0.12 (SE = 0.05) as confirming the theory, while –0.06 (SE = 0.05) sends a much less clear signal. But from a policy perspective, the two estimates are both "small"—small enough that the earnings gains caused by a minimum wage increase are only partially offset by employment losses. It is this perspective that led Richard Freeman (1996, 639) to describe the minimum wage as "a risky but potentially 'profitable' investment in redistribution."

A related literature focuses on the effects of minimum wages on job transitions. Both Dube, Lester, and Reich (2016) and Kaj Gittings and Ian Schmutte (2016) report that accession and separation rates fall (for teenagers and restaurant workers) in response to higher minimum wages. A decline in separations is not predicted by frictionless models, but is consistent with search models with employed workers less likely to encounter a better opportunity and so less likely to leave jobs voluntarily; Gopalan and his colleagues (2018) find that the entire employment reduction in their sample following minimum wage increases comes from reduced hiring.

Conclusions and Concerns About Minimum Wage Effects

For both teenagers and workers in the restaurant industry, the employment effects of the minimum wage are often but certainly not always estimated to be negative. In general, studies that control more aggressively for other factors that might affect employment and wages (such as by including state-specific trends) tend to find smaller effects of minimum wages on employment, while the effects on wages tend to be more robust. As a rule, proportional reductions in employment tend to be smaller than (weekly) wage gains, more clearly in the studies that attempt to control for more unmeasured factors. The sensitivity of the estimates to choices about specification is noted in an earlier survey (Belman and Wolfson 2014). It remains despite the fact that newer studies have more data and often better-detailed empirical strategies (Neumark 2019).

The bottom line that employment effects are fairly small comes with three important caveats. First, although focusing on groups with relatively high concentrations of low-wage workers, such as teenagers, makes sense from a statistical point of view, impacts on workers who are likely to be members of low-income families—or on the income of poor households—would be of greater policy interest. The focus on teenagers arises partly from historical accident. The early time-series studies relied on employment data tabulated from the CPS and published by the Bureau of Labor Statistics (BLS), and such data were not available for dropouts or heads of single-parent families. Recent work by Jeffrey Clemens and Michael Strain (2018) suggests that the effect on "low-skilled" workers—those ages sixteen to twenty-five who have not completed high school—may be larger than the effect on teenagers generally. Comparing states that increased their minimum wage by more than a dollar following the federal minimum wage increases in 2007 through 2009 to those that remained at the federal minimum, they find much larger employment elasticities for low-skilled workers (on the order of –0.40) than for young (sixteen through twenty-one) adults (roughly –0.16).[4] Interestingly, states with increases below a dollar above the federal minimum show no reductions in

3. Gopalan and his colleagues use payroll-like data from Equifax with nearby states as controls. Although this data source includes individual-level wage and turnover data, the sample is skewed toward larger and, apparently, multilocation employers, for whom shuffling production across locations would be relatively easy.

4. Clemens and Strain do not report elasticities, and their estimates for young adults differ between those based on the American Community Survey and the CPS. The text reports our attempt to construct traditional elasticities with respect to the minimum wage, averaged over the two data sets.

employment in either group, consistent with the notion that the minimum "bites" more strongly the higher it is raised.[5]

Second, the debate among researchers about how actively one should control for unmeasured factors is intense. Such controls provide protection against omitted-variable bias, but at the cost of statistically eliminating minimum wage variation that is correlated with the controls. The additional controls do not lead to imprecise minimum wage estimates—typically, the standard error of the minimum wage variable is reduced. Progress on this front is likely to depend on the ability to identify what economic forces such variables as state-specific trends actually represent.

Finally, the impacts discussed so far are all short term; but policy should be based on longer-term effects. Given longer data series for each state and more states altering their minimum wages, researchers have used distributed-lag specifications to try to tease out the long-run effects of a higher minimum wage. Both Allegretto and her colleagues (2017), on teenagers, and Dube, Lester, and Reich (2010), on restaurants, report cumulated employment effects after three or four years that are not appreciably different from the current-period estimates. Isaac Sorkin (2015) argues that this specification cannot recover long-term effects in an environment where capital adjustment is slow (for example, in the model the capital-labor ratio is fixed, so adjustment comes from entry and exit). Indeed, the effects of a saw-toothed increase are small, and the cumulative effects on employment decline rather than increase as time passes since a minimum wage was increased. Daniel Aaronson, Eric French, and Sorkin (2018) find that both exit and entry of limited service restaurants (especially chains) rise following an increase in the minimum wage, with somewhat more exit than entry, while employment at restaurants remaining in business stays flat, consistent with Sorkin's model.[6] In their calibrated model, the long-run effects are two to five times larger than the short-run estimates, and the ratio is sensitive to estimates of minimum wage labor's share of costs and to ex ante substitution possibilities between capital and labor. Given that they find much less evidence of entry and exit effects in other low-wage industries, the ratio of long- to short-run effects in low-wage labor markets remains uncertain.

One relatively uncontroversial implication of the Sorkin and Aaronson, French, and Sorkin models is that long-term responses to increases in minimum wages depend on employers' expectations about future increases. In the absence of data on these expectations, the experience of states that have indexed their minimum wage may help identify long-term effects—at least if, in forming expectations, employers assume that indexing provisions will remain in place. Early evidence suggests that indexing may matter. Peter Brummund and Strain (2019) allow the effect of the minimum wage on employment to differ in states that have indexed their minimum wage compared to those that have not. In their preferred specifications (with county and period fixed effects or using border-county pairs) the effect of an indexed minimum wage is about three times the effect of that in non-indexed states; but when border-pair multiplied by time-effects are allowed, there is no effect of either indexed or unindexed minimum wages. Clemens and Strain (2018) do not find further employment losses in 2015 and 2016 among states that had previously indexed their minimum wage.

5. Studying low-wage workers directly is difficult, because wages change from job to job and, of course, are changed by the minimum wage. Clemens and Michael Wither (2019) focus on workers paid less than $7.50 before the federal minimum wage increased from $6.55 to $7.25 and find very large employment losses in states where the federal increase was fully binding—from a relatively small increase. Cengiz and his colleagues (2019) report that minimum wage increases reduce employment below the new minimum but increase employment at and above the new minimum, for no net loss—and that this applies to workers who had been employed prior to the increase. The conflicting messages of these two studies are difficult to reconcile.

6. Card and Krueger (2015) find some evidence of entry, but essentially no exit, by one chain—McDonald's—between 1986 and 1991. Exit rates are very low, overall, in their sample, relative to those in Aaronson, French, and Sorkin.

OVERTIME LAWS AND FLSA OVERTIME: WHAT WE KNOW

In the eighty years since the FLSA was enacted, the specification of its crucial parameters regulating hours—a penalty rate of 50 percent extra wages on hours beyond the standard weekly hours (H_S) of forty—has not changed. The only changes have been extensions of coverage to additional industries and firms, all of which were complete by the mid-1970s, and alterations in the weekly earnings above which salaried workers are presumed exempt from the law. Similarly, no major changes have been effected in state overtime laws. Indeed, most states simply extend the FLSA's provisions to some otherwise uncovered workers. Only Alaska, California, Colorado, and Nevada have mandated overtime penalties on daily work schedules beyond eight hours, varying the application of this mandate over the years.[7] Although this additional requirement does alter labor-market outcomes (Hamermesh and Trejo 2000), it too has not changed in the last two decades. In short, because of their remarkable constancy, U.S. overtime laws do not provide as fertile a field for evaluating policy as the regulation of wages. Not surprisingly, therefore, little research on them has been produced in the United States in the last decade.

This absence does not mean that overtime regulations have been neglected in debates over labor-market policy. A repeated topic has been the substitution of comp time for overtime pay, that is, allowing employers to offer workers time off in lieu of the 1.5 times their wage rate that they would otherwise receive for overtime hours worked. This proposal regularly resurfaces in Republican-controlled Congresses, as it did in 2017 (115th Congress, H.R. 1180), passing the House of Representatives but stalling in the Senate. Evaluating its potential impacts is extremely difficult because the extent to which employers and workers would wish to avail themselves of the opportunity to substitute more time off for additional pay is unclear.

The only other policy issue that has seen serious recent debate in the United States is the dollar amount above which white-collar (salaried) workers can be considered presumptively exempt from the FLSA's overtime provisions. This limit, set at $455 per week in the mid-1970s, has not changed in more than forty years. As shown in figure 2, its erosion in real terms is such that, though the limit was nearly 200 percent of median weekly earnings in the United States in 1979, today it is barely above 50 percent (based on calculations using the CPS-MORG for the years from 1979 to 2017). As the figure also shows (right vertical axis), the percentage of the workforce that is salaried, although varying slightly, has remained between 42 and 46 percent for the past four decades. The rough constancy of this percentage of workers means that the dollar limit has become decreasingly relevant for nearly half the U.S. workforce.

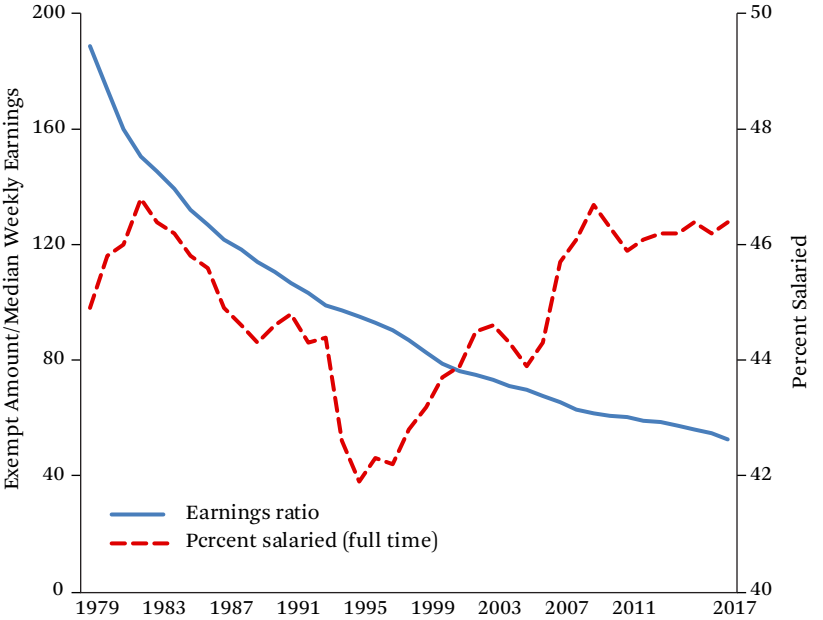
To extend overtime protection to more salaried workers, the Obama administration, after lengthy discussion, issued a rule in 2016 raising the limit to $913 per week and indexing it beginning in 2020 to wages at the 40th percentile of the distribution of earnings of full-time salaried workers.[8] This rule would have extended the overtime provisions of the FLSA to more than 20 percent of all full-time salaried workers, as many as an additional 6 percent of all American workers. An injunction was issued before the rule became effective, and it was struck down by district and appellate courts in 2017.

The economic outcomes that might be affected by changes in the provisions of overtime laws are employment, hours per worker, overtime hours per worker, and the hourly wage rate (and thus total earnings). For employment, the implications of decreasing H_S (the standard workweek), increasing the penalty, or extending coverage are clear: because employers sub-

7. Wage and Hour Defense Institute, "State-by-State Wage and Hour Law Summary," January 1, 2018, https://shermanhoward.com/wp-content/uploads/2016/02/WHDI-2016-State-By-State-Chart.pdf, accessed June 30, 2019.

8. Wage and Hour Division, Department of Labor, "Defining and Delimiting the Exemptions for Executive, Administrative, Professional, Outside Sales and Computer Employees," Federal Registrar, May 23, 2016, https://www.federalregister.gov/documents/2016/05/23/2016-11754/defining-and-delimiting-the-exemptions-for-executive-administrative-professional-outside-sales-and, accessed June 30, 2019.

Figure 2. FLSA Overtime-Exempt Limit



Source: Authors' calculations based on CPS-MORG weekly earnings.

stitute workers for hours when the price of the latter increases, which it will with all these changes, more binding overtime laws are a job creator. The issue, of course, is how many jobs, and whether any induced increase in employment would be large enough to prevent total labor input from decreasing. It will not be that total worker hours will decrease because of the scale effect induced by the higher price of labor at the margin (Hamermesh 1993).

Hours per worker overall will decrease with the greater stringency of overtime laws, but the changes depend on where the worker would be in the distribution of work hours. Those working less than H_S when coverage is extended or the penalty rises, and those whose hours are below any new, lower H_S, will be unaffected or might even see their hours increase as employers shift away from the now more expensive workers who had put in more than H_S hours per week. Lowering H_S makes hours of workers who were already covered and nonexempt, whose hours exceed the previous H_S, more expensive. It produces scale effects on employers' demand for them but does not affect the price of a marginal hour of their work time.

Those workers who become covered or whose hours are newly partly subject to a penalty will see their weekly hours reduced—those hours have become more expensive at the margin, generating both substitution and scale effects. Moreover, their hours will be more likely to be at the corner solution of forty per week. These are the least ambiguous theoretical predictions about overtime laws: the laws will reduce the hours of those workers who were not affected by them, either because they were exempt or uncovered, or because their hours were below the previous H_S but above the new H_S. Even though their total hours will fall, their hours that are paid as overtime hours will rise.

This discussion assumes that these changes do not alter hourly wage rates. The evidence shows that expansions of overtime laws do reduce wage rates (Trejo 1991). That is to be expected. Given a supply of labor to firms and the market that is not perfectly inelastic, offering some workers a higher return on the marginal hour of their work time induces them to supply more effort. That enables employers to offer lower straight-time pay per hour. A strong prediction is that hourly wage rates will decrease as overtime provisions become more stringent. Coupled with receipt of overtime pay for more

hours, whether the cut is enough to reduce total earnings is unclear. But because of it, and because of the induced cuts in weekly hours, we can be sure that earnings will rise by less than the product of 50 percent of any previous hourly wage and previous hours exceeding the new H_S.

International Evidence on the Effects of Overtime Laws

Since 2006, nine studies examining changes in overtime laws in seven different countries have been published. We summarize them in table 2, detailing the legislated changes and their impacts on the essential economic outcomes—overtime hours, hours per worker, the hourly wage rate, and earnings. No study presents estimates of effects on employment, and none offers evidence on all outcomes; but on each of the other outcomes we have evidence from at least two studies. Except for the French tax waiver that Pierre Cahuc and Stéphane Carcillo (2014) examined, all the research summarized in the table deals with changes that extended overtime protection by reducing H_S.

The most frequently studied outcome in this recent research has been the impact on total hours. The results are unanimous and consistent with the theory: reducing H_S, thus subjecting more weekly hours to overtime penalties, leads employers to cut total worker hours. The reductions in hours are concentrated among those workers whose hours had been below the previous H_S but above its new lower level. The somewhat sparser evidence shows that overtime hours decrease as overtime laws become more stringent.

The direct evidence on changes in wage rates and earnings from these foreign legislative changes is ambiguous—in some of the cases wage rates rise, in others they fall. The impacts on total earnings are varied, but typically tiny. Given the decreases in hours, the minute effects on earnings suggest that declines in wage rates eat up much of the impact of broader applications of overtime laws.

Given the likely conclusion that expansions of overtime provisions decrease total hours through demand-side effects, but that they produce at worst small decreases in weekly earnings, the question is whether workers benefit from this trade-off—from sacrificing a bit of income to obtain a reduction in their work time. Comparing life satisfaction of affected workers in Japan and Korea before and after legislated decreases in H_S, Hamermesh, Daiji Kawaguchi, and Jungmin Lee (2017) show that they were happier after being forced to accept this trade-off, which changes in Japanese and Korean hours legislation induced employers to make.

Measuring the Impact of the Erosion of the FLSA Exempt Level

No doubt because of the absence of major changes in the law, only one scholarly economic study of U.S. overtime laws has been published in the past ten years (Barkume 2010). Using detailed information on the quasi-fixed costs of labor from the BLS National Compensation Survey, the study finds that lower hourly wages are associated with more use of overtime in a plant. Although large numbers of establishment-based covariates are accounted for, the absence of any exogenous shock that might be altering these outcomes means that the study cannot, and does not, claim that the relationship is causal. The current catchphrase in applied microeconomics being "causality über alles," this makes it difficult to assess whether any changes in the law's parameters would affect outcomes.

Despite the absence of legislated changes, the law's economic effects may have changed. Because the nominal exempt level for salaried workers has been fixed at $455 for more than forty years, the hours, wages, and other conditions of some workers who would have been affected by the FLSA overtime provisions are no longer affected because of its erosion in real terms. This is the treatment group, Group T, defining treatment as removal of presumptive nonexempt status. It works out that the salary limit in this group for 2014 through 2016, the recent period that we use in our empirical example, would have been almost exactly at the 40th percentile of full-time salaried workers' earnings had the exempt limit not eroded.[9]

Of the two control groups, Group C1 consists

9. In the recent period, two states—California and New York—have set exempt limits above the federal level. We account for these by classifying workers whose weekly earnings in 2014, 2015, or 2016 were between these

Table 2. Labor-Market Impacts of Overtime Policy Changes, Seven Countries

			Effect on			
Study	Country	Policy Change	Overtime Hours	Total Hours	Hourly Wage	Earnings
Sánchez 2013	Chile	2001–2005: H_S↓, 48 to 45		↓	↑	
Cahuc and Carcillo 2014	France	2007: Exempt OT pay from income and some payroll taxes	↑ high-wage workers only	0		
Chemin and Wasmer 2009	France	1998: 35-hour H_S, different in 3 *départements*	`	↓ very small	↓ very small	
Kuroda and Yamamoto 2012	Japan	1980s–1990s: H_S ↓ 48 to 40		↓		0
Kawaguchi, Naito, and Yokoyama 2017	Japan	1990s: H_S ↓ 44 to 40		↓ , if prior 44 > H > 40		0
Kawaguchi, Lee, and Hamermesh 2013	Korea	2000s: H_S ↓ 44 to 40		H ↓ by 40 minutes, large cut in Saturday work		
Raposo and van Ours 2010	Portugal	1996: H_S ↓ 44 to 40		H ↓ a lot, if prior 42>H>40	↑	↓ small
Skuterud 2007	Quebec	1997–2000: H_S ↓ 44 to 40	OT ↓ nearly 1 hour	↓ small	↓ small	
Chen and Wang 2013	Taiwan	2001: H_S 48/week to 84/biweekly		↓ high-wage workers only		0 males small ↓ females

Source: Authors' compilation.

of low-wage white-collar workers, sufficiently near the bottom of the earnings distribution to be nonexempt both from 2014 to 2016 and from 1987 to 1989, the earlier period that we use here. Only full-time salaried workers in the lowest 8 percent of the earnings distributions of such workers remained nonexempt in 2014 through 2016. Group C2 consists of workers sufficiently high in the distribution of salaried workers' earnings to be exempt today and to have been exempt in the past. These are in the top 60 percent of the distributions of these workers' earnings.

We chose to examine these two periods because both were times of near full employment (roughly 5 percent in both periods), and because the earlier period included the first three such years for which CPS-MORG data are available to provide information on method of pay, usual weekly earnings, actual weekly hours, and detailed demographics. The outcomes of interest are the double-differences in weekly hours and the probability that weekly hours equal forty: the differences

$$D1 = [(T_{2010s} — T_{1980s}) — [(C1_{2010s} — C1_{1980s})], \quad (1)$$

and

$$D2 = [(T_{2010s} — T_{1980s}) — [(C2_{2010s} — C2_{1980s})]. \quad (2)$$

Each double-difference measures the change in the outcome over these twenty-seven years in the treatment group relative to the change in a control group.

In classifying workers into these two groups we cannot use their actual weekly earnings. Because these are the products of hours and wage rates, they are affected by overtime laws and are thus endogenous to the shock whose impact we are measuring. We thus estimate a first-stage earnings regression over all full-time salaried workers, using as covariates all the demographic information in the CPS—marital status, gender, and their interaction; presence of young children; and indicators of state of residence, years of schooling, and age. Also included are vectors of indicators of three-digit occupation and industry; but because of the endogeneity problem, weekly hours of work are excluded. We then classify full-time salaried workers into one of the three groups—T, C1, and C2—using the worker's predicted earnings.

Because of the duties test in determining whether a salaried worker is exempt from the overtime provisions, even if the worker's earnings are below the exempt limit, we cannot simply classify workers based on their predicted weekly pay. Also, the test being idiosyncratically applied in individual cases by employers, we cannot be sure which workers in the treatment or control groups might be eligible for overtime pay. The best we can do without national firm-based micro data that includes employers' classifications of their workers by overtime eligibility, data that do not exist, is to exclude from the samples workers whose employers are likely to claim they are exempt because of the duties test. We thus eliminate all those CPS respondents whose occupational classification is as manager, supervisor, or one of several occupations in which the employee clearly supervises others (such as lawyers and judges).[10] These restrictions eliminate roughly one-third of salaried workers from the samples, very few from (the low-wage employees in) C1, nearly half from (the higher-paid employees in) C2.

Table 3 presents single- and double-differences in weekly hours (actual hours worked in the CPS reference week) and the probability of working exactly forty hours. The double-differences describing Group T and Group C1 —which was always nonexempt— show a clear statistically significant increase in hours because of the failure to raise the exempt amount and a positive but statistically insignificant increase in bunching at forty hours per week. Examining what would happen if the 50 percent overtime penalty were extended to the

higher amounts and $455 as in C1, those above these levels but below the 40th percentile of earnings as in the treatment group.

10. We use the detailed occupation classifications in the variable *occ80* in the 1987–1989 sample and in the variable *occ2012* in the 2014–2016 sample (U.S. Bureau of the Census 1989; CDC 2017).

Table 3. Effect on Hours of Lowering Real Overtime-Exempt Weekly Earnings, 1987–1989 to 2014–2016

	Difference 2014–2016 over 1987–1989		Double-Difference	
			Hours	Pr{H = 40}
Outcome	Hours	Pr{H = 40}	Groups	
Group			T – C1	
C1. Always nonexempt	–0.442 (0.150)	0.070 (0.008)	0.302 (0.138)	0.010 (0.008)
Elasticity			–0.180 (0.083)	
T. Exempt 2014 to 2016, nonexempt 1987 to 1989	–0.140 (0.058)	0.080 (0.003)		
			T – C2	
C2. Always exempt	–1.195 (0.048)	0.087 (0.064)	0.834 (0.087)	–0.007 (0.003)
Elasticity			–0.609 (0.030)	

Source: Authors' compilation based on CPS-MORG data.
Note: Standard errors in parentheses. Estimates are based on comparisons of weekly earnings predicted from a densely specified earnings regression based on CPS-MORG data for these years. Salaried workers in occupations where the duties test was unlikely to render the worker exempt and in states other than California or New York were classified as follows: always nonexempt, if predicted earnings were below $455 from 2014 to 2016 and from 1987 to 1989 below $223, the same percentile point as $455 was from 2014 to 2016; exempt from 2014 to 2016, nonexempt from 1987 to 1989, if predicted earnings were above $455 from 2014 to 2016 and above $223 but below $455 from 1987 to 1989; and always exempt, if predicted earnings were above $455 in both periods. In California, the cut-off between C1 and T was $720 in 2014 and 2015, $800 in 2016; in New York, the cut-off was $600 in 2014, $656 in 2015, and $675 in 2016.

treatment group, the elasticity of overtime hours is a statistically significant –0.180.[11]

The second comparison, between Group T and Group C2, yields a large and statistically highly significant double-difference in hours, showing an elasticity of overtime hours with respect to imposing the wage penalty of –0.609. The impact on bunching at exactly forty hours is essentially zero, albeit statistically significantly negative. Averaging the double-differences, the best conclusion is that failing to allow the presumptively exempt limit on salaried workers' overtime to increase over the past four decades has raised some salaried workers' work time by about one-half hour above what it otherwise would have been.

This exercise does not allow estimating what the impact on hourly wage rates would have been had the limit been increased. But the literature suggests that any decline in wage rates would have been too small for earnings received on (the reduced) overtime hours not to have risen. It also does not account for possible anticipatory responses by employers from 2014 to 2016 to any expected increase in the presumptively nonexempt salary level that briefly would have become effective in December 2016 and that was formally proposed in 2015. If such responses did occur, however, they simply mean that the absolute values of the estimated elasticities in table 3 are biased toward zero.

We can conclude that increasing the exempt limit would have raised some salaried workers' earnings and reduced their weekly hours. One exercise suggested that 12.5 million workers would have been affected (Eisenbrey and Kimball 2016). Using our estimates, workers who could possibly have been affected if the increase in the exempt amount had been allowed to remain in effect are those in the treatment

11. The elasticity is calculated as the double-difference change in hours shown in the table divided by the average of overtime hours in the two groups, all divided by 0.5.

group T. Taking the size of this group relative to the number of salaried workers in 2016, and using this ratio along with the fraction of all employees who are salaried, yields a prediction that around three million workers would benefit directly if the exempt limit were raised as proposed by the Obama administration. This estimate is quite close to the estimate of four million workers produced by the Department of Labor (as noted in Weil 2017).

Performing the same calculations, but based on the Trump administration's proposed regulation (an unindexed limit of $679 per week) yields the prediction that slightly more than one million salaried workers would become nonexempt (U.S. Department of Labor, Wage and Hour Division 2019). This number would erode over time due to the absence of indexation under the proposed regulation. Indeed, assuming 3 percent annual growth in earnings in this part of the distribution, by 2025 more than half of the one million additional workers would no longer be nonexempt.

Conclusions About the FLSA's Overtime Provisions

The FLSA's overtime provisions currently have only small effects on labor-market outcomes. They do reduce employers' demand for overtime hours, and they reduce weekly hours of work slightly. The law probably spreads employment among a few more labor-force participants, although total labor input—hours per worker times employment—probably decreases because hours drop more than employment increases. Of course, in the long term it has no impact on unemployment rates. Earnings of affected workers are probably very slightly above what they would otherwise be, even though their hourly wage rates are probably reduced. In the context of general equilibrium, however, this is a wage advantage relative to workers and others who are not affected given that the decline in total labor input reduces total gross domestic product. We can also infer that small changes that would apply the FLSA overtime provisions more broadly—by lowering standard hours, raising the overtime penalty or expanding coverage, or reducing exemptions—would have small effects in the same directions.

WHAT MIGHT BE DONE?

When the federal minimum wage was first adopted, it covered employers engaged in interstate commerce. As such, it had the capacity to change the distribution of economic activity between high- and low-wage areas, because it focused on the tradeable sector. As the economy and minimum wage legislation have coevolved, the law's impact is now more concentrated on locally consumed goods and services. Perhaps because of this, most studies find modest effects on the employment of low-wage groups—in line, déjà vu all over again, with what Mary Eccles and Freeman (1982, 227) called "the professional consensus." As was true nearly forty years ago, however, we do not have a reliable estimate of the long-term effects of minimum wages.

The controversy over recent proposals to increase the minimum wage to $15 an hour has implicitly raised the question of the level at which minimum wages begin to have more serious negative effects on employment. The available evidence is not helpful in answering this question. First, states in which the minimum wage has come closest to this level have been high-wage states. Second, as the minimum wage is increased, both the fraction of workers affected and the average increase that affected workers receive increases. Third, most recent studies have backtracked from measuring the impact of the minimum wage based on these two factors—in effect, assuming that the effect of raising the minimum wage from, say, $10 to $11 is the same in Washington as it would be in Alabama.

Although the question of the "right" level of the minimum wage remains controversial, the evolution of recent minimum wage policy has taken what seem like two constructive directions. The flurry of state legislation has produced a set of minimum wages that are, roughly, de facto indexed to local wages in a cross-sectional sense; and twelve states have explicitly indexed the level of their legislated minimum wage over time. Whatever the right level of the minimum wage, it ought to vary with local wages. Apart from historical accident, it is hard to see why indexing makes sense for Social Security, federal income tax brackets, and the estate tax but not for the minimum wage. In-

deed, even at the federal level indexing seems like a sensible idea, and it might have the important political advantage of reducing the frequency and severity of legislative fights over changing the minimum.

The mobility of firms, workers, and consumers across state borders raises potentially important concerns for a decentralized minimum wage policy. At an empirical level, estimates that rely on cross-border designs may be biased if the control counties are out of control. For example, if employment there rises as employers move to avoid higher minimum wages in adjacent jurisdictions, the difference between treatment and controls may exaggerate the true effect on treated jurisdictions.[12] From a policy perspective, such migration is one more source of elasticity to the demand for low-wage labor in each state and one more source of job loss from an aggressive minimum wage policy. We do not find any tendency for cross-border estimates to be larger than other estimates, suggesting, at least in the short term, that little evidence indicates this sort of response. The concentration of directly affected jobs in retail trade and service industries (nontradeables) likely limits the opportunities for cost-saving relocation in the longer run. However, some evidence does indicate this sort of relocation in tradeable goods industries.

Recent history suggests that major changes in the FLSA are not likely to occur any time soon. Perhaps in response to this absence of mobility, and as with states' responses to the lack of federal action on minimum wages, a number of states are now considering joining California and New York and changing their laws to bring more salaried workers into nonexempt status.[13] If federal rigidity continues, it is likely that the number of such states will expand.

Even with expansion of overtime regulations at the state level, and even if the applicability of FLSA overtime regulations were to be expanded, the effects on labor-market outcomes—wages, earnings, and, of particular interest, hours and employment—would be small. If we are interested in spreading work among more people and removing the United States from its current position as the international champion among wealthy countries in annual work time per worker, minor tinkering with current overtime laws will do little. We might borrow from some of the panoply of European mandates that alter the amount and timing of work hours. Among these are penalties for work on weekends, evenings, and nights and limits on annual overtime hours, while lengthening the accounting period for overtime beyond the current single week. If our goal is to spread work and make for a more relaxed society, these changes will help but their effects will also be small.

Beyond these specific changes in FLSA policy, the law was structured to apply to labor markets that are much different from today's. Fewer workers have nine-to-five schedules at fixed workplaces than they did in the 1930s; and an increasing though still small fraction of the workforce even has irregular gig jobs (Abraham and Houseman 2019; Katz and Krueger 2019). Even greater changes are likely in the future (Weil 2019). These considerations will make it worthwhile for policy analysts to go beyond the kind of narrow but important recommendations that we have presented based on our analyses of existing wage-employment-hours structures to think more broadly about how and even whether wage and hours policy fits into a labor market that is hugely different from what was contemplated when the FLSA was enacted in 1938.

12. Alternatively, workers in areas with low minimum wages may cross the border to look for perhaps scarcer but higher-paying jobs (Brown, Gilroy, and Kohen 1982, 491–92).

13. See discussions in Pennsylvania (Joseph DiStefano, "Pa. Proposal Would Boost Overtime for Half a Million Workers," *Philadelphia Inquirer*, June 26, 2018, http://www2.philly.com/philly/blogs/inq-phillydeals/overtime-labor-employment-trump-wolf-pennsylvania-overtime-20180626.html, accessed June 30, 2019); Washington (Washington State Department of Labor and Industries, "Learn About EAP Exemptions," https://lni.us.engagementhq.com/learn-about-eap-exemptions, accessed June 30, 2019); and Michigan (Michigan Legislature, Senate Bill no. 1137, October 20, 2016, http://www.legislature.mi.gov/documents/2015-2016/billintroduced/Senate/pdf/2016-SIB-1137.pdf, accessed June 30, 2019).

Table A1. Elasticities from Recent Studies of the Employment and Wage Impact of Higher Minimum Wages

					Employment		Wage*	
Study	Data†	Years	Geographic Units	Control Variables	β	SE	β	SE
Teenagers								
Neumark, Salas, and Wascher 2014	CPS	1990–2011	States	State and year FE	−0.165	0.041		
——	CPS	1990–2006	States	Synthetic control group	−0.145	0.060		
Dube, Lester, and Reich 2016	QWI	2000–2011	Border county pairs	County and quarter FE	−0.173	0.071	0.177	0.036
——	QWI	2000–2011	Border county pairs	County pair x quarter FE	−0.059	0.084	0.222	0.047
Liu, Hyclak, and Regmi 2016	QWI	2000–2009	Counties	County and quarter FE	−0.230	0.067	0.127	0.057
——	QWI	2000–2009	Counties	Economic area x quarter FE	−0.173	0.047	0.209	0.030
Allegretto et al. 2017	CPS MORG	1979–2014	States	State and year FE	−0.214	0.044	0.266	0.037
——	CPS MORG	1979–2014	States	State-specific trends	−0.062	0.041	0.228	0.020
Totty 2017	QWI	2000–2011	Counties	Factor model	−0.036	0.017	0.308	0.018
Restaurant workers								
Neumark, Salas, and Wascher 2014	QCEW	1990–2011	Border county pairs	County and quarter FE	−0.112	0.079		
——	QCEW	1990–2006	Counties	Synthetic control group	−0.063	0.023		
Addison, Blackburn, and Cotti 2015	QCEW	1990–2014	Counties	State and year FE	−0.067	0.042	0.222	0.022
——	QCEW	1990–2014	Counties	County-specific trends	−0.043	0.023	0.171	0.021
Dube, Lester, and Reich 2016	QWI	2000–2011	Border county pairs	County and quarter FE	−0.073	0.042	0.203	0.028
——	QWI	2000–2011	Border county pairs	County pair x quarter FE	−0.022	0.091	0.207	0.059
Allegretto et al. 2017	QCEW	1990–2014	Counties	County and quarter FE	−0.240	0.075	0.233	0.026
——	QCEW	1990–2014	Border county pairs	Period x pair fixed FE	0.023	0.069	0.209	0.033
Totty 2017	QCEW	1990–2010	Counties	Factor model	−0.023	0.019	0.148	0.026
Brummund and Strain 2019	QCEW	1990–2016	Counties	County pair and quarter FE	−0.153	0.078	0.236	0.032
——	QCEW	1990–2016	Counties	County pair and quarter FE	−0.002	0.051	0.213	0.031

Source: Authors' compilation.

†CPS = Current Population Survey, MORG = Merged Outgoing Rotation Groups, QCEW = Quarterly Census of Employment and Wages, QWI = Quarterly Workforce Indicators.

*Wage = Hourly earnings in CPS, weekly earnings in QCEW and QWI.

REFERENCES

Aaronson, Daniel, Eric French, and Isaac Sorkin. 2018. "Industry Dynamics and the Minimum Wage: A Putty-Clay Approach." *International Economic Review* 59(1): 51–84.

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 104(490): 493–505.

Abraham, Katharine G., and Susan N. Houseman. 2019. "Making Ends Meet: The Role of Informal Work in Supplementing Americans' Income." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 110–31. DOI: 10.7758/RSF.2019.5.5.06.

Addison, John, McKinley Blackburn, and Chad Cotti. 2015. "On the Robustness of Minimum Wage Effects: Geographically-Disparate Trends and Job Growth Equations." *IZA Journal of Labor Economics* 4(24): 1–16. Accessed June 30, 2019. https://link.springer.com/content/pdf/10.1186%2Fs40172-015-0039-z.pdf.

Allegretto, Sylvia, Arindrajit Dube, and Michael Reich. 2011. "Do Minimum Wages Really Reduce Teen Employment? Accounting for Heterogeneity and Selectivity in State Panel Data." *Industrial Relations* 50(5): 205–40.

Allegretto, Sylvia, Arindrajit Dube, Michael Reich, and Ben Zipperer. 2017. "Credible Research Designs for Minimum Wage Studies: Response to Neumark, Salas and Wascher." *Industrial and Labor Relations Review* 70(3): 559–92.

Barkume, Anthony. 2010. "The Structure of Labor Costs with Overtime Work in U.S. Jobs." *Industrial and Labor Relations Review* 64(1): 128–42.

Belman, Dale, and Paul Wolfson. 2014. *What Does the Minimum Wage Do?* Kalamazoo, Mich.: W. E. Upjohn Institute.

Brown, Charles, Curtis Gilroy, and Andrew Kohen. 1982. "The Effect of the Minimum Wage on Employment and Unemployment." *Journal of Economic Literature* 20(2): 487–528.

Brummund, Peter, and Michael Strain. 2019. "Does Employment Respond Differently to Minimum Wage Increases in the Presence of Inflation Indexing?" *Journal of Human Resources* 54(2). Published online September 5, 2018. DOI: 10.3368/jhr.55.2.1216.8404R2.

Cahuc, Pierre, and Stéphane Carcillo. 2014. "The Detaxation of Overtime Hours: Lessons from the French Experiment." *Journal of Labor Economics* 32(2): 361–400.

Card, David, and Alan Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84(4): 772–93.

———. 2015. *Myth and Measurement: The New Economics of the Minimum Wage*, rev. ed. Princeton, N.J.: Princeton University Press.

Castillo-Freeman, Alida, and Richard Freeman. 1992. "When the Minimum Wage Really Bites: The Effect of the U.S.-Level Minimum on Puerto Rico." In *Immigration and the Workforce: Economic Consequences for the United States and Source Areas*, edited by George Borjas and Richard Freeman. Chicago: University of Chicago Press.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer. 2019. "The Effect of Minimum Wages on Low-Wage Jobs." *Quarterly Journal of Economics* 134(3): 1405–54.

Chemin, Mathieu, and Étienne Wasmer. 2009 "Using Alsace-Moselle Local Laws to Build a Difference-in-Differences Estimation Strategy of the Employment Effects of the 35-Hour Workweek Regulation in France." *Journal of Labor Economics* 27(4): 487–524.

Chen, Long-Hwa, and Wei-Chung Wang. 2013. "The Impact of the Overtime Policy Reform—Evidence from the Low-Paid Workers in Taiwan." *Applied Economics* 43(1): 75–90.

Clemens, Jeffrey, and Michael Strain. 2018. "Minimum Wage Analysis Using a Pre-Committed Research Design: Evidence Through 2016." *IZA* discussion paper no. 11427. Bonn: Institute of Labor Economics.

Clemens, Jeffrey, and Michael Wither. 2019. "The Minimum Wage and the Great Recession: Evidence of Effects on the Employment and Income Trajectories of Low-Skilled Workers." *Journal of Public Economics* 170 (February): 53–67.

Dube, Arindrajit, William Lester, and Michael Reich. 2010. "Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties." *Review of Economics and Statistics* 92(4): 945–64.

———. 2016. "Wage Shocks, Employment Flows, and Labor Market Frictions." *Journal of Labor Economics* 34(3): 663–704.

Eccles, Mary, and Richard Freeman. 1982. "What, Another Minimum Wage Study?" *American Economic Review* 72(2): 226–32.

Eisenbrey, Ross, and Will Kimball. 2016. "The New Overtime Rule Will Directly Benefit 12.5 Million Working People." Washington, D.C.: Economic Policy Institute.

Freeman, Richard B. 1996. "The Minimum Wage as a Redistributive Tool." *Economic Journal* 106 (436): 639–49.

Gittings, R. Kaj, and Ian Schmutte. 2016. "Getting Handcuffs on an Octopus: Minimum Wages, Employment, and Turnover." *Industrial and Labor Relations Review* 69(5): 1133–70.

Gopalan, Radhakrishnan, Barton Hamilton, Ankit Kalda, and David Sovitch. 2018. "State Minimum Wage Changes and Employment: Evidence from One Million Hourly Wage Workers," Unpublished Paper, Olin Business School, Washington University.

Hamermesh, Daniel. 1993. *Labor Demand*. Princeton, N.J.: Princeton University Press.

Hamermesh, Daniel, Daiji Kawaguchi, and Jungmin Lee. 2017. "Does Labor Legislation Benefit Workers? Well-being After an Hours Reduction." *Journal of the Japanese and International Economies* 44(1): 1–12.

Hamermesh, Daniel, and Stephen Trejo. 2000. "The Demand for Hours of Labor: Direct Evidence from California." *Review of Economics and Statistics* 82(1): 38–47.

Katz, Lawrence F., and Alan B. Krueger. 2019. "Understanding Trends in Alternative Work Arrangements in the United States." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 132–46. DOI: 10.7758/RSF.2019.5.5.07.

Kawaguchi, Daiji, Jungmin Lee, and Daniel Hamermesh. 2013. "A Gift of Time." *Labour Economics* 24(2): 205–16.

Kawaguchi, Daiji, Hisahiro Naito, and Izumi Yokoyama. 2017. "Assessing the Effects of Reducing Standard Hours: Regression Discontinuity Evidence from Japan." *Journal of the Japanese and International Economies.* 43(1): 59–76.

Krueger, Alan. 2015. "The Minimum Wage: How Much Is Too Much?" *New York Times*, October 3, 2015.

Kuroda, Sachiko, and Isamu Yamamoto. 2012. "Impact of Overtime Regulations on Wages and Work Hours." *Journal of the Japanese and International Economies* 26(2): 249–62.

Liu, Shanshan, Thomas Hyclak, and Krishna Regmi. 2016. "Impact of the Minimum Wage on Youth Labor Markets." *Labour* 30(1): 18–37.

Neumark, David. 2019. "The Econometrics and Economics of the Employment Effects of Minimum Wages: Getting from Known Unknowns to Known Knowns." *German Economic Review*. DOI: 10.1111/geer.12184.

Neumark, David, Ian Salas, and William Wascher. 2014. "Revisiting the Minimum Wage-Employment Debate: Throwing Out the Baby with the Bathwater?" *Industrial and Labor Relations Review* 67(Suppl.): 609–48.

Neumark, David, and William Wascher. 2000. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Comment." *American Economic Review* 90(5): 1362–96.

Powell, David. 2017. "Synthetic Control Estimation Beyond Case Studies: Does the Minimum Wage Reduce Employment?" *RAND* working paper no. WR-1142. Santa Monica: RAND Corporation.

Raposo, Pedro, and Jan van Ours. 2010. "How Working Time Reduction Affects Jobs and Wages." *Economics Letters* 106(1): 61–63.

Sánchez, Rafael. 2013. "Do Reductions of Standard Hours Affect Employment Transitions? Evidence from Chile." *Labour Economics* 20(1): 24–37.

Sewell, Terri I. 2019. "PHASE-in $15 Wage Act—Explainer." Accessed June 30, 2019. https://sewell.house.gov/sites/sewell.house.gov/files/4.2.19%20PHASE-in%20%2415%20Wage%20Act%20Explainer.pdf.

Skuterud, Mikael. 2007. "Identifying the Potential of Work-Sharing as a Job-Creation Strategy." *Journal of Labor Economics* 25(2): 265–87.

Sorkin, Isaac. 2015. "Are There Long-Run Effects of the Minimum Wage?" *Review of Economic Dynamics* 18(2): 306–33.

Totty, Evan. 2017. "The Effect of Minimum Wages on Employment: A Factor Model Approach." *Economic Inquiry* 55(4): 1712–37.

Trejo, Stephen. 1991. "The Effects of Overtime Pay Regulation on Worker Compensation." *American Economic Review* 81(4): 719–40.

U.S. Bureau of the Census. 1989. "The Relationship Between the 1970 and 1980 Occupation Classification Systems." Technical Paper no. 59. Washington: Government Printing Office.

U.S. Centers for Disease Control and Prevention (CDC). 2017. "NHANES 2011–12 Data Documentation: Occupation-Industry and Occupation Codes." Atlanta, Ga.: U.S. Department of Health and Human Services. Accessed June 30, 2019.

https://wwwn.cdc.gov/Nchs/Nhanes/2011-2012/OCQ_G.htm.

U.S. Department of Labor. 2018. "History of Changes to the Minimum Wage Law." Accessed June 30, 2019. https://www.dol.gov/whd/minwage/coverage.htm.

———. 2019. "Minimum Wage Laws in the States." Accessed June 30, 2019. https://www.dol.gov/whd/minwage/america.htm.

U.S. Department of Labor, Wage and Hour Division. 2019. "Notice of Proposed Rulemaking: Overtime Update." March 9. Accessed June 30, 2019. https://www.dol.gov/whd/overtime2019.

Weil, David. 2017. "Defend Obama's Overtime Policy." *U.S. News & World Report*, October 25.

———. 2019. "Understanding the Present and Future of Work in the Fissured Workplace Context." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 147–65. DOI: 10.7758/RSF.2019.5.5.08.

Unions, Worker Voice, and Management Practices: Implications for a High-Productivity, High-Wage Economy

THOMAS A. KOCHAN AND WILLIAM T. KIMBALL

This article uses the metaphor of a social contract to review the evolution of American unions and their effects—especially in the variations in their quality—on firm employment strategies and performance, takes stock of the current state of unions and alternative forms of worker voice that have emerged in recent years, and discusses implications for the future of labor and employment policies. The key policy implication is that fundamental, not incremental, changes in labor policy will be needed if the range of worker voice and representation processes workers want and the economy needs are to grow to a scale large enough to close existing voice gaps and contribute to building a new productivity- and wage-enhancing social contract.

Keywords: unions, labor law, voice, collective bargaining, productivity

Throughout most of the twentieth century, unions and collective bargaining were powerful mechanisms for improving wages and other aspects of job quality for both union-represented and non-union workers. These improvements negotiated in collective bargaining in turn put pressure on employers to find ways to increase productivity, what Sumner Slichter, James Healy, and E. Robert Livernash (1960) labeled the "shock effect" of unions on management practices. These management adjustments could range from or include a mix of investments in new technology, workforce training or other personnel management practices, product upgrading, or other productivity enhancing actions. This dynamic process served as a precursor to what would later be labeled high-road management strategies (Kochan and Osterman 1994; Osterman 2018). Pattern bargaining, and the threat effects of union organizing of non-union firms, spread wage increases and other negotiated improvements in employment practices across establishments and firms within regions and industries (Levinson 1960; Budd 1992) and contributed to reducing income inequality (Freeman 1980; DiNardo,

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Fortin, and Lemieux 1996; Western and Rosenfeld 2011; Farber et al. 2018). In doing so, collective bargaining played a significant role in generating tandem increases in compensation and productivity, an indicator of what some of us have labeled the post–World War II social contract (Kochan 2000).

In recent decades, however, declining union membership and bargaining power reduced the role of unions as both a source of wage growth and as a spur to high-road managerial practices. The postwar social contract's tandem movement of productivity and wages broke down and has yet to be replaced with other ways of supporting steady wage growth or motivating employers to compete on the basis of high productivity and high wages. As a result, the past four decades have witnessed significant growth in income inequality and a number of its associated consequences, such as increased worker insecurity, resistance to trade and immigration, and growing political polarization between the perceived winners and losers from globalization and changing technologies.

This leaves policymakers who want to support a high-productivity, high-wage economy and society with a set of important but difficult questions: What can be done to build a new productivity and wage-enhancing social contract suited to the contemporary and future economy and workforce? Are new policies needed to rebuild unions and worker bargaining power in ways that work in today's economy? And, given the difficulties associated with reversing long-term union decline, what additional policy options might be needed to create good jobs for all segments of the workforce?

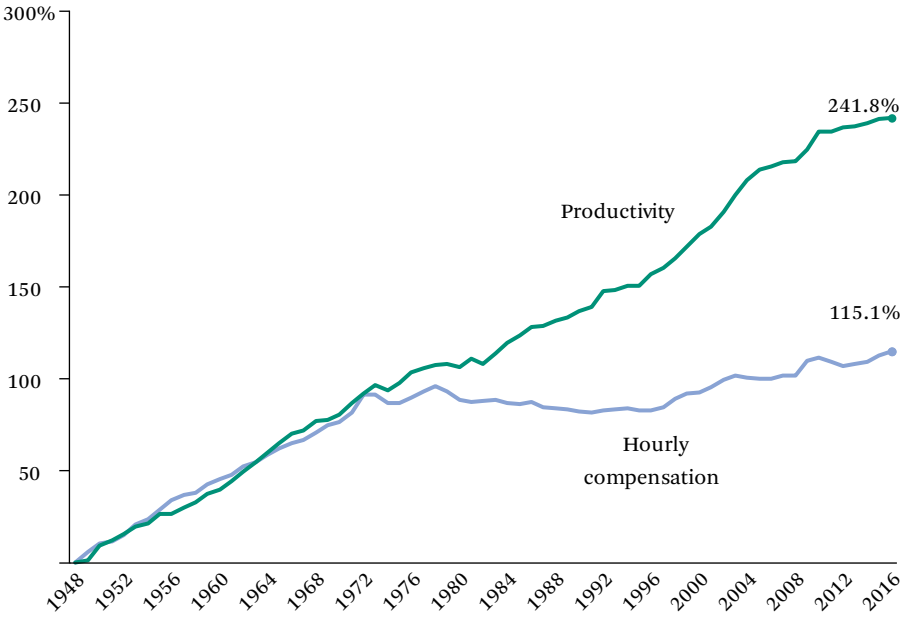
Our bottom line is that fundamental rather than incremental changes in labor and employment policies will be needed to build a new social contract that reverses recent trends and lays the foundation for a new social contract.

COLLECTIVE BARGAINING AND THE POSTWAR SOCIAL CONTRACT

The National Labor Relations Act (NLRA) of 1935, along with the other three pillars of the New Deal labor legislation (unemployment insurance, social security and disability insurance, and minimum wages) laid the foundation for the social contract that emerged in the decades following World War II. The main effect of the NLRA was to provide long-term stability to union membership—once a union was recognized, it could not be ignored or broken by employers unless a majority of workers voted to decertify it. Union density in the private sector grew from approximately 11 percent in 1930 to a peak of 35 percent in 1945. Unions gained further legitimacy during World War II through participation in the National War Labor Board and its actions to endorse practices such as grievance arbitration, cross-firm wage comparisons within industries and occupations, and benefits such as paid health insurance (National War Labor Board 1946). The growth and strength of unions led President Truman to call a national labor-management conference in 1945 seeking a postwar accord for guiding the future of labor-management relations. That effort failed to achieve consensus largely because of the inability of labor and management representatives to agree on the extent to which unions should be able to have a voice in management practices (Chamberlain and Kuhn 1965, 85). As a result, unions and employers were left to their own devices to develop the norms and practices that would shape collective bargaining in the postwar era.

The latter half of the 1940s was a tumultuous and pivotal time for collective bargaining. Pent-up demands for wage increases following the end of wartime wage restraints led to numerous strikes; a higher percentage (1.4 percent) of the workforce's estimated total work hours (U.S. Department of Labor 1947) were lost to strike activity in 1946 than any year since. Major debates over the extent of union influence on management decisions dominated bargaining in the large industrial unions. Walter Reuther, president of the United Auto Workers (UAW), pressed auto firms to give the union a voice in product pricing in return for moderating wage demands. This was vigorously resisted by General Motors (GM) and other auto firms but also discouraged by union leaders in other industries who favored a more conventional arms-length relationship that would leave management free to make business decisions and unions free to negotiate for the best wage, benefit, and working conditions deal possible. This

Figure 1. Growth in Productivity and in Average Hourly Compensation



Source: Economic Policy Institute 2017.

debate was essentially resolved when, in two rounds of negotiations between 1948 and 1950, GM management proposed and the UAW accepted a new wage norm that would eventually spread across the auto industry and to unionized firms in other industries but excluded any role for unions in wider business decision making. Later labeled the Treaty of Detroit, this principle called for wages to increase annually to keep up with increases in the cost of living and to provide an "annual improvement factor" of 2 percent to share the growth in aggregate productivity (Lichtenstein 1995, 279). Once GM agreed to this basic formula, the UAW then insisted it be followed in negotiations with Ford, with Chrysler, and to varying degrees throughout the unionized auto supply industry. Unions in other industries with high degrees of union density adopted similar practices. This process of diffusing similar wage increases within large unionized firms and within industries through collective bargaining became known as pattern bargaining. It became an instrument for diffusing this wage-productivity norm broadly enough across the economy to achieve the tandem upward movement in both indicators from the mid-1940s to around 1980 (see figure 1).

UNION WAGE EFFECTS DURING THE SOCIAL CONTRACT ERA

Given the growing importance of unions in the post–World War II expansion, it is not surprising that interest also grew among economists in estimating the effects of unions on wages (and to a lesser extent on productivity). Essentially all these studies applied and further refined the methodology for estimating the *average* effects of unions first developed by Gregg Lewis (1962). It calls for isolating the difference between wages of otherwise comparable union and non-union workers by controlling for other aspects of human capital. This task is made difficult by dynamic processes by which workers and employers react to unionization and the associated wage gains. For example, either adjustment (the shock effect responses described) or selection effects—lower- or higher-skilled workers might select into union jobs or employers might raise their standards for hiring to justify the higher union wage (Lewis 1986)—render estimation of the union wage premium using conventional cross-sectional data sets (such as the Current Population Survey) incomplete. Nevertheless, in the 1950s and 1960s these estimated union differentials tended to range be-

Box 1. Summary of Pre-1980s Variations in Union Effects on Wages

1. Unions have a greater positive effect on wages of blacks, particularly black men relative to whites. (Ashenfelter 1972)

2. Unions reduce the effects of age and education on earnings. That is, unions increase the earnings of younger workers by raising the entry-level salaries on union jobs above what an inexperienced worker would be paid in a comparable non-union job. At the upper end of the wage distribution, the effects of seniority provisions in union contracts protect older workers from wage erosion after they pass their peak productivity years. (Johnson and Youmans 1971)

3. One study estimated the following union–non-union pay differentials by occupation: laborers, 45 percent; transportation equipment operators, 38 percent; craft workers, 19 percent; operatives, 18 percent; service workers, 15 percent; managers, 2 percent; clerical employees, 2 percent; and sales workers, 4 percent. (Bloch and Kuskin 1978)

4. Union wage effects also vary across industries: 43 percent in construction; 16 percent in transportation, communications, and utilities; 12 percent in nondurable goods manufacturing; and 9 percent in durable goods manufacturing. (Ashenfelter 1978)

5. Unions reduce white-collar/blue-collar wage differentials in firms where blue-collar workers are organized. Unions also reduce intra-industry wage differentials to a degree that this effect offsets the increase in earnings dispersion across industries so that the net effect of union is to reduce wage inequality among workers. (Freeman 1980, 1982)

Source: Katz, Kochan, and Colvin 2004, 241.

tween 10 to 15 percent, depending on differences in occupations, industries, and regions. Estimates in the 1970s grew to 15 to 20 percent or more, again with considerable variations in and outside this range across different demographic and occupational groups (for a summary of the pre-1980s evidence, see box 1). Upon finding the union wage premium to be above 20 percent in some of their data by the late 1970s and early 1980s, Richard Freeman and James Medoff (1984, 54) predicted that these premiums were unsustainable. Indeed, union employment declined as the premium reached its peak, followed by somewhat of a decline in the premium in more recent years (Bratsberg and Ragan 2002; Blanchflower and Bryson 2004). The predominant explanations for these wage premiums at the time were the traditional neoclassical view of unions acting as a monopoly (whereby they restrict labor supply and therefore increase wage levels) and a view that saw unions as a way to achieve greater rent sharing, particularly in firms or sectors where the product market allowed for sizable rents to exist. Neither Lewis (1962) nor Freeman and Medoff (1984) were able to adjudicate between these two hypotheses.

Besides estimating the average effects of unions on wages, considerable attention was given to how unions affected income inequality in the post war period. At the firm level, unions have traditionally sought to attach wages to jobs following a principle of "equal pay for equal work." Naturally, this leaves less room for variation of wages across individuals doing similar work (Freeman 1980; Freeman and Medoff 1984; Card 1996; Card, Lemieux, and Riddell 2004; Farber et al. 2018). Unions also reduced the pay differentials between occupational groups such as white- and blue-collar workers within firms (Freeman and Medoff 1984). Their equalizing effects across firms reflected, as noted, the role of pattern bargaining. Although less well-documented, the threat effect (that is, the motivation of non-union firms to avoid unionization) also played a significant role in equalizing wages in the past when unions were stronger. Although difficult to measure, that

threat has largely dissipated given the very low probabilities that a union-organizing drive will occur or, if it occurs, will be successful (Ferguson 2008). Despite several successful and highly visible union-organizing drives at media companies (Masters and Gibney 2019) and academic institutions (Schmidt 2017; Benderly 2018), no substantial changes are apparent in the number of elections held or their success rate since 2011.[1]

UNION EFFECTS ON PRODUCTIVITY

Fewer studies have been undertaken on the effects of the average unions on productivity than on wages. The majority have focused on particular industries and also drew on data from the late 1960s through the early 1980s.

Freeman and Medoff (1984) suggest three potential pathways by which unions can affect productivity: restricting labor supply, restrictive work rules, and "voice." The restriction to labor supply and work rules set off changes to employers' allocation of capital and innovations to make more efficient use of higher-cost labor. The third pathway—empowering workers' voice—however, can facilitate productive information exchange between frontline workers and management as well as boost workers' loyalty to the firm. Early case studies found positive effects for unions on productivity in industries such as manufacturing, construction, and cement plants (for a review, see Freeman and Medoff 1984). Analysis of higher-level industry data included that of Freeman and Medoff (1984), which tested and reject some of the commonly cited mechanisms for why unions might inhibit productivity (for example, reduced managerial flexibility and prevention of technological change), and of Charles Brown and Medoff (1978), which also encountered little evidence for positively selected workers and instead supported voice-related or shock effects. Absent finer-detailed data or identification strategies, detailed case studies such as that of Kim Clark (1980) offered more insight into the potential mechanisms (albeit limited to specific industries)—Clark's conclusions indeed found ex post changes to workers (such as turnover, absenteeism, discipline problems, and morale) but—more important—to management practices (such as formalization of procedures, worker-manager relations, performance reviews, and so on). Freeman and Medoff (1984) qualify that worker voice and management response channels could also negatively affect productivity if the state of employment relations is poor. We address the evidence of this mediating variation in union or employment relations quality later in this article.

UNION EFFECTS ON PROFITS

The positive estimates of union effects on productivity have not, however, extended to effects on firm profits. Most of the studies on this issue report negative effects (Hirsch 2007). Unions appear to be associated with rent sharing with unionized firms, particularly in more concentrated industries, though it is not clear whether this is a causal effect (Belman 1988). Again, most of these empirical studies used data from the 1970s through the 1990s. One interesting, and to our knowledge unanswered, question is whether this effect still holds today. We would expect the decline in union power and failure of unions to organize the newer large so-called superstar firms in concentrated industries (such as Apple, Microsoft, and Google) would weaken the overall union effects on profits. If so, this suggests that the decline in unions may account for part of the decline in labor's share of national and corporate income observed in recent decades. The issue warrants more careful research before firm conclusions on this issue can be reached.

In summary, research on the economic effects of unions in the era of the postwar social contract tends to focus on average effects, largely ignoring both the processes by which unions gained and sustained the bargaining power to have an impact, or on the variations in union-management relations in different settings. This began to change as evidence of both longitudinal and cross-sectional varia-

1. Using National Labor Relations Board election report data (2019), we see little change to the number of employee-initiated elections held, the share of elections won, or the number of employees eligible to vote between the years of 2011 and 2018.

Table 1. Wage Change Regressions: 1957–1984

	Full Sample		Pre-1980		Post-1980	
Multiplant, single-firm structures	.0039**	.0037**	.0058**	.0055**	−0.0067	−0.0067
	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0038)	(0.0039)
Multifirm structures	.0042**	.0043**	.0046**	.0046**	0.0031	0.0028
	(0.0013)	(0.0014)	(0.0014)	(0.0014)	(0.0043)	(0.0043)
Region-wide pattern bargaining	.0046**	.0050**	.0036**	.0039**	.0085*	.0090*
	(0.0013)	(0.0014)	(0.0014)	(0.0014)	(0.0043)	(0.0043)
Industry-wide pattern bargaining	.0045**	.0046**	.0043**	.0042**	0.0057	0.0063
	(0.0014)	(0.0014)	(0.0015)	(0.0014)	(0.0046)	(0.0046)
Strike 1 to 14 days		.0075*		.0080**		0.0039
		(0.0031)		(0.0030)		(0.0157)
Strike 15 to 24 days		0.0054		0.002		0.0164
		(0.0046)		(0.0046)		(0.0158)
Strike 25 or more days		.0052**		.0060**		−0.0029
		(0.0019)		(0.0019)		−0.0072
R^2	0.5	0.5	0.55	0.55	0.31	0.3

Source: Adapted from Kochan 1988. Reprinted in Kochan and Riordan 2016.
Note: Standard errors in parentheses. All regressions include controls for unemployment rate, price increases, price controls, and employment growth or decline during the term of the contract.
*p < .05; **p < .01; ***p < .001

tions in union-management relationships became more visible.

THE BREAKDOWN OF THE SOCIAL CONTRACT

The cumulative effects of the two oil shocks of the 1970s and the expanding union–non-union wage differentials—along with the inability of unions to overcome management resistance in organizing the growing high technology sectors of the economy or even the new plants of many unionized firms (Kochan, McKersie, and Chalykoff 1986)—put significant stresses on existing collective bargaining relationships. These stresses seemed to explode with the combined effects of the change in political control of the national government that came with the election of Ronald Reagan; the decision of the Federal Reserve Bank to bring down the rate of inflation by raising interest rates and the recession that followed; the deregulation of various highly unionized industries such as trucking, airlines, railroads, and communications; and the rising importance of import competition in key manufacturing industries such as autos, steel, and electronics. The confluence of these policy decisions and economic developments helped launch what was described as a fundamental transformation of industrial relations in the 1980s that led to the demise of the old social contract and a search for new principles to guide labor-management relations (Kochan, Katz, and McKersie 1994).

One indication of the fundamental changes taking place in the 1980s was observed in the shift in the structure of wage determination under collective bargaining, a shift that lowered the bargaining power of unions and resulted in lower wage increases than collective bargaining produced in the pre-1980 period. Tables 1 and 2 present estimates of effects of the changes in wage determination that occurred before and after 1980 using the U.S. Bureau of Labor Statistics (BLS) Current Wage Developments series covering bargaining units with one thousand or more workers (Kochan 1988; Kochan and Riordan 2016). The regression coefficients in pre- and post-1980 equations in table 1 show that the major causes of the change were that strikes (or the threat of strikes proxied by actual strikes), centralized bargaining structures, and pattern bargaining, sources of bargaining

Table 2. Overpredictions of Post-1980 Wage Changes Using Pre-1980 Model

Structure or Pattern Cell	N	Without Strikes (%)	With Strikes (%)
Overall sample	414	1.35	1.36
Single plant	169	0.79	0.83
Multiplant, single firm	163	2.10	2.09
Multifirm	82	0.94	0.96
No pattern	83	1.20	1.24
Regional pattern	162	0.89	0.90
Industry pattern	169	1.85	1.83

Source: Adapted from Kochan 1988. Reprinted in Kochan and Riordan 2016.

power that drove wage increases in the period from 1957 through the 1970s, no longer served as significant determinants of wage changes in the early 1980s. Thus the forces that produced and sustained the postwar social contract were no longer able to sustain the tandem upward movement of wages with productivity growth. As a result, as shown in table 2, the model used to explain wage determination in the pre-1980 period overpredicted the post-1980s by an average of 1.35 percent per year. Overprediction was greatest in centralized bargaining structures and in settings where intra-industry pattern bargaining had previously been the common practice. Unfortunately, in 1984 the BLS discontinued the data series that provided the wage data and so we are not able to test whether these differences persisted. Moreover, the expanding gap between aggregate productivity growth and wage growth from the 1980s to today suggests that the breakdown in the social contract has persisted.

VARIATIONS IN UNION EFFECTS AND THE QUALITY OF LABOR-MANAGEMENT RELATIONSHIPS

Starting in the 1980s, a large body of research began examining the effects of variations in the quality of labor-management relationships in both union and non-union establishments and firms within the same industries using what came to be called high-performance work systems. Two early studies of this type found large differences in productivity and product quality across auto assembly plants in the same firm. The differences were associated with variations in grievance rates, employee attitudes (trust) in supervisors, and the extent to which workers were engaged in quality improvement efforts (Katz, Kochan, and Gobeille 1983; Katz, Kochan, and Weber 1985). These studies had the effect of shifting focus from the average effects of unions on employment outcomes to explore more carefully the complementary (Milgrom and Roberts 1995; Black and Lynch 2001) or system of practices (Cutcher-Gershenfeld 1991; MacDuffie 1995; Ichniowski, Shaw, and Prennushi 1997) that combined to produce high or low productivity in both union and non-union firms.

The rise of Japanese "transplants" (auto assembly plants opened in the United States in the 1980s by Japanese firms such as Honda, Toyota, and Nissan) proved to be a fertile ground for studying these issues. A major debate developed over why the Japanese transplants appeared to achieve higher productivity and product quality than auto plants owned and managed by U.S. firms. The first documentation of this variation (without controlling for all unobserved factors) showed that average union effects would mask large differences between union and non-union facilities that employed traditional and high-performance work systems. Table 3 reproduces a classic set of comparisons that sparked much of this research. John Krafcik (1988) compared productivity and quality of auto assembly plants of non-union Japanese producers Nissan and Honda with a joint Toyota-GM unionized facility (NUMMI) and two other more traditionally structured GM-UAW plants using different levels of automation. The NUMMI plant matched and in some cases exceeded the productivity

Table 3. NUMMI Productivity Compared with Other Auto Plants in 1986

Company, Location	Productivity (hrs/unit)	Quality (defects/ 100 units)	Automation Level (0 = none)
Honda, Ohio	19.2	72.0	77.0
Nissan, Tennessee	24.5	70.0	89.2
NUMMI, California	19.0	69.0	62.8
Toyota, Japan	15.6	63.0	79.6
GM, Michigan	33.7	137.4	100.0
GM, Massachusetts	34.2	116.5	7.3

Source: Adapted from Krafcik 1988.
Note: Productivity: standardized number of hours to weld, paint, and assemble a vehicle. Quality: defects attributable to assembly operations reported in first six months of ownership. Automation level: robotic applications or production rate, normalized to one hundred for highest level in the group.

and quality performance of the non-union Japanese transplants and far exceeded the performance of the traditionally structured low and high technology (unionized) GM plants. This work spawned a host of industry-specific studies that documented similar productivity and quality results in organizations employing variations of high-performance work systems (MacDuffie 1995; Ichniowski, Shaw, and Prennushi 1997; for a review, see Appelbaum, Hoffer Gittell, and Leana 2011). Sandra Black and Lisa Lynch (2001) compared union and non-union manufacturing plants that used traditional and "transformed" or high-performance work system practices and further demonstrated the importance of focusing on the variations in both sectors: transformed plants achieved higher productivity in both union a*nd* non-union plants. Indeed, the differential between high and low productivity was greater in union than in non-union plants.

These quantitative results were collaborated with case studies of a number of transformed labor-management relationships observed in the auto, steel, office product, telecommunications, airline, health care, and other industries. The common features that distinguished transformed relationships was that unions and employers worked together in various forms of partnerships to engage employees in continuous improvement efforts. Many adopted variants of team work or other flexible work systems that departed from the individual job control model that characterized more traditional systems carried over from Taylorism and standard industrial engineering job design principles. Some encouraged and supported different forms of gains sharing thereby adapting the old productivity-wage norm in modified ways. Box 2 summarizes the features of the labor-management partnership at Kaiser Permanente, one of the largest, longest-lasting, and most comprehensive labor-management partnerships of the post-1980s era.

The bottom line of this body of research is that unions can and have had highly variable effects on managerial practices and on organizational performance, depending on the quality of the labor-management relationship. Traditional arms-length union-management relationships perform poorly relative to more flexible and partnership-oriented relationships. However, because a strong union is a precondition to partnerships (recall GM's resistance to allowing a union to participate in what the company deemed management issues), these types of partnerships have withered and fewer new ones have been established as union power and density have declined. More broadly, the diffusion of high-performance work systems or high-road strategies also appears to have stalled (Albers Mohrman et al. 1995; Osterman 2018). The key question is whether unions or some other form of worker organization can regain its role as a significant force for wage and productivity growth. That is, can a new social contract be imagined and achieved in today's economy? We now turn to this question.

Box 2. The Kaiser Permanente Labor-Management Partnership

In 1997, the CEO of Kaiser Permanente (KP), the president of the AFL-CIO, and leaders of the coalition of the unions representing employees at KP created what was to become the largest, most long-standing, and most innovative labor-management partnership in the nation's history.

Over its first decade, the partnership helped turn around Kaiser Permanente's financial performance, built and sustained a record of labor peace, and demonstrated the value of using interest-based processes to negotiate national labor agreements and to resolve problems on a day-to-day basis. Among its most significant achievements was the negotiation of a system-wide employment and income security agreement for dealing with workers affected by organizational restructurings. This agreement provided a framework that supported the introduction of electronic medical records technology on a scale that has made Kaiser Permanente a national leader in this area. In 2005 negotiations, the parties committed to bring partnership principles more fully to bear to support continuous improvement in health care delivery and performance by forming "unit based teams" (UBTs) of nurses, technicians, doctors, and service providers.

Since 2007 the parties have achieved significant progress in integrating the partnership into the standard operating model for delivering health care by expanding UBTs throughout the organization and demonstrating that high-performing teams that engage employees contribute significantly to improving health care quality and service, reducing workplace injuries, improving attendance rates, and achieving high levels of employee satisfaction with KP as a place to work and a place to get health care. As a result, Kaiser Permanente is now one of the nation's leaders in the use of front line teams to improve health care delivery.

Source: Adapted from Kochan 2013.

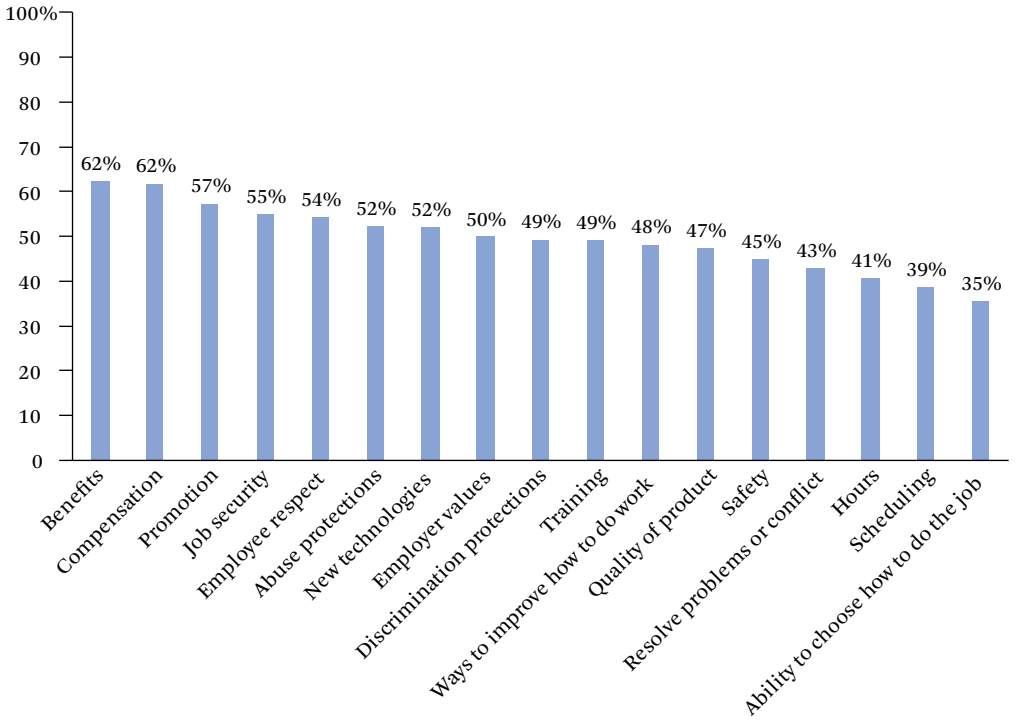
OUT OF THE ASHES: CURRENT STATE OF WORKER VOICE

So far we have painted a historical picture of the rise and decline of unions and the effects on both wages-compensation and the rise and stalled diffusion of high-road or high-performance work systems. Missing from this story is whether something has filled the void in worker voice and bargaining power as unions have declined. Can these new forms grow large enough to help increase wages or diffuse high-road practices that generate productivity growth? Or have workers lost interest in union representation in light of this long-term union decline? Answering these basic questions is crucial to deriving sensible implications for the future of labor policy.

Three data sets allow us to compare whether worker interest in gaining or having union representation has changed over the years before and after the breakdown in the postwar social contract. Two of these surveys also support comparisons of whether workers are experiencing a gap between the amount of say or influence (voice) they expect to have over conditions at work and their actual level of say or influence. We use these data to first summarize changes over time in interest in unions and then examine a number of other options for meeting worker expectations for a voice at work.

In 1995, Freeman and Rogers (1999) conducted a national survey of worker voice that identified what they labeled a representation gap; we use the term *voice gap* here. On average, workers reported that they had less say or influence on their jobs in determining wages, benefits, training, and other working conditions than they thought they ought to have. We conducted a similar national survey in 2017 and found these gaps persisted on compensation, wages, and training and extended to a broader array of workplace issues included in our survey than were measured in the Freeman and Rogers study (Kochan et al. 2019). Figure 2 summarizes the 2017 data. The largest voice gaps were

Figure 2. Voice Gap: Percentage of Workers with Less Involvement Than They Want



Source: Adapted from Kochan et al. 2019. Data based on Kochan and colleagues' analysis of Worker Voice Survey.

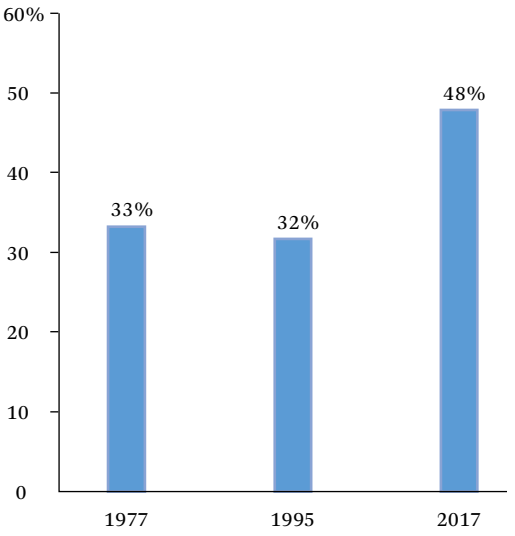
Note: Calculated as the share of respondents who, on a given issue, rate higher on how much say they ought to have compared to how much say they actually have.

reported for benefits, wages, promotions, and job security—essentially the key issues traditionally negotiated in collective bargaining. A majority of respondents reported having less of a voice on these issues than they felt they ought to have on their jobs. Although comparable data are not available for the earlier social contract era before 1980, the data—both that of Freeman and Rogers and the 2017 survey—suggest that a sizable voice gap has persisted since the 1990s.

These two surveys, along with a 1977 national survey sponsored by the Department of Labor and conducted by the University of Michigan Survey Research Center, also allow for comparisons of the level of interest in joining a union among unorganized workers (Kochan 1979). Figure 3 presents the differences in the percentage of non-union workers who indicated a preference for union representation in nationally representative surveys in 1977, 1995, and 2017.[2] The 1977 and 1995 results were nearly identical: approximately one-third of the non-union workforce indicated they would vote to have union representation if given an opportunity to do so on their current job. Estimates of union support from the 1995 data are likely lower than what they would be if public-sector employees were included. In 2017 that number increased to 48 percent. This number translates

2. For each survey, we restrict the sample to those employed who are eighteen or older, work twenty hours or more per week, and are not self-employed. Both the 1995 and 2017 samples exclude those in upper management or who are owners or related to the owners. The 1995 sample also excluded public-sector workers and those at small firms (twenty-four or fewer employees).

Figure 3. Percent of Non-union Workers Who Would Vote for a Union



Source: Adapted from Kochan et al. 2019. Based on authors' analysis of 1977 Quality of Employment Survey (Quinn and Staines 1992), Worker Representation and Participation Survey (Freeman and Rogers 1999), and 2017 Worker Voice Survey data. Data for 1995 from Freeman and Rogers 1999, 99.
Note: Each year's sample excludes self-employed. The 1995 sample also excludes all management occupations.

into an underrepresentation of unions of approximately fifty-eight million workers.[3]

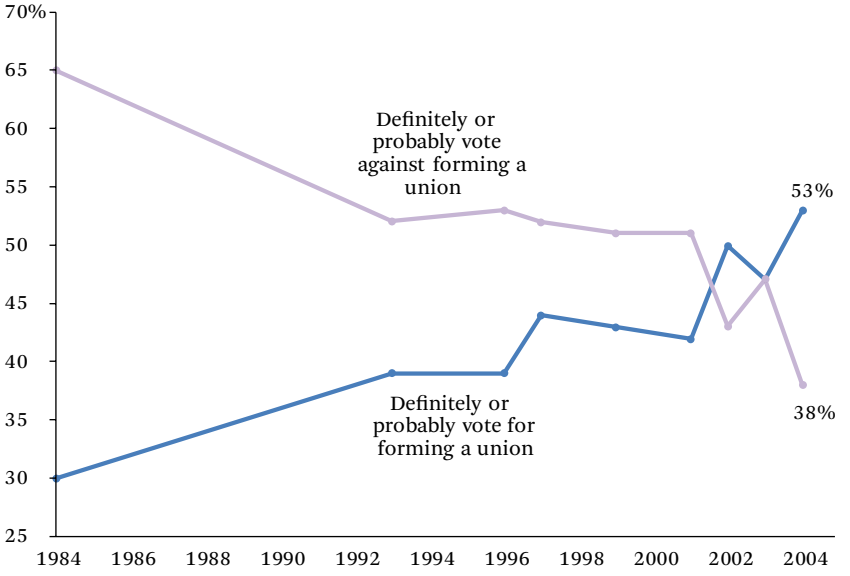
How do the results of these three surveys (that is, the share of non-union workers who would vote for union) comport with other analyses of public opinions on unions? According to Freeman (2007), citing polls conducted by Peter Hart Associates, worker willingness to join a union from 1984 to 2004 shows a similar pattern—interest hovers in the area of 30 to 40 percent between the 1980s and 1990s but by 2004 reaches a high of 53 percent (see figure 4). Meanwhile, Gallup polls on Americans' opinions of unions since 1936 show a similar pattern in the trend of stagnation of approval from the late 1970s to the 1990s (see figure 5). However, no substantial gain is evident between either the 1970s or 1990s and 2017. In 1979, approval sat at 55 percent. By 2017, it had risen to only 61 percent. This minimal change suggests that no major societal change in the role of unions in the economy had taken place in recent decades, but rather that an increasing share of approvers might also see unions as personally instrumental and relevant. These two series suggest that the union-interest indicator from the worker voice survey is not an aberration—instead, it seems as if the antiunion wave of the 1960s and 1970s stagnated until turning slightly more favorable after the Great Recession (other than a negative turn against most institutions during the Great Recession). Unions have become more attractive in that people are more likely to evince interest in joining a union *if an election were held at their work*.

EMERGING FORMS OF WORKER VOICE

Given the long-term decline in unions and the difficulties of organizing using traditional approaches under the National Labor Relations Act, it is not surprising that a variety of new approaches to providing workers a voice have been emerging and continue to emerge. We explored a number of such alternatives in the 2017 worker voice survey. These included both options typically offered by employers and options typically offered independently of employers by groups either working in coalition with one or more unions or on their own. Table 4 lists the options and frequency of their use. Workers are most likely to turn first to their su-

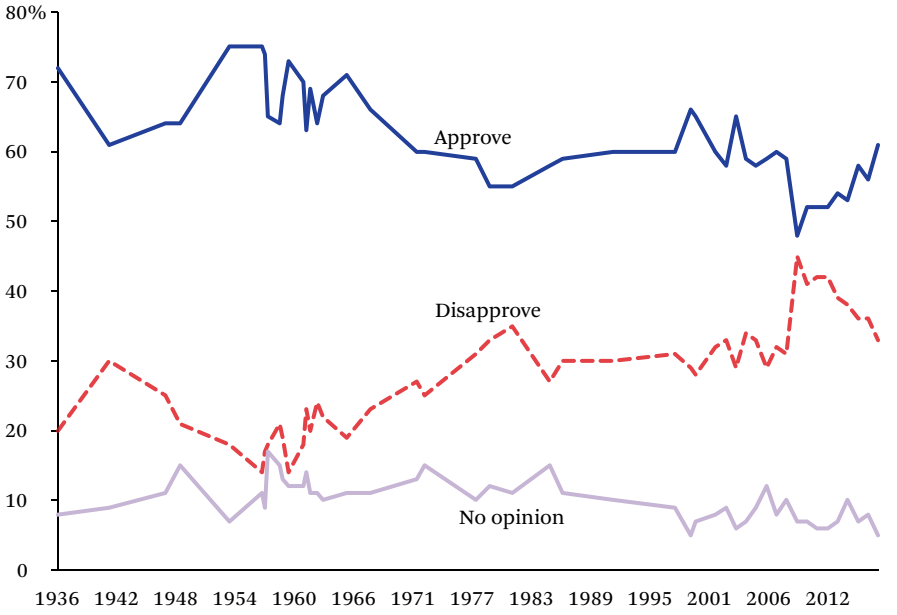
3. We estimate this number by assuming that every non-union worker who would want to join a union can join a union. This is calculated as the product of the 48 percent of non-union workers who would vote for a union in our sample by the total number of non-union workers in the 2017 Current Population Survey Outgoing Rotation Group (CPS ORG) microdata. We employ most of the same sample restrictions in the CPS ORG as in our sample: workers who are currently employed, working for pay, are eighteen years or older, and do not belong to a union or professional association. We are not able to exclude upper-level management or ownership in the CPS ORG as we did in the Worker Voice Survey (WVS). If instead we exclude all workers in management occupations in the CPS ORG, the estimate for potential new union members drops to fifty million workers.

Figure 4. Non-union Worker Likely Vote in a Union Representation Election, 1984–2004



Source: Freeman 2007, figure A.
Note: The original figure was based on polls conducted by Hart Research Associates from 1993 through 2014, supplemented with data from a 1984 Harris poll.

Figure 5. Approval of Labor Unions



Source: Gallup 2018.

Table 4. Workers Who Used Each Voice Channel

Voice Channel	Percent
Supervisor	71
People like you	64
Joint committee	17
Union	16
Grievance	15
Occupation association	15
Ombudsman	13
Petition	10
Online rating	10
Demographic association	10
Protest or rally	7
Strike	6

Source: Kochan et al. 2019.
Note: Based on Worker Voice Survey question 4: "In order to deal with workplace issues at your primary/current workplace, have you ever decided to [use voice mechanism]?" Sample restricted to those with valid answers that included yes or no.

pervisors and coworkers for advice on how to address a workplace problem, likely in part because they are readily available in most workplaces. The other newer options have only been used by 20 percent or less of this sample.

The number and variety of new forms of organizing and advocating for addressing workers' issues is impressive and likely to continue to grow. A sampling of these are listed in box 3. Some, such as the Freelancers Union, focus on professionals, in this case professional freelancers/independent contractors. Others such as the Domestic Workers Alliance focus on low-wage occupations that carry out their work in customers' homes. Some are affiliated with worker centers across the country, advocate for immigrant rights, and provide advice and legal services in disputes over wage and hour violations, discrimination, harassment, or safety and health. Others, such as Coworkers.org, help employees mount petitions to their employers to change scheduling and other practices. OUR Walmart uses artificial intelligence tools to track and answer employee inquiries about legal rights and potential violations of company policies. Lobstermen 207 is a union-affiliated co-op created to market the catch of independent lobster fishermen in Maine. Still other groups, such as the Fight for $15, mobilize in states and cities for increasing minimum wages.

Although the range of innovations is impressive, the impact of these forms of organizing to

Box 3. Examples of New Worker Voice Organizations

AFL-CIO Worker Center Partnerships
Alianza Nacional de Campesinas
Blue Green Alliance
Center on Policy Initiatives
Chinese Progressive Association
CLEAN Carwash Campaign
Contratados
Coworkers.org
Drivers Network
Fight for $15
Freelancers Union
Glassdoor
Green for All
Interfaith Worker Justice
Jobs with Justice
Justice for Janitors
LaborX
Laundry Workers Center
Los Angeles Alliance for a New Economy
National Day Laborer Organizing Alliance
National Domestic Workers Alliance
National Guestworkers Alliance
National Taxi Workers Alliance
OUR Walmart
Partnership for Working Families
Raise Up Massachusetts
Restaurant Opportunities Center United
SherpaShare
Tech Workers Coalition
Turkopticon
Workers Lab
Working America

Source: Arvins, Larcom, and Weissbourd 2018.

date has been limited relative to that of unions at their peak. Evidence is scant that these innovations have had effects on wages or standards with the possible exception of the Fight for $15 movement in terms of achieving minimum wage increases that appear to be linked to recent wage growth for lower-paid workers (Gould 2019). Although some have succeeded in extending opportunities for voice (Coworker.org), labor protections (Domestic Workers Alliance), and job benefits such as health insurance (Freelancers Union) or training (Domestic Workers Alliance) to specific groups of workers who are otherwise unable to access them, none have achieved a level of scale at which they could have an impact on the overall economy or their industry the way that unions' pattern bargaining did. Nor have any developed a fully self-sustaining revenue model: most still rely on financial support from foundations or unions (Rolf 2016). Thus, whether these emerging groups will be successful in building new sources of power that can achieve effects anywhere close to the effects of traditional unions remains to be seen. Clearly, however, the range and number of such efforts indicate that today's labor advocates are looking to build worker voice and bargaining power in ways not limited to or constrained by existing labor law, union-management relations, or collective bargaining. This has profound implications for the future of labor policy.

IMPLICATIONS FOR POLICY

We now address three interrelated questions. First, what do the data on the current state of worker voice and representation imply for the future of labor policy? Second, what has the history of unions and union-management relations taught us about how labor policy fits with and might contribute to economic policies capable of improving living standards for the majority of Americans? Third, looking beyond policies for worker voice and representation, what other actions might government policymakers take to improve employment standards for union and non-union workers? We end with some more preliminary thoughts about how labor and employment policy might also contribute to meeting the challenges of technological innovations that lie ahead.

The evidence is quite clear that contemporary labor law is failing to deliver on its intended purpose of providing workers the ability to decide whether they want union representation. The survey data presented earlier show that a large and growing number of workers who express an interest in union membership have been and continue to be unable to get it. The best study of the union-organizing process proscribed in the National Labor Relation Act further reinforces this conclusion. John-Paul Ferguson (2008) traced the outcomes of organizing and first contract negotiations processes overseen by the National Labor Relations Board and the Federal Mediation and Conciliation Service from 1999 to 2004. He finds that only 20 percent of those processes that showed enough support to request an election were successful in achieving an initial collective bargaining contract.[4] If the employer resisted to the point the union filed an unfair labor practice charge, the union success rate fell to just below 10 percent. These results suggest that, in reality, employers decide whether workers who express a desire for union representation will get it.

Many other features of labor law are equally ineffective, outdated, or—as one labor law scholar termed it—"ossified" (Estlund 2010). In a paper prepared for the seventh-fifth anniversary of the NLRA, Kochan (2011) suggests that five doctrines that need reconsideration are especially problematic. One pertains to distinctions between who is eligible for union membership and who is excluded. A second relates to the exclusion of topics from mandatory subjects of bargaining that workers want to influence. A third involves constraints on direct forms of employee engagement and participation in decisions about how work is organized or how to improve workplace operations and performance. A fourth is the role of exclusive representation. Last is the determination of separate bargaining units for occupational groups within an enterprise or workplace. This list could go on in regard to features that carry

4. The law requires a minimum of 30 percent support but most unions will not file a petition for an election unless a majority of potential voters have signed cards indicating they want to be represented.

over from labor law conceived in the 1930s for a largely industrial economy that do not fit well with today's economy and workforce. Indeed, consensus is growing among labor law experts that the time has come to take a clean slate approach to the design of a new labor law in contrast to the multiple failed efforts (such as those in 1977, 1995, and 2008) to make incremental reforms to the existing law. A broad-based discussion of what these new features of labor law should entail is now under way (Milano 2018).

STARTING POINTS FOR A NEW LABOR POLICY

Although discussions of the features of a new labor law are only in the early stages, the evidence reviewed here suggests several basic design parameters for both an updated labor law and a labor policy that promotes forms of labor-management relations that might contribute to building a new productivity- and wage-enhancing social contract.

First, any new labor law and policy has to deliver on the core principle of freedom of association, especially given the evidence that interest in joining a union has increased in recent decades. Workers should be able to decide whether they want representation and those who do should have ready access to institutions and processes that allow them to express their voices at work in ways that allow them to influence the range of working conditions of importance to them. The United Nations' International Labor Organization includes freedom of association as one of its fundamental principles. That is, workers should have the ability to express their voice collectively and participate in the determination of their working conditions through collective bargaining or other means. As Albert Rees (1963) clearly stated decades ago, the political functions that unions serve in a democratic society may be as or more important than their economic functions. This principle is often lost or overlooked in economic policy discussions about unions. We present it here as the starting point for building a future labor policy.

Second, given the economic (potentially positive and potentially negative) effects of collective representation, labor policy (both the law and its affiliated administrative arrangements) should be integrated with and an integral part of national economic policies capable of supporting high and increasing levels of productivity that are accompanied by increasing wages and economic security. This is the essence of the old social contract; new ways need to be crafted to achieve similar results in today's significantly different economic and technological environment. Calls for viewing labor policy as an integral part of economic policy have been made before but have largely been ignored by those in charge of economic policy in both Democratic and Republican administrations. This needs to change.

Third, the results of our worker voice research to date suggest that "no one-size shoe" approach to voice at work fits all issues or all workers. This implies that labor law needs to open up to support a range of voice options that include but are not limited to collective bargaining, direct employee engagement in work design and improvement efforts, consultation or representation on the broad employment strategies adopted by employers through institutions such as works councils (representative and consultative bodies elected by all workers in an establishment that are common in Europe by are not allowed under current U.S. labor law) or representation on company boards (Hirsch 2007). Recognizing that "pattern bargaining" is no longer feasible as an instrument for reducing cross-firm income inequality or diffusing high-road strategies, some argue for establishing sectoral bargaining or industry-specific wage boards to set minimum standards (Madland 2018).

Fourth, labor policies need to promote high-quality labor-management relationships that contribute both to worker voice and to economic performance. This in turn calls for endorsement of models that support employee engagement, flexibility, investments in training and workforce development, and the types of labor-management partnerships discussed earlier.

Finally, the history of failed efforts at labor law reform suggest one other design principle. Prior efforts have been largely technical affairs among labor policy experts and narrowly debated political battles between labor and management and advocates. Yet the biggest changes

in American labor policy have been achieved in times of widespread activism by workers who captured the attention of the American public. The NLRA was enacted in the midst of the Great Depression, when organizing and strike activity were rising and concern over social and political stability was growing. The 1947 amendments to the NLRA were passed when growing numbers of people disapproved of labor unions, presumably on the basis of the notion that labor had become too powerful and too disruptive a force. Public-sector workers began gaining access to collective bargaining in the 1960s in states where teacher unions and others were agitating and engaging in strikes in the absence of effective options for dispute resolution and in the context of escalating social unrest in cities across the country. The point here is that achieving a new labor policy will require a broad-based public awareness and a call to action. That necessary condition is not yet present in society. So the ultimate policy implication is to increase public awareness that labor policy is failing but that ideas on how to fix it are numerous.

BROADER STRATEGIES FOR IMPROVING JOB QUALITY

Given the long-term nature of union decline and the historic difficulties of changing labor policies, it is important to consider policies for promoting high-road employment practices and improving job quality in all workplaces regardless of whether unions or other forms of worker voice or representation are present. Here we suggest a mix of carrots designed to support and reward firms that already follow high-productivity, high-wage practices that are complemented with enough sticks that enforce or incentivize upgrading minimum employment standards.

The policy levers for enforcing and upgrading minimum employment standards are well known and normally include some combinations of gradually raising minimum wages or the Earned Income Tax Credit; setting a joint employer standard; and rigorous targeting of enforcement of safety and health, wage and hour, and other workplace regulations on employers and sectors with the most egregious violation histories. Combinations of these levers would be the equivalent of what we described earlier as a union shock effect on low-standard employers. The policies aim to establish a universal minimum on various working conditions and compensation, raising the floor so that there is less room for low-road employers to undercut others on labor costs. Charles Brown and Daniel Hamermesh (2019) summarize much of the research to date as showing minimal disemployment effects with the caveat that longer-term effects are harder to predict without making contestable assumptions about the substitutability of technology and labor. In addition to their review, we also highlight the work of Doruk Cengiz and his colleagues (2019), which focuses on how minimum wage changes affected employment of low-wage workers specifically (those at or slightly above the existing minimum wages) and finds no significant disemployment effects for low-wage workers but seemingly spurious disemployment effects do show up further up the wage distribution. One reason that the minimum wage disemployment effects appear to be minimal is that employers enlist productivity-enhancing actions similar to those set in motion by the shock effects of union-negotiated increases (Hirsch, Kaufman, and Zelenska 2015). In their article, Brown and Hamermesh also discuss how changing overtime rules (such as the Obama administration's attempt at increasing the overtime salary threshold)—a lever that arguably affects more middle-income workers—can reduce workers' hours and increase effective hourly pay but potentially at the expense of lower overall work hours and gross domestic product. Other levers seek to plug the holes in existing labor law and standards that businesses may exploit to avoid mandated benefits or liability for workers' well-being. Fissuring of the workplace—which David Weil (2019) notes can contribute to inequality, reduce access to benefits and safety net protections, and "unravel" the social networks of workers to lead firms—suggests the need to counteract these effects with policies to affirm a joint standard or prevent misclassification of independent contractors. The resources afforded by the government to monitoring and enforcing these labor standards are often inadequate, but a complementary force of worker voice and representation could work from the

bottom up, empowering workers to identify and resolve or flag labor violations, an idea that dates back to Sidney and Beatrice Webb's *Industrial Democracy*:

> To get the principle of a National Minimum unreservedly adopted; to embody it in successive Acts of Parliament of the requisite technical detail; to see that this legislation is properly enforced; to cause the regulations to be promptly and intelligently adapted to changes in the national industry, requires persistent effort and specialised skill. For this task no section of the community is so directly interested and so well-equipped as the organized trades, with their prolonged experience of industrial regulation and their trained official staff. (1897, 817)

The importance of work-life balance to job quality has come to the forefront in recent years as the lack of flexibility and the motherhood penalty are the likely suspects for recent stagnation in the women's labor-force participation and the closing of the gender pay gap in the United States (Doran, Bartel, and Waldfogel 2019). To the extent that policy can provide affordable childcare and directly support paid family leave, it will reduce existing inequalities in the availability or affordability of these benefits and make it less likely for businesses to discriminate against women in hiring or promoting if mandates were used instead. Relatedly, flexible work arrangements in terms of work schedule and location can allow more individuals to balance the needs of work and home, which again can increase more individuals' attachment to the workforce. These policies are instrumental in not only closing gender gaps but also making jobs more compatible with needs of today's workers.

Policies that reward high-road firms are less well developed and tested. For years, the Occupational Safety and Health Administration has had a voluntary protection program that absolves establishments from periodic government inspections if they meet or exceed average injury rates for their industry and have comprehensive safety management practices in place. Other initiatives of this sort would include prevailing wage laws or giving preference to government contractors that meet or exceed specified wage, training, or other job quality thresholds. Still other options would be to use tax incentives to encourage or reward investments in training or profit sharing, which have been found to improve productivity, workers' investment in training, and wage growth (Azfar and Danninger 2001). These are simply examples of specific policy actions that can be considered. The general principle might be to find the best mix of sticks and carrots that produce the same dynamic adjustment strategies as the union shock effect did in an era of strong unions.

TECHNOLOGY AND THE FUTURE OF WORK

All of these options deserve consideration, but perhaps the single biggest challenge, and perhaps opportunity, for policy innovations lies in harnessing anticipated changes in technologies to improve job quality and to build a new social contract at work. How to do this is a topic of widespread debate and discussion today yet to date no consensus has been reached on the mix of policies best suited to this task. Our suggestions here are thus designed more as inputs to these debates and to encourage actions that might test the ability to build a new social contract than to provide final answers.

Most discussions about technology and the future of work focus on the need for additional training for workers most at risk of displacement from technological changes. The displacement effects of robots could be substantial (Borjas and Freeman 2019; Acemoglu and Restrepo 2017). The need for training is also a sensible idea given the evidence of growing demand for advanced technical and social skills and evidence that technical skills have a relatively high rate of depreciation (Deming 2017). However, training is likely to have limited success in terms of take up or positive returns when workers are already at risk of or facing displacement. But if done in anticipation of technological changes and before the changes appear at the workplace, workers will be better prepared to adapt to new technologies. Again, this could be encouraged in a variety of ways, such as through tax credits or other incentives for broad-based human capital investments, joint worker and union management training

programs funded as a part of the overall wage bill, or individual training accounts that move with workers across jobs and employers.

Although increased investments in training are clearly warranted, too often training or upskilling the workforce is viewed as the only policy lever for addressing changing technologies. We see training investments as a necessary but not a sufficient policy action. It is equally important to provide workers, whether through unions, works councils, or informal methods, the right and ability to participate in the earliest stages of the technology design decisions in order to integrate changes in work processes and tasks with the design of new technologies. There is both long-standing (MacDuffie and Krafcik 1992) and more recent (Brynjolfsson and Milgrom 2013; Hitt and Tambe 2016; Litwin 2011) evidence that effective integration of technology and work design strategies generate higher productivity than when technologies are designed and implemented in isolation. Yet evidence is scant that industry practice or government policies that subsidize development of new technologies have taken this evidence into account (Bonvillian and Singer 2017). We are encouraged to see that this issue is now getting attention in some settings. The 2018 contracts negotiated between a number of large hotels in various cities and UNITE-HERE, for example, provide for a comprehensive provisions including advance notice of major technological changes, union participation in early stage technology decision processes, enhanced training in anticipation of coming technologies, and adjustment and income supports for workers displaced by technological changes (Johnston 2018). These might serve as the generic elements for a national technology and work policy that, appropriately adapted to fit different circumstances, should be made available to all workers.

The wide-ranging discussions of technology and the future of work could serve as a focal point for bringing business, labor, government, and educators together to forge the starting principles for a new social contract at work.

REFERENCES

Acemoglu, Daron, and Pascual Restrepo. 2017. "Robots and Jobs Evidence from US Labor Markets." *NBER* working paper no. 23285. Cambridge, Mass.: National Bureau of Economic Research.

Albers Mohrman, Susan, Ramkrishnan V. Tenkasi, Edward E. Lawler, and Gerald E. Ledford. 1995. "Total Quality Management: Practice and Outcomes in the Largest U.S. Firms." *Employee Relations* 17(3): 26–41.

Appelbaum, Eileen, Jody Hoffer Gittell, and Carrie Leana. 2011. "High-Performance Work Practices and Sustainable Economic Growth." Washington, D.C.: Center for Economic and Policy Research.

Ashenfelter, Orley. 1972. "Racial Discrimination and Trade Unionism." *Journal of Political Economy* 80(3, Part 1): 435–64.

———. 1978. "Union Relative Wage Effects: New Evidence and a Survey of Their Implications for Wage Inflation." In *Econometric Contributions to Public Policy*, edited by Richard Stone and William Peterson. New York: St. Martins Press.

Arvins, Jeremy, Megan Larcom, and Jenny Weissbourd. 2018. "New Forms of Worker Voice in the 21st Century." Working Paper. Cambridge, Mass.: Harvard Kennedy School of Government and MIT Sloan School of Management. Accessed September 7, 2019. https://iwer.mit.edu/wp-content/uploads/2018/01/New-Forms-of-Worker-Voice-IWER.pdf.

Azfar, Omar, and Stephan Danninger. 2001. "Profit-Sharing, Employment Stability, and Wage Growth." *ILR Review* 54(3): 619–30.

Belman, Dale. 1988. "Concentration, Unionism, and Labor Earnings: A Sample Selection Approach." *Review of Economics and Statistics* 70(3): 391–97. DOI: 10.2307/1926776.

Benderly, Beryl Lieff. 2018. "The Push for Graduate Student Unions Signals a Deep Structural Shift in Academia." *Science*, June 6, 2018. Accessed June 30, 2019. https://www.sciencemag.org/careers/2018/06/push-graduate-student-unions-signals-deep-structural-shift-academia.

Black, Sandra E., and Lisa M. Lynch. 2001. "How to Compete: The Impact of Workplace Practices and Information Technology on Productivity." *Review of Economics and Statistics* 83(3): 434–45.

Blanchflower, David G., and Alex Bryson. 2004. "What Effect Do Unions Have on Wages Now and Would Freeman and Medoff Be Surprised?" *Journal of Labor Research* 25(3): 383–414.

Bloch, Farrell E., and Mark S. Kuskin. 1978. "Wage Determination in the Union and Nonunion Sec-

tors." *Industrial and Labor Relations Review* 31(2): 183–92.

Bonvillian, William, and Peter L. Singer. 2017. *Advanced Manufacturing: The New American Innovation Policies*. Cambridge, Mass.: MIT Press.

Borjas, George J., and Richard B. Freeman. 2019. "From Immigrants to Robots: The Changing Locus of Substitutes for Workers." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 22–42. DOI: 10.7758/RSF.2019.5.5.02.

Bratsberg, Bernt, and James F. Ragan. 2002. "Changes in the Union Wage Premium by Industry." *ILR Review* 56(1): 65–83.

Brown, Charles C., and Daniel S. Hamermesh. 2019. "Wages and Hours Laws: What Do We Know? What Can Be Done?" *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 68–87. DOI: 10.7758/RSF.2019.5.5.04.

Brown, Charles C., and James Medoff. 1978. "Trade Unions in the Production Process." *Journal of Political Economy* 86(3): 355–78.

Brynjolfsson, Erik, and Paul Milgrom. 2013. "Complementarity in Organizations." *In The Handbook of Organizational Economics*, edited by Robert Gibbons and John Roberts. Princeton, N.J.: Princeton University Press.

Budd, John W. 1992. "The Determinants and Extent of UAW Pattern Bargaining." *ILR Review* 45(3): 523–39.

Card, David. 1996. "The Effect of Unions on the Structure of Wages: A Longitudinal Analysis." *Econometrica* 64(4): 957–79.

Card, David, Thomas Lemieux, and W. Craig Riddell. 2004. "Unions and Wage Inequality." *Journal of Labor Research* 25(4): 519–59.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer. 2019. "The Effect of Minimum Wages on Low-Wage Jobs: Evidence from the United States Using a Bunching Estimator." *NBER* working paper no. 25434. Cambridge, Mass.: National Bureau of Economic Research.

Chamberlain, Neil W., and James W. Kuhn. 1965. *Collective Bargaining*. New York: McGraw-Hill.

Clark, Kim B. 1980. "The Impact of Unionization on Productivity: A Case Study." *ILR Review* 33(4): 451–69.

Cutcher-Gershenfeld, Joel. 1991. "The Impact on Economic Performance of a Transformation in Workplace Relations." *ILR Review* 44(2): 241–60.

Deming, David J. 2017. "The Growing Importance of Social Skills in the Labor Market." *NBER* working paper no. 21473. Cambridge, Mass.: National Bureau of Economic Research.

DiNardo, John, Nicole M. Fortin, and Thomas Lemieux. 1996. "Labor Market Institutions and the Distribution of Wages, 1973–1992: A Semiparametric Approach." *Econometrica* 64(5): 1001–44.

Doran, Elizabeth L., Ann P. Bartel, and Jane Waldfogel. 2019. "Gender in the Labor Market: The Role of Equal Opportunity and Family-Friendly Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 168–97. DOI: 10.7758/RSF.2019.5.5.09.

Economic Policy Institute. 2017. "Productivity and Hourly Compensation." *State of Working America Data Library*. Accessed May 25, 2019. https://www.epi.org/data/#?subject=prodpay.

Estlund, Cynthia. 2010. *Regoverning the Workplace: From Self-Regulation to Co-Regulation.* New Haven, Ct.: Yale University Press.

Farber, Henry S., Daniel Herbst, Ilyana Kuziemko, and Suresh Naidu. 2018. "Unions and Inequality over the Twentieth Century: New Evidence from Survey Data." *NBER* working paper no. 24587. Cambridge, Mass.: National Bureau of Economic Research.

Ferguson, John-Paul. 2008. "The Eyes of the Needles: A Sequential Model of Union Organizing Drives, 1999–2004." *ILR Review* 62(1): 3–21.

Freeman, Richard B. 1980. "Unionism and the Dispersion of Wages." *ILR Review* 34(1): 3–23.

———. 1982. "Union Wage Practices and Wage Dispersion Within Establishments." *ILR Review* 36(1): 3–21.

———. 2007. "Do Workers Still Want Unions? More Than Ever." Briefing Paper 182. Washington, D.C.: Economic Policy Institute.

Freeman, Richard B., and James L. Medoff. 1984. *What Do Unions Do?* New York: Basic Books.

Freeman, Richard B., and Joel Rogers. 1999. *What Workers Want*. Ithaca, N.Y.: ILR Press.

Gallup. 2018. "Labor Unions." Accessed June 22, 2019. https://news.gallup.com/poll/12751/Labor-Unions.aspx.

Gould, Elise. 2019. "Wage Growth for Low-Wage Workers Has Been Strongest in States with Minimum Wage Increases." Washington, D.C.: Economic Policy Institute. Accessed June 22, 2019. https://www.epi.org/publication/wage-growth-for-low-wage-workers-has-been-strongest-in-states-with-minimum-wage-increases/.

Hirsch, Barry T. 2007. "What Do Unions Do for Economic Performance?" In *What Do Unions Do? A Twenty-Year Perspective*, edited by James T. Bennett and Bruce E. Kaufman. New Brunswick, N.J.: Transaction Publishers.

Hirsch, Barry T., Bruce E. Kaufman, and Tetyana Zelenska. 2015. "Minimum Wage Channels of Adjustment." *Industrial Relations* 54(2): 199–239. DOI: 10.1111/irel.12091.

Hitt, Lorin M., and Prasanna Tambe. 2016. "Health Care Information Technology, Work Organization, and Nursing Home Performance." *ILR Review* 69(4): 834–59.

Ichniowski, Casey, Kathryn Shaw, and Giovanna Prennushi. 1997. "The Effects of Human Resource Management Practices on Productivity." *American Economic Review* 87(3): 291–313.

Johnson, George E., and Kenwood C. Youmans. 1971. "Union Relative Wage Effects by Age and Education." *ILR Review* 24(2): 171–79.

Johnston, Katie. 2018. "Progressive Marriot Workers Contract Could Have Ripple Effects." *Boston Globe*, December 10, 2018.

Katz, Harry C., Thomas A. Kochan, and Alexander James Colvin. 2004. *An Introduction to Collective Bargaining and Industrial Relations*. Boston, Mass.: McGraw-Hill/Irwin.

Katz, Harry C., Thomas A. Kochan, and Kenneth R. Gobeille. 1983. "Industrial Relations Performance, Economic Performance, and QWL Programs: An Interplant Analysis." *Industrial and Labor Relations Review* 37(1): 3–17.

Katz, Harry C., Thomas A. Kochan, and Mark R. Weber. 1985. "Assessing the Effects of Industrial Relations Systems and Efforts to Improve the Quality of Working Life on Organizational Effectiveness." *Academy of Management Journal* 28(3): 509–26.

Kochan, Thomas A. 1979. "How American Workers View Labor Unions." *Monthly Labor Review* 102(4): 23–31.

———. 1988. "Wage Determination Under Collective Bargaining." Unpublished working paper. Cambridge, Mass.: MIT Sloan Institute for Work and Employment Research.

———. 2000. "Building a New Social Contract at Work: A Call to Action." *Perspectives at Work* 4(1): 3–12.

———. 2011. "Rethinking and Reframing U.S. Policy on Worker Voice and Representation." *ABA Journal of Labor & Employment Law* 26(2): 231–48.

———. 2013. "The Kaiser Permanente Labor Management Partnership: 2009–2013." Cambridge, Mass.: MIT Sloan Institute for Work and Employment Research.

Kochan, Thomas A., Harry C. Katz, and Robert B. McKersie. 1994. *The Transformation of American Industrial Relations*. Ithaca, N.Y.: ILR Press.

Kochan, Thomas A., Robert McKersie, and John Chalykoff. 1986. "The Effects of Corporate Strategy and Workplace Innovations on Union Representation." *ILR Review* 39(4): 487–501.

Kochan, Thomas A., and Paul Osterman. 1994. *The Mutual Gains Enterprise: Forging a Winning Partnership Among Labor, Management, and Government*. Boston, Mass.: Harvard Business School Press.

Kochan, Thomas A., and Christine A. Riordan. 2016. "Employment Relations and Growing Income Inequality: Causes and Potential Options for Its Reversal." *Journal of Industrial Relations* 58(3): 419–40.

Kochan, Thomas A., Duanyi Yang, William T. Kimball, and Erin L. Kelly. 2019. "Worker Voice in America: Is There a Gap Between What Workers Expect and What They Experience?" *ILR Review* 72(1): 3–38.

Krafcik, John F. 1988. "Triumph of the Lean Production System." *Sloan Management Review* 30(1): 41–52.

Levinson, Harold M. 1960. "Pattern Bargaining: A Case Study of the Automobile Workers." *Quarterly Journal of Economics* 74(2): 296–317.

Lewis, H. Gregg. 1962. "The Effects of Unions on Industrial Wage Differentials." In *Aspects of Labor Economics*. Princeton, N.J.: Princeton University Press.

———. 1986. "Union Relative Wage Effects." In *Handbook of Labor Economics*, vol. 2, edited by Orley Ashenfelter and David Card. New York: Elsevier.

Lichtenstein, Nelson. 1995. *Walter Reuther: The Most Dangerous Man in Detroit*. Urbana: University of Illinois Press.

Litwin, Adam Seth. 2011. "Technological Change at Work: The Impact of Employee Involvement on the Effectiveness of Health Information Technology." *ILR Review* 64(5): 863–88.

MacDuffie, John Paul. 1995. "Human Resource Bundles and Manufacturing Performance: Organizational Logic and Flexible Production Systems in the World Auto Industry." *ILR Review* 48(2): 197–221.

MacDuffie, John Paul, and John F. Krafcik. 1992. "Integrating Technology and Human Resources for High-Performance Manufacturing: Evidence from the International Auto Industry." In *Transforming Organizations*, edited by Thomas A. Kochan and Michael Useem. New York: Oxford University Press.

Madland, David. 2018. "Wage Boards for American Workers." Washington, D.C.: Center for American Progress. Accessed June 22, 2019. https://www.americanprogress.org/issues/economy/reports/2018/04/09/448515/wage-boards-american-workers.

Masters, Marick F., and Raymond F. Gibney. 2019. "The Tactics Media Unions Are Using to Build Membership." *Harvard Business Review*, January 9. Accessed June 22, 2019. https://hbr.org/2019/01/the-tactics-media-unions-are-using-to-build-membership.

Milano, Brett. 2018. "A 'Clean Slate' for the Future of Labor Law." *Harvard Law Today*, August 1. Accessed May 25, 2019. https://today.law.harvard.edu/clean-slate-future-labor-law.

Milgrom, Paul, and John Roberts. 1995. "Complementarities and Fit Strategy, Structure, and Organizational Change in Manufacturing." *Journal of Accounting and Economics* 19(2–3): 179–208.

National Labor Relations Board. 2019. "Election Reports." Last modified April 2019. Accessed June 22, 2019. https://www.nlrb.gov/reports-guidance/reports/election-reports.

National War Labor Board. 1946. "Termination Report of the National War Labor Board: Industrial Disputes and Wage Stabilization in Wartime." Washington: Government Printing Office.

Osterman, Paul. 2018. "In Search of the High Road: Meaning and Evidence." *ILR Review* 71(1): 3–34.

Quinn, Robert, and Graham Staines. 1992. "Quality of Employment Survey, 1977: Cross-Section: Version 1." Ann Arbor, Mich.: ICPSR—Interuniversity Consortium for Political and Social Research. Accessed June 22, 2019. https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/7689.

Rees, Albert. 1963. "The Effects of Unions on Resource Allocation." *Journal of Law and Economics* 6 (October): 69–78.

Rolf, David. 2016. *The Fight for Fifteen: The Right Wage for a Working America*. New York: The New Press.

Schmidt, Peter. 2017. "New Study Charts Recent Proliferation of Faculty Unions." *The Ticker* (Chronicle of Higher Education blog). January 27. Accessed June 22, 2019. https://www.chronicle.com/blogs/ticker/new-study-charts-recent-proliferation-of-faculty-unions/116611.

Slichter, Sumner H., James J. Healy, and E. Robert Livernash. 1960. *The Impact of Collective Bargaining on Management*. Washington, D.C.: Brookings Institution.

U.S. Department of Labor. 1947. "Work Stoppages Caused by Labor-Management Disputes in 1946." Bureau of Labor Statistics Bulletin no. 918. Washington: Government Printing Office. Accessed June 22, 2019. https://www.bls.gov/wsp/1946_work_stoppages.pdf.

Webb, Beatrice, and Sidney Webb. 1897. *Industrial Democracy.* London: Longman.

Weil, David. 2019. "Understanding the Present and Future of Work in the Fissured Workplace Context." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 147–65. DOI: 10.7758/RSF.2019.5.5.08.

Western, Bruce, and Jake Rosenfeld. 2011. "Unions, Norms, and the Rise in U.S. Wage Inequality." *American Sociological Review* 76(4): 513–37.

PART III

Reshaping Labor Markets and Policy Responses

Making Ends Meet: The Role of Informal Work in Supplementing Americans' Income

KATHARINE G. ABRAHAM AND SUSAN N. HOUSEMAN

Data from the Survey of Household Economics and Decisionmaking indicate that, over the course of a month, more than one-quarter of adults engage in some informal work outside of a main job. Of these, about two-thirds say that they do informal work to earn money and about one-third say that informal work is an important source of household income. Informal work plays a particularly important role in the household finances of minorities, the less educated, those experiencing financial hardship, those who work part time involuntarily, independent contractors, and the unemployed. Aggregate earnings from informal work are modest but help many households to make ends meet. Informal work cannot compensate, however, for the lack of benefits typical of part-time and contractor work.

Keywords: informal work, gig work, independent contractors, income adequacy

In recent years, widespread media reports have trumpeted the rise of the so-called gig economy, characterized by a workforce increasingly composed of independent contractors, consultants, freelancers, and others in nonemployee arrangements. Workers in these arrangements typically provide services for short durations to clients or customers. The attention focused on the gig economy echoes a similar interest in the temporary or so-called contingent workforce that emerged in the late 1980s and 1990s. Although some may value the flexibility or other attributes of nonemployee work arrangements, such workers are not eligible to receive employer-provided benefits, are not covered by social insurance programs such as unemployment insurance and workers' compensation, and are not afforded protections under employment and labor laws. Consequently, there has been widespread concern that such arrangements put workers at significant risk relative to those in a more traditional employee relationship.

Given the widely held belief that the tradi-

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tional employee-employer relationship is in decline, many were surprised by the findings from the 2017 Contingent Worker Survey supplement (CWS) to the Current Population Survey (CPS) released in June 2018 by the U.S. Bureau of Labor Statistics (BLS). The BLS developed the CWS, first fielded in 1995 and repeated on several subsequent occasions, to learn more about the arrangements under which Americans work. Earlier findings reported by Lawrence Katz and Alan Krueger (2016) had suggested that the prevalence of alternative work arrangements as measured in the CWS grew significantly between 2005 and 2015, though more recent work by the same authors concludes that any increase was much smaller than they had initially estimated (Katz and Krueger 2019). The new CWS data show no increase between 2005 and 2017 in the prevalence of any of the alternative work arrangements the supplement measures—independent contractors, on-call workers, temporary agency employees, and contract firm employees. In fact, the CWS data show a slight decline over those twelve years in the prevalence of independent contractor arrangements, captured by asking survey respondents whether they worked as an independent contractor, independent consultant, or freelance worker. This finding was especially surprising to many, given evidence from tax data and other financial data suggesting nonemployee work arrangements have become more common (see, for example, Farrell and Greig 2016a, 2016b; Jackson, Looney, and Ramnath 2017; Abraham et al. 2018b; Farrell, Greig, and Hamoudi 2018).

A central reason for the apparent discrepancy between the CWS findings and other evidence is the focus of the CWS on the main jobs held by people categorized as employed in the basic monthly CPS. Studies using tax data and other financial data have found that work done as an independent contractor, consultant, or freelancer often supplements other sources of income rather than represents a primary source of income (for example, Farrell and Greig 2016a, 2016b; Jackson, Looney, and Ramnath 2017; Abraham et al. 2018a, 2018b; Farrell, Greig, and Hamoudi 2018; Koustas 2018; Katz and Krueger 2019). The CWS was not designed to capture information about nonemployee work activity that supplements a primary job.

Reflecting the perspective that a worker's well-being depends primarily on the characteristics of his or her main job, some have characterized the CWS findings as showing that any changes in the prevalence of gig and other nonemployee work arrangements are of little significance and do not merit the large amount of attention they have received. Lawrence Mishel (2018), for example, describes the new CWS data as providing "the best measure of independent contracting" and throwing "cold water on those hyping the explosion of freelancing and the rapidly changing nature of work." Other research concludes that the growing prevalence of independent contractor, consultant, and freelancer work has led to only a modest increase in nonemployee earnings as a share of total earnings (see, for example, Mishel and Wolfe 2018).

Arguably, however, growth in the share of people who supplement earnings from a main job or other sources of income with nonemployee work is itself an important development. Such growth, which by design the CWS will not capture, may indicate underlying problems with workers' primary jobs. In addition, even in cases in which informal work is a person's only work activity, if respondents do not think of what they are doing as a job, they may not report it when answering the standard CPS questions and thus may never be asked the CWS questions about their work arrangements (Abraham and Amaya 2018; Bracha and Burke 2019). This is an additional reason the picture painted by the CWS may be incomplete. As documented in ethnographic studies of low-income communities, even a relatively small amount of money from nonemployee work activity can make a critical difference to a low-income household trying to make ends meet (see, for example, Edin and Lein 1997; Seefeldt and Sandstrom 2015). The value of informal work to the households engaging in it could be considerable even if the aggregate amount of income it generates is modest.

The primary contribution of this article is to present new evidence on the role of informal work as a source of income for individuals and households with different characteristics. Our

analysis uses data from the Survey of Household Economics and Decisionmaking (SHED), a large household survey sponsored by the Board of Governors of the Federal Reserve System. In 2016 and 2017, the SHED included a special module with detailed questions about various types of informal work done outside a person's main job (Federal Reserve 2017, 2018). Given the extensive information the survey collects on demographic characteristics, financial situation, and employment status, these data are especially well suited to examining who is involved in informal work and the role that earnings from informal work play in household incomes. We also exploit the limited panel structure of the survey to examine the persistence of informal work from one year to the next.

Although the SHED data do not allow us to make statements about how the prevalence of informal work has changed over time, they imply that more than one-quarter of adults age eighteen and older participated in informal work for pay during the survey reference month. Two-thirds of those reporting informal work say that their motivation is to earn money; more than one-third say that the money earned from informal work over the previous twelve months was a very or somewhat important source of household income; and just under one-third say that it usually accounts for 10 percent or more of their household's monthly income. Although there is reason to suspect that the overall incidence of informal work is higher among respondents to the SHED than in the population as a whole, informal work nonetheless appears to be an important source of income for many who are doing it.

The share of people reporting that they do informal work to earn money varies considerably across groups based on their demographic, financial, and employment characteristics. A disproportionate share of respondents who are less educated, minority, low-income, unemployed, or financially distressed report working in informal jobs to earn money. Informal work to earn money also is more prevalent among workers who are part time, sole proprietors, contractors, or consultants on their main job or who have unpredictable work schedules. Moreover, informal work appears to be more persistent and important to household income among those with these same characteristics.

BACKGROUND

Despite a widespread perception that nonemployee work has become more common, data from standard household surveys such as the Current Population Survey and the American Community Survey show no upward trend in self-employment in recent decades. In contrast, substantial growth in the number of people with income from nonemployee work is apparent in tax data (Katz and Krueger 2016; Jackson, Looney, and Ramnath 2017; Abraham et al. 2018b). Based on an analysis of data for a sample of respondents to the Annual Social and Economic (ASEC) supplement to the CPS linked to tax records, one study concludes that roughly one-third of the growth in self-employment between 1996 and 2012 captured in tax data but missing from the CPS-ASEC occurred among people for whom secondary self-employment was not captured in the CPS-ASEC and roughly one-third among people for whom no work-related income was reported in the CPS-ASEC (Abraham et al. 2018b).

Findings such as these have contributed to fears that the questions asked on standard household surveys may be missing informal work activity. Katz and Krueger (2019) report on responses from a sample of subjects recruited via Amazon's Mechanical Turk. They first asked subjects the standard CPS employment questions and then asked additional questions to probe for whether the subjects had done any work on small paid jobs that they had not included in their previous responses. In their sample, 61 percent of those not categorized as multiple job holders (based on their responses to the CPS questions) acknowledged that they had done so. Katharine Abraham and Ashley Amaya (2018) report similar findings, also based on a sample of respondents recruited via Amazon's Mechanical Turk. In their study, respondents were asked to report for themselves and for others in their households. Both for self-reports and for proxy reports, probing uncovered substantial amounts of informal work activity not reported in response to the standard CPS questions.

The periodic Contingent Worker Survey sup-

plement to the CPS collects information about work arrangements to augment the information collected in the basic monthly CPS. As noted, however, the CWS asks only about the arrangements on individuals' main jobs as reported in the basic monthly CPS. If informal work activity is reported on the monthly CPS but not considered to be a subject's main job or is not reported in response to the standard CPS employment questions, the CWS does not ask about it. Even if people report informal, nonemployee work as their main job in the CPS, they may not consider themselves to be independent contractors, independent consultants, or freelance workers, and thus not be captured by the CWS question used to identify the independent contractor group.

The possibility that informal work is underreported in existing household surveys has generated considerable interest in new approaches to measuring its prevalence. In a series of innovative papers, researchers at the JPMorgan Chase Institute have used data on deposits from online platform companies into the checking accounts of Chase banking customers to measure trends in online platform work. Their latest estimates incorporate payments originating from 128 separate platforms. Diana Farrell, Fiona Greig, and Amar Hamoudi (2018) report that, in March of 2018, 1.6 percent of JPMorgan Chase checking accounts received deposits that originated with an online platform company, up from a little over 1 percent in March of 2016 and less than 0.5 percent in March of 2014.

The JPMorgan Chase data, however, may be missing some online platform payments and thus understating to some unknown extent the share of households with online platform income. First, though lengthy, the list of online platform companies considered in compiling the data is not exhaustive. Second, some online platform payments may not flow through recipients' checking accounts. The largest share of online platform payments is for transportation services. In 2015, Lyft introduced its Express Pay option; Uber followed in 2016 with Instant Pay. Both services allow drivers to transfer money they have earned instantly to a debit card rather than have it deposited at regular intervals into their checking account. Other platforms' payment arrangements vary, with some offering deposit to a checking account as the only option, others offering multiple payment options that include deposit to a checking account, and still others not having deposit to a checking account as an option.

Although interest in the prevalence and growth of online platform activity has been considerable, work mediated through online platforms represents only a subset—and quite likely a small subset—of all informal work. Other researchers seeking to measure the overall prevalence of informal work activity have carried out household surveys designed specifically for that purpose. The Federal Reserve Bank of Boston's Survey of Informal Work Participation (SIWP) has been fielded several times since 2013 as a supplement to the Survey of Consumer Expectations (SCE). The SCE is a rotating online panel with participants who may remain in the sample up to twelve months. Respondents to the January and December 2015 SIWP were given a list of different types of informal work activity and asked to indicate those in which they were "currently engaged." Based on these responses, using a broad definition of informal work, Anat Bracha and Mary Burke (2019) estimate that 32.5 percent of household heads age twenty-one and older were currently engaged in one or more types of such activity. The estimated share participating in informal work activities exclusive of selling or renting property is 18.5 percent.

The Enterprising and Informal Work Activities (EIWA) Survey sponsored by the Federal Reserve Board was administered online to the GfK KnowledgePanel in October and November of 2015 (Robles and McGee 2016). Like the SIWP, the EIWA contained a battery of items asking respondents about different informal income-generating activities, but with a six-month reference period. The EIWA estimates indicate that about 36 percent of the U.S. population age eighteen and older engaged in at least one of these activities during the six-month reference period. This includes people who earned income by selling new or used goods or renting out property. Focusing more narrowly on labor service activities, the EIWA estimates are that 26.7 percent of the adult population earned income by housecleaning, house sitting, yard

work, or other property maintenance tasks and that 17.1 percent did so by babysitting or providing childcare services.

The 2015 SHED, also administered online via the GfK KnowledgePanel, contained a single question about whether a respondent was currently engaged in informal work activity. This question focused on informal work that was not part of a job the respondent had already reported or, in the case of a respondent with more than one job, not part of their main job. In 2016, the SHED adopted the more detailed set of questions about informal work activity developed for the EIWA and a one-month reference period, again focusing specifically on work that was not part of an already reported job or main job.[1] SHED respondents were told to exclude taking GfK surveys when answering these questions. According to our tabulations of pooled data from the 2016 and 2017 SHED, described more fully later in this article, 28.1 percent of adults age eighteen and older reported participating in informal work outside of a main job during the survey reference month; excluding activities that involved selling or renting property, that figure is 23.1 percent.

The SIWP, the EIWA, and the SHED are consistent in estimating high prevalence rates for informal work activity. All three are based on online panels weighted to match the demographic characteristics of the adult population as a whole. A possible concern is that the type of people who are willing to participate in an online panel also might be more likely than others with similar observable characteristics to participate in informal work activity.[2] In our analysis of the 2016 and 2017 SHED data, we have attempted to assess the extent to which the nature of the sample may have affected the prevalence of informal work activity among SHED respondents, but this is difficult to do, and some uncertainty unavoidably remains. There is no obvious reason, however, to doubt our findings regarding the correlates of participation in informal work.

Ethnographic research suggests that, at least in certain populations, income from informal work is an important supplement to households' income from other sources. In one early study, for example, Kathryn Edin and Laura Lein (1997) examined the household budgets of low-income mothers in four cities, documenting the multiple sources of income these mothers drew on to make ends meet. Among mothers in their sample who were on welfare, about 40 percent engaged in informal work that was not reported to their caseworkers; about 30 percent who were not on welfare engaged in informal work in addition to their primary job. In a more recent example, Kristin Seefeldt and Heather Sandstrom (2015) studied mothers in Los Angeles and southeastern Michigan who were neither working at a regular job nor receiving cash welfare benefits. They too find evidence of substantial reliance on informal work, though they observe that the amounts of money earned from such work can be quite unstable. Focus groups conducted by one of us in connection with a related project also yielded evidence of substantial reliance on a variety of types of informal work in economically depressed areas of southwestern Michigan.

A limitation of the findings from qualitative research is that they cannot readily be generalized. Research using tax data has established that, in the population as a whole, a considerable share of self-employment activity supplements income from a primary wage and salary job (Jackson, Looney, and Ramnath 2017; Abraham et al. 2018a, 2018b). Farrell and her colleagues find that income from work mediated through online platforms supplements earnings from other sources and compensates for fluctuations in income from individuals' primary jobs (Farrell and Greig 2016a, 2016b; Far-

1. The SHED's focus on informal work outside a main job is different from the focus in the SIWP and EIWA, both of which asked about all informal work activity.

2. Response rates for the EIWA and the 2016 and 2017 SHED are under 5 percent; no response rate is reported for the SIWP, but based on the description of how the survey sample was constructed, it likely is similarly low. Although the relationship between response rates and nonresponse bias is not monotonic (Groves and Peytcheva 2008), very low response rates may exacerbate concerns about sample representativeness.

rell, Greig, and Hamoudi 2018). Similarly, in a study of the earnings of Uber drivers based on data obtained from a large online personal financial management service, Dmitri Koustas (2018) finds that earnings from driving smooth fluctuations in earnings from a main job and thus smooth consumption spending.

Related to how informal work is being used is whether informal work activity tends to be short term or persistent. Studies of participation in online platforms have found that many participants do not remain on the platforms for long. Cody Cook and his colleagues, for example, analyze records for Uber drivers who started driving between January 2015 and March 2016 (Cook et al. 2018). More than 60 percent of new drivers were no longer active on the platform six months later, they report; a driver was considered active if he or she made at least one trip within twenty-six weeks after a given date. Farrell and Greig (2016b) report that turnover in the online platform economy as a whole is high. In their study, they identify online platform participants from deposits to bank accounts and find that more than half exited within twelve months of entry. Relatively little is known, however, about the persistence of participation in informal work more generally.

DATA

The Survey of Household and Economic Decisionmaking is sponsored by the Board of Governors of the Federal Reserve System. It has been conducted annually since 2013, and detailed questions about informal work have been included on the survey since 2016. GfK, a consumer research firm, has administered the survey using its online KnowledgePanel. The cumulative survey response rate—reflecting the response rate to the invitation to join the KnowledgePanel, the response rate to an initial profiling survey carried out as part of the process of developing the sample for the SHED, and the response rate to the SHED itself—was about 4.4 percent in 2016 and 4.2 percent in 2017. These rates are quite low relative to those for the surveys underlying official labor-market statistics but fairly typical for probability-based online survey panels.[3]

We use information about the demographic characteristics of SHED respondents, their household incomes, and their employment situation. In the employment section of the SHED questionnaire, respondents are asked whether at any point during the prior month they were employed for someone else, self-employed, temporarily laid off from a job, or not employed. An individual may report multiple statuses. Additional employment-related information also is collected, including information about the main job of those who report being employed. Everyone—regardless of whether they report employment during the prior month—then is asked whether they have engaged in any of eleven (2016) or twelve (2017) types of "occasional work activities or side jobs" during the month. Those who previously reported working during the month are instructed not to include activities on their main job. Thus the survey is designed to capture informal work activities that the respondent may not have considered when answering the initial employment questions or that are secondary to a primary job.

The survey groups informal activities into three broad categories: personal services, online activities, and offline sales and other activities. Within each category, respondents are asked about three or four more specific types of work. Personal services include babysitting, childcare services, dog walking, or house sitting; disabled adult or elder care services; house cleaning, house painting, yard work, or other property maintenance work; and providing other personal services such as running errands, helping people move, and so forth. Online activities include completing paid online tasks, such as those on Amazon Services, Mechanical Turk, Fiverr, Task Rabbit, or You Tube; renting out property online, such as a car or residence; selling goods online through eBay, Craigslist, or other websites; driving using a ridesharing app such as Uber or Lyft (2017 survey only); and other online paid activities. Respondents are instructed not to include taking

3. For additional details about the 2016 and 2017 SHEDs, see Federal Reserve 2017, 2018.

GfK surveys in reporting their online activities.[4] The final category includes selling goods or services at flea markets, garage sales, or other temporary locations; selling goods at consignment shops or thrift stores; and any other paid activity that the respondent had not previously mentioned.

Individuals who report having engaged in informal work during the prior month are asked additional questions about their reasons for doing so, allowing us to identify those whose primary motivation is to earn money. In addition, the survey asks questions about the importance of informal work to household income and the amount of time that the respondent usually devotes to informal work activity.

The SHED questionnaires are available for download from the survey website. Several changes were made to the work-related questions between 2016 and 2017. For example, although obtaining essentially the same information, the sequence of questionnaire items used to collect the information for determining a person's employment status was modified; a question was added to allow those working part time voluntarily to be distinguished from those working part time who would have preferred full-time work; and, in the question about informal work activity, driving for Uber, Lyft, or another ridesharing company was added as an explicit response option and minor changes were made to the wording of several other response options. We have created a data set that harmonizes the two years' responses.

Responses to the 2016 SHED, fielded in October, totaled 6,610 and to the 2017 SHED, fielded in November and December, 12,447, for a grand total of 19,057 responses. GfK has created survey weights for use in analysis constructed so that the characteristics of the weighted sample match those of the population age eighteen and older based on the March Current Population Survey with respect to age, gender, race, ethnicity, education, census region, metropolitan area status, and household income. Among those interviewed for the 2016 SHED, 2,995 were reinterviewed in 2017. GfK also has created weights suitable for use with this smaller panel sample.

Most of the results we report are based on a sample created by pooling the 2016 and 2017 responses, treating the two years' data as independent cross-sections. We drop 497 cases that were missing values for variables needed for our analysis, reducing the usable sample from 19,057 to 18,560 cases, a loss of 2.6 percent. Our analysis of the smaller panel interviewed in both 2016 and 2017 focuses either on the 608 people who reported being engaged in informal work in the 2016 SHED or on the 395 people in that group who said their reason for doing informal work in 2016 was to earn money. We drop ninety-one cases from the first group (15.0 percent of the sample cases) and eighty-one from the second group (20.5 percent of the sample cases) owing to missing values for variables of interest, leaving us with 517 and 314 usable cases, respectively. All reported tabulations of sample distributions make use of the survey weights constructed by GfK.

Informal Work: Evidence from the SHED

The detailed information about informal work collected on the SHED together with the rich set of demographic, financial, and employment variables also available on the survey make it well suited to exploring who performs informal work and their reasons for doing so. The smaller panel subsample allows us also to use these data to examine the persistence of informal work.

Incidence of Informal Work Activities

Tables 1 and 2 show the incidence of informal work activities by the respondent's demographic characteristics, income and finances, and employment status and job characteristics, based on pooled data from the 2016 and 2017 surveys. The first column of each table shows the percentage of the population with various characteristics. Column 2 shows the percentage engaged in any informal work activity during the last month, while columns 3 through 5 display the percentages engaged in each of the

4. GfK maintains a modest incentive program to encourage panel members to participate in surveys. In addition to the standard GfK incentives, those completing the SHED received the equivalent of $5 through the GfK rewards system, in the form of points that could be used for online purchases from participating merchants.

Table 1. Percent with Informal Work Outcome by Type of Arrangement and Demographic Characteristics

	Percent of Population (1)	Any Informal Work in Past Month (2)	Of Which			Percent with 2+ Informal Arrangements (6)
			Personal Services (3)	Online Tasks (4)	Offline Sales and Misc. Activities (5)	
All	100.0	28.1	13.0	15.0	10.6	11.7
Age (years)						
18–24	7.9	41.3	27.9	20.7	13.1	20.4
25–34	19.8	38.2	18.7	22.8	13.8	17.7
35–44	17.6	32.7	14.0	20.0	12.1	14.6
45–54	15.2	25.7	10.3	13.7	9.6	10.0
55–64	20.0	23.0	9.9	9.8	9.8	8.1
65–74	13.6	16.5	6.2	7.4	6.7	5.1
75 plus	5.9	13.4	4.8	5.0	6.0	3.2
Gender						
Male	48.3	27.5	12.7	15.4	9.5	11.3
Female	51.7	28.7	13.3	14.7	11.6	12.1
Race-ethnicity						
White	65.2	26.9	10.9	14.5	10.7	10.2
Black	11.8	28.6	17.9	14.0	8.6	14.0
Hispanic	15.0	31.7	18.7	15.8	11.2	15.3
Multiracial	1.3	37.1	19.9	19.5	12.7	15.2
Other	6.8	29.4	11.0	19.2	11.1	13.7
Education						
High school or less	39.2	27.2	16.5	12.0	9.8	12.5
Some college	28.9	27.9	13.1	15.3	10.2	11.5
College plus	31.8	29.5	8.7	18.4	11.8	10.9

Source: Authors' calculations based on SHED data (Federal Reserve 2017, 2018).
Note: Tabulations based on SHED data pooled for the years 2016 and 2017 and weighted using GfK weights designed to make the sample representative of the U.S. population eighteen and oolder. N = 18,560.

three categories of informal work. Column 6 shows the percentage who report being engaged in two or more informal work activities during the month.[5]

Overall, 28.1 percent of respondents report being engaged in some type of informal work activity during the previous month: 13.0 percent engaged in personal services, 15.0 percent in online activities, and 10.6 percent in offline sales or other activity. Among all respondents, 11.7 percent—or about 42 percent of those reporting any informal work activity—report being engaged in at least two types of informal activities during the month. As noted earlier, our definition of informal work includes those who rent property or sell goods online—catego-

5. Each measure of informal work shown in tables 1 and 2 differs by demographic group (age, gender, race and ethnicity, and education) and by financial and job characteristics (household income, financial well-being, monthly income changes, employment status, and work schedule status) at the .001 level of significance.

Table 2. Percent with Informal Work Outcome by Type of Arrangement and Financial and Job Characteristics

			Of Which			
	Percent of Population (1)	Any Informal Work in Past Month (2)	Personal Services (3)	Online Tasks (4)	Offline Sales and Misc. Activities (5)	Percent with 2+ Informal Arrange-ments (6)
Household income						
Less than $50,000	35.1	28.6	16.8	14.0	9.9	13.8
$50,000 to $99,999	31.3	28.0	12.2	14.8	10.3	10.7
$100,000 or more	33.5	27.7	9.9	16.3	11.5	10.5
Financial well-being						
Difficult to get by	7.3	38.4	21.2	19.5	14.5	19.0
Just getting by	20.6	29.9	15.9	15.6	10.8	13.4
Doing okay	40.5	28.3	13.4	14.7	10.2	11.3
Living comfortably	31.6	24.4	8.8	14.0	10.0	9.4
Monthly income changes						
Often varies	9.2	36.6	21.9	20.2	10.9	18.4
Sometimes varies	21.0	35.4	18.6	19.6	14.1	16.8
Roughly the same	69.8	24.8	10.2	12.9	9.5	9.3
Employment status						
Full-time employee	42.9	28.3	10.7	16.5	11.1	11.2
Part-time employee	9.7	35.0	18.7	17.9	12.9	15.2
Self-employed or partner	7.4	44.8	26.4	23.3	17.4	23.5
Consultant or contractor	1.6	44.3	23.8	30.1	16.2	24.6
Not employed, looking	4.3	41.7	26.8	19.6	12.5	20.6
Not employed, not looking	34.2	19.9	9.2	9.2	7.2	7.1
Part-time preference (2017, N = 12,115)						
Voluntary part time	6.4	31.6	16.0	15.3	11.8	14.3
Involuntary part time	3.3	44.8	26.7	21.7	12.9	18.9
Work schedule status (employees, consultants, contractors, N = 8,682)						
Varies at own request	8.3	36.9	16.4	23.1	15.5	18.9
Employer determines						
Less than 1 week's notice	10.6	37.9	20.9	20.9	11.9	20.7
1 to 2 weeks' notice	3.5	36.4	20.5	20.1	12.3	16.2
3 plus weeks' notice	2.5	32.0	12.0	21.3	13.6	11.8
Normally the same hours	75.2	27.7	10.6	15.7	11.0	10.2

Source; Authors' calculations based on SHED data (Federal Reserve 2017, 2018).
Note: Tabulations based on SHED data pooled for 2016 and 2017 and weighted to represent the U.S. population age eighteen and older. Information to distinguish voluntary and involuntary part time available only for 2017; results for just those two employment statuses shown for that restricted sample. Questions on work scheduling asked only of those identifying themselves as employees, consultants, or contractors. N = 18,050 unless otherwise noted.

ries that are sometimes excluded because they may largely reflect returns to capital. The share of those doing any informal work in the SHED, however, remains high if these categories are dropped. Excluding those whose only informal work activities in the prior month involve renting property or selling goods online, the estimated incidence of any informal work is 23.1 percent and of online informal work is 10.0 percent.

Table 1 shows the incidence of informal work by demographic characteristic. Informal work declines monotonically with age, though a sizable minority of older adults report some type of informal work activity in the preceding month (16.5 percent among those age sixty-five to seventy-four and 13.4 percent among those seventy-five and older). The relative importance of various types of informal work activities also varies systematically by age. The most common form of informal work among the youngest age group, eighteen through twenty-four, perhaps not surprisingly, is personal services, which includes childcare, elder care, and home maintenance work. Among prime-age working adults—those age twenty-five to fifty-four—online tasks are the most common form of informal work; among those age fifty-five and older, the incidence of informal work is relatively evenly distributed across the three categories. The percentage of those engaged in two or more types of informal work activities also declines with age: 20.4 percent of respondents age eighteen to twenty-four but only 3.2 percent of those age seventy-five and older report more than one type of informal work activity.

The incidence of informal work activity varies little by gender. Minority groups generally are only somewhat more likely to report working in an informal arrangement than whites, but the mix of types of work activities varies considerably more by race and ethnicity than the overall incidence. African Americans and Hispanics are much more likely than whites to provide personal services and to have engaged in two or more types of informal work activity.

Interestingly, the incidence of informal work activity is, if anything, slightly higher among those who are more educated. Those with a bachelor's degree are about 2 percentage points more likely than those with a high school education or less to report doing informal work in the last month (29.5 versus 27.2 percent). The patterns for the overall incidence of informal work, however, mask considerable heterogeneity in the patterns by type of activity. The share of people providing personal services declines sharply with education level; among those with a four-year college degree, the proportion providing personal services is only about half (8.7 percent) that among those with a high school education or less (16.5 percent). In contrast, the proportion engaging in online work activities rises sharply with education, with college-educated individuals about 50 percent more likely to engage in online activities (18.4 percent) than those with a high school education or less (12.0 percent). College-educated respondents also are somewhat less likely than less-educated respondents to report having engaged in two or more informal work activities in the last month.

Table 2 reports the incidence of informal work activities by three measures of the household's or respondent's finances—household income, a subjective assessment of financial well-being, and variability of the respondent's income. Annual household income is reported in categories, and in table 2 we report three aggregated groupings that correspond roughly to household income terciles—less than $50,000, $50,000 or more but less than $100,000, and $100,000 or more. The overall incidence of informal work is similar across the household income terciles, but as with race and education, the composition of that informal work varies greatly across the categories. Most striking, those in the bottom tercile are more likely to provide personal services (16.8 percent) than those in the middle (12.2 percent) and top terciles (9.9 percent). Those in the bottom tercile also are somewhat more likely to report working in more than one informal arrangement (13.8 percent) than those in the second (10.7 percent) or third terciles (10.5 percent).

In addition to reporting their household income, respondents provide a subjective assessment of their financial well-being, answering that they find it "difficult to get by," that they are "just getting by," that they are "doing okay," or that they are "living comfortably." Compared with those who report living comfortably, those

who report finding it difficult to get by are 14 percentage points more likely to have worked in an informal arrangement (38.4 versus 24.4 percent) and almost 10 percentage points more likely to have worked in two or more arrangements (19.0 versus 9.4 percent).

Respondents also are asked about the stability of their monthly income. About 9 percent indicate that it often varies from month to month, 21 percent that it is mostly the same but sometimes varies, and about 70 percent that it varies little. Those who report that their monthly income often varies are more than 10 percentage points more likely to report having engaged in informal work activities in the last month (36.6 percent) than those whose income varies little (24.8 percent). They also are nearly twice as likely to have worked two or more side jobs than those with stable incomes (18.4 versus 9.3 percent). These statistics of course are descriptive; the higher incidence of informal work could be a response to unstable income from a main job or periodic spells of unemployment, or the higher variability of income could be a consequence of periodically having side jobs.

Table 2 also shows the incidence of informal work arrangements by employment status and, among employees, contractors, and consultants, by how the individual's work schedule is determined and by its variability. The prevalence of informal work exceeds 40 percent among those who are self-employed, sole proprietors or partners, those who are consultants or contractors, and those who are not employed but looking for work. These numbers are 13 to 15 percentage points higher than among full-time employees. In 2017, part-time employees were asked whether they preferred part-time or full-time hours; we find a similarly high prevalence of informal work among those stating they would have preferred full-time work, a group we call involuntary part time.[6] The incidence of working multiple side jobs also is quite high in each of these groups, ranging from about 19 to 25 percent. The prevalence of informal work is lowest among those who are not employed and not looking for work, but even in this group, about one in five reports having engaged in some informal work activity in the prior month.

The relatively high reported prevalence of informal work during the past month among those who report not being employed at any point during the month is notable. Some researchers have suggested that those engaged in informal work for pay may not think of these activities as regular jobs and so may fail to report them in response to the questions about employment on government household surveys. To the extent this occurs, it will lead to an understatement of the employment to population ratio and potentially to an understatement of the labor-force participation rate and an overstatement of the unemployment rate (see, for example, Bracha and Burke 2019; Abraham and Amaya 2018).[7] Although not the focus of this article, the descriptive statistics reported in table 2 suggest that underreporting of employment that consists of informal work may indeed be a significant problem in official statistics.

The final variable in table 2 describes work scheduling among full-time employees, part-time employees, and consultants or contractors.[8] Three-fourths of employees normally work the same hours each week. For about one in six (16.6 percent), the schedule varies at the employer's request; within this group, about two-thirds (10.6 percent of all employees) usually receive less than one week's notice from their employer about their upcoming work schedule, and another 20 percent (3.5 percent

6. Although we label part-time workers who say they would have preferred full-time work as involuntary part time, this measure does not correspond exactly to the measure of involuntary part-time employment in the Current Population Survey. The CPS measure requires not only that individuals working part time prefer full-time work but that they were available during the survey reference week to work longer hours.

7. How taking into account previously unmeasured informal work activity affects the labor-force participation rate and unemployment rate will depend on whether those participating in such activity had previously been categorized as unemployed or as out of the labor force.

8. Employees accounted for 97 percent of the respondents who were asked the survey's work scheduling questions, and for simplicity we refer to the whole group as employees.

of all employees) usually receive only one to two weeks' notice. Work schedules vary at the employee's request for 8 percent of employees. Relative to that among employees with a fixed schedule, the incidence of informal work is 9 to 10 percentage points higher among employees who receive short notice about their schedules from their employer (two weeks or less) or whose schedule varies at their own request. For the former, the high rate is consistent with individuals using informal work to supplement hours and income. For the latter, however, the direction of causality may be reversed, with employees choosing variable hours to accommodate informal work activities.

Importance of Informal Work to Income

For policy analysis, what matters is not simply who has informal work arrangements but their reasons for engaging in these casual work activities. Some may engage in these activities as a hobby or a way of making social connections, but the tabulations reported in tables 1 and 2 show that informal work is especially prevalent among those who are economically disadvantaged or work in nonstandard arrangements. This suggests that economic motivations also are likely to play an important role.

Tables 3 and 4 provide descriptive evidence that bears more directly on this issue. The SHED asks respondents who had done informal work in the previous month their main reason for this activity. Column 1 of tables 3 and 4 repeats information from tables 1 and 2 on the percentage of respondents reporting any informal work activity during the previous month. Column 2 reports the percentage indicating that their goal is primarily to earn income, and columns 3 and 4 the percentages for whom informal work either is their primary source of income or supplements their income or their family's income.

Although the questions about participation in informal work pertain only to activities in the preceding month, those who report such work also are asked about its importance to their income and the intensity of such work over a longer period. Column 5 shows the percentage indicating that the work was an important source of household income over the previous year. Column 6 reports the percentage indicating that such activities usually account for at least 10 percent of their household income. Column 7 shows the percentage indicating that they usually spend at least twenty hours per month on informal work activities.[9]

As in table 1, the top row of table 3 reports statistics for all respondents and subsequent rows report breakouts by demographic characteristics. Table 4 reports on financial and job characteristics. Eighteen percent of all respondents, or about 65 percent of those who reported working in an informal arrangement in the preceding month, say they did so primarily to earn money. Of those who give earning money as the main reason, 75 percent (13.5 percent of all respondents) say that they work side jobs to supplement their income or assist family members; the other 25 percent (4.5 percent of all respondents) say that informal work activities are their primary source of income. Among all respondents, 10.7 percent say that informal work activities were an important source of household income during the previous twelve months, 9.6 percent that such earnings usually constitute at least 10 percent of their household income, and 7.1 percent that they usually spend at least twenty hours per month on informal work activities.

Large differences in the importance of income from informal work and the hours spent in these activities are apparent across some demographic groups. The importance of informal work as an income source declines sharply with age. Nonetheless, 15.8 percent of respondents age twenty-five to thirty-four and 12.5 percent of those age thirty-five to forty-four regarded income from informal work as an important source of household income over the previous year. Minorities generally appear more reliant than whites on income from informal work. Among blacks, for example, 8.2

9. For each measure of informal work incidence and importance shown in tables 3 and 4, differences by demographic characteristics (age, gender, race and ethnicity, and education) and by financial and job characteristics (household income, financial well-being, monthly income changes, employment status, and work schedule status) are statistically significant at the .001 level.

Table 3. Percent with Informal Work by Reason and Intensity of Use and Demographic Characteristics

	Any Informal Work in Past Month (1)	Any Informal Work to Earn Money in Last Month (2)	Of Which		Important Source of Household Income (5)	Usually 10 Percent or More of Household Income (6)	Usually Do 20 or More Hours per Month (7)
			Primary Source of Income (3)	Supplements Income (4)			
All	28.1	18.0	4.5	13.5	10.7	9.6	7.1
Age (years)							
18–24	41.3	31.2	10.5	20.7	20.2	21.3	10.1
25–34	38.2	27.5	7.3	20.2	15.8	14.2	10.8
35–44	32.7	21.2	5.2	16.0	12.5	11.0	8.0
45–54	25.7	15.7	4.0	11.7	9.3	7.3	6.2
55–64	23.0	13.5	2.8	10.7	7.8	6.7	5.7
65–74	16.5	7.3	0.9	6.4	4.7	4.1	4.3
75 plus	13.4	4.5	0.4	4.1	3.0	2.9	2.4
Gender							
Male	27.5	17.9	4.8	13.1	11.7	10.2	7.6
Female	28.7	18.1	4.3	13.8	9.8	9.1	6.7
Race-ethnicity							
White	26.9	17.2	3.9	13.4	9.5	8.1	6.5
Black	28.6	20.5	8.2	12.3	15.7	16.5	10.6
Hispanic	29.4	18.5	4.1	14.4	8.2	6.7	6.0
Multiracial	37.1	26.9	6.3	20.6	20.2	15.5	15.6
Other	31.7	18.2	4.4	13.7	12.6	11.6	7.1
Education							
High school or less	27.2	17.7	6.1	11.7	12.4	11.1	7.2
Some college	27.9	17.9	4.3	13.6	10.7	10.0	7.6
College plus	29.5	18.3	2.7	15.6	8.7	7.4	6.6

Source: Authors' calculations based on SHED data (Federal Reserve 2017, 2018).
Note: Tabulations based on SHED data pooled for years 2016 and 2017 and weighted using GfK weights designed to make sample representative of the U.S. population eighteen and older. N = 18,560.

percent indicate that informal work arrangements are their primary source of income, 15.7 percent that they were an important source of household income during the previous twelve months, and 16.5 percent that they usually account for at least 10 percent of their income. These rates are 65 to 110 percent larger than those for whites. Table 3 also shows that less-educated individuals are considerably more likely than those with a bachelor's degree to say that informal work is their primary source of income and to consider it an important component of their household income over the previous year.

With respect to the respondent's financial situation, the various indicators of reliance on informal work for income decrease with household income, decrease as respondents' subjective assessment of their financial well-being improves, and decrease as monthly income becomes less volatile (table 4). Notably, among those who report finding it difficult to get by, 31.8 percent report being engaged in informal work to earn money, 14.0 percent that such

Table 4 Percent with Informal Work by Reason and Intensity of Use and Financial and Job Characteristics

	Any Informal Work in Past Month (1)	Any Informal Work to Earn Money in Last Month (2)	Of Which: Primary Source of Income (3)	Of Which: Supplements Income (4)	Important Source of Household Income (5)	Usually 10 Percent or More of Household Income (6)	Usually Do 20 or More Hours per Month (7)
Household income							
Less than $50,000	28.6	19.8	6.5	13.3	13.7	12.3	8.5
$50,000 to $99,999	28.0	17.6	3.9	13.7	10.7	8.5	7.0
$100,000 or more	27.7	16.4	3.0	13.4	7.6	7.8	5.8
Financial well-being							
Difficult to get by	38.4	31.8	14.0	17.8	21.5	17.3	11.6
Just getting by	29.9	22.5	5.9	16.7	14.0	12.4	9.0
Doing okay	28.3	18.1	3.7	14.4	10.5	9.3	6.9
Living comfortably	24.4	11.7	2.5	9.2	6.3	6.4	5.3
Monthly income changes							
Often varies	36.6	26.8	11.6	15.2	20.1	20.3	12.4
Sometimes varies	35.4	24.6	6.6	18.0	16.0	14.3	9.9
Roughly the same	24.8	14.8	3.0	11.9	7.9	6.8	5.6
Employment status							
Full-time employee	28.3	18.7	3.0	15.8	9.8	7.4	6.2
Part-time employee	35.0	25.9	7.1	18.8	15.5	16.1	11.4
Self-employed or partner	44.8	30.4	11.2	19.2	22.0	22.4	15.8
Consultant or contractor	44.3	34.6	9.1	25.5	21.4	23.7	17.3
Not employed, looking	41.7	32.0	18.8	13.2	24.2	25.0	14.4
Not employed, not looking	19.9	9.6	2.2	7.3	5.8	5.2	3.9
Part-time preference (2017, N = 12,115)							
Voluntary part time	31.6	21.9	3.8	18.1	15.1	13.2	10.5
Involuntary part time	44.8	31.1	10.7	20.4	20.9	19.3	14.4
Work schedule status (employees, consultants, contractors, N = 8,692)							
Varies at own request	36.9	26.9	5.8	21.1	17.6	14.3	13.4
Employer determines							
Less than 1 week's notice	37.9	27.8	6.5	21.3	15.6	13.3	10.5
1 to 2 weeks' notice	36.4	26.5	4.8	21.7	15.6	14.5	11.3
3 plus weeks' notice	32.0	18.4	4.1	14.3	10.0	6.0	6.1
Normally the same hours	27.7	18.5	3.3	15.3	9.7	8.2	6.2

Source: Authors' calculations based on SHED data (Federal Reserve 2017, 2018).
Note: Tabulations based on SHED data pooled for 2016 and 2017 and weighted to represent the U.S. population age eighteen and older. Information to distinguish voluntary and involuntary part time available only for 2017; results for just those two employment statuses shown for that restricted sample. Questions on work scheduling asked only of those identifying themselves as employees, consultants, or contractors. N = 18,050 unless otherwise noted.

work is their primary source of income, 21.5 percent that informal work had been an important income source during the prior year, 17.3 percent that they usually earn at least 10 percent of their income from informal work, and 11.6 percent that they usually work at least twenty hours per month on informal jobs.

A strong correlation also exists between an individual's employment status and working in informal jobs to earn money. The data in table 4 show that sizable minorities of part-time employees, particularly those who would prefer full-time work, and of those who are not employed but are looking for work rely significantly on income from informal work arrangements to supplement their income. Use of informal work arrangements to earn money is strikingly high among those in nonemployee arrangements as well. More than 30 percent of those who say that they are self-employed, a sole proprietor, a partner, or a consultant or contractor report doing informal work outside their main job to earn income in the last month. More than 20 percent of those in these groups report that this income was an important source of their household's income during the preceding year; and more than 20 percent also indicate that at least 10 percent of their household's income usually comes from such side jobs. Among those working under the same set of employment arrangements, more than 15 percent report usually spending at least twenty hours a month on informal work activities. Similarly, the data indicate that a large minority of those with unpredictable work schedules—employees, contractors, or consultants who are given two weeks or less notice regarding their schedule—rely on income from informal work.

Many of the variables measuring demographic characteristics, financial well-being, and job characteristics are highly correlated with each other. This makes it difficult to know from the descriptive statistics presented in tables 1 through 4 whether these variables have any independent relationship with individuals' propensity to work in informal jobs and rely on income from these jobs over the short and medium term. To partially address this issue, we estimate five linear probability models in which the dependent variables alternately indicate

1. the respondent had informal work in the past month,
2. the respondent had informal work to earn money in the past month,
3. informal work was an important source of household income in the last twelve months,
4. informal work usually accounts for 10 percent or more of the respondent's household income, and
5. the respondent usually spends twenty hours or more per month on informal work activities.

We include all of the demographic, financial, and job characteristic variables from tables 1 though 4 that are available for both 2016 and 2017 as explanatory variables.[10] Table 5 reports selected coefficient estimates from these descriptive regressions.

Controlling for other factors, those in the lower- and middle-income terciles, those who report being under some level of financial stress, and those with variable monthly incomes are significantly more likely to indicate not only that they worked in side jobs to earn income in the last month but also that such jobs have been an important source of income over a longer period and that they spend significant time working in side jobs. For example, relative to those who report being financially comfortable, those who are finding it difficult to get by are 14 percentage points more likely to have worked a side job in the last month to earn money, 10 percentage points more likely to report that income from side jobs has been important to household income, and 4 percentage points more likely to report both that income from these jobs usually accounts for at least 10 percent of their household income and that they usually spend at least twenty hours per month in informal work activities.

10. Breakouts for part-time workers who want and do not want full-time work are only available in the 2017 data and therefore are not included in the regressions.

Table 5. Selected Coefficient Estimates from Linear Probability Models of Informal Work Outcomes on Demographic, Financial, and Job Characteristics

	Any Informal Work (1)	To Earn Money (2)	Important Source of Household Income (3)	Usually 10+ Percent of Household Income (4)	Usually 20+ Hours per Month (5)
Household income					
Less than $50,000	0.03**	0.04**	0.05**	0.04**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$50,000 to $99,999	0.03**	0.02**	0.03**	0.01~	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Financial well-being					
Difficult to get by	0.08**	0.14**	0.10**	0.04**	0.04**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Just getting by	0.03**	0.09**	0.05**	0.02*	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Doing okay	0.03**	0.05**	0.03**	0.01~	0.01
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Monthly income changes					
Often varies	0.04**	0.04**	0.06**	0.06**	0.04**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sometimes varies	0.05**	0.04**	0.04**	0.03**	0.02**
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
Employment status					
Part-time employee	0.04**	0.04**	0.04**	0.06**	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Self-employed or partner	0.19**	0.13**	0.11**	0.14**	0.10**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Consultant or contractor	0.15**	0.11**	0.09**	0.13**	0.09**
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Not employed, looking	0.11**	0.09**	0.09**	0.12**	0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Not employed, not looking	−0.01	−0.04**	−0.02**	−0.01	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Work schedule status					
Varies at own request	0.05**	0.05**	0.04**	0.03*	0.04**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Less than two weeks' notice	0.03*	0.03*	0.01	0.00	0.02~
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
R^2	0.062	0.087	0.076	0.079	0.041

Source: Authors' calculations based on SHED data (Federal Reserve 2017, 2018).
Note: Each column represents a separate regression with the indicated dependent variable. Standard errors clustered on individual and reported in parentheses. Controls for demographic characteristics (age, gender, race-ethnicity, education) included but not reported. Reference categories for each set of variables as follows: household income $100,000 or more; living comfortably; monthly income generally the same; full-time employee; and work schedule mostly the same or three plus weeks' notice. N = 18,560.
**p<.01; *p<.05; ~ p<.10 level

Even after controlling for other factors, an individual's employment status on their main job continues to be an especially strong predictor of working in informal activities to earn income and of the intensity and economic importance of that work. Relative to full-time employees, those who are self-employed, a sole proprietor, a partner, or a consultant or contractor are 11 to 13 percentage points more likely to have worked in one or more informal activities in the last month to earn money, 9 to 11 percentage points more likely to view income from these side jobs as having been important to household income in the last year, and 13 to 14 percentage points more likely to report that side jobs usually account for at least 10 percent of their household income. They also are 9 to 10 percentage points more likely to report that they usually spend at least twenty hours per month working in such jobs. Although the heterogeneity in self-employment arrangements is considerable, for a sizable minority of the self-employed, informal work appears to be an important supplement to income from the primary job. In all models, the coefficient estimates for those who are not employed but are looking for work are generally similar in magnitude to estimates for those in nonemployee arrangements, indicating heavy reliance on income from informal work during unemployment spells. As noted, these findings suggest that government surveys may not fully capture casual work, raising the possibility that employment, labor force, and unemployment statistics are biased.

Among employees, contractors, and consultants, having a variable or unpredictable work schedule also is associated with a higher incidence of working informal jobs to earn income and with various measures of the importance of those earnings to income and the intensity of that work. For example, compared with those with stable work schedules or considerable advance notice of their work schedules, those whose hours vary mainly at their own request and those who typically receive two weeks or less notice about their schedule from their employer are 5 and 3 percentage points more likely, respectively, to work an informal job to earn income. Particularly for the latter group, informal work may be a way to supplement income from a job characterized by unpredictable and variable hours and earnings.

Persistence of Informal Work

Although people participate in informal work activities or side jobs for a variety of reasons, the evidence presented in the preceding section indicates that individuals who have relatively low earnings, are in precarious or nonstandard work arrangements, or are unemployed frequently use casual work arrangements to help make ends meet. The policy implications of these findings depend in part on whether casual work is typically a short-term fix for individuals who are temporarily in financial difficulty, or something that people rely on over a longer period, whether because they experience frequent spells of nonemployment or because their main job provides inadequate or unreliable income.

Here we present evidence regarding the persistence of informal work based on the subsample of SHED respondents who were interviewed in both 2016 and 2017. The first column of table 6 shows, conditional on reporting informal work during the prior month in the 2016 survey, the percent who reported informal work during the prior month in the 2017 survey. Column 2 indicates the percentage of those who reported doing informal work to earn money in the 2016 survey who gave the same response in the 2017 survey. As in previous tables, we report these statistics for all respondents and by selected demographic, financial, and employment or job characteristics. Because the sample sizes for these tabulations are considerably smaller than those underlying earlier tabulations—521 for the column 1 percentages and 316 for column 2 percentages—we have aggregated categories for some variables. The weights developed by GfK for the 2016–2017 panel sample were used in preparing these tabulations.

Among those who reported informal work during the prior month in 2016, exactly half did so for the prior month in 2017, just over a year later. Among those reporting in 2016 that they worked a side job primarily to earn money, 42.7 percent gave the same response in 2017. Although some of the cell sizes are quite small once the data are broken out by demographic, financial, and employment characteristics, the

Table 6. The Persistence of Informal Work

	Informal Work in 2017/ Informal Work in 2016 (Percent) (1)	Informal Work to Earn Money in 2017/Informal Work to Earn Money in 2016 (Percent) (2)
All	50.0	42.7
Age (years)		
18–24	39.1	31.4
25–54	54.4	46.4
55–64	36.2	25.7
65 plus	56.5	57.0
Gender		
Male	51.8	38.2
Female	48.1	46.5
Race-ethnicity		
White	46.8	38.8
Hispanic	61.6	56.5
Other	50.0	42.7
Education (2016)		
High school or less	50.1	49.5
Some college	48.5	42.4
College plus	50.8	34.7
Household income (2016)		
Less than $50,000	55.9	50.4
$50,000 to $99,999	49.9	46.7
$100,000 or more	43.6	30.4
Financial well-being (2016)		
Difficult to get by	41.0	47.4
Just getting by	56.8	46.8
Doing okay	49.7	41.5
Living comfortably	49.1	36.4
Monthly income changes (2016)		
Often varies	50.3	44.9
Mostly same, sometimes varies	49.1	43.1
Roughly the same	50.1	42.0
Employment status (2016)		
Full-time employee	51.2	43.4
Part-time employee	47.8	47.4
Self-employed/contractor	53.5	45.1
Not employed	47.6	38.1
Work schedule status (2016) (employees, consultants, contractors, N = 271 and 187)		
Varies at own request	46.9	45.8
2 or fewer weeks' notice	46.7	34.9
3 plus weeks' notice	49.6	45.6

Source: Authors' calculations based on SHED data (Federal Reserve 2017, 2018).
Note: Sample includes individuals interviewed in both 2016 and 2017 SHED. Unless otherwise indicated, N = 517 for first column and N = 314.

data in table 6 are generally consistent with the findings reported earlier. For example, despite no clear pattern in the persistence of informal work activity by level of education overall, conditional on having done informal work to earn money in 2016, those with a high school education or less were 15 percentage points more likely to be doing informal work to earn money in 2017 (49.5 percent) than those with a bachelor's degree (34.7 percent). Similarly, conditional on having a side job to earn money in 2016, those whose household income fell below $50,000 in that year were 20 percentage points more likely to still be working a side job to earn money in 2017 (50.4 percent) than those with household incomes of $100,000 or more (30.4 percent). Those who reported finding it difficult to get by or said they were just getting by in 2016 were more than 10 percentage points more likely to report still having a side job to earn money in 2017 (47.4 and 46.8 percent, respectively) than those who in 2016 reported living comfortably (36.4 percent). The year-over-year persistence rate in working a side job to earn income is also somewhat higher for those who worked in part-time jobs or who were not employees in 2016 (47.4 and 45.1 percent, respectively) than for full-time employees (43.4 percent).

Are the SHED Estimates Biased?

A natural concern about these findings is whether the SHED respondents are typical of the overall population in regard to their participation in informal work activities. A possible concern is that, even among those with similar observable characteristics, someone who is willing to participate in an online panel also might be more likely to participate in other informal work activity.

One strategy for assessing the potential for this sort of bias is to compare estimates of informal work activity from the SHED to estimates from other sources. The SHED estimates of the overall prevalence of informal work activity are quite similar to those from the SIWP and EIWA, but because the data for all three of these surveys are collected in a similar fashion, this finding is unsurprising.

We also can compare the 2017 SHED estimate of the share of people who had been paid within the past month for "driving using a ride-sharing app such as Uber or Lyft" and the JPMorgan Chase estimate of the share of households with income in a given month from a transportation platform. The estimate based on the 2017 SHED, for which data were collected in November and December, is that 1.5 percent of individuals had driving income during the prior month; the JPMorgan Chase estimate is that, in March 2018, deposits from online transportation platforms were recorded for 1.0 percent of checking accounts. Although not an apples-to-apples comparison, the order of magnitude of the two estimates is similar. Moreover, the JPMorgan Chase estimate, which is lower than the SHED estimate, does not capture certain payments, including transfers directly to debit cards, and thus may understate the prevalence of participation in online driving platforms.

Another approach to assessing the sensitivity of our results to possible selection bias is to exclude online activity from our measures of participation. The rationale for doing this is that participants in the online GfK panel may be more likely than is typical to take on other online work and, if so, estimates that exclude online work may more closely approximate the prevalence of informal activity in the population. In the same spirit, we also go further and construct estimates that exclude all informal activity carried out by anyone in the SHED sample who reports any online activity. Not surprisingly, restricting the set of informal work activities considered in this way substantially reduces the estimated prevalence of informal work activity. Our baseline estimate is that 28.1 percent of adults age eighteen and older engaged in informal work activity over the prior month; excluding those who were involved only in online activities reduces this to 20.1 percent; and dropping anyone who did any online work, even if they also were involved in other types of informal work, reduces it to 13.1 percent. Although clearly lower—indeed, perhaps too low—these numbers still imply a substantial level of participation in informal work activities. The online tables mirror the information provided in tables 3 and 4 for these two other

definitions of informal work.[11] As can be seen in these tables, the basic patterns apparent in our baseline estimates hold up after excluding, first, all online work and, second, all informal work done by anyone who participated in any online work. Groups that are relatively disadvantaged (by race, by education, by financial circumstances, or by employment status) are far more likely to rely on informal work to earn money and, moreover, to report that informal work is an important source of income. Although members of the SHED sample may be more likely than those in the population at large to participate in informal work, the patterns of reliance on informal work we have documented seem unlikely to be an artifact of issues with the representativeness of the SHED sample.

DISCUSSION AND POLICY CHALLENGES

According to the SHED estimates for 2016 and 2017 presented in this paper, as many as 28 percent of adult Americans engaged in informal work activities outside their main job during the survey reference months. Although informal work is common regardless of race, ethnicity, education, and household income, the reasons individuals hold side jobs and the extent to which they rely on them for income differ systematically across groups. Minorities, the less educated, those with lower incomes or experiencing financial stress, those in nonstandard work arrangements, and the unemployed are far more likely to work side jobs to earn money. They also are more likely to report that earnings from these jobs were important to household income over the prior year, that these earnings usually make up at least 10 percent of their income, and that they usually spend at least twenty hours or more per month in these activities.

Reliance on informal work for income also varies strikingly by work arrangement. Relative to full-time employees, part-time employees—particularly those who would prefer full-time work—and those who are sole proprietors or partners, are contractors or consultants, or are in some other self-employment arrangement are considerably more likely to hold side jobs to earn money and to indicate that informal work is an important source of income over short and longer time horizons. Among employees, contractors, and consultants, those with unstable or unpredictable schedules are considerably more likely to have informal jobs to earn money. The relative importance of informal work to supplement income among those in part-time or other alternative work arrangements may be a symptom of the inadequate or unstable hours and earnings often associated with these forms of work.

For most people, informal work accounts for a relatively small share of income. Yet, consistent with evidence from ethnographic studies, the SHED estimates suggest that informal work plays an important role in helping the economically vulnerable and those in alternative work arrangements make ends meet.

Informal work is not, however, a panacea. Those most likely to hold informal jobs to supplement income are the least likely to work in arrangements that provide critical benefits such as sick pay, health insurance, and retirement plans. According to data from the U.S. Bureau of Labor Statistics (2018), whereas 88 percent of full-time employees were offered employer-provided health-care benefits, 81 percent were offered employer-provided retirement benefits, and 88 percent were offered paid leave, the corresponding figures for part-time employees were just 40 percent, 22 percent, and 43 percent. Workers in contract and consultant arrangements generally are treated as self-employed and so, like sole proprietors and others in nonemployee arrangements, are not eligible for employer-provided benefits. Because informal work generally is treated as self-employment as well, it rarely comes with employee benefits. Thus, while informal jobs may boost earnings, they do not help workers access benefits, which are an important component of the compensation package for most full-time employees. Lacking benefits such as health insurance or a pension during retirement is a common source of financial hardship.

11. The online appendix is available at https://www.rsfjournal.org/content/5/5/110/tab-supplemental.

The perceived growth in independent contractor and other nonemployee arrangements has focused considerable policy attention on increasing access to benefits among these so-called gig workers. Recent proposals at the federal and state levels primarily target large platform companies, such as Uber and Lyft, that help connect workers providing services with customers. Although the specifics vary, the proposed legislation typically would enable or require such companies to provide workers' compensation or to contribute to benefit plans that are portable across jobs (Fitzpayne and Greenberg 2018; Maxim and Muro 2018). Yet available evidence suggests that workers in these arrangements typically use them to supplement income from a main job. Moreover, the evidence presented shows that, although work done online or through mobile apps accounts for a significant share of informal work, traditional types of informal work are more common among the economically vulnerable populations most dependent on this work for income. A more comprehensive approach for addressing the lack of benefits among workers in part-time and nonemployee arrangements is therefore needed.

REFERENCES

Abraham, Katharine G., and Ashley Amaya. 2018. "Probing for Informal Work Activity." *NBER* working paper no. 24880. Cambridge, Mass.: National Bureau of Economic Research.

Abraham, Katharine G., John C. Haltiwanger, Kristin Sandusky, and James R. Spletzer. 2018a. "Driving the Gig Economy." Unpublished paper, University of Maryland, College Park.

———. 2018b. "Measuring the Gig Economy: Current Knowledge and Open Issues." *NBER* working paper no. 24950. Cambridge, Mass.: National Bureau of Economic Research.

Board of Governors of the Federal Reserve System (Federal Reserve). 2017. *Report on the Economic Well-Being of U.S. Households in 2016.* Washington, D.C.: Board of Governors of the Federal Reserve System.

———. 2018. *Report on the Economic Well-Being of U.S. Households in 2017.* Washington, D.C.: Board of Governors of the Federal Reserve System.

Bracha, Anat, and Mary A. Burke. 2019. "How Big Is the Gig?" Unpublished paper, Federal Reserve Bank of Boston.

Cook, Cody, Rebecca Diamond, Jonathan Hall, John A. List, and Paul Oyer. 2018. "The Gender Earnings Gap in the Gig Economy: Evidence from over a Million Rideshare Drivers." *NBER* working paper no. 24732. Cambridge, Mass.: National Bureau of Economic Research.

Edin, Kathryn, and Laura Lein. 1997. *Making Ends Meet: How Single Mothers Survive Welfare and Low-Wage Work.* New York: Russell Sage Foundation.

Farrell, Diana, and Fiona Greig. 2016a. "Paychecks, Paydays, and the Online Platform Economy." New York: JPMorgan Chase Institute. Accessed July 1, 2019. https://www.jpmorganchase.com/corporate/institute/document/jpmc-institute-volatility-2-report.pdf.

———. 2016b. "The Online Platform Economy: Has Growth Peaked?" New York: JPMorgan Chase Institute. Accessed July 1, 2019. http://www.jpmorganchase.com/corporate/institute/document/jpmc-institute-online-platform-econ-brief.pdf.

Farrell, Diana, Fiona Greig, and Amar Hamoudi. 2018. "The Online Platform Economy in 2018: Drivers, Workers, Sellers and Lessors." New York: JPMorgan Chase Institute. Accessed July 1, 2019. https://www.jpmorganchase.com/corporate/institute/document/institute-ope-2018.pdf.

Fitzpayne, Alastair, and Hilary Greenberg. 2018. "Portable Benefits Legislation Reintroduced in Washington State: Uber and SEIU Commit to Work Together." *Employment and Jobs* (Aspen Institute blog), February 23. Accessed July 1, 2019. https://www.aspeninstitute.org/blog-posts/wa-portable-benefits-bill-letter-2018.

Groves, Robert, and Emilia Peytcheva. 2008. "The Impact of Nonresponse Rates on Nonresponse Bias: A Meta-Analysis." *Public Opinion Quarterly* 72(2): 167–89.

Jackson, Emilie, Adam Looney, and Shanthi Ramnath. 2017. "The Rise of Alternative Work Arrangements: Evidence and Implications for Tax Filing and Benefit Coverage." *Office of Tax Analysis* working paper no. 114. Washington: U.S. Department of the Treasury. Accessed July 1, 2019. https://www.treasury.gov/resource-center/tax-policy/tax-analysis/Documents/WP-114.pdf.

Katz, Lawrence F., and Alan B. Krueger. 2016. "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015." *NBER* working paper no. 22667. Cambridge, Mass.: National Bureau of Economic Research.

———. 2019. "Understanding Trends in Alternative Work Arrangements in the United States." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 132–46. DOI: 10.7758/RSF.2019.5.5.07.

Koustas, Dmitri. 2018. "Consumption Insurance and Multiple Jobs: Evidence from Rideshare Drivers." Unpublished working paper. Chicago: University of Chicago.

Maxim, Robert, and Mark Muro. 2018. "Rethinking Worker Benefits for an Economy in Flux." *The Avenue* (Brookings Institution blog), March 30. Accessed July 1, 2019. https://www.brookings.edu/blog/the-avenue/2018/03/29/rethinking-worker-benefits-for-an-economy-in-flux.

Mishel, Lawrence. 2018. "Contingent Worker Survey Is Further Evidence That We Are Not Becoming a Nation of Freelancers." Statement, June 7. Washington, D.C.: Economic Policy Institute. Accessed July 1, 2019. https://www.epi.org/press/contingent-worker-survey-is-further-evidence-that-we-are-not-becoming-a-nation-of-freelancers/.

Mishel, Lawrence, and Julia Wolfe. 2018. "Has Self-Employment Surged?" *Working Economics Blog* (Economic Policy Institute), June 20. Accessed July 1, 2019. https://www.epi.org/blog/has-self-employment-surged-data-on-nonemployer-establishments-confirm-other-data-showing-more-activity-but-not-much-economic-impact/.

Robles, Barbara, and Marysol McGee. 2016. "Exploring Online and Offline Informal Work: Findings from the Enterprising and Informal Work Activities (EIWA) Survey." *Finance and Economics Discussion Series* no. 2016–089. Washington: Board of Governors of the Federal Reserve System.

Seefeldt, Kristin S., and Heather Sandstrom. 2015. "When There Is No Welfare: The Income Packaging Strategies of Mothers Without Earnings or Cash Assistance Following an Economic Downturn." *RSF: Russell Sage Foundation Journal of the Social Sciences* 1(1): 139–58. DOI: 10.7758/RSF.2015.1.1.08.

U.S. Bureau of Labor Statistics. 2018. "National Compensation Survey: Employee Benefits in the United States." Bulletin no. 2789. Washington: U.S. Department of Labor.

Understanding Trends in Alternative Work Arrangements in the United States

LAWRENCE F. KATZ AND ALAN B. KRUEGER

This article discusses trends in alternative work arrangements in the United States using data from the Contingent Worker Survey (CWS) supplements to the Current Population Survey (CPS) for 1995 to 2017, the 2015 RAND-Princeton Contingent Work Survey, and administrative tax data from the Internal Revenue Service for 2000 to 2016. Based on cyclically adjusted comparisons of the CPS CWS, measures using self-respondents in the CPS CWS, and measures of self-employment and 1099 workers from administrative tax data, we conclude that there has likely been a modest upward trend in the share of the U.S. workforce in alternative work arrangements during the 2000s. We also present evidence from Amazon Mechanical Turk suggesting that the basic monthly CPS question on multiple job holding misses many instances of multiple job holding.

Keywords: alternative work arrangements, gig economy, self-employment, independent contractor

Many observers have speculated that traditional employment relationships may be in decline in the United States, driven by the rise of digital platforms and online gig work as well as through the increased fragmentation of supply chains and use of domestic outsourcing leading to a greater use of contract workers and independent contractors (Weil 2014; Government Accountability Office 2015). But high frequency, comprehensive, point-in-time measures of U.S. work arrangements have not been available (Bernhardt 2014).

In 2015, we attempted to fill this void. The U.S. Bureau of Labor Statistics (BLS) had been unable to conduct the Contingent Work Survey (CWS), a Current Population Survey (CPS) supplement and its main instrument for tracking alternative (or nonstandard) work arrangements, since 2005. We tried to update the CWS data by conducting the RAND-Princeton Con-

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tingent Work Survey (RPCWS), a version of the CWS, as part of the RAND American Life Panel (ALP) in October and November 2015. At the time we undertook the RPCWS, the BLS did not have funding or plans to undertake another round of the CPS CWS in the near term. We attempted to make the RPCWS as comparable as possible the 2005 CPS CWS.

The 2015 RAND survey pointed to what appeared to be a substantial increase in the share of the workforce engaged in an alternative work arrangement on their main job compared with the 2005 CWS. Boosted by growth in the share of workers classified as self-employed freelancers or working for a contract firm that contracts workers out to work onsite at other companies, our initial estimates indicated that the percent of workers in alternative jobs rose from 10.7 percent in 2005 to 15.8 percent in 2015 (Katz and Krueger 2016, 2019). Online gig work appeared to account for only a small share of the large rise in alternative work arrangements through 2015.

The increase in alternative work arrangements implied by the comparison of the 2005 CPS CWS and 2015 RPCWS seemed consistent as well with administrative tax data showing a rise in the share of tax returns and workers with self-employment income in the 2000s as seen in Schedule C filing rates and 1099 receipt rates (Abraham et al. 2018a, 2018b; Jackson, Looney, and Ramnath 2017; Katz and Krueger 2016). Our study and related efforts using a range of sources helped generate a discussion of the incidence, composition, and nature of U.S. alternative work arrangements, and the need for more accurate and more frequent surveys and administrative data collection efforts (for example, Abraham et al. 2018a, 2018b; Farrell and Greig 2016a, 2016b).

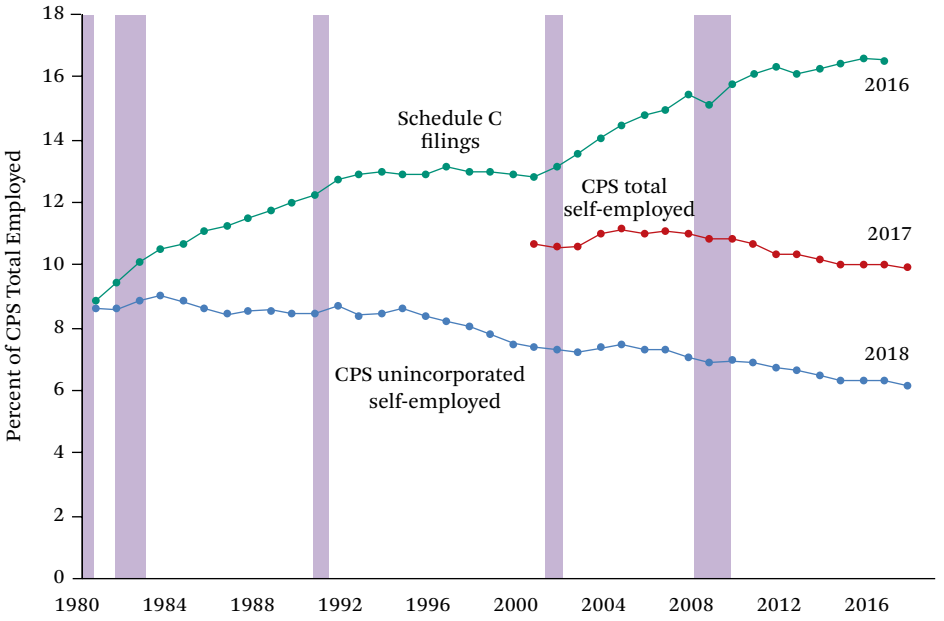
Following our undertaking of the 2015 RPCWS, the BLS secured funding for a new CWS, which was conducted as a supplement to the May 2017 CPS. The 2017 CPS CWS findings were released in June 2018 and indicate, in seeming contrast to our earlier findings from the 2015 RPCWS, a slight decline in the incidence of alternative work arrangements from 10.7 percent in 2005 to 10.1 percent in 2017 (BLS 2018), driven by a decline in the share of workers classified as independent contractors.

In this article, we revisit the measurement of trends in U.S. alternative work arrangements and try to reconcile our 2015 RPCWS results with the 2005 and 2017 CPS CWS findings. An analysis of all six CPS CWS from 1995 to 2017 indicates a modest upward trend in the incidence of alternative work arrangements of about 1 percent of the workforce from 2000 to 2017, after accounting for business cycle conditions. The higher incidence of alternative work arrangements in the 2015 RPCWS than the CWS can largely be accounted for by cyclical conditions (a tighter labor market in 2017 than 2015), differences in survey methods (the use of self-responses only in the RPCWS versus half the responses being from proxy respondents in the CPS CWS), and sampling issues with respect to the RAND web panel (an apparent oversample of multiple job holders in the RPCWS). After adjusting for these differences, the RPCWS suggests a 1 to 2 percentage point increase in the share of workers in alternative work from 2005 to 2015, rather than the 5 percentage point increase originally reported (see Katz and Krueger 2016).

Given the benefit of hindsight, we conclude that comparisons of trends in work arrangements across surveys with different sampling frames (as is the case for the CPS and RAND ALP) and at different points of the business cycle require extra caution, even after the best attempts to make the surveys as comparable as possible. Another lesson is that workers appear to have a difficult time accurately reporting on their work status in standard surveys, and the problems are likely greater for proxy respondents (see also Abraham and Amaya 2018). We conclude that the basic monthly CPS and CWS instrument may have difficulty capturing changes in the incidence of casual or intermittent work in the United States because respondent reporting errors are likely to be exacerbated during a period of changing work relationships.

A puzzle remains concerning the rising trend in self-employment measures in administrative tax data relative to a declining trend in worker self-reports of self-employment rates in primary jobs in the CPS as seen in figure 1. Schedule C filings as a share of CPS employment increased from 12.9 percent in 2000 to

Figure 1. Trends in Self-Employment



Source: Current Population Survey, 1980 to 2017 (BLS 2019); IRS Statistics of Income Publication 1304, table 1.3 (U.S. Department of Treasury, IRS 2019).

16.6 percent in 2016 driven by a rise in the share of nonemployers—Schedule C filers without any employees (documented in Abraham et al. 2018a, 2018b). In contrast, the share of employees in the CPS classified as self-employed, unincorporated continued a secular decline in the 2000s, falling from 7.5 percent in 2000 to 6.3 percent in 2016. We draw on an analysis of Internal Revenue Service (IRS) administrative data by Brett Collins and his colleagues to explore in more detail the importance of online gig economy, primary versus secondary jobs, and small jobs (low amounts of annual earnings) in accounting for the rise in the incidence of 1099 receipts and self-employment income in the 2000s (see Collins et al. 2019). The rise in the share of workers with 1099 receipts and self-employment incomes is driven by individuals with relatively small amounts of self-employment income where, over the course of a year, the earnings appear to be secondary and supplemental sources of income.

We also examine data on two new questions on electronically mediated work that were added to the 2017 CWS. The BLS concluded that more than two-thirds of affirmative responses to these new questions were false positives and recoded the data. In the recoded data, 1 percent of the workforce was classified as having performed electronically mediated work in the survey reference week, similar to our estimate from the RPCWS and to estimates by Diana Farrell, Fiona Greig, and Amar Hamoudi (2018, 2019) using comprehensive banking data. Finally, we present evidence from Amazon Mechanical Turk that suggests that the basic monthly CPS question on multiple job holding misses many instances of multiple job holding.

REWEIGHTING THE RAND SURVEY

For our 2016 paper (Katz and Krueger 2016), we worked with the RAND Institute to add questions on alternative work arrangements to the RAND ALP conducted in October and November 2015 resulting in the Rand-Princeton Contingent Worker Survey (RPCWS). The additional questions were closely patterned on the BLS's CWS questions. There are several important differences between the RPCWS and the CPS CWS, however. First, the RPCWS survey was conducted online, and the CWS is conducted in person or over the telephone. Second,

the RAND sample used in the RPCWS was recruited through a variety of methods (such as a group recruited for the University of Michigan internet panel, a random digit dial sample, and a snowball sample), and likely is less representative of the U.S. workforce than the CPS CWS sample. Third, all individuals self-respond about themselves in the RAND survey, whereas the BLS accepts proxy responses as well as self-responses in the CPS, including the CWS. Approximately half of responses to the CPS CWS are from proxy respondents on behalf of others in their household. Fourth, the U.S. economy and the labor market were not as strong in October and November 2015, when the RPCWS was conducted, as they were in May 2017, when the latest BLS CWS survey was conducted. Fifth, the sample size for the RPCWS survey is considerably smaller than that of the CPS.[1]

Did features of the RAND survey upwardly bias our estimate of the share of workers in alternative work arrangements compared with CWS? We first focus on the representativeness of the sample, and then turn to proxy respondents in the CPS and cyclical factors.

Table 1 reports the percentage of workers engaged in various measures of alternative work arrangements from the RPCWS survey and all the CWS surveys, for all respondents age eighteen and older, and for three separate age groups (eighteen to twenty-four, twenty-five to fifty-four, and fifty-five to seventy-five). Panel A shows workers who report being self-employed on their main job based on the basic monthly CPS class of worker question; panel B shows the alternative work categories based on CWS questions. Independent contractors are individuals who report they obtain customers on their own to provide a product or service as an independent contractor, independent consultant, or freelance worker. On-call workers report having certain days or hours in which they are not at work but are on standby until called to work. Temporary help agency workers are paid by a temporary help agency. Contract workers are individuals who worked for a company that contracted out their services during the reference week.[2]

Our figures do not exactly match the published CWS results because we use a different sample (age eighteen and older) and because we use a different definition of contract workers to align with the RPCWS survey, but we were able to replicate the published CWS figures when we used the same sample restrictions and contract worker definition as the BLS.

The raw (unweighted) 2015 RPCWS tabulations are shown in column 1 of table 1 indicating 13.3 percent of the workforce in self-employment and 20.5 percent in alternative work arrangements. RAND developed a set of survey weights to adjust the ALP sample to more closely match the CPS based on age, gender, race, ethnicity, education, and household income groups. These weights did not consider differences in self-employment or multiple job holding rates in the RAND versus CPS samples, however. The RAND sample contained a substantially higher percentage of workers who identified as self-employed—11.6 percent—in the RCPWS after applying the RAND weight than the October 2015 CPS—9.6 percent. Consequently, we further adjusted the RAND weights to match the CPS self-employment rate in October 2015. Results using these weights, called Altwt., are presented in column 2 of table 1. We took this step to protect against the possibility that the RAND sample may overrepresent workers who are more likely to be in alternative jobs.

The estimates in column 2 were the core focus of our earlier study and suggested that 15.8

1. A sixth difference is that in some cases the skip logic in the RAND questionnaire slightly deviated from that used by BLS to compute statistics from the CWS, so we recomputed statistics from CWS to more closely mirror the RAND skip logic.

2. In the published CPS CWS tabulations, contract workers are further restricted to those "who are usually assigned to only one customer and usually work at the customer's worksite." We do not impose this restriction in our tabulations of the BLS CWS or RPCWS. Our results also differ from CWS because we restrict the CWS sample to those age eighteen and older who worked in the reference week to be comparable to RPCWS, whereas the official figures include those age sixteen and older who were employed (but not necessarily worked) in the reference week.

Table 1. Self-Employed and Alternative Work Arrangements

	Rand Unwt. (1)	Rand Altwt. (2)	Rand Altwt. 2 (3)	1995 CWS (4)	1997 CWS (5)	1999 CWS (6)	2001 CWS (7)	2005 CWS (8)	2017 CWS (9)
Panel A. Self-employed (basic monthly)									
Overall	13.3	9.6	9.2	11.6	11.3	10.6	10.2	10.8	9.9
18–24	5.1	5.9	6.5	2.7	2.4	2.2	1.8	2.0	2.3
25–54	9.2	7.3	6.9	11.8	11.2	10.5	10.3	10.6	9.1
55–75	19.9	18.1	17.0	20.2	20.2	18.9	17.8	18.0	15.7
Panel B. Alternative work arrangements									
Any arrangement									
Overall	20.5	15.8	13.7	10.1	10.2	9.6	9.4	10.8	10.5
18–24	8.5	6.4	5.7	6.7	6.6	6.5	6.5	7.4	6.2
25–54	17.1	14.3	11.9	10.0	10.1	9.5	9.2	10.4	9.9
55–75	26.5	23.9	21.5	14.1	14.1	13.3	13.6	15.1	14.4
Independent contractors									
Overall	11.7	8.4	7.2	6.4	6.4	6.1	6.1	7.0	6.7
18–24	3.4	2.1	2.4	1.5	1.5	1.6	1.7	2.2	2.1
25–54	8.1	6.8	5.5	6.6	6.5	6.2	6.1	6.8	6.2
55–75	17.8	15.8	13.8	10.5	10.4	9.7	10.5	11.3	10.4
On-call workers									
Overall	2.6	2.6	2.4	1.5	1.5	1.5	1.5	1.7	1.6
18–24	0.0	0.0	0.0	1.9	2.1	1.7	2.4	2.4	1.8
25–54	2.3	2.6	2.3	1.4	1.3	1.3	1.3	1.5	1.5
55–75	3.1	3.3	3.2	2.2	2.0	2.1	1.6	1.9	1.9

Temporary help agency workers									
Overall	2.0	1.6	1.7	1.0	1.0	0.9	0.9	0.9	0.9
18–24	1.7	1.7	1.9	1.8	1.8	1.9	1.5	1.4	1.3
25–54	2.3	1.6	1.6	0.9	0.9	0.8	0.8	0.8	0.9
55–75	1.5	1.7	1.7	0.6	0.8	0.7	0.9	0.7	0.8
Contract workers									
Overall	4.2	3.1	2.5	1.3	1.4	1.3	1.1	1.4	1.4
18–24	3.4	2.5	1.4	1.5	1.3	1.5	1.1	1.5	1.1
25–54	4.4	3.2	2.4	1.4	1.5	1.4	1.1	1.4	1.5
55–75	4.1	3.1	2.8	1.0	1.0	0.9	0.7	1.4	1.4
Observations	2,194	2,194	2,194	54,415	53,493	49,420	36,574	42,087	46,071
Unemployment rate (SA)	5.0	5.0	5.0	5.4	5.2	4.4	4.2	5.4	4.3

Source: Authors' compilation based on the CPS CWS supplements for 1995, 1997, 1999, 2001, 2005, and 2017 (U.S. Census Bureau 2019) and the RPCWS (Katz and Krueger 2019).

Note: The sample includes employed individuals who are age eighteen or older. Panel A reports the percent of employed workers who are self-employed. Panel B reports the percent of employed who are independent contractors, on-call workers, temporary help agency workers, and contract workers. Any alternative work arrangement includes all of the listed categories in panel B. Individual categories may not add to the total due to rounding or changes in definitions that improve comparability between the RPCWS and CPS CWS. Column 1 reports unweighted figures from the 2015 RPCWS; column 2 uses a set of weights that accounts for the overrepresentation of self-employed workers; and column 3 uses a set of weights that further accounts for the overrepresentation of multiple job holders in the ALP, both relative to the October 2015 basic monthly CPS. Columns 4 through 9 are weighted using CPS final weights in panel A and CPS supplement weights in panel B.

percent of the U.S. workforce was in alternative work arrangements in their primary job in October and November 2015 (Katz and Krueger 2016). The implication was a large (5 percentage point) rise in the share working in alternative work arrangements from the 10.8 percent in the 2005 CWS (in column 8) to the 15.8 percent in the 2015 RPCWS. In contrast, the May 2017 CWS in column 9 yielded only 10.5 percent in alternative work arrangements.

Multiple job holding is another dimension in which the RAND sample does not match the CPS. In the unweighted RPCWS sample, 14.3 percent of workers reported multiple jobs and in the weighted sample 13.1 percent did. The corresponding figure from the October 2015 CPS is 5.2 percent. We did not previously adjust the RAND sample to match the CPS in terms of the proportion of workers who held multiple jobs, however.[3] Because multiple job holders may be more likely to work in alternative jobs, we created a new set of weights (Altwt. 2) that adjusted the Altwt. weights to down weight multiple job holders, and match the October 2015 CPS. Tabulations using these weights are reported in column 3 of table 1. Using the second set of weights causes the share of workers in alternative jobs to fall by 2.1 percentage points (from 15.8 percent to 13.7 percent), and accounts for 40 percent of the 5.3 percentage point gap between the RPCWS survey and the 2017 CWS in terms of the overall share of workers in alternative work arrangements.

The largest discrepancy in the share of workers in alternative jobs between the RPCWS survey and the CWS (either 2005 or 2017) occurs for the oldest group of respondents (those age fifty-five to seventy-five). Reweighting the RPCWS data to account for the oversampling of multiple job holders in the RAND survey shrinks the discrepancy for older workers, but it remains substantial (more than 7 percentage points higher in the 2015 RPCWS than in the 2017 CWS) and much larger than for those age eighteen to twenty-four (a 0.5 percentage point gap) or those age twenty-five to fifty-four (a 2 percentage point gap). A possible explanation for the age pattern in the discrepancy in the alternative work share in the RPCWS and the CWS is that internet panels, such as the RAND ALP, may be particularly unrepresentative of older Americans. The RPCWS seems to especially oversample elderly individuals who report themselves to be independent contractors, that category accounting for half of the discrepancy with the CWS. The higher incidence of temporary help agency and contract workers in the RPCWS is more similar for all three age groups.

CWS: CYCLE AND PROXY RESPONDENTS

The bottom row of table 1 reports the seasonally adjusted unemployment rate in each month when the RAND and CWS surveys were conducted. The unemployment rate was 1.1 percentage point lower when the latest CWS was conducted in May 2017 than when the previous CWS was conducted in February 2005, and 0.7 percentage point lower in May 2017 than when the October and November 2015 RPCWS was conducted. If a tighter job market increases the fraction of workers who are in traditional employment, then cyclical factors could affect comparisons of the share of workers in alternative work over time.

The unemployment rate averaged 4.3 percent in February 1999 and February 2001, the same as it was in May 2017. Thus a simple way to adjust for unemployment rate differences is to compare the average of the 1999 and 2001 CWS surveys with the 2017 CWS survey. The share of workers in alternative work arrangements rose by 1 percentage point from 1999–2001 to 2017, from 9.5 percent to 10.5 percent. A 0.6 percentage point increase in independent contractors was responsible for most of this rise.

Notice also that the unemployment rate was about the same when the CWS was conducted in 1997 and 2005, which provides another set of years to compare the growth in alternative work at similar points of the business cycle. Over this period, the share of workers in alternative jobs

3. To partly address this discrepancy in our earlier paper, in one set of results we compared the share of contract workers restricting the sample to single job holders (Katz and Krueger 2016). This narrowed the gap between the 2015 CWS and the RPCWS sample by 1 percentage point.

rose by 0.6 of a percentage point, again mainly because of a rise in independent contractors. These figures suggest that, cyclically adjusted, the share of independent contractors in the workforce is rising by 0.04 to 0.08 of a percentage point per year.

From 1997 to 1999, the unemployment rate fell by 0.8 of a percentage point and the CWS showed a 0.6 percentage point drop in the alternative work share. The decline in the unemployment rate between 2015 and 2017 was in the same ballpark, so the business cycle could perhaps account for 0.6 percentage point of the difference between the 2015 RPCWS and the 2017 CWS.

An alternative approach to examining trend versus business cycle factors in alternative work arrangements is to use all six CPS CWS from 1995 to 2017 shown in columns 4 to 9 in table 1. We regress the overall alternative work arrangements rate on the (seasonally adjusted) unemployment rate in the month of the survey and a linear (yearly) time trend yielding a coefficient (standard error) on the unemployment rate of 0.901 (0.076) and on the trend of 0.0596 (0.0055).[4] The 0.7 percentage point gap in unemployment between the October-November 2015 RPCWS and the May 2017 CWS multiplied by coefficient for unemployment also yields a 0.6 percentage point higher alternative work arrangements rate in the 2015 RPCWS than in the 2017 CWS from a weaker labor market. The regression also implies a trend rise in the alternative work arrangements rate of 0.06 of a percentage point per year.

Independent contractor status in CWS is derived from different questions that were asked separately of the self-employed and wage and salary workers. Those who identify as self-employed in the basic monthly class of worker question are asked, "Are you self-employed as an independent contractor, independent consultant, freelance worker, or something else?" Those who are classified as wage and salary workers in the basic monthly question are asked, "Last week, were you working as an independent contractor, an independent consultant or freelance worker? That is, someone who obtains customers on their own to provide a product or service."[5] Following BLS, the results in table 1 combine the two groups using the recoded data. From 1999 through 2001 to 2017, both groups contributed 0.3 percentage points to the overall rise in independent contractors of 0.6 percentage points.

One puzzle evident in the CPS data is that, although the cyclically adjusted share of independent contractors in CWS is rising slowly over time, the share of workers who report themselves as self-employed in the basic CPS is declining over the same periods. The basic monthly CPS shows a particularly sharp decline in self-employment among older workers. A partial reconciliation of the divergent trends in self-employment in the basic monthly CPS and the CWS is that the decline in self-employment in the basic monthly CPS largely reflects a decline in the self-employment of those who are employers (small business owners) rather than of the nonemployer self-employed (Hipple and Hammond 2016). And the self-employed who are employers are not counted as independent contractors in the CWS.

Proxy Respondents

Proxy respondents are likely to be less knowledgeable about the employment status of the person for whom they are reporting than that person, and possibly less willing to provide answers that lead to supplemental questions about alternative work arrangements as well. This could cause a mode bias wherein proxy respondents are more likely to report that a household member is employed in a traditional

4. The analogous regression on the published BLS CWS share of all workers (age sixteen and older) in alternative work arrangements leads to almost identical estimates of a 0.882 (0.132) effect of unemployment and a 0.0525 (0.0095) time trend coefficient.

5. The RAND survey combined these two questions and asked it of everyone: "Last week, were you working or self-employed as an independent contractor, an independent consultant, or a freelance worker? That is, someone who obtains customers on their own to provide a product or service." In the various years of the CWS, between 86 percent and 88 percent of the independent contractors were self-employed according to the class of worker question.

Table 2. Proxy Respondents and Alternative Work Arrangements

	Proxy Respondents		Alternative Work Arrangements	
	All Respondents (1)	Independent Contractors (2)	Self-Respondents (3)	Proxy Respondents (4)
1995	51.1	46.5	10.9	9.2
1997	50.6	43.9	11.2	9.0
1999	50.8	44.9	10.6	8.5
2001	50.8	44.0	10.4	8.3
2005	50.1	43.9	11.8	9.6
2017	48.9	41.0	11.8	8.9

Source: Authors' calculations based the CPS CWS supplements for 1995, 1997, 1999, 2001, 2005, and 2017 (U.S. Census Bureau 2019).

Note: Column 1 reports the percent of CWS respondents who were proxy respondents and column 2 reports the percent of independent contractors who were proxy respondents. Columns 3 and 4 report the percent of self-respondents and proxy respondents, respectively, who reported being in an alternative work arrangement. All columns are weighted using supplement weights.

job (as opposed to in an alternative work arrangement) than that household member would be had he or she been a self-respondent. Table 2 reports various statistics on proxy and self-respondents from the CWS. The share of responses in the CWS from proxy respondents has hovered close to 50 percent in all the waves of the survey; the RAND survey accepts only self-responses. Responses from proxies totaled 51.1 percent in 1995 and 48.9 percent in 2017. Katz and Krueger (2019) find that proxy respondents were about 2 percentage points less likely to report being in an alternative work arrangement than were self-respondents in the 1995 and 2015 CPS CWS surveys. It is not clear whether the survey mode has a causal effect on responses, or whether self-responders are truly more likely to be engaged in an alternative work arrangement (perhaps because they are likely to work from home, and therefore to be available to self-respond as self-employed when an interviewer visits their home or calls). Nonetheless, the 2 percentage point differential persisted after we controlled for respondents' educational attainment, experience, race, and sex in a linear probability regression model. Table 2 indicates that this gap has grown to 2.9 percentage points in 2017.

If the difference in the alternative work percentage is interpreted as a survey mode effect, that half of CPS respondents are proxy respondents could account for 1.5 percentage point of the difference between the 2015 RPCWS survey and the 2017 CWS.

Furthermore, the percentage of CWS self-respondents in alternative jobs shows a somewhat stronger upward trend over time than the corresponding percentage for proxy responses. The pattern is particularly apparent for independent contractors, where the share who are proxy respondents has fallen from 46.5 percent in 1995 to 41 percent in 2017. The entire drop from 2005 to 2017 in the share of workers in alternative jobs occurred among proxy respondents in the CWS. The rate held steady for self-respondents.

Summing Up

We can account for just over 4 percentage points of the 5.3 percentage point difference in the 15.8 percent share of the workforce in alternative work arrangements between the 2015 RPCWS (reported in Katz and Krueger 2016) and the 10.5 percent in the 2017 CWS, as follows: 2.1 are a result of differential sample representativeness reflected in greater multiple job holding in the RPCWS, 1.5 is due to the use of proxy respondents in CWS, and 0.6 arises from differences in the state of the business cycle between 2015 and 2017.

TRENDS IN ADMINISTRATIVE TAX DATA

Trends in self-employment have been diverging in survey and administrative tax data since 1980. The contrast is particularly striking in the 2000s (as illustrated in figure 1). Self-employment based on worker self-reports in the CPS declined in the 2000s, the drop driven by a decline in the unincorporated self-employed, which fell 1.2 percentage points from 2000 to 2016. The number of Schedule C filings as a share of employment, however, continued rising by 3.7 percentage points from 2000 to 2016. Katharine Abraham and her colleagues (2018b) also report a rise since 2000 in several administrative measures of self-employment for tax and census data, including the share of self-employed nonemployers, that is, individuals with more than $1,000 in business income but no employees. Abraham and her colleagues find, using linked household survey and administrative tax data for the same individuals, a noticeable increase in the share of individuals with self-employment income reported to the IRS but not in the CPS. Emilie Jackson, Adam Looney, and Shanthi Ramnath (2017) document that the share of the workforce with self-employment income (who are Schedule SE filers) increased from 10.1 percent in 2000 to 12.2 percent in 2014. Finally, Lawrence Mishel (2018), using publicly available Social Security Administration data, finds that the share of individuals with taxable earnings who have self-employment income increased from 9.6 percent in 2000 to 11.7 percent in 2015. The CWS and RPCWS data seem more consistent with the tax data in showing a modest rise in independent contractors as a share of employment in the 2000s (as seen in table 1).

A potential reconciliation of the divergent trends in CPS and administrative tax measures of self-employment could be that the CPS measure covers only primary jobs, but the tax measures include individuals with self-employment from secondary jobs or activities. Mishel's (2018) tabulations, however, imply that the share of those with any taxable earnings who only had self-employment income increased by 1 percentage point, from 5.8 percent in 2000 to 6.8 percent in 2015.

Collins and his colleagues (2019) use micro administrative tax data from the IRS covering the universe of tax returns to attempt to reconcile the different trends in self-employment and alternative work arrangements and to explore the role of gig work mediated by online platforms. They report a noticeable rise in the 1099 economy in the 2000s, the share of earners with income from alternative nonemployee work arrangements (1099 income from any 1099-MISC nonemployee compensation or from gig economy company income on a 1099K) increasing by 1.9 percentage points—from 9.9 percent in 2000 to 11.8 percent in 2016. A rapidly rising share of individuals receiving 1099 income from gigs mediated through online labor platforms from 2013 to 2016 accounts for more than half the growth of the 1099 workforce in the 2000s.

Collins and his colleagues (2019) explore in detail the patterns and distribution of 1099 and other self-employment earnings in tax data. They find that the rise in the incidence of 1099 income is driven by individuals with 1099 income as secondary income or with low or modest levels of 1099 income (less than $2,500 per year). The share of the workforce earning a full-time, full-year income at the minimum wage ($15,000 or more) from 1099 income or self-employment (Schedule SE) income as their primary source of income has not noticeably risen since 2000. Collins and his colleagues conclude from administrative tax data that the rise in online platform work for labor is driven by earnings that are secondary and supplemental sources of income. Using banking data from de-identified Chase checking accounts, Farrell, Greig, and Hamoudi (2019) similarly conclude that the rise in the incidence of earnings from the online platform economy from 2012 to 2018 largely reflects secondary and occasional sources of income.

Thus, assuming no rise in the underreporting of the amount of self-employment income in tax data, the Collins and colleagues (2019) findings suggest that self-employment as a primary income source has not been rising for workers with strong labor-force attachment over the course of a year. These results are reinforced by Mishel's (2018) conclusion that much of the rise of the incidence of self-employment reflects side activities by freelancers as self-employment earnings as a share of

total earnings increased by much less than the share of workers with any self-employment income from 2000 to 2015.

MEASURING MULTIPLE JOB HOLDERS

As mentioned, the RAND survey indicates a much higher rate of multiple job holding than the CPS. Since January 1994, the basic monthly CPS has asked respondents about multiple job holding.[6] Multiple job holding is defined as working on more than one job during the survey reference week. BLS does not count individuals who were self-employed on their primary job and were either self-employed or an unpaid family worker on their second job as multiple job holders, which excludes workers who simultaneously work as independent contractors on Lyft and TaskRabbit, for example. Someone who reports moonlighting as a Lyft driver in addition to having a traditional W-2 job would be counted as a multiple job holder.

Despite the rise of the online platform economy, the monthly CPS shows a secular decline in multiple job holding. The percent of employees who were multiple job holders fell from an annual peak of 6.2 percent in 1996 to 4.9 percent in 2013. In the first half of 2018, 5 percent of workers were classified as multiple job holders.[7] This decline might be viewed as an indication that alternative work arrangements are not rising.

We designed a survey experiment using 2,291 participants age eighteen and older recruited on Amazon Mechanical Turk (MTurk) to explore whether the standard CPS-type question on multiple job holding fails to capture a substantial amount of the secondary work that takes place. The survey was conducted online in late March 2015, and respondents were paid $3 for their participation. Median survey completion time was seven minutes. The sample was not chosen to be representative, but instead was selected to oversample workers who worked on multiple jobs, often on a casual basis. Our motivation was to determine whether relatively many multiple job holders neglect to report that they worked on multiple jobs based on the standard CPS question, and to probe whether multiple job holders could be identified if we asked more specifically about overlooked work activities in the previous week.

Specifically, along the lines of the CPS, we asked, "Last week did you have more than one job or business, including part time, evening or weekend work?" A total of 39 percent of MTurk participants volunteered that they had more than one job or business in the previous week.

After asking multiple job holders how many jobs they held in the previous week, we asked all respondents, "Did you work on any gigs, HITs or other small paid jobs last week that you did not include in your response to the previous question?" (A HIT is a human intelligence task and reflects standard usage for small online jobs.) We next asked respondents to describe any work that they omitted.

Table 3 provides a tabulation of the responses. Of those who did not indicate holding multiple jobs on the CPS-like question, 61 percent acknowledged that they failed to report working on a gig, HIT, or small job in the previous week. The omitted work was frequently tasks conducted on MTurk based on free-form descriptions, but also included work as writers, editors, teachers, dog sitters, and other freelance activities. If these workers are added to the multiple job holders, the percent of workers who are multiple job holders would almost double from 39 percent to 77 percent.[8]

Younger respondents were much less likely to acknowledge omitting secondary jobs. Indi-

6. The key question is this: "Last week, did (name/you) have more than one (job/job or business), including part time, evening or weekend work?"

7. Research has also found that multiple job holding rate is acyclic over time, and only weakly correlated with the unemployment rate across labor markets (Hirsch, Husain, and Winters 2016).

8. The data may also include some false positives: 9.8 percent of multiple job holders according to the CPS-type question reported that they held only one job in the previous week. Under the assumption that these answers are correct, the share of multiple job holders would be 72.6 percent, still indicating substantial undercounting of multiple job holders.

Table 3. Underreporting of Multiple Jobs

Failed to Report Gigs, HITs, or Other Small Jobs Last Week	Multiple Job Holder on CPS Question	
	No	Yes
No	38.6%	61.6%
Yes	61.4	38.4

Source: Authors' calculations based on an MTurk Survey on Workers in the Share Economy implemented on March 30–31, 2015 (Krueger and Freeland 2019).
Note: The sample size is 2,291 participants on MTurk. HITs are human intelligence tasks.

viduals with less than a college degree were also somewhat less likely to acknowledge omitting secondary jobs.

The MTurk sample is highly nonrepresentative, but this survey experiment demonstrates that the standard multiple job holding question in the basic monthly CPS is susceptible to underreporting. Abraham and Ashley Amaya (2018) similarly find in a survey experiment conducted with an MTurk sample in 2016 that additional probing identified a substantial amount of informal work activity not captured by the CPS employment questions, implying an understatement of the overall employment rate and the multiple job holding rate. Although it seems clear that the CPS fails to capture much secondary work activity, leading to an understatement of the multiple job holding rate, the MTurk point-in-time surveys in 2015 and 2016 do not allow one to make assessments of whether there is a trend in the rate of understatement of multiple job holding.

Abraham and Amaya (2018) suggest that proxy respondents in the CPS may not be aware of multiple job holding arrangements for the worker on which they report. In the basic monthly CPS, we find that self-respondents are 25 to 40 percent more likely than proxy respondents to report holding multiple jobs, depending on the month. It is unclear, however, whether this difference represents a proxy respondent reporting effect or a real difference in work behavior.

ELECTRONICALLY MEDIATED WORK

The May 2017 CWS included two new questions on electronically mediated work to measure participation in the online platform economy. The questions were as follows:

Introduction. I now have a few questions related to how the internet and mobile apps have led to new types of work arrangements. I will ask first about tasks that are done in person and then about tasks that are done entirely online.

Q1. Some people find short, IN-PERSON tasks or jobs through companies that connect them directly with customers using a website or mobile app. These companies also coordinate payment for the service through the app or website.

For example, using your own car to drive people from one place to another, delivering something, or doing someone's household tasks or errands.

Does this describe ANY work you did LAST WEEK?

Yes

No

Q2. Some people select short, ONLINE tasks or projects through companies that maintain lists that are accessed through an app or a website. These tasks are done entirely online and the companies coordinate payment for the work.

For example, data entry, translating text, web or software development, or graphic design.

Does this describe ANY work you did LAST WEEK?

Yes

No

In addition, in the case of affirmative responses to either question, a follow-up question asked whether the work was for the respondent's main job, a second job, or other additional work.

About 3 percent of workers reported that they had performed some work in person or remotely (or both) through an online intermediary in the reference week. After an extensive review, however, the BLS "determined that these questions did not work as intended and had a large number of incorrect 'yes' answers."[9] The BLS suspected that a large number of affirmative responses were false positives and recoded the originally reported responses to these questions using a confidential micro data file that included respondents' verbatim descriptions of their job duties, employer name, industry, occupation, and other information. (A handful of workers were reclassified in the opposite direction.) The BLS has made both the original reports and the recoded data available, although not all the data that were used to recode the originally reported responses have been made public. Using the BLS "as reported" and "reclassified" data, the false positive rate was 68.5 percent to question 1 (in-person tasks) and 76.4 percent to question 2 (remote tasks). Combining both questions, BLS recoded 69 percent of those who reported yes to at least one of the electronically mediated work as no.[10] Thus, in the recoded data, only 1 percent of the workforce is classified as working through an online intermediary.

Workers in some industries were much more likely to be reclassified as false positives than in others. For example, among those who originally reported themselves as finding some work through an online platform, 95 percent of workers whose primary industry was public administration, 94 percent in manufacturing, and 91 percent in construction were reclassified as not working online. By contrast, only 33 percent of workers in transportation and warehousing were reclassified as false positives.

The apparently high rate of false positive classification errors, even in the transportation industry, where Uber, Lyft, and other ridesharing platforms are used by a substantial proportion of workers, is indicative of the difficulty inherent in assessing the percentage of the workforce in alternative work arrangements from household survey data. Nonetheless, as with the BLS's recoded CWS data, both Katz and Krueger (2016, 2019) and Farrell, Greig, and Hamoudi (2019) estimate that only 0.5 percent to 1.5 percent of the workforce was engaged in online work in a given reference week or month for sample periods covering late 2015 to early 2018.

CONCLUSIONS

We conclude that there has likely been a modest upward trend in the share of the U.S. workforce in alternative work arrangements (independent contractors, contract workers, temporary help agency workers, and on-call workers) during the 2000s based on the cyclically adjusted comparisons of the CPS CWS, measures using self-respondents in the CPS CWS, and measures of self-employment and 1099 workers from administrative tax data. The growth in alternative work arrangements is not as sharp as suggested by our comparison of the 2015 RPCWS and the 2005 CPS CWS if more consistent measures are compared over time (Katz and Kreuger 2016). Differences in survey methods between the CPS CWS and the RPCWS related to the use of proxy respondents in the CPS and the less representative nature of the RAND ALP than the CPS likely account for our 2016 overstatement in trend growth in alternative work arrangements.

Estimating the percentage of workers in alternative work in both primary and secondary jobs is a difficult task in household surveys. Because only a relatively small proportion of workers are currently working in specific alternative employment arrangements in any given week, and often for relatively modest amounts of income or short periods, respondent (or coder) misclassifications and other nonsampling errors are likely to exert a sizable impact on estimates. In view of the differential trends in the CWS between proxy and self-respondents, one suggestion from our analysis is that the BLS should consider only using self-responses for

9. See Current Population Survey Staff 2018.

10. Proxy respondents were only slightly more likely than self-respondents to be reclassified as false positives (70.0 percent versus 68.2 percent).

CWS because proxy respondents may not be knowledgeable.

Furthermore, given the difficulty of measuring alternative work and multiple job holding in household surveys, it might also be worthwhile for the BLS to probe more deeply involvement in secondary work, as in our MTurk experiment. Abraham and Susan Houseman (2019), using data from the Survey of Household Economics and Decisionmaking, find that over the course of a month about a quarter of adults engage in some informal work activity outside of a main job. Anat Bracha and Mary Burke (2019) similarly find in a Survey of Informal Work Participation, a supplement to Survey of Consumer Expectations of the Federal Reserve Bank of New York, that 19 percent of U.S. household heads had some form of informal labor earnings in 2015. The implication is that most informal casual work is not reported to the CPS as a secondary job in response to the basic monthly multiple job holding question. A more deliberate approach to probing about nonstandard work activities and secondary jobs in the CPS appears warranted.

When it comes to measuring trends over time, an important lesson from our review of the evidence is that it is essential to hold constant survey modes, questionnaires, and survey design features to guard against the risk that nonsampling errors dominate time-series comparisons. A similar lesson was clear from the 1992–1993 CPS parallel overlap sample, which was used to evaluate the effects of the 1994 CPS redesign on employment, labor force, and unemployment (Polivka and Miller 1998). Although the fraction of workers employed in alternative work could be biased in any given year, repeated measures could nonetheless reflect actual changes over time if survey methods are held constant. In this regard, it could be a useful exercise to conduct another wave of the RPCWS survey in the future to assess trends in alternative work.

REFERENCES

Abraham, Katharine G., and Ashley Amaya. 2018. "Probing for Informal Work Activity." *NBER* working paper no. 24880. Cambridge, Mass.: National Bureau of Economic Research.

Abraham, Katharine G., John C. Haltiwanger, Kristin Sandusky, and James R. Spletzer. 2018a. "Driving the Gig Economy." Unpublished paper, National Bureau of Economic Research. Accessed June 25, 2019. http://papers.nber.org/conf_papers/f110357/f110357.pdf.

———. 2018b. "Measuring the 'Gig' Economy: Current Knowledge and Open Issues." *NBER* working paper no. 24950. Cambridge, Mass.: National Bureau of Economic Research.

Abraham, Katharine G., and Susan N. Houseman. 2019. "Making Ends Meet: The Role of Informal Work in Supplementing Americans' Income." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 110–31. DOI: 10.7758/RSF.2019.5.5.06.

Bernhardt, Annette. 2014. "Labor Standards and the Reorganization of Work: Gaps in Data and Research." *IRLE* working paper no. 100–14. Berkeley: University of California, Institute for Research on Labor and Employment. Accessed June 25, 2019. https://irle.berkeley.edu/files/2014/Labor-Standards-and-the-Reorganization-of-Work.pdf.

Bracha, Anat, and Mary A. Burke. 2019. "How Big Is the Gig?" Unpublished paper, Federal Reserve Bank of Boston.

Collins, Brett, Andrew Garin, Emile Jackson, Dmitri Koustas, and Mark Payne. 2019. "Is Gig Work Replacing Traditional Employment? Evidence from Two Decades of Tax Returns." Unpublished paper, IRS SOI Joint Statistical Research Program.

Current Population Survey Staff. 2018. "Electronically Mediated Work: New Questions in the Contingent Worker Supplement." *Monthly Labor Review*, September. Washington: U.S. Bureau of Labor Statistics. DOI: 10.21916/mlr.2018.24.

Farrell, Diana, and Fiona Greig. 2016a. "Paychecks, Paydays and the Online Platform Economy." Washington, D.C.: JPMorgan Chase Institute. Accessed June 25, 2019. https://www.jpmorganchase.com/corporate/institute/document/jpmc-institute-volatility-2-report.pdf.

———. 2016b. "The Online Platform Economy: Has Growth Peaked?" Washington, D.C.: JPMorgan Chase Institute. Accessed June 25, 2019. https://www.jpmorganchase.com/corporate/institute/document/jpmc-institute-online-platform-econ-brief.pdf.

Farrell, Diana, Fiona Greig, and Amar Hamoudi. 2018. "The Online Platform Economy in 2018: Drivers, Workers, Sellers and Lessors." Washing-

ton, D.C.: JPMorgan Chase Institute. Accessed June 25, 2019. https://www.jpmorganchase.com/corporate/institute/document/institute-ope-2018.pdf.

———. 2019. "The Evolution of the Online Platform Economy: Evidence from Five Years of Banking Data." *AEA Papers and Proceedings* 109: 362–66.

Government Accountability Office. 2015. "Contingent Workforce: Size, Characteristics, Earnings, and Benefits." GAO-15-168R. Washington: Government Printing Office. Accessed June 25, 2019. http://www.gao.gov/products/GAO-15-168R.

Hipple, Steven F., and Laurel A. Hammond. 2016. "Self-Employment in the United States." *Spotlight on Statistics*. Washington: U.S. Bureau of Labor Statistics. Accessed June 25, 2019. https://www.bls.gov/spotlight/2016/self-employment-in-the-united-states/pdf/self-employment-in-the-united-states.pdf.

Hirsch, Barry T., Muhammad M. Husain, and John V. Winters. 2016. "Multiple Job Holding, Local Labor Markets, and the Business Cycle." *IZA Journal of Labor Economics* 5(4): 1–29.

Jackson, Emilie, Adam Looney, and Shanthi Ramnath. 2017. "The Rise of Alternative Work Arrangements: Evidence and Implications for Tax Filing and Benefit Coverage." *Office of Tax Analysis* working paper no. 114. Washington: U.S. Department of the Treasury.

Katz, Lawrence F., and Alan B. Krueger. 2016. "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015." *NBER* working paper no. 22667. Cambridge, Mass.: National Bureau of Economic Research.

———. 2019. "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015." *ILR Review* 72(2): 382–416.

Krueger, Alan B., and Edward Freeland. 2019. "Workers in the Sharing Economy." Princeton, N.J.: Princeton University Survey Research Center. Accessed July 30, 2019. https://psrc.princeton.edu/file/521/download?token=hpGAR2Lk. Data set available at https://psrc.princeton.edu/file/526/download?token=K2bZnbnn.

Mishel, Lawrence. 2018. "Social Security Data Confirm Same Old Patterns: Self-employment Headcount Has Risen but Economic Impact Remains Small." *Working Economics Blog*, June 28, 2018. Washington, D.C.: Economic Policy Institute. Accessed June 25, 2019. https://www.epi.org/blog/social-security-data-confirm-same-old-pattern-self-employment-headcount-has-risen-but-economic-impact-remains-small.

Polivka, Anne E., and Stephen M. Miller. 1998. "The CPS After the Redesign: Refocusing the Economic Lens." In *Labor Statistics Measurement Issues*, edited by John Haltiwanger, Marilyn E. Manser, and Robert Topel. Chicago: University of Chicago Press and NBER.

U.S. Bureau of Labor Statistics (BLS). 2018. "Contingent and Alternative Arrangements – May 2017." News Release USDL-18-0942. Washington: Government Printing Office. Accessed June 25, 2019. https://www.bls.gov/news.release/pdf/conemp.pdf.

———. 2019. "Labor Force Statistics from the Current Population Survey." Washington: Government Printing Office. Accessed July 29, 2019. https://data.bls.gov/cgi-bin/srgate.

U.S. Census Bureau. 2019. "Current Population Survey Supplement." Washington: Census Bureau. Accessed July 15, 2019. https://thedataweb.rm.census.gov/ftp/cps_ftp.html#cpssupps.

U.S. Department of Treasury, Internal Revenue Service. 2019. "Statistics of Income Tax Stats—Individual Statistical Tables by Filing Status." Washington: U.S. Treasury. Accessed July 29, 2019. https://www.irs.gov/statistics/soi-tax-stats-individual-statistical-tables-by-filing-status#_grp1.

Weil, David. 2014. *The Fissured Workplace*. Cambridge, Mass.: Harvard University Press.

Understanding the Present and Future of Work in the Fissured Workplace Context

DAVID WEIL

The fissuring *of business structures fundamentally changes the nature of employment and work in industries and the economy as a whole. This article describes the core elements comprising fissuring, distinguishes them from the narrower concepts of contingent work and alternative work arrangements, and provides an estimate of its size. Work restructuring arising from fissuring alters wage determination inside and outside firms affected by it and provides an alternative explanation for a growing empirical literature on earnings inequality. The fissured workplace perspective requires different policies for the workplace and labor market than traditional approaches including those regarding worker rights and protections, employment responses to the business cycle, workforce education and training, and job and career mobility.*

Keywords: fissured workplace, alternative work arrangement, earnings inequality, wage determination, future of work

When a book, blender, or box of cereal from a branded online retailer arrives at our door within a day or even hours after purchase, we seldom consider how that item got there. On ordering, we are instantly told by the retailer when we can expect delivery and are enabled to monitor in real time when the item is packed, put in transit, and arrives. We are also assured by the retailer that our satisfaction with a timely arrival and readiness for use is guaranteed. Most customers do not know, however, that the delivery was governed by strict deadlines on timing and quality of delivery by the retailer, its progress monitored by retailer information technologies and sophisticated software systems, and allocated in "blocks" designed to minimize time from the distribution center to the door. But the actual "final mile" to an individual doorway is done by an independent contractor (that is, workers acting as a self-employed entity), paid on a piece-rate basis who bear all the costs for the fuel, vehicle, parking tickets, and the risks of injury arising from a slip or fall or angry neighborhood dog.

When we receive our orders from an online retailer, much less stay at a hotel, use our digi-

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tal devices, or order takeout food, we make the assumption that the branded company we paid for these services—Amazon, Marriott, Apple, McDonalds, and so on—also employs the people who deliver or make them. This assumption is increasingly incorrect: our deliveries are often undertaken by contractors and our hotel rooms are cleaned by workers from staffing agencies. The change in how businesses organize themselves to achieve core objectives while shifting more and more of the work to other entities changes the nature of employment. The consequences of this restructuring have been felt most by low-wage workers for some time. But those with college and graduate educations, even in professions once regarded as protected from the ups and downs of churning labor markets, are increasingly being affected as well.

Over the past three decades, major companies throughout the economy have faced intense pressure to improve financial performance for private and public investors. They responded by focusing their businesses on core competencies—that is, activities that provide the greatest value to their consumers and investors—and by shedding less essential activities. Firms typically started by outsourcing activities such as payroll, publications, accounting, and human resources. But, over time, outsourcing spread to activities such as janitorial and facilities maintenance and security. Later, it went deeper, spreading into employment activities that could be regarded as core to the company's core competency. For example, the use of staffing agencies for distribution centers began as a response to meet fluctuating staffing needs driven by the cycle of retail demand. Over time, however, retailers and their third-party managers began to rely on it increasingly to staff ongoing activities and later home delivery. Similarly, hotel properties turned to staffing agencies for room cleaning, restaurants for kitchen crews, and even law firms for basic legal tasks.

Once an activity like janitorial services, loading dock labor, or housekeeping is shed, the secondary businesses doing that work are affected, often shifting those activities to still other businesses. A common practice in janitorial work, for instance, is for companies in the hotel or grocery industries to outsource that work to cleaning companies. Those companies, in turn, often hire smaller businesses to provide workers for specific facilities or shifts.

The opening example illustrates the "recipe" underlying what I term the *fissured workplace*. First, it involves companies seeking to focus on their greatest competence from the perspective of customers and especially investors (such as logistics excellence and inventory risk minimization for modern retailers). Second, fissured business models shed as many as possible of the activities not core to delivering those competencies to other organizations (third-party managers and, in turn, staffing agencies in the above). Finally, and crucially, the lead business maintains tight control of the outcomes of those subsidiary organizations in orbit around its competence through standards, monitoring, and mechanisms of enforcement. This ensures that the competence is fulfilled and other entities are allowed to do—and be responsible for—the work, for reasons that will be made clear. In retailing, this means detailed standards and associated contracts between the different organizations, though it can also take the form of franchising, supply chain monitoring mechanisms, or increasingly sophisticated software algorithms.

The broader changes involved in fissuring mean that its impact goes beyond the narrower concepts of contingent work or alternative work arrangements.

HOW BIG IS THE FISSURED WORKPLACE?

When I was working on the manuscript for *The Fissured Workplace*, I sought a term to capture the profound business restructuring that was emerging in a variety of industries. Those changes included but were not limited to the offshoring, outsourcing, and use of staffing agencies that led to work characterized by low wages, noncompliance with core workplace statutes, limited benefits, more contingent employment, greater risk exposure, and weakened bargaining leverage for workers in general. I purposefully chose a somewhat obscure geologic term as the metaphor for this fragmentation to highlight that the practices associated with fissuring arose from a more fundamental

change in how businesses structured themselves beginning in the 1980s.

The fissured workplace connotes restructuring motivated by capital market demands that major businesses focus on the core competencies that provide value to customers and investors and concomitantly shed activities to other entities to carry out those efforts (Appelbaum and Batt 2014; Davis 2013). But the organizations that undertake that fissured activity for lead businesses are guided by exacting standards and high-powered incentives to ensure that core competencies are met (Prahalad and Hamel 1990). These take the form of detailed subcontracting and supply chain requirements, franchise agreements, and most recently the highly calibrated incentive systems created by platform algorithms. This allows major businesses to have it both ways: benefit from work executed in strict compliance with central corporate objectives and not be required to treat the workers who do it as their employees with the obligations that relationship holds.

This comprehensive definition of the changes that are transforming the workplace in the United States (and elsewhere around the world) gives rise to the challenge of how to measure its prevalence. Start with the kinds of alternative work practice tracked by the U.S. Bureau of Labor Statistics (BLS) using its Contingent Worker Survey (CWS). The four practices that BLS classifies as alternative work arrangements—independent contracting, on-call employment, temporary help, and contract work—are measured in the CWS through the household survey, and certainly are linked to the concept of fissuring. Based on the CWS, the BLS estimated some 10.6 million independent contractors (6.9 percent of total employment), 2.6 million on-call workers (1.7 percent of total employment), 1.4 million temporary help agency workers (0.9 percent of total employment), and 933,000 workers provided by contract firms (0.6 percent of total employment).

The recent CWS estimates represent a slight decrease in the incidence of alternative work arrangements, from 10.7 percent in 2005 to 10.1 percent in 2017, primarily because of a decline in the share of workers classified as independent contractors (BLS 2018). Lawrence Katz and Alan Krueger (2019a) originally estimated significant growth in alternative work practices in their own survey in 2015, constructed to estimate the prevalence of these practices at a time when it was unclear if the CWS would be repeated. Their revised estimates (reported in this volume) indicate "there likely has been a modest upward trend in the share of the U.S. workforce in alternative work arrangements during the 2000s" (Katz and Krueger 2019b).

The CWS may not fully capture the incidence of alternative work practices for a number of reasons. To begin with, the CWS definition of alternative work includes independent contractors—that is, those workers who are not considered employees under the definitions of workplace laws. Though the criteria for classifying independent contractors vary under state and federal statutes (allowing widespread misclassification of workers as independent contractors), a growing body of evidence indicates that workers often incorrectly classify themselves as employees when they are not being treated that way by the organization for whom they work. Katharine Abraham and her colleagues (2018), Katz and Krueger (2019a), and Abraham and Ashley Amiya (2018) all show that self-employment has been growing when using Internal Revenue data sources (based on actual tax filings) even though household sources like CWS suggest little change in incidence. Ongoing work by Abraham, Brad Hershbein, and Susan Houseman (2018) indicates that part of the discrepancy may arise from misunderstanding by household survey respondents of their actual employment status.

Additional problems arise in measuring the size of alternative work arrangements from household surveys. Workers may not be aware of the presence of workplace intermediaries like staffing agencies, third-party management companies, or franchise arrangements in settings where the managerial outcomes are set by a lead business (such as a hotel, retailer, or fast food brand) even if the employer of record is a different entity. Indicative of the often hidden nature of relationships is that "temporary agencies" now predominately deem themselves "staffing companies" because of the permanence of their placements (Hyman 2018). And people who work for staffing agencies are often payroll employees—yet still clearly part of the

fissured workplace. As a result, workers appear to have a difficult time accurately reporting on their work status in standard surveys, further compounded when household surveys are based on proxy respondents (Abraham and Amaya 2018; Katz and Krueger 2019b).

More fundamentally, even accounting for the measurement problems, the boundaries of the fissured workplace are not synonymous with those of alternative work arrangements. The fissured workplace describes a business strategy characterized by the central components described in the opening section rather than the adoption of individual work practices or arrangements and as captured more narrowly by household surveys like the CWS. A variety of other organizational setups also allow businesses to follow the fissured recipe. The expansion of franchising over the last three decades from its familiar presence in fast food into areas like hospitality, janitorial services, and homecare are driven by a fissured workplace calculus. So too the heightened use of subcontracting that shifts activities to businesses that may provide full time, W-2 employment, but operate under very different economic constraints and incentives than had those jobs remained inside their original organizations. Fissured workplace arrangements can exist even though employment itself might be traditional (that is, ongoing and full time) when the worker is employed by a subcontractor, franchisee, or other business organization undertaking the work of a lead business. Such employment would never be picked up in the CWS and would require information about contracting relationships between companies rather than household surveys to detect.

Consider the work relationships inside a retail distribution center. Distribution centers are the logistics fulcrum for modern retailers and central to a core competence of reducing exposure to inventory risk. [1] As such, all functions are governed by exacting standards of operation. However, retailers have shifted management of their centers to third-party logistics companies. Those companies manage to the retailer's specifications but use staffing agencies to hire and manage the workforce for loading and unloading. These agencies often treat their workforce as independent contractors rather than employees. So work relationships in a retailer's distribution center could be traditional W-2 employment for any of remaining workers of the controlling retailer; W-2 for the supervisory and other workers of the third-party logistics company; W-2, 1099 (independent contracting), or under-the-table forms of employment for the workers of the staffing agency. Those workers might, or might not know that the business entity that pays them might not be the same as the place where they work. Those workers might be working full time, part time, and in ongoing or highly contingent terms of employment. Yet regardless of the combination of relationships and nature of the work arrangement, the totality of the workforce operates in a fissured set of relationships collectively affected by the change in business structure.

Measuring the extent of the fissured workplace therefore requires a combination of approaches that look at the relationship of the party directly compensating the worker (who may or may not be an employer) with other business entities as well as with the work. In this sense, both household surveys (the CPS CWS) and employer-based surveys such as the Current Employment Statistics (CES) or Quarterly Census of Employment and Wages do not sufficiently capture all relevant features. In particular, marrying business transaction data with worker data is crucial for capturing the phenomenon, perhaps leveraging linked data sets like the Longitudinal Employer-Household Dynamics. But it also requires information

1. For an early discussion of the lean retailing model, see Abernathy et al. 1999. Staffing agencies in this space range from relatively large players such as Hire Dynamics to very small, unincorporated businesses (https://hiredynamics.com/employers/logistics/, accessed September 7, 2019). During the Obama administration, a number of major cases were brought by the U.S. Wage and Hour Division and by the plaintiff bar for workers regarding misclassification of workers and wage theft. The retailing practices described here have been documented among traditional retailers (see for example, Jamieson 2014) as well as in the emerging giant in retailing, Amazon, both in its distribution centers and in its approaches to providing home delivery (Semuels 2018; Zaleski 2018).

from sources not traditionally tapped for labor-market estimates such as departments responsible for procurement. For example, Hye Jin Rho (2018) examines how health-care organizations increasingly recruit workers using intermediate organizations that in turn select candidates from a group of competing supplier organizations. These "multilayered contracting" models are often connected to major health-care providers through procurement offices that operate independently from the human resource offices of the same organizations. Adequately capturing the size of the fissured workforce drawing on existing and new sources of data is therefore a frontier issue requiring attention.[2]

A lower bound and admittedly rough estimate of the size of the fissured workplace can be determined by tallying at a subset of industries where fissured relationships have been well documented and appear to be widespread on the basis of industry-based studies and enforcement data.[3] Table 1 provides a list of these NAICS industries and the number of workers (overall and nonsupervisory and production employees) in them as reported in the BLS CES for 2017. We compare the total number of workers in these highly fissured industries with total employment in the private workforce to provide a rough estimate of scale.

The list in table 1 is far from comprehensive. It does not include many industries where fissured activity is alongside continuing traditional forms of employment. For example, to be conservative in the estimate, I do not include any manufacturing (NAICS 31–33) or public administration (NAICS 92) industries, even though subcontracting and outsourcing has been used extensively in the former and staffing agencies and other forms of contracting out in the latter. I also do not include industries where fissuring has become common in particular occupational areas. These include the use of adjunct professors in higher education; outsourced lower level contract work in legal services, real estate, and financial services; mechanical and ground transportation work in air transport; a variety of copy editing, illustration, and marketing functions in publishing industries; extensive subcontracted work in fracking in oil and gas extraction; or contract mining in the coal mining industry.

Table 1 therefore represents a conservative estimate of the extent of fissuring in the economy. Based on that, close to 19 percent of the private-sector workforce were in industries where fissured arrangements predominate. If we consider the additional fissured workers in occupations and in industries with mixed use of practices, I believe that prevalence could easily double, making the practice more pervasive than U.S. unions were at their pinnacle in 1956 (34 percent). And, like unionization, the presence of fissuring in one workplace spills over to the wage-setting decisions of other businesses and to the labor markets in which they compete for workers. That means that the impact of fissuring on the wage and salary structure of the economy is sizable and of first-order importance.

WAGE DETERMINATION IN A FISSURED WORKPLACE

Understanding the impact of a sizable sector of the economy organized along fissured principles requires looking at factors driving wage setting in major companies prior to this change. Large employers that dominated the economy in the post–World War II era drew on unified personnel and pay policies and internal labor markets for a variety of reasons: to take advantage of administrative efficiencies, to cre-

2. In the spring of 2019, the National Academies of Science, Engineering, and Medicine convened the Committee on Contingent Work and Alternative Work Arrangements at the request of the Bureau of Labor Statistics to look into this and related questions. I serve on that Committee with fellow authors in this volume Katharine Abraham and Susan Houseman.

3. To be included on the list, the industry needed to have been significantly affected by fissured practices as documented by detailed cases studies (including those I have conducted), evidence from enforcement sources that indicate significant use of these practices, or detailed appraisals in investigative reporting. The selection errs on the side of conservatism as described further in the text. For sources of industry information, see table 1.

Table 1. Highly Fissured Industries, 2017

Code	Description	All Employees	Nonsupervisory and Production
23611	Residential building construction [a, b, i]	752.5	483.7
23813	Framing contractors [a, b, i]	83.6	73.7
23831	Drywall and insulation contractors [a, b, i]	242.5	204.7
4451	Grocery stores [a. g, i]	2705.3	2,380.3
44711	Gasoline stations with convenience stores [a, i]	824.7	695.8
4841	General freight trucking [e, h]	1,002.0	886.0
4853	Taxi and limousine services [e]	78.5	
4931	Warehousing and storage [a, d, e, g, h, i]	1,026.9	904.3
5152	Cable and other subscription programming [a, i]	52.69	
51731	Telecommunications carriers, wired and wireless [a, i]	692.0	583.9
56132	Temporary help services [a, c, d, j, k]	2,940.1	2,821.3
56142	Telephone call centers [i, j]	530.5	469.6
56143	Business service centers [i, j, k]	78.2	64.2
561612	Security guards and patrol services [a, c, d]	742.0	
56171	Exterminating and pest control services [i]	119.8	95.8
56172	Janitorial services [a, c, d, i]	1,078.0	963.5
56173	Landscaping services [a, i]	780.5	651.0
56179	Other services to buildings and dwellings [a, c, i]	91.1	73.7
56292	Materials recovery facilities [i]	60.0	
6216	Home health-care services [a, i]	1,419.7	1,318.1
72111	Hotels (except casino hotels) and motels [a, i]	1,615.1	1,383.1
72231	Food service contractors [a, d, i]	499.3	437.9
72233	Mobile food services [i]	199.6	169.9
722513	Limited-service restaurants [a, i]	4,380.6	3,858.3
811192	Car washes [i]	168.8	143.7
8121	Personal care services [a, i]	710.4	605.6
81293	Parking lots and garages [a, i]	140.7	124.2
81299	All other personal services [a, i]	75.6	
	Total private	124,259.4	102,415.3
	Total highly fissured industry employment	23,091	19,392
	Percentage of private workforce	18.6%	18.9%

Source: Author's tabulation based on Current Employment Statistics (BLS 2017), seasonally adjusted (annual estimates 000s).

[a] Weil 2014; [b] Abernathy et al. 2012; [c] Dey, Houseman, and Polivka 2010; [d] Grabell 2013; [e] Murphy 2017; [f] Parrott and Reich 2018; [g] Semuels 2018; [h] Viscelli 2016; [i] Wage and Hour Division enforcement investigations; [j] Weber 2017a, [k] 2017b.

ate consistency in corporate policies, and to reduce exposure to violations of laws. They did so through collective bargaining with unions that codified these arrangements in the economy (Slichter 1950; Slichter, Healy, and Livernash 1960). But large businesses also adopted similar wage- and salary-setting practices in non-union enterprises (Foulkes 1980).

Along with factors affecting labor supply and demand, wage setting within an organization is affected by fairness norms (Breza, Kaur, and Shamdasani 2017).[4] A large empirical literature

4. Older models in the economics literature, of course, seek to explain the existence of elaborate internal labor markets and empirical findings like large firm wage premiums (discussed later) in the context of competitive

from psychology, decision science, and more recently behavioral economics reveals that people care not only about their own gains but also about those of others. In fact, people frequently gauge the magnitude of their benefits relative to those of others. And they are often willing to sacrifice some of their gains because of equally important beliefs about fairness. An important reason that large employers adopted the wage and internal labor markets used in previous decades arose because of their need to deal with two kinds of fairness notions as they apply to the internal structure of wages: horizontal equity regarding how people think about different pay rates for similar work; and vertical equity regarding how they think about different pay rates for different types of work.

Large employers historically addressed horizontal equity concerns by creating consistent pay for people in comparable positions in a company, even if their performance varied. The vast majority of businesses (78 percent) interviewed in Truman Bewley's (1999) study of compensation policies cited "internal harmony and morale" as the main reason why internal pay equity was important.[5] Labor-market studies show that wages within firms vary far less than one would expect given the existence of considerable differences in productivity across workers (see, for example, Medoff and Abraham 1980). Firms move toward a single-wage policy for workers of similarly observable skill or ability because of the negative consequences arising from having multiple rates for workers who otherwise seem similar.

Workers' contentment with their wages also is affected by vertical fairness notions and norms. In particular, experimental and empirical evidence points to the fact that people look "up" in judging their pay, asking, "What is my pay relative to the jobs at the next rung in my organization?" (Fehr, Goette, and Zehnder 2009). If the pay of the group just above me is too high—or if the gap widens over time—I may be less and less happy with the pay I receive, regardless of its absolute level.

In a large organization, vertical equity issues like these can be particularly vexing. Unionized

labor markets. Gary Becker (1964) and Walter Oi (1983) argued that these phenomena are not incompatible with the functioning of competitive labor markets, but simply reflect the complexity of labor as an input in production—an input whose productivity changes over the course of employment. The presence of either quasi-fixed costs of labor or the need to provide specific training (that is, training that benefits a worker at a specific employer) creates a compensation problem that firms must find a way to solve by acting as if, in the Oi model, only a portion of compensation costs are variable or, in the case of Becker, thinking about compensation policy as part of a human capital investment that the firm must recover over time.

Another set of theories explains internal labor markets via implicit contract theory, according to which risk-neutral employers strike agreements with risk-averse workers that smooth wages over time, accommodating both parties in the process. These arrangements have some of the characteristics of internal labor markets but arise from underlying supply and demand features. A third view explains internal labor markets as the methods by which firms overcome the day-to-day holdup problems, given that the employment contract between workers and employers is inherently incomplete—that is, it cannot adequately commit to language the complicated and changing nature of what the employer wishes the worker to do. As a result, a combination of explicit and implicit contract devices arises to prevent either party from cheating the other. In this view, the overall employment relationship creates value that the parties then must figure out a way to share in the course of ongoing employment. These contracts reflect both conditions in the external labor markets and relative bargaining power within the firm (Milgrom 1988; Rosen 1988).

5. Just under 50 percent cited job performance as the major reason for internal pay equity; only 7 percent cited avoidance of discrimination suits. Bewley quotes a human resources manager in a unionized manufacturing company with twenty-seven thousand employees as remarking, "Unfairness can cause upheaval within an organization and lead to dysfunctional activities. People want to be treated fairly and to see that their contributions are recognized and that this is done on a consistent basis from one location to another and from one profession to another" (1999, 79, 81). For a related formal model of how fairness concerns play out in workplaces, see Stark and Hyll 2011.

workplaces in traditional manufacturing solved this problem with collectively bargained deals that linked these grades—often providing for upward ratcheting of the whole wage system (leaving relative wages intact) over time. The collectively bargained contract creates a transparent set of expectations of what is fair (in part because it reflects the preferences of the workforce, at least as represented by the union's negotiating committee). Large non-union workplaces also must accommodate the demands of vertical equity in setting compensation policies, even though unfettered by collective bargaining. Higher wages in part reflect an effort to avoid unionization, but also to avoid the kind of internal frictions described. Studies of wage determination found that executives in large non-union enterprises frequently justified formal internal pay structures on the basis of equity.[6]

The fissured workplace changes the factors that in the past led companies to set wages in light of equity considerations. By shedding their employees in a variety of ways and making those workers the employees of other organizations, a wage-setting problem becomes a pricing problem. The janitor, maintenance person—or even lawyer—who no longer is a member of the company also no longer need be bounded by the pay considerations of that company's wage structure.

The impact on wages from altering the relationship in this way is illustrated by a recent analysis of pay systems in the package delivery industry described at the outset of this article. Home package delivery was handled for decades primarily by the U.S. Postal Service and later by the addition of private companies such as UPS and DHL drawing on an employment-based business model. Systems were optimized to reduce costs through creation of information-driven and highly automated logistics hubs, route optimization, and time motion and ergonomic studies of delivery drivers' activities.

Companies like FedEx entered the package delivery market with many of the same system investments in airline, distribution center, and trucking logistics. But FedEx began to break the logistics of shipment from the task of final mile delivery by creating a subsidiary, FedEx Ground, in 1985. That subsidiary used an independent contractor model to drive the allocation of packages to geographic regions served by different driver contractors. Not surprisingly, the model has been heavily litigated based on federal and state law (Viscelli 2016). In cases such as *Alexander v. FedEx*, courts were asked to rule whether the drivers could be reasonably classified as independent contractors given the significant oversight, integration, standards monitoring, and control exercised by the company.[7]

But the Amazon Flex model of home delivery goes further. Started in 2015, Amazon Flex offers "flexible opportunity for Delivery Partners to turn free time into supplemental or part-time income." It does so via a system where individuals, vetted via a multistep online course, bid for small deliveries via an Amazon Flex app, and deliver those packages within tight time restrictions set by Amazon using the driver's vehicle. An analysis undertaken for investors by A/B Bernstein used pricing, delivery route and time information, and cost estimates to estimate the average earnings of typical Amazon Flex workers. When fully accounting for vehicle fuel, amortization, insurance, maintenance, tolls, and other costs, drivers received net earnings of $5.30 per hour (significantly below the federal minimum wage). This compares to av-

6. Fred Foulkes in his study of large non-union workplaces in the 1970s found that "The pay policies of the companies [large non-union employers] are designed to provide and demonstrate equity" (1980, 185). Bewley similarly found that although executives acknowledged that differences in pay between grades proved useful as incentives, 69 percent of the businesses interviewed cited "internal equity, internal harmony, fairness, and good morale" as the principal justification (1999, table 6.4, 75–79).

7. In *Alexander v. FedEx Ground Package Sys.*, 765 F.3d 981 (9th Cir. 2014), the 9th Circuit Court in a three judge panel held that FedEx delivery workers designated as independent contractors under their contract were actually employees of FedEx. After undertaking a thorough review of all of the ways that FedEx exerted control and management of the activities of the drivers, the court's ruling stated "[labeling] the drivers as 'independent contractors' in FedEx's Operating Agreement does not conclusively make them so."

erage earnings of $23.10 for UPS and $14.40 for FedEx drivers (Vernon 2018).[8] On June 7, 2019, FedEx announced that it would no longer provide express shipping service for Amazon.[9]

CONNECTING EARNINGS INEQUALITY AND THE FISSURED WORKPLACE HYPOTHESIS

The fissured workplace hypothesis would suggest that the well-documented increase in earnings inequality can be partly attributed to the change in wage setting described (Piketty, Saez, and Zucman 2018). First, as illustrated by Amazon Flex, the fissured workplace hypothesis predicts that the earnings of workers undertaking the same work inside of companies are higher than earnings when that work is shifted to contractors or firms outside those companies. Empirical evidence on specific occupations that are shifted from inside to outside a business confirm this prediction.

Janitors and security guards were in the vanguard of fissuring. By 2000 about 45 percent of janitors worked under contracting arrangements, and more than 70 percent of guards were employed as contractors (Dey, Houseman, and Polivka 2010). As predicted , shifting janitors and security guards from inside to outside the walls of lead businesses has indeed significantly impacted pay for workers in those occupations.[10] Samuel Berlinski (2008) finds that janitors who worked as contractors earned 15 percent less than those working in-house, and contracted security guards earned 17 percent less than comparable in-house guards. Similarly, Arandajit Dube and Ethan Kaplan (2010) estimate a "wage penalty" for working as a contractor of 4 percent to 7 percent for janitors and 8 percent to 24 percent for security guards.

Deborah Goldschmidt and Johannes Schmieder (2017) provide similarly compelling evidence of changing wage structures in Germany. They show significant growth in domestic service outsourcing of a variety of activities beginning in the 1990s. Using a carefully constructed sample allowing them to compare wages of food service, cleaning, security, and logistic workers, they examine the impact of moving the same jobs from inside to outside businesses engaged in domestic outsourcing. Their results show reductions in wages ranging from 10 to 15 percent of those jobs outsourced relative to those that were not. What is more, because of the ability to match workers who have experienced outsourcing to control for unobservable human capital characteristics, they argue that the reductions arise from the loss of wage premiums earned by workers when they move from inside to outside the outsourcing firm.[11]

Workers in large companies historically received an extra bump in their earnings ("large firm earnings premium") simply because they were employed in those companies—somewhere between 8 to 12 percent above what comparable workers at smaller, but otherwise similar companies earned (Brown, Hamilton, and Medoff 1984). For neoclassic models, the persistence of this bump in earnings—unexplained by differences in either labor supply or the productivity of firms employing these workers—was a puzzle. The earlier discussion explains the persistence of the large firm earnings bump in employment-based business models.

8. Not surprisingly, the estimated cost per delivery for Amazon Flex is significantly below that of UPS: $1.50 to 2.00 per package versus $4.00 to 6.00 for UPS or FedEx. However, the services are not direct substitutes because some of the costs that the latter providers charge customers are born by Amazon prior to the Flex drivers receiving parcels (Vernon 2018, exhibit 5, 6–7). See also Zaleski 2018.

9. See Corkery 2019, B4.

10. Abraham and Susan Taylor (1996) demonstrate that the higher the typical wage for the workforce at an establishment, the more likely that establishment will contract out its janitorial work. They also show that establishments that do any contracting out of janitorial workers tend to shift out the function entirely.

11. The authors also show that food, cleaning, security, and janitorial workers receive wage premiums comparable to those of the overall workforce prior to outsourcing. This result, like the earlier Abraham and Taylor study, has significant incentives to outsource work that is not central to core competencies, particularly where they can find other methods to monitor the output of subordinate providers of those services.

But it also would suggest that the fissured workplace would act in the opposite direction, eroding that differential.

Evidence by Matissa Hollister (2004) and more recently by Adam Cobb, Ken-Hou Lin, and Paige Gabriel (2017) and Nicholas Bloom and colleagues (2018) confirms that prediction: the large firm wage premium has eroded substantially in recent years. Bloom and his colleagues show that this reduction is due to the dramatic decline of wage premiums at very large firms (those with 1,000 to 2,500 employees), a decline not readily explained by differences in the quality or composition of the workforce or by the cross-section of companies in the largest firm grouping. Very large firms also appear to shift their hiring toward high-wage workers over time, a tell-tale sign of shedding lower-end workers through a fissured workplace strategy (Cobb, Lin, and Gabriel 2017).

Other recent papers on inequality shed further light on the connections between increased earnings dispersion and the fissured workplace. Increasing earnings inequality can arise from growing inequality within firms (more and more dispersion of earnings of the workers inside the walls) versus growing inequality between firms (more dispersion in earnings outside the walls of a given firm). The fissured workplace hypothesis would predict growing inequality from the latter (that is, increased variation of earnings across firms). Lead businesses would continue to extract rents arising from their core competency. For the fairness reasons discussed, they would continue to share some of those gains with the workers who remained inside. At the same time, other firms who competed to provide the activities shed by lead businesses would have lower rents (for the traditional reasons predicted in competitive labor markets) and therefore less to share with their workforce. At the bottom of fissured workplaces, where firms compete to provide more homogenous products and services for lead businesses, in more competitive markets with lower barriers to entry, one would find businesses with lower profitability, paying wages closer to marginal productivity.

Research by Erling Barth and colleagues (2016) finds that the vast majority of increases in the dispersion of earnings between 1992 and 2007 arise from increases in the variance of earning between rather than within firms. In their matched data set, the authors find that about 80 percent of increased earnings inequality for those workers who stayed with the same establishment from one year to the next arose from growing divergence in the earnings of different establishments, as opposed to arising from growing divergences in the pay structure of the firms where they remained.[12]

Arguing that their results show that almost none of the growing dispersion of earnings arise from a widening gap between CEO pay and that of the workforce, Jae Song and his colleagues (2015) estimate that virtually all of the growth in earnings dispersion between 1978 and 2012 for firms with less than ten thousand workers arose from increased variation between rather than within firms. In their sample, the large wage gap between CEOs or high-level executives and average workers employed by the firm increased by only a small amount over the study period. Very large firms (those with more than ten thousand workers) are more affected by growing inequality within their ranks, consistent with the research by Bloom.[13] David Card, Jörg Heining, and Patrick Kline (2013) find evidence of both within and between fac-

12. The authors use a combined data set of the March Current Population Survey, the Census Longitudinal Business Data Base, and the Longitudinal Employer-Household Dynamics data set. This provides them detailed data on both workers and the firms for which they work. Because most workers stay at the same establishment in any given year, the approach of looking at the sources of growing inequality "around" the stayers provides a useful mooring post to explore the causes of growing earning dispersion around them.

13. Song and colleagues use administrative data from the confidential Master Earnings File (MEF) compiled and maintained by the U.S. Social Security Administration for their analysis. The MEF contains labor earnings data, which, unlike other sources of earnings data, is not capped and also includes non-salary forms of compensation such as bonuses, exercised stock options, and estimated dollar values of restricted stock grants provided to employees (executives in most cases).

tors driving the growing inequality of wages in Germany. In their study, using an approach similar to that of Song and colleagues, the authors estimate that inequality was roughly equally explained by increases in the heterogeneity of workers (within firm), increases in the heterogeneity of firms (between firm), and increases in the matching of workers and firms.[14]

The fissured workplace hypothesis is also consistent with evidence of growing earnings dispersion in sectors that are increasingly reliant on franchising as a form of business organization. Branding products to consumers is a critical core competency in industries like eating and drinking and hospitality, and studies that compare wages earned by workers in branded companies find that those workers earn, on average, more than workers who work in similar, nonbranded companies in the same sector (Cappelli and Hamori 2008). Franchising allows a company to split out the gains of developing and marketing the brand from the delivery of the actual product, with the franchisor capturing a significant portion of the rents of owning the brand, the residual value going to the business entities purchasing use of that brand (the franchisees).[15] In the 1980s, many branded chains in the fast food and hotel industries sold off a high percentage of fast food outlet and hotel properties to franchisees. This changed wage structures among the establishments within the sector, to a higher percentage of firms (franchisees) having a lower wage structure than the units still held by the franchisor. This would result in increased overall dispersion of earnings in the sector where franchising became more common, driven by growing divergence of earnings across franchisees and franchisors.[16]

These findings suggest that workers have experienced relatively less change in the inequality of their coworkers who remain with them at their firms than earlier accounts suggest. Instead, growing dispersion of earnings can be thought of as a big bang leading firms to rush away from one another, with lead businesses and their set of workers moving upward and subordinate firms and their associated distribution of earnings moving downward. This is consistent with the fissured workplace hypothesis in that the distribution no longer includes workers whose activities and jobs have been shed to other employers external to the firm.

The fissured hypothesis, however, does not preclude increasing dispersion within firms as well if there have been changes in fairness norms of behavior inside those firms. For example, CEOs of lead businesses with valuable core competencies may extract more rents and propel themselves to ever higher levels of compensation.[17] The CEOs in firms in the subordinate fissured universes may be less able to ex-

14. A more recent paper by this team (along with Cardoso) builds a model under which firms exercise some monopsony power arising from heterogeneity in workers' preferences for different employers (with no particular model of the source of that heterogeneity). Their model precludes price discrimination based on idiosyncratic preferences of the workers, but still allows firms to "post a common wage for each skill group that is marked down from marginal product in inverse proportion to their elasticity of labor supply to the firm." See Card et al. 2016.

15. Franchisees (independent businesses who pay royalties to be a part of a franchised system) have significantly lower rates of return than do the franchisors (the owners of the brand—the core competency—and sometimes operators of a limited number of company-owned outlets). See Kaufmann and Lafontaine 1994; Weil 2014, chapter 6.

16. Alan Krueger (1991) shows that managers of franchisees earned significantly less than managers of comparable fast outlets owned by the company. Min Woong Ji and David Weil (2015) find in a related vein far higher violations of labor standards in terms of frequency and severity among franchisees than in the company-owned units of the franchisors. Richard Freeman (2014) presents consistent evidence of the impacts of fissuring on overall earnings in the hotel industry.

17. In 2017, the average CEO of the 350 largest firms in the United States received $18.9 million in compensation (defined as salary, bonuses, restricted stock grants, realized stock options, and long-term incentive payouts). This represents a 17.6 percent increase over 2016. In that year, CEO-to-median worker compensation ratio was

tract such rents, though evidence still shows they earn many times the earnings of average workers. This further heightens the overall extent of inequality, albeit from changing norms, capture of corporate governance, and other factors driving the growth of executive compensation.

One final article that connects the rise in inequality to the fissured workplace hypothesis regards the fall in labor's share of gross domestic product over time and the rise of superstar firms that become dominant in their industries. David Autor and his colleagues (2017) document the association between rising product market concentration in a wide variety of industries and the corresponding reduction in the labor share of income in them. At one level, industry concentration and the increasing profitability of a smaller number of superstars leads mechanically to a reduction of the labor share in firm-value added. But the rise of those superstar firms in the first place—presumably attributable to their dominance in core competency in an area of their business as illustrated in a variety of examples above—and their restructuring of their organization to shift work out to other parties in more competitive parts of their own sector or to other allied industries (such as business services) would provide a mechanism that drives those shifts and further exacerbates them. Along with the finding of Bloom and his colleagues (2018) that the declining large firm earnings premium is in part driven by the shedding of lower level jobs by large firms and the reduction of premiums particularly for the remaining jobs at the low end of earnings distributions, this evidence is compatible with a fissured workplace explanation for the declining labor share story.

In sum, recent studies offer compelling evidence consistent with the fissured workplace hypothesis. The fissured workplace, given its estimated scale, likely continued growth and multiple forms has led to a separation of activities between lead businesses and subordinate networks of other enterprises who support them. This has enabled lead businesses in the economy to transform the challenge of wage determination into a conventional pricing problem. For those workers whose jobs no longer benefit from the penumbral effects of fairness in wage setting, the impacts have been significant.

POLICY APPROACHES FOR THE PRESENT AND FUTURE OF WORK

The fissured workplace transforms many of the mechanisms underlying workplace outcomes, labor markets, and the drivers of earnings inequality. But many policy prescriptions in these areas have not adequately factored in these profound changes. During the Obama administration, the Labor Department's enforcement agencies instituted new approaches to enforcement that explicitly sought to address some of the impacts the fissured workplace, such as in the area of labor standards compliance.[18] Here, I focus on policies to address income inequality

312-to-1, more than five times greater than the 58-to-1 ratio in 1989 but lower than the 2000 peak ratio of 344-to-1). See Mishel and Schieder 2018.

18. At the Wage and Hour Division, we sought to undertake policies to explicitly address the fissured workplace. And we had significant success in that regard. We fundamentally changed the way we did enforcement and outreach so that the parties who had impact on problems arising from the fissured workplace were engaged in their resolution. For example, we pursued an active policy of invoking joint employment where appropriate and by the law in our enforcement actions. But we also did so in issuing guidance—something called an administrator interpretation—that clearly laid out the legal regulatory and court opinions pertaining to the use of joint employment. We addressed the issue of joint employment in our public outreach to industries where it had become commonplace. And we engaged with state and local government partners on this issue by coordinating enforcement and outreach efforts in industries with highly fissured workplace structures. That work, in concert with the work of advocacy organizations and progressive employers, led to an acknowledgment of the problem, and engagement with some of the implications of joint employment, and broader awareness by the public. I have written a detailed account of the elements of our approach to dealing with the fissured workplace as a labor standards agency, which I define as *strategic enforcement* (Weil 2018).

and related areas as informed by the foregoing discussion.

REALIGNING RESPONSIBILITY AND PROTECTIONS IN THE WORKPLACE

Answering the question "who is responsible here?" given the ambiguity introduced by the fissured workplace is of critical importance. Many of our fundamental workplace protections, spanning from being assured pay for work done, provision of a safe workplace, and protections against discrimination and sexual harassment, emanate from employment. Benefits provision and the basic workplace safety net of policies such as unemployment insurance, workers compensation, and paid leave are linked to employment (Goldman and Weil 2019). Fissuring also raises important questions about how to fund the range of family-friendly policies that Elizabeth Doran, Ann Bartel, and Jane Waldfogel (2019) discuss given the complexity of employment relationships in many of the industries where women represent a high percentage of the workforce.

Companies in the fissured workplace require an organizational glue to ensure that the networks of organizations working under the lead company keep to standards and do not undermine core competencies. That glue can take many forms: stringent subcontracting requirements, detailed supply chain standards, strict franchise agreements, or software algorithms deployed via digital platforms to create micro-incentives for individual operators on them. Information technology facilitates the glue by serving as a low-cost mechanism to monitor subsidiary organizations or the networks of organizations that make up a fissured workplace.

At the moment, the disparity between the degree of control exercised by lead business organizations and their responsibility under law is large. Current state and federal laws provide a patchwork structure for assigning responsibility, some relying on master-servant concepts arising from the common law to broader definitions of the economic reality of employment arising from statutes such as the Fair Labor Standards Act. Reevaluating existing policies and assessing what is needed to provide the rights established by workplace and labor statutes is therefore warranted. So too are the means to ensure that those statutes have impact through enforcement and other interventions (Weil 2018).

EMPLOYMENT AND EARNINGS OVER THE BUSINESS CYCLE

The fissured workplace perspective potentially provides insight into changes in how employment and earnings respond over the business cycle in recent recessions and recoveries. Lead businesses' employment response to increasing demand coming out of a recession may be attenuated by their increased use of other entities to undertake parts of their work. It took longer for employment to recover to pre-recession levels from their trough in the 1990, 2001, and 2007 recessions relative to those occurring earlier. And recent recoveries were led by far faster growth among lower-wage occupations than mid-wage and higher-wage occupations, mid-wage occupations not returning to pre-recession levels of employment (McCorkell and Hinkley 2019).

Earnings responses to changing aggregate demand are similarly attenuated by the presence of fissured relationships. Where direct employment of a larger cross-section of the workforce led firms to both maintain wages in the face of slowing demand and increase them as demand increased, working through fissured businesses moderates these linkages. The reluctance of major employers to lower nominal wages in a recession first observed by Keynes and documented in the literature (for example, Kahn 1997) can be overcome in a fissured world by changing staffing agencies or subcontractors who offer lower prices or directly renegotiating with existing providers of those services. Equally, in the face of upturns, inflationary pressures may be reduced given that firms can expand by adding workers through staffing agencies or multitiered subcontracting arrangements. Because workers in many of those setups receive lower compensation and fewer benefits, the impact on wage costs is moderated from what might have arisen from a tightening labor market in a traditional, employment-based economy. Thus, a

fissured workplace hypothesis is consistent with the experience of low unemployment accompanied by modest real wage growth that characterizes recent recoveries including the current one.

EDUCATION AND TRAINING SOLUTIONS TO ADDRESS INEQUALITY

Public policies to deal with earnings inequality tend to go down familiar paths that miss the impacts of the fissured workplace. Take, for example advocacy for increased access to college as a response to growing earnings inequality. Citing the earnings premium arising from college education, this prescription focuses on the need for those entering the labor market to have the skills that employers increasingly demand. Recent evidence suggests that although the earnings premium for college remains large, its rate of growth has slowed and essentially remained unchanged between 2010 and 2015 (Valletta 2019).

The impact of fissured work provides a partial explanation for flattening growth in the earnings premium for college. Professions with graduate level requirements (notably law and higher education) have witnessed increases in fissured employment. Hence, the use of contract law firms and adjunct professors who receive significantly lower wages, reduced benefits, and limited opportunities for upward advancement (Naguchi 2018; Weber 2017a, 2017b). Several recent investigative reports document that Google now relies on more contractors than employees, including in programming and technical positions at the company (Bergen and Eidelson 2018; Wakabayashi 2019; Wong 2019). Even the development of artificial intelligence is dependent on networks of contract workers operating through platforms (Gray and Suri 2019). College and graduate level education may not result in the same earnings premium in a world where the jobs that those workers seek are in transformed employment relationships where less of their value added translates into wage premiums. Given the rising cost of college education and the debt burden that many workers entering the labor market face, relying on college as a stand-alone response to inequality is likely incomplete.

AFFECTING THE IMPACTS OF NORMS ON WAGES AND WORK IN THE FISSURED WORKPLACE

Fissuring has created greater volatility in the earnings and stability of employment of those affected by it, and contributes to the need to supplement income as Abraham and Houseman describe (2019; see also Collins et al. 2019). The fissured workplace, though, means that wage setting is occurring in a very different way than it has in the past. Norms—in particular perceptions of fairness—are an intrinsic part of the workplace and basic to how decisions are made within it. Norms influence workers' decisions to accept or reject jobs by determining reservation wages. They affect workers' perception of the fairness of compensation policies. Norms are therefore fundamental features of how labor markets work and potential tools for policy interventions to improve earnings and work conditions. The large firm wage premium reflected a set of normative arrangements that existed in companies in the past. The foregoing discussion implies changes in norms throughout fissured workplace structures.

The fissured workplace has been accompanied by the erosion of wage and other workplace norms in many industries and occupations. If public policies seek to redress this erosion, we will need better understanding of how norms are set among the subsidiary firms that compose fissured business structures. Important policy questions include: How do norms of acceptable wages diffuse in a labor market? How might they be affected by public policies—either directly (for example, through the government contracting authority) or indirectly (such as by encouraging corporate voluntary activity).

Policies regarding worker representation are also important in rebuilding norms in fissured workplaces. Unions and collective bargaining have long affected wage standards and norms in organized workplaces as well as in related non-union workplaces through spillovers. The erosion of union density over the decades obviously undermines this impact. Future considerations of revisions to labor law and policies that affect other forms of worker voice (such as the Fight for $15 movement) should also consider these norm-building effects.

CAREER MOBILITY AND TRAINING

The fissured workplace raises the question of career paths in a fissured world. If more and more people work for organizations not part of lead businesses (or for that matter lead governmental or higher education institutions), public policies need to address alternative ways to provide information about career opportunities and access to formal and informal training. Multi-employer apprenticeship programs in the construction industry arose, for example, as a solution to the public goods nature of training in an industry in which workers moved frequently between employers in the course of the year and over time (Palladino 2005). Exploring what structures might be feasible and sustainable in industries, occupations, and geographic labor markets to play roles in providing information and access to training opportunities is a clear implication of the fissured workplace.

WHERE DO WE GO FROM HERE?

Richard Freeman, whom this volume honors, has commented on the complexities raised by the fissured workplace:

> The evidence of fissuring creates a great puzzle to labor economics and social science more broadly. We need a new "fissured market" model that goes beyond standard analysis, new measures of wage determinants in the existing framework, or some judicious mixture of the two. . . . My belief is that, as more researchers work on it—via case studies, insider econometrics of labor practices of firms and their subcontractors, and analysis of establishment earnings in countries with different labor institutions—and apply insights from behavioral economics, game theory, and Beckerian price theory, we will advance our understanding enough to find ways to counter its effect on compensation. (2014, 109)

At the turn of the last century, the labor economist John R. Commons and his colleagues at the University of Wisconsin looked out at comparable problems posed by a changing economic landscape: growing national markets arising from the falling cost of transportation, emerging manufacturing industries that sought to serve expanding demand and harness new technologies and management methods to do so, and emergent capital markets that infused financial resources and new forms of governance over enterprises. Together, those changes transformed the workplace, giving rise to pressing problems such as falling wages and shifting employment patterns, growing numbers of occupational fatalities and injuries, and new demands for worker voice among unskilled workers who had never been represented by unions.

The Wisconsin Idea that Commons pursued sought to understand the new mechanisms that drove worker and workplace outcomes and then experiment with new policies to address those problems, informed by that understanding. In 1913, writing about the distinctive need for what he called "constructive research" that brought academic rigor to applied problems, Commons noted that

> The science of political economy is now called upon for something practical. Legislation has been left to lawyers and politicians. The people turn to economists and sociologists, but do not find what they need. The regulation of public utilities, the revision of currency and tariff laws, the relations of capital and labor, are economic as well as legal or political questions. On these and other subjects the science of economics remains academic, after it has been summoned to the work of construction. (8)

I agree with Richard Freeman that we face a comparable challenge as researchers who are also called upon to provide insight to policymakers who seek to understand "the future of work." In providing that guidance, my conclusion would be that it is not so much the future of work we need to understand as the present of work with which we still have not adequately grappled; that the mechanisms underlying the present of work require deep and rigorous examination; and that the resulting solutions will lead us to pursue policies that will take us into uncharted waters requiring experimentation, evaluation, and the ongoing translation of knowledge into practical policy responses—much like those crafted at the turn of the last

century such as workers compensation and industry-based collective bargaining. This volume will hopefully contribute to that broader need.

REFERENCES

Abernathy, Frederick, Kermit Baker, Kent Colton, and David Weil. 2012. *Bigger Isn't Necessarily Better: Lessons from the Harvard Home Builder Survey*. New York: Lexington Books.

Abernathy, Frederick, John T. Dunlop, Janice Hammond, and David Weil. 1999. *A Stitch in Time: Lean Retailing and the Transformation of Modern Manufacturing*. New York: Oxford University Press.

Abraham, Katharine, and Ashley Amaya. 2018. "Probing for Informal Work Activity." *NBER* working paper no. 24880. Cambridge, Mass.: National Bureau of Economic Research.

Abraham, Katharine, John Haltiwanger, Kristin Sandusky, and James Spletzer. 2018. "Measuring the Gig Economy: Current Knowledge and Open Issues." *NBER* working paper no. 24950. Cambridge, Mass.: National Bureau of Economic Research.

Abraham, Katharine, Brad Hershbein, and Susan Houseman. 2018. "Independent Contract and Informal Work: Preliminary Evidence on Developing Better Measures in Household Surveys." Working Paper. College Park: University of Maryland.

Abraham, Katharine, and Susan Houseman. 2019. "Making Ends Meet: The Role of Informal Work in Supplementing Americans' Income." *RSF: The Russell Sage Foundation of the Social Sciences* 5(5): 110–31. DOI: 10.7758/RSF.2019.5.5.06.

Abraham, Katharine, and Susan Taylor. 1996. "Firms' Use of Outside Contractors: Theory and Evidence." *Journal of Labor Economics* 14(3): 394–424.

Appelbaum, Eileen, and Rose Batt. 2014. *Private Equity at Work: When Wall Street Manages Main Street.* New York: Russell Sage Foundation.

Autor, David, David Dorn, Lawrence Katz, Christina Patterson, and John Van Reenen. 2017. "The Fall of the Labor Share and the Rise of Superstar Firms." *IZA* working paper no. 10756. Bonn: Institute of Labor Economics.

Barth, Erling, Alex Bryson, James Davis, and Richard Freeman. 2016. "It's Where You Work: Increases in Earnings Dispersion Across Establishments and Individuals in the U.S." *Journal of Labor Economics* 34(2): S67–S97.

Becker, Gary. 1964. *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. New York: Columbia University Press.

Bergen, Mark, and Josh Eidelson. 2018. "Inside Google's Shadow Workplace." *Bloomberg Business*, July 25, 2018. Accessed July 16, 2019. https://www.bloomberg.com/amp/news/articles/2018-07-25/inside-google-s-shadow-workforce.

Berlinski, Samuel. 2008. "Wages and Contracting Out: Does the Law of One Price Hold?" *British Journal of Industrial Relations* 46(1): 59–75.

Bewley, Truman. 1999. *Why Wages Don't Fall During a Recession*. Cambridge, Mass.: Harvard University Press.

Bloom, Nicholas, Faith Guvenen, Benjamin Smith, Jae Song, and Till von Wachter. 2018 "Is the Large Firm Wage Premium Dead or Merely Resting?" *AEA Papers and Proceedings* 108(1): 317–22.

Breza, Emily, Supreet Kaur, and Yogita Shamdasani. 2017. "The Morale Effects of Pay Inequality." *Quarterly Journal of Economics* 133(2): 611–63.

Brown, Charles, James Hamilton, and James Medoff. 1984. *Employers Large and Small*. Cambridge, Mass.: Harvard University Press.

Cappelli, Peter, and Monika Hamori. 2008. "Are Franchises Bad Employers?" *Industrial and Labor Relations Review* 61(2): 146–62.

Card, David, Ana Rute Cardoso, Joerg Heining, and Patrick Kline. 2016. "Firms and Labor Market Inequality: Evidence and Some Theory." Unpublished paper, University of California, Berkeley.

Card, David, Jörg Heining, and Patrick Kline. 2013. "Workplace Heterogeneity and the Rise of West German Wage Inequality." *Quarterly Journal of Economics* 128(3): 967–1015.

Cobb, J. Adam, Ken-Hou Lin, and Paige Gabriel. 2017. "Growing Apart: The Changing Firm-Size Wage Effect and Its Inequality." Unpublished paper, Wharton School, University of Pennsylvania.

Collins, Brett, Andrew Garin, Emile Jackson, Dmitri Koustas, and Mark Payne. 2019. "Is Gig Work Replacing Traditional Employment? Evidence from Two Decades of Tax Returns." Unpublished paper, IRS SOI Joint Statistical Research Program. Accessed July 30, 2019. https://www.irs.gov/pub/irs-soi/19rpgigworkreplacingtraditionalemployment.pdf.

Commons, John. 1913. *Labor and Administration.* New York: The Macmillan Company.

Corkery, Michael. 2019. "FedEx Says it will Stop Express Mail for Amazon." *New York Times*, June 8. Accessed July 16, 2019. https://www.nytimes.com/2019/06/07/business/fedex-amazon-express-delivery.html.

Davis, Gerald. 2013. *Managed by the Markets: How Finance Reshaped America*. New York: Oxford University Press.

Dey, Matthew, Susan Houseman, and Anne Polivka. 2010. "What Do We Know About Contracting Out in the United States? Evidence from Household and Establishment Surveys." In *Labor in the New Economy,* edited by Katharine Abraham, James Spletzer, and Michael Harper. Chicago: University of Chicago Press.

Doran, Elizabeth L., Ann P. Bartel, and Jane Waldfogel. 2019. "Gender in the Labor Market: The Role of Equal Opportunity and Family-Friendly Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 168–97. DOI: 10.7758/RSF.2019.5.5.09.

Dube, Arandajit, and Ethan Kaplan. 2010. "Does Outsourcing Reduce Wages in the Low-Wage Service Occupations? Evidence from Janitors and Guards." *Industrial and Labor Relations Review* 63(2): 287–306.

Fehr, Ernst, Lorenz Goette, and Christian Zehnder. 2009. "A Behavioral Account of the Labor Market: The Role of Fairness Concerns." *Annual Review of Economics* 1(3): 355–84.

Foulkes, Fred. 1980. *Personnel Policies in Large Non-Union Workplaces*. Englewood Cliff, N.J.: Prentice Hall.

Freeman, Richard. 2014. "The Subcontracted Labor Market." *Perspectives on Work* 18(3): 38–42.

Goldman, Tanya, and David Weil. 2019. "Who's Responsible Here? Establishing Legal Responsibility in the Fissured Workplace." Working paper. Waltham, Mass.: Heller School for Social Policy and Management, Brandeis University.

Goldschmidt, Deborah, and Johannes Schmieder. 2017. "The Rise of Domestic Outsourcing and the Evolution of the German Wage Structure." *Quarterly Journal of Economics* 132(3):1165–217.

Grabell, Michael. 2013. "The Expendables: How the Temps Who Power Corporate Giants Are Getting Crushed." *ProPublica*, June 27. Accessed July 16, 2019. https://www.propublica.org/article/the-expendables-how-the-temps-who-power-corporate-giants-are-getting-crushe.

Gray, Mary, and Siddharth Suri. 2019. *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass*. New York: Houghton Mifflin Harcourt.

Hollister, Matissa. 2004. "Does Firm Size Matter Anymore? The New Economy and Firm Size Wage Effects." *American Sociological Review* 69(5): 659–76.

Hyman, Louis. 2018. *Temp: How American Work, American Business, and the American Dream Became Temporary*. New York: Viking.

Jamieson, Dave. 2014. "Walmart Warehouse Contractor to Pay $21 Million to Settle Wage Theft Allegations." *Huffington Post*, May 14. Accessed July 16, 2019. https://www.huffingtonpost.com/2014/05/14/walmart-warehouse-wage-theft_n_5324021.html.

Ji, Min Woong, and David Weil. 2015. "Does Ownership Structure Influence Regulatory Behavior? The Impact of Franchising on Labor Standards Compliance." *Industrial and Labor Relations Review* 68(5): 977–1006.

Kahn, Shulamit. 1997. "Evidence of Nominal Wage Stickiness from Microdata." *American Economic Review* 87(5): 993–1008.

Katz, Lawrence F., and Alan B. Krueger. 2019a. "The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015." *ILR Review* 72(2): 382–416.

———. 2019b. "Understanding Trends in Alternative Work Arrangements in the United States." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 132–46. DOI: 10.7758/RSF.2019.5.5.07.

Kaufmann, Patrick J., and Francine Lafontaine. 1994. "Costs of Control: The Source of Economic Rents for McDonald's Franchisees." *Journal of Law and Economics* 37(2): 417–53.

Krueger, Alan. 1991. "Ownership, Agency, and Wages: An Examination of Franchising in the Fast Food Industry." *Quarterly Journal of Economics* 106(1): 75–101.

McCorkell, Lisa, and Sara Hinkley. 2019. "The Post-Recession Labor Market: An Incomplete Recovery." Policy Brief. Berkeley: University of California, Institute for Research on Labor and Employment. Accessed July 16, 2019. https://

irle.berkeley.edu/the-post-recession-labor-market-an-incomplete-recovery.

Medoff, James L., and Katharine Abraham. 1980. "Experience, Performance, and Earnings." *Quarterly Journal of Economics* 95(4): 703–36.

Milgrom, Paul. 1988. "Employment Contracts, Influence Activities, and Efficient Organization Design." *Journal of Political Economy* 96(1): 42–60.

Mishel, Lawrence, and Jessica Schieder. 2018. "CEO Compensation Surged in 2017." Washington, D.C.: Economic Policy Institute. Accessed July 16, 2019. https://www.epi.org/publication/ceo-compensation-surged-in-2017.

Murphy, Brett. 2017. "Retail Giants Enable Trucker Exploitation." *USA Today*, June 29. Accessed July 16, 2019. https://www.usatoday.com/pages/interactives/news/rigged-retail-giants-enable-trucker-exploitation.

Naguchi, Yuki. 2018. "Freelanced: The Rise of the Contract Workforce." *All Things Considered*, January 22. Accessed July 16, 2019. https://www.npr.org/2018/01/22/578825135/rise-of-the-contract-workers-work-is-different-now.

Oi, Walter. 1983. "The Fixed Employment Costs of Specialized Labor." In *The Measurement of Labor Costs*, edited by Jack Triplett. Chicago: University of Chicago Press.

Palladino, Grace. 2005. *Skilled Hands, Strong Spirits: A Century of Building Trades History*. Ithaca, N.Y.: Cornell University Press.

Parrott, James, and Michael Reich. 2018. "An Earnings Standard for New York City's App-Based Drivers Economic Analysis and Policy Assessment." Report to the New York Taxi and Limousine Commission. New York: The New School, Center for New York City Affairs.

Piketty Thomas, Emmanuel Saez, and Gabriel Zucman. 2018. "Distributional National Accounts: Methods and Estimates for the United States." *Quarterly Journal of Economics* 133(2): 553–609.

Prahalad, C. K., and Gary Hamel. 1990. "The Core Competence of the Corporation." *Harvard Business Review*, May / June. Accessed July 16, 2019. https://hbr.org/1990/05/the-core-competence-of-the-corporation.

Rho, Hye Jin. 2018. "Multi-Layered Labor Contracting and Distribution of Power: Evidence from Employment Records for Nonstandard Work." Working paper. Cambridge, Mass.: MIT Sloan School of Management.

Rosen, Sherwin. 1988. "Implicit Contracts: A Survey." *Journal of Economic Literature* 25(4): 1144–75.

Semuels, Alana. 2018. "What Amazon Does to Poor Cities." *The Atlantic*, February 1. Accessed July 16, 2019. https://www.theatlantic.com/business/archive/2018/02/amazon-warehouses-poor-cities/552020.

Slichter, Sumner. 1950. "Notes on the Structure of Wages." *Review of Economics and Statistics* 32(1): 80–91.

Slichter, Sumner, James Healy, and Robert Livernash. 1960. *The Impact of Collective Bargaining on Management*. Washington, D.C.: Brookings Institution.

Song, Jae, David Price, Nicholas Bloom, Faith Guvenen, and Till von Wachter. 2015. "Firming Up Inequality." *NBER* working paper no. 21199. Cambridge, Mass.: National Bureau of Economic Research.

Stark, Oded, and Walter Hyll. 2011. "On the Economic Architecture of the Workplace: Repercussions of Social Comparisons Among Heterogeneous Workers." *Journal of Labor Economics* 29(2): 349–75.

U.S. Bureau of Labor Statistics (BLS). 2017. "Current Employment Statistics – CES (National) – 2017 Employment and Earnings Online." Accessed September 20, 2019. https://www.bls.gov/opub/ee/2017/ces/ces.htm.

———. 2018. "Contingent and Alternative Employment Arrangements." News release. USDL-18–0942, June 7. Washington: U.S. Department of Labor.

Valletta, Robert G. 2019. "Recent Flattening in the Higher Education Wage Premium: Polarization, Skill Downgrading, or Both?" In *Education, Skills, and Technical Change: Implications for Future U.S. GDP Growth*, edited by Charles R. Hulten and Valerie A. Ramey. Chicago: University of Chicago Press.

Vernon, David. 2018. "North American Transportation: PS, FDX: A Deep-Dive on Amazon Flex and the Threat from Crowdsourced Delivery." London: A/B Bernstein Analysts, May 24.

Viscelli, Steve. 2016. *The Big Rig: Trucking and the Decline of the American Dream*. Oakland: University of California Press.

Wakabayashi, Daisuke. 2019. "Google's Shadow Work Force: Temps Who Outnumber Full-Time Employees." *New York Times*, May 28. Accessed

July 16, 2019. https://www.nytimes.com/2019/05/28/technology/google-temp-workers.html.

Weber, Lauren. 2017a. "The Second-Class Office Workers." *Wall Street Journal*, September 24.

———. 2017b. "Some of the World's Largest Employers No Longer Sell Things, They Rent Workers." *Wall Street Journal*, December 28.

Weil, David. 2014. *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done About It*. Cambridge, Mass.: Harvard University Press.

———. 2018. "Creating a Strategic Enforcement Approach to Address Wage Theft: One Academic's Journey in Organizational Change." *Journal of Industrial Relations* 60(3): 437–60.

Wong, Julia Carrie. 2019. "'A White-Collar Sweatshop': Google Assistant Contractors Allege Wage Theft." *The Guardian*, May 28. Accessed July 16, 2019. https://www.theguardian.com/technology/2019/may/28/a-white-collar-sweatshop-google-assistant-contractors-allege-wage-theft.

Zaleski, Olivia. 2018. "Amazon Raises Minimum Pay for Everyone—Except These Workers." *Bloomberg*, November 1. Accessed July 16, 2019. https://www.bloomberg.com/news/features/2018-11-01/amazon-flex-workers-are-left-out-of-minimum-pay-raises.

PART IV

Sharing Prosperity: Minorities, Women, and Nonworking Youth

Gender in the Labor Market: The Role of Equal Opportunity and Family-Friendly Policies

ELIZABETH L. DORAN, ANN P. BARTEL, AND JANE WALDFOGEL

Although the gender wage gap in the United States has narrowed, women's career trajectories diverge from men's after the birth of children, suggesting a potential role for family-friendly policies. We provide new evidence on employer provision of these policies. Using the American Time Use Survey, we find that women are less likely than men to have access to any employer-provided paid leave and this differential is entirely explained by part-time status. Using the National Longitudinal Survey of Youth 1997, we find that young women are more likely to have access to specifically designated paid parental leave, even in part-time jobs. Both data sets show insignificant gender differentials in access to employer-subsidized childcare and access to scheduling flexibility. We conclude with a discussion of policy implications.

Keywords: gender, equal opportunity, family-friendly policies

Fifty-five years after the passage of the Equal Pay Act, gender differences in the labor market remain. The gender gap in pay has narrowed but not closed, and female participation rates seem to have plateaued. Indeed, the United States now lags behind many other advanced industrial countries on measures of gender equality in the workplace. In particular, substantial gender gaps in labor-force participation and wages exist, especially for mothers. The larger gender gaps faced by mothers suggest that family-friendly employer policies, such as paid leave, childcare, and work scheduling flexibility, could play a potentially consequential role.

We fill an important gap in the literature by considering whether access to employer-provided paid leave, childcare, and work scheduling flexibility shows gender differentials. We focus on employer-provided benefits for two main reasons: first, in the United States, employers are the major source of these types of benefits; and, second, relatively little information exists in the literature on gender differences in access to such benefits. We also discuss current public policy provisions and the

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role that new or expanded public policies might play.

Using two nationally representative data sets, we find that women are less likely than men to have access to employer-provided paid leave—including paid parental leave, paid sick leave, and other types of paid leave—and this differential is entirely explained by the fact that women are more likely to work part time. Young women are found to be more likely than young men to have access to specifically designated paid parental leave even in part-time jobs. Women and men are equally unlikely to have access to childcare and scheduling flexibility. We find substantial heterogeneity by educational level: although women at all levels of education are more likely to have access to specifically designated paid parental leave than similar men, highly educated women are less likely to have access to employer-provided childcare or scheduling flexibility than comparable men. These results have important implications for policymakers.

RECENT TRENDS AND DEVELOPMENTS

U.S. equal employment opportunity (EEO) policies were established with the Equal Pay Act of 1963 and Title VII of the 1964 Civil Rights Act (EEOC 1997). The Equal Pay Act prohibits unequal pay on the basis of sex for equal work. Title VII makes it illegal for employers to discriminate against employees or job applicants on the basis of gender, sexual orientation, race, religion, age, nationality, disability, and other characteristics.

Since the 1960s, when EEO became law, the participation rate of women in the labor market increased steadily, until peaking in 2000 at 60.7 percent (Goldin 2014; Black, Schanzenbach, and Breitwieser 2017). Labor-force participation particularly increased among women under age thirty-five (Goldin and Mitchell 2017). This may be partly attributable to the affirmative action policies that came about after EEO: reviewing the literature, Harry Holzer and David Neumark (2000, 2006) present descriptive evidence suggesting that firms using affirmative action practices have more women apply and be hired for open positions.

In addition, the gender wage gap steadily decreased in the latter part of the twentieth century. Francine Blau and Lawrence Kahn (2017) show that, although female wages have dramatically increased since the 1960s, they have not reached parity with men's, as progress largely stagnated since 2000. Their decomposition analysis finds that both individual- and firm-level characteristics account for gender wage differences. In 2010, occupation and industry accounted for the majority of the explained gender wage gap; the worker's race, experience, and region also contributed. The authors conclude that it is plausible that EEO policies were responsible for the decline in the gap, but the evidence does not definitively indicate a causal effect.

One important factor in the narrowing of the gender wage gap is the new life cycle of women's employment. The average age at first birth has increased with recent cohorts, resulting in decreases in labor-force participation later in the life cycle as women leave the labor force to care for children, a trend that Claudia Goldin and Joshua Mitchell call the "sagging middle" (2017). This midlife retreat from work has two important implications. First, as the age of first birth has shifted later, employment has increased for younger women (Goldin and Mitchell 2017). Younger women and men experience greater parity in the labor market prior to childbirth, indicating that EEO policies have the desired effect before women have children but are potentially less effective once workers become parents.[1] Second, because women are

1. More young men participate in the labor force than young women, however (Loprest, Spaulding, and Nightingale 2019). Marianne Bertrand, Claudia Goldin, and Lawrence Katz (2010) find that recent male and female MBA graduates from the University of Chicago begin their careers with almost identical earnings. Five years after graduation, men earn 30 log points more than women; ten to sixteen years after graduation, this gap increases to nearly 60 log points. One of the primary reasons for this divergence is that women experience more career interruptions. Goldin and Katz (2016) show that this pattern is not inevitable. They explore the narrowing gender gap among pharmacists, finding that technological and retail changes have increased substitutability among pharmacists, which, in turn, reduced the wage penalty for part-time work and the gender wage gap.

giving birth later, they have greater attachment to the labor force, take less leave time after birth, and reenter the workforce faster (Dey 2014; Goldin and Mitchell 2017). Yet, although women in their twenties and thirties are out of the labor force for fewer years and work more steadily throughout their lives (Blau and Winkler 2017; Goldin and Mitchell 2017), they do not experience parity in labor-force participation or wages later in life (Black, Schanzenbach, and Breitwieser 2017; Chung et al. 2017).

This new life cycle of women's employment and the narrowing of the gap in labor-force participation are linked to a closing of the education gap (Dey 2014; Goldin 2014; Blau and Kahn 2017). The average woman today has more education than the average man, and more women hold advanced degrees (Blau and Kahn 2017). This increase has ushered in greater labor-force participation and experience (Goldin 2014).

Heterogeneity is substantial in labor-force participation rates among subgroups of women, particularly mothers. For men and women without children, labor-force participation has nearly reached parity; but for mothers and fathers, a wide gap still exists (Weeden, Cha, and Bucca 2016). This gap is exacerbated by gender differences in labor-force exits after the birth of a child. In the year following childbirth, women's likelihood of employment decreases by 30 to 40 percent (Kuziemko et al. 2018). Women also stay out of the labor force for longer than men; this differential is narrowing, though, because women are taking shorter leaves (Dey 2014).

Progress on narrowing the gender gap in pay has also been uneven, particularly for workers with children. The motherhood wage penalty, whereby having children is linked to lower wages for women, is well documented in survey data (Waldfogel 1997; Budig and England 2001; Pal and Waldfogel 2016; Blau and Kahn 2017) and in experiments (Correll, Benard, and Paik 2007). Recent estimates indicate that, on average, childless women earn 87 percent of the wages of similar childless men, and that mothers earn 75 percent of the wages of similar fathers (Chung et al. 2017). The motherhood wage penalty may explain wage divergence across the life cycle: although men and women begin their careers with roughly equivalent wages, the gender wage gap widens as cohorts age (Goldin 2014; Chung et al. 2017).

The motherhood wage penalty varies greatly across subgroups. Mothers in low-skill and low-wage jobs bear the bulk of the wage penalty (Blau and Winkler 2017; Budig and Hodges 2014; Budig 2014). Nonmarried mothers and African American mothers also face a greater wage gap than married, white, or Hispanic mothers do (Pal and Waldfogel 2016).

It is difficult to determine whether the relationship between motherhood and lower wages is causal or results from the selection of women with lower wages into motherhood. The timing of the emergence of a prominent gender wage gap—after age thirty-five, when many workers are married and begin to have children—indicates a plausible causal story (Budig 2014). Blau and Kahn (2017) posit several reasons to expect the motherhood wage penalty to be causal. First, without paid parental leave, women may be more likely to leave their employers upon the birth of a child; they may exit the labor force or join an employer with more family-friendly policies. Second, if firms expect women to leave after childbirth, they may refrain from hiring or investing in women. Finally, having children may change worker behavior in ways difficult to measure, such as decreased productivity or work scheduling restrictions. It is likely, therefore, that the motherhood penalty occurs due to issues that arise after childbirth (Goldin 2014; Blau and Kahn 2017), indicating that EEO policies are not enough to close the gap.

In summary, although EEO policies have likely played a role in narrowing gender gaps, progress in recent years has stalled. Men and women may begin their careers on similar ground, but their trajectories diverge after children are born. This may be due in large part to the fact that the time demands associated with having children are largely borne by women, which can decrease labor-force participation and wages (Blau and Kahn 2017).

Family-Friendly Policies

Relative to EEO policies, on which the United States has been a leader, in the domain of family-friendly policies it lags behind its peers. Although EEO policies have likely helped nar-

row overall gender wage and employment gaps, these policies do not address gaps for women with children, which are now the major drivers of overall gender gaps. Family-friendly policies—which would help women maintain labor-force attachment after having children—are needed to continue the foundation set by EEO policies.

Evidence from peer countries indicates that family-friendly policies may help reduce gender gaps. Blau and Kahn (2013) find that though the gender gap in labor-force participation in the United States fell from 19.4 percentage points in 1990 to 14.1 percentage points in 2010, it fell much more substantially—on average, from 26.9 percentage points to 13.0 percentage points—in twenty-one other countries over the same period. Applying average family-friendly policies in other countries to the United States, they estimate that family-friendly policies would have increased U.S. women's labor-force participation rate from 75.2 percent to 82 percent during this period. Further, although other nations have experienced similar economic and technological challenges, they have not experienced the stalled female labor-force participation of the United States (Black, Schanzenbach, and Breitwieser 2017). Taken together, this evidence suggests that strengthening family-friendly policies may help close gender gaps for mothers that EEO policies have not yet touched. Michelle Budig, Joya Misra, and Irene Boeckmann (2015), using data from twenty-two nations, find that the most effective policies to keep mothers in the labor force after childbirth are midlength leaves and childcare, and that both policies reduce the motherhood wage penalty.[2]

Given the potentially important role that family-friendly policies might play in reducing the gender gaps in workforce participation and earnings in the United States, we focus on three key family-friendly policies: paid family leave, childcare, and work scheduling flexibility. Our analysis explores whether men and women have differential access to these policies because this information is important to policy decisions. If a gender difference in access does exist—particularly one favoring men—it would suggest that equalizing access to employer policies may play a role in reducing gaps. If one does not exist, it would suggest that low levels of access to these benefits across the workforce may be hindering progress toward closing the gender gap, and that public policies should focus on raising the overall level of access to these benefits for all workers.

Paid Family Leave

The United States is the only industrialized country that does not provide paid and job-protected leave for new parents. Qualified employees may take up to twelve weeks of job-protected leave under the Family and Medical Leave Act (FMLA), though only approximately 60 percent of workers are eligible (Klerman, Daley, and Pozniak 2012). Paid family leave (PFL) has garnered increased attention in recent years, as California, New Jersey, Rhode Island, and, most recently, New York, have implemented these policies; Washington, D.C., Massachusetts, Connecticut, Oregon, and Washington state will be implementing these policies in the coming years. These policies augment long-standing temporary disability insurance (TDI) programs through which mothers in five states (California, Hawaii, New Jersey, New York, and Rhode Island) can take some paid leave during pregnancy and after childbirth. The effects of PFL are theoretically unclear, given that they depend on how mothers and employers react to leave availability and leave-taking (Rossin-Slater 2017). On the one hand, women who would have exited the labor market in the absence of paid leave may be induced to return to work after childbirth, leading to increased participation; on the other hand, women who would have continued working without leave likely would take more leave, but with no effect on participation. Further, employers may discriminate against hiring or promoting women of childbearing age if they do not believe they can manage the short-term cost of temporary employee replacement, but may also reward employees who remain with them after the child's birth.

2. Such policies may not fully eliminate gaps if gendered roles and attitudes persist (Kleven, Landais, and Søgaard 2018).

California's PFL is the most extensively studied U.S. program because it dates back the furthest, to 2004. Research generally finds positive outcomes for children and parents (Milkman and Appelbaum 2013; Bartel et al. 2014; Stearns 2015; Bedard and Rossin-Slater 2016; Boushey 2016; Rossin-Slater 2017). Specifically, with regard to labor-market outcomes, the evidence from California suggests that PFL increases the likelihood that mothers return to work in the nine to twelve months following a birth by 18 percentage points, increases weeks and hours worked by mothers when children are one and two years old (Baum and Ruhm 2016), and increases weekly work hours for mothers of children under the age of three by 10 to 17 percent (Rossin-Slater, Ruhm, and Waldfogel 2013). One potential mechanism is that PFL may keep women in the workforce who otherwise would have dropped out after having a child (Rossin-Slater 2017). PFL is therefore a promising strategy to boost the sagging U.S. labor-force participation for midcareer women, potentially decreasing the gender gaps in labor-force participation and wages.

Childcare

Childcare is a critical component of family-friendly policy, especially for mothers of young children. Relative to parental leave, childcare may be particularly relevant in reducing gender gaps because it allows mothers to continue in employment without taking time off or reducing work hours, and because it affects a longer portion of their working life (Olivetti and Petrongolo 2017). However, childcare is largely seen as a private responsibility in the United States (Craig and Mullan 2010; Chaudry et al. 2017). Subsidies are available for low-income families, but only about 15 percent of eligible families receive such assistance (Chaudry et al. 2017). Tax credits are available to low- and middle-income families but are not widely used due to cumbersome program rules (Chaudry et al. 2017). Publicly funded childcare centers, preschools, and pre-kindergartens serve only a small share of preschool age children.

Access to high-quality and affordable childcare has the potential to improve a variety of parent and child outcomes, including parental attachment to the labor market and wages (Usdansky and Wolf 2008; Ha and Miller 2015; Chaudry et al. 2017). International evidence indicates that greater spending on childcare is associated with increased female employment and decreased gender wage gaps (Olivetti and Petrongolo 2017). Recent evidence from Washington, D.C., shows that providing free preschool for three- and four-year-olds increases maternal labor-force participation by 10 percentage points (Malik 2018). Affordability is particularly crucial. Considerable evidence indicates that childcare costs affect women's wages and labor-force participation, especially for low-income families (Herbst 2010; Ahn 2012; Ha and Miller 2015). In 2011, families who used childcare spent an average of 7 percent of income on care; low-income families spent 30 percent or more (Laughlin 2013). Yet current U.S. spending on childcare is low relative to other high-income countries. The federal government spends approximately 2 percent of gross domestic product (GDP) on children, and less than 0.2 percent of GDP on programs only for young children, such as childcare subsidies and Head Start (Chaudry et al. 2017). In contrast, the average Organization for Economic Cooperation and Development country spends 0.8 percent of GDP on programs only for young children, with the United Kingdom spending 0.5 percent, France spending 0.8 percent, and Sweden and Norway each spending nearly 2 percent (OECD 2017).

Because public provision is limited, employer-provided childcare could potentially be a promising solution. Although employer-supported childcare would have direct costs, it could also promote worker productivity and commitment (Hipp, Morrissey, and Warner 2017) and reduce absences and interruptions (Usdansky and Wolf 2008). Yet most American employers do not provide any support for childcare: the National Compensation Survey indicates that only 11 percent of workers have access to employer-provided childcare, a proportion that has held roughly constant for the past two decades (U.S. Bureau of Labor Statistics 2017). Little is known about whether women are less likely to have access to this benefit than their male peers.

Work Scheduling

Finally, policies that affect work hours and schedules, such as the right to request part-time or flexible hours and advance work schedules, can help women stay in the labor force after having children by providing an avenue by which to reconcile responsibilities to an employer and the family. These policies may be beneficial to women across the income distribution. For salaried workers, scheduling flexibility policies are associated both with an increase in female labor-force participation after childbirth (Herr and Wolfram 2012) and an increase in female wages (Weeden 2005). These policies may be particularly beneficial for women in low-wage jobs because they tend to have the least flexibility and may be penalized by being assigned fewer hours if they request it (Goldin 2014; Boushey 2016).

Although less research has been undertaken to date on these policies than on other types of family-friendly policies, recent studies have brought work scheduling practices to the forefront of public attention and have identified three primary types of unpredictable scheduling: lack of advance notice, last-minute scheduling changes, and changes in weekly work schedules (Henly and Lambert 2014). Recent results from the first randomized controlled trial of an intervention targeting unpredictable scheduling are promising (Williams et al. 2018). The intervention, conducted at Gap stores in San Francisco and Chicago from November 2015 to August 2016, addressed unpredictable work scheduling by requiring stores to provide two-weeks advance notice of schedules, end the use of just-in-time scheduling, allow swapping of shifts among employees through an app, improve consistency of schedules from week to week, and guarantee some workers a minimum number of hours per week, among other practices. Results show that these practices increased median sales by 7 percent, increased worker productivity by 5 percent, and were generally welcomed both by employees and managers.

National surveys suggest that 6 percent of the workforce has flexibility in location of work and 49 percent has flexibility in hours or days worked (U.S. Bureau of Labor Statistics 2017). But the specific types of flexibility measured vary considerably, and little evidence exists as to gender differences in access to flexible work arrangements.

ACCESS TO FAMILY-FRIENDLY BENEFITS

We first describe the data and methods used to examine gender differentials in access to family-friendly benefits. Next, we present primary regression results for gender differences in access to paid leave, employer-provided childcare, and scheduling flexibility. Finally, we show differences in access to family-friendly benefits by educational attainment, as education is typically related to the types of firms and jobs into which workers sort.

Data and Methods

We use national survey data from two data sets to provide new evidence on access to employer-provided paid leave, childcare, and work scheduling flexibility in the United States and consider whether gender differentials in such access are evident. The first data set, the American Time Use Survey (ATUS) 2011 Leave Module, is a nationally representative sample of the working-age population age fifteen to eighty-five years. Critical for our purposes, the Leave Module contains detailed measures of whether respondents receive paid leave from their employer, including whether they are able to take paid leave for vacation, errands or personal reasons, own illness or medical care, a family member's illness or medical care, childcare, eldercare, or the birth or adoption of a child. Although the ATUS provides important details about whether and how workers can use paid leave, it does not measure whether workers have access to paid parental leave specifically set aside for new mothers and fathers.

We therefore turn to the National Longitudinal Survey of Youth 1997 (NLSY97), which has measures of paid leave specifically to be used by new parents. The NLSY97 is a nationally representative sample of persons who were ages twelve to sixteen in 1997; we use data from 2011, 2013, and 2015, when the respondents are ages twenty-six to thirty-six. Thus, the NLSY97 not

only provides measures not captured in the ATUS, but also provides a large sample of working adults in prime childbearing years. We also use the NLSY97 to examine access to employer-provided or subsidized childcare; the ATUS does not measure childcare benefits.

Finally, we return to the ATUS to study access to work scheduling flexibility. The Leave Module asks respondents whether they can vary their work schedules in lieu of using leave time. Respondents indicate whether they can vary work scheduling by the day of the week, hours worked in a day, or work location. This measure captures flexibility that workers may use when they would otherwise have to use paid or unpaid leave, but does not capture whether they have access to more regular flexibility. We therefore use the NLSY97 to examine whether workers report a regularly accessible flexible work schedule. Last, we use the ATUS to study working from home, which is another method for achieving flexibility. To do so, we examine the number of minutes that respondents report working while at home in a given day.

For ease of interpretation, ordinary least squares (OLS) linear probability models are estimated to predict access to family-friendly policies. (Results from probit models are similar.) We restrict our analysis of the ATUS sample to prime-age workers ages twenty-five to fifty-four; as noted earlier, the NLSY97 sample contains only respondents ages twenty-six to thirty-six. Our primary variable of interest is gender. We also include a set of individual and employer control variables. Individual covariates include race and ethnicity (white non-Hispanic, black non-Hispanic, Hispanic, or other non-Hispanic), age, age-squared, education (high school degree or less, some college, or college degree or more), relationship status (married, cohabiting, or single), household composition (no children, youngest child ages zero to five, or youngest child ages six to seventeen), and citizenship status (native-born citizen, foreign-born citizen, or foreign-born noncitizen). Employer covariates include industry (thirteen dummies using the 2007 Census Industry Classification system), occupation (six dummies using the 2010 Census Occupation Classification system), sector (government, private nonprofit, or private for-profit), and union status. We also include controls for geographic area (state fixed effects in the ATUS; region fixed effects in the NLSY97). As the NLSY97 includes observations from multiple years, we include year fixed effects in these models.

We estimate three sets of models. The first includes only controls for individual characteristics (plus the relevant geographic fixed effects and, in the NLSY97, year effects). The second adds potentially endogenous controls for employer characteristics, and the third adds a control for part-time status, which is also potentially endogenous. We estimate the following equations:

$$y_{is} = \alpha + \beta_1 female_{is} + \beta_2 X_{is} + \beta_3 S_s + \varepsilon_{is} \quad (1)$$

$$y_{is} = \alpha + \beta_1 female_{is} + \beta_2 X_{is} + \beta_3 S_s + \beta_4 Z_{is} + \varepsilon_{is} \quad (2)$$

$$y_{is} = \alpha + \beta_1 female_{is} + \beta_2 X_{is} + \beta_3 S_s + \beta_4 Z_{is} + \beta_5 W_{is} + \varepsilon_{is} \quad (3)$$

$$y_{irt} = \alpha + \beta_1 female_{irt} + \beta_2 X_{irt} + \beta_3 R_r + \beta_4 T_t + \varepsilon_{irt} \quad (4)$$

$$y_{irt} = \alpha + \beta_1 female_{irt} + \beta_2 X_{irt} + \beta_3 R_r + \beta_4 T_t + \beta_5 Z_{irt} + \varepsilon_{irt} \quad (5)$$

$$y_{irt} = \alpha + \beta_1 female_{irt} + \beta_2 X_{irt} + \beta_3 R_r + \beta_4 T_t + \beta_5 Z_{irt} + \beta_6 W_{irt} + \varepsilon_{irt} \quad (6)$$

Equations (1), (2), and (3) measure gender differences in access to paid leave and scheduling flexibility as well as minutes spent working from home in a given day, in the ATUS. Equations (4), (5), and (6) measure gender differences in access to paid parental leave, employer-provided or subsidized childcare, and regular scheduling flexibility in the NLSY97. In equations (1), (2), and (3), y is access to a family-friendly policy for worker i living in state s, *female* is a dichotomous indicator set to one (zero) for female (male) workers, X is a vector of individual covariates, S is a vector of state indicator variables, Z is a vector of employer covariates, and W is an indicator variable for part-time status. In equations (4), (5), and (6), y is access to a family-friendly policy for worker i living in region r in year t, *female* is a dichoto-

mous indicator set to one (zero) for female (male) workers, X is a vector of individual covariates, R and T are vectors of region and year indicator variables, Z is a vector of employer covariates, and W is an indicator variable for part-time status.

Primary Results

Table 1 presents unadjusted means for access to family-friendly policies by gender in the ATUS and NLSY97. Although the majority of respondents of both genders report access to some type of paid leave, a significantly smaller share of female respondents (4.3 percentage points fewer than men) have paid leave (panel A). Results from the ATUS show no significant gender differentials in access to paid leave for infant bonding. Results from the NLSY97 (panel B), however, reveal that significantly more women have access to paid parental leave. Turning to employer-provided or subsidized childcare, results from the NLSY97 indicate that fewer than one in ten workers receive this benefit with no gender differential in access (panel B). Finally, ATUS results in panel A show no significant gender difference in access to scheduling flexibility in lieu of using leave, and no significant gender difference in daily minutes spent working from home. However, results for the NLSY97 measure of regular access to scheduling flexibility (panel B) indicate a significantly greater share of women have access to this benefit.

The gender differences observed in table 1 could be explained by a sorting model in which workers sort into firms based on characteristics such as wages, family-friendly policies, and the availability of part-time hours. Male and female workers may value these characteristics differently, both because of personal preferences and because of the constraints they face, such as requiring time for caregiving. Women with children, or women who anticipate having children, may be more likely to sort into firms that accommodate their preferences and constraints, even if doing so requires a trade-off of pay and other benefits. For example, a mother with young children may prefer a job in which she can work part-time, though this may mean she does not have access to paid time off.

Tables 2 and 3 provide evidence consistent with this type of sorting. Results in table 2 show that women, especially those with children, are significantly more likely to work part time than men. Table 3 considers whether part-time jobs provide fewer family-friendly benefits than full-time jobs. With the exception of scheduling flexibility for the NLSY97 sample, all the part-time and full-time differentials in family-friendly policies are significant. Taken together, tables 2 and 3 demonstrate that women are more likely to engage in part-time work and, in so doing, they forgo access to family-friendly benefits. With regard to wages, we find no significant hourly wage differential for part-time versus full-time workers in the NLSY97; as expected, the difference in annual hours worked is significant.

The results in tables 2 and 3 suggest that part-time status may explain why table 1 shows gender differentials in access to some family-friendly benefits. To more fully explore whether part-time status alone, or other control variables, explain the gender differentials, we next turn to the OLS regression results. Table 4 reports results using ATUS data, panel A showing results for access to any paid leave by prime-age workers, panel B showing access to scheduling flexibility in lieu of leave, and panel C showing time spent working from home on a given day.[3] When specified only with individual controls and state fixed effects (column 1), and when adding employer controls (column 2), women are around 5 percentage points less likely to have access to any paid leave than men. Column 3 adds a control for part-time status, which essentially brings the gender differential to zero. This result indicates that, while women have less access to paid leave, this differential is driven by part-time workers, who are 37.7 percentage points less likely to have access to paid leave than full-time workers (see table A1).

3. We also estimated all ATUS models with a sample mirroring the ages of the NLSY97 sample. Results for this younger sample (not shown but available on request) are similar in magnitude, direction, and significance.

Table 1. Unadjusted Gender Differentials in Access to Family-Friendly Policies

	Male	Female	Differential
Panel A. Family-friendly benefits, ATUS			
Any paid leave	0.713	0.671	−0.043*
	(0.014)	(0.015)	(0.020)
Vacation	0.710	0.659	−0.050*
	(0.014)	(0.015)	(0.021)
Personal	0.628	0.576	−0.051*
	(0.017)	(0.018)	(0.025)
Own illness	0.694	0.651	−0.042*
	(0.015)	(0.015)	(0.021)
Other's illness	0.590	0.534	−0.039
	(0.017)	(0.017)	(0.024)
Elder care	0.353	0.341	−0.011
	(0.016)	(0.015)	(0.022)
Childcare	0.384	0.374	−0.009
	(0.016)	(0.015)	(0.022)
Infant bonding	0.523	0.540	0.017
	(0.017)	(0.016)	(0.023)
Any flexibility	0.552	0.570	0.018
	(0.016)	(0.015)	(0.022)
Hourly flexibility	0.512	0.508	0.029
	(0.015)	(0.016)	(0.021)
Day of week flexibility	0.372	0.401	−0.005
	(0.015)	(0.015)	(0.022)
Location flexibility	0.264	0.250	−0.013
	(0.014)	(0.013)	(0.019)
Daily minutes working from home	18.257	19.866	1.609
	(1.605)	(1.860)	(2.456)
Panel B. Family-friendly benefits, NLSY97			
Paid parental leave	0.325	0.410	0.085***
	(0.006)	(0.007)	(0.009)
Employer-provided childcare	0.081	0.087	0.005
	(0.004)	(0.004)	(0.005)
Scheduling flexibility	0.393	0.437	0.045***
	(0.006)	(0.007)	(0.009)

Source: Authors' calculations based on ATUS Leave Module and NLSY97 (BLS 2011, 2011–2015).
Note: ATUS sample is restricted to prime working age, twenty-five to fifty-four years old. NLSY97 sample is twenty-six to thirty-six years old. Percentages and differences are weighted using individual weights. Differentials may be slightly different than the amount obtained by subtracting the female column from the male column due to rounding. In panel A, male n = 1,827 for leave, female n = 1,934 for leave; male n = 1,840 for flexibility, female n = 1,945 for flexibility. In panel B, male n = 6,781, female n = 6,658.
*$p < .05$; **$p < .01$; ***$p < .001$

Table 2. Gender Differences in the Share of Part-Time Workers

	Male		Female	
	Unadjusted	Regression Adjusted	Unadjusted	Regression Adjusted
Panel A. All workers, ATUS				
Part time	0.143	0.138	0.286***	0.241***
	(0.009)	(0.009)	(0.011)	(0.010)
Observations	1,827	1,827	1,934	1,934
Panel B. Workers with children, ATUS				
Part time	0.150	0.137	0.331***	0.269***
	(0.014)	(0.013)	(0.015)	(0.014)
Observations	1,078	1,078	1,184	1,184
Panel C. Workers without children, ATUS				
Part time	0.137	0.137	0.252***	0.222***
	(0.012)	(0.012)	(0.015)	(0.014)
Observations	749	749	750	750
Panel D. All workers, NLSY97				
Part time	0.168	0.143	0.313***	0.262***
	(0.004)	(0.005)	(0 .005)	(0.006)
Observations	6,781	6,781	6,658	6,658
Panel E. Workers with children, NLSY97				
Part time	0.118	0.107	0.342***	0.282***
	(0.005)	(0.006)	(0.007)	(0.008)
Observations	3,462	3,462	4,571	4,571
Panel F. Workers without children, NLSY97				
Part time	0.213	0.173	0.263***	0.233***
	(0.006)	(0.007)	(0.009)	(0.009)
Observations	3,319	3,319	2,087	2,087

Source: Authors' calculations based on ATUS Leave Module and NLSY97 (BLS 2011, 2011–2015).
Note: Regression-adjusted means control for individual characteristics and firm characteristics (industry, sector, and occupation). In the ATUS, regression-adjusted means also control for state fixed effects; in the NLSY97, regression-adjusted means also control for region and year fixed effects. Individual controls include race, age, age-squared, relationship status, education, household composition, and citizenship status. Employer controls include industry, occupation, sector, and union coverage. Industry controls use the 2007 Census Industry Classification system to categorize workers into: agriculture, forestry, and fishing; mining, quarrying, and oil; construction; manufacturing; wholesale and retail; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration. Occupation controls use the 2010 Census Occupation Classification system to categorize workers into: management, professional, and related; services; sales and office; farming, fishing, and forestry; construction and maintenance; and production, transportation, and material moving. Sector controls include government, private for-profit, and private nonprofit. All models are weighted using individual weights. Significance stars indicate difference between male and female results.
*$p < .05$; **$p < .01$; ***$p < .001$

Table 3. Family-Friendly Benefits and Hourly Wages for Part-Time and Full-Time Workers

	Part-Time Workers		Full-Time Workers	
	Unadjusted	Regression Adjusted	Unadjusted	Regression Adjusted
Panel A. Family-friendly benefits, ATUS				
Any paid leave	0.223	0.346	0.700***	0.708***
	(0.016)	(0.021)	(0.009)	(0.009)
Any scheduling flexibility	0.647	0.650	0.514***	0.547***
	(0.018)	(0.022)	(0.009)	(0.010)
Minutes working from home	13.534	18.769	20.478*	18.265
	(2.401)	(3.072)	(1.406)	(1.512)
Panel B. Family-friendly benefits, NLSY97				
Paid parental leave	0.129	0.158	0.422***	0.414***
	(0.007)	(0.008)	(0.005)	(0.005)
Employer-provided childcare	0.032	0.042	0.096***	0.094***
	(0.003)	(0.004)	(0.003)	(0.003)
Regular scheduling flexibility	0.426	0.423	0.412	0.411
	(0.010)	(0.011)	(0.005)	(0.005)
Panel C. Hourly wage, NLSY97				
Hourly wage	23.54	20.81	26.37	21.48
	(1.18)	(3.15)	(4.10)	(1.29)
Panel D. Annual hours worked, NLSY97				
Annual hours worked	1,127.017	1,293.153	2,094.322***	2,159.485***
	(13.929)	(17.448)	(7.638)	(7.631)

Source: Authors' calculations based on ATUS Leave Module and NLSY97 (BLS 2011, 2011–2015).
Note: Regression-adjusted means control for individual characteristics and firm characteristics (industry, sector, and occupation). In the ATUS, regression-adjusted means also control for state fixed effects; in the NLSY97, regression-adjusted means also control for region and year fixed effects. See note to table 2 for information on individual and employer controls. All models are weighted using individual weights. In panel A, paid leave n = 3761, scheduling flexibility n = 3,785. For all models in panels B, C, and D, n = 14,060. Significance stars indicate difference between part-time and full-time results.
*$p < .05$; **$p < .01$; ***$p < .001$

Table 5 uses the ATUS to study gender differentials by allowed type of paid leave use.[4] Results from specifications 1 and 2 (panels A and B) indicate that women are significantly less likely (5 to 7 percentage points) to have access to leave that can be used for vacation, personal time, their own illness, or someone else's illness. Once we account for part-time status (panel C), these differences are no longer significant. Nor do we see significant gender differences in being able to use paid leave for infant bonding. To explicitly examine paid pa-

4. Because of missing data, our sample varies according to the outcome measure used. When conducting the same analysis with a consistent sample (n = 2,403), our results are similar in magnitude, direction, and significance.

Table 4. Primary Regression Results from ATUS 2011

	1	2	3
Panel A. Access to any leave			
Female	−0.056**	−0.050*	−0.006
	(0.020)	(0.021)	(0.021)
Panel B. Access to scheduling flexibility in lieu of leave			
Female	0.005	−0.014	−0.025
	(0.022)	(0.023)	(0.023)
Panel C. Minutes spent working from home on a given day			
Female	2.030	0.416	0.399
	(3.632)	(3.705)	(4.524)
Employer controls	No	Yes	Yes
Part-time worker control	No	No	Yes

Source: Authors' calculations using ATUS Leave Module (BLS 2011).
Note: Coefficients for individual controls, sector, and part time are presented in table A1 for panel A and table A4 for panel B. All models include state fixed effects and individual controls. See note to table 2 for information on individual and employer controls. All models are weighted using individual weights. For all models in panel A, n = 3,761. For all models in panels B and C, n = 3,785.
*$p < .05$; **$p < .01$; ***$p < .001$

Table 5. Access to Paid Leave by Allowed Paid Leave Use Type from ATUS 2011

	1 Vacation	2 Personal	3 Own Illness	4 Other's Illness	5 Elder Care	6 Child-care	7 Infant Bonding
Panel A. Specification 1, individual controls only							
Female	−0.066**	−0.073**	−0.060**	−0.058*	−0.024	−0.025	−0.007
	(0.021)	(0.024)	(0.021)	(0.023)	(0.021)	(0.022)	(0.022)
Panel B. Specification 2, individual controls and employer controls							
Female	−0.056*	−0.062*	−0.057**	−0.055*	−0.023	−0.027	−0.019
	(0.021)	(0.024)	(0.022)	(0.024)	(0.023)	(0.023)	(0.023)
Panel C. Specification 3, individual controls, employer controls, and part-time status control							
Female	−0.009	−0.017	−0.010	−0.007	0.002	−0.002	0.019
	(0.021)	(0.025)	(0.022)	(0.023)	(0.023)	(0.024)	(0.024)
Observations	3,673	2,909	3,538	3,117	3,505	3,526	3,521

Source: Authors' calculations using ATUS Leave Module (BLS 2011).
Note: All models include state fixed effects. See note to table 2 for information on individual and employer controls. All models are weighted using individual weights.
*$p < .05$; **$p < .01$; ***$p < .001$

Table 6. Primary Regression Results from NLSY97

	1	2	3
Panel A. Access to paid parental leave			
Female	0.065***	0.045***	0.075***
	(0.009)	(0.010)	(0.010)
Panel B. Access to employer-provided or subsidized childcare			
Female	0.0001	−0.016**	−0.010
	(0.005)	(0.006)	(0.006)
Panel C. Access to regular scheduling flexibility			
Female	0.036***	−0.002	−0.003
	(0.009)	(0.010)	(0.010)
Employer controls	No	Yes	Yes
Part-time worker control	No	No	Yes

Source: Authors' calculations using NLSY97 (BLS 2011–2015).
Note: All models include region fixed effects, year fixed effects, and individual controls. Coefficients for individual controls, sector, and part-time worker are presented in table A2 for panel A, table A3 for panel B, and table A6 for panel C. See note to table 2 for information on individual and employer controls. All models are weighted using individual weights. For all models, n = 14,060.
*p < .05; **p < .01; ***p < .001

rental leave more closely, we turn to the primary regression results for the NLSY97, as shown in panel A of table 6 (full results shown in table A2). Across all three specifications, these results indicate that, among workers of prime childbearing age, women are up to 7.5 percentage points more likely to have access to paid parental leave than similar men even when we control for part-time status.

Using the NLSY97, access to employer-provided childcare for workers of prime childbearing age is studied in panel B of table 6. Results from specification 1 show no significant gender differential. Results from specification 2 indicate that women are significantly less likely (1.6 percentage points) to have access to childcare than similar men. In specification 3, as in table 4, the addition of a control for part-time status yields an insignificant gender difference: part-time workers are 4 to 5 percentage points less likely to have access to employer-provided childcare than full-time workers (see table A3).

Gender differentials in access to scheduling flexibility in lieu of taking leave are studied using both data sets. Using the ATUS, results in panel B of table 4 indicate no significant gender differences in access to any flexibility in lieu of leave nor in access to particular types of flexibility (for full estimates of table 2, panel B, see table A4; for estimates by type of leave, see table A5). Using the NLSY97, estimates in panel C of table 6 examine gender differentials in regular access to scheduling flexibility (for full estimates, see table A6). Although results from specification 1 suggest that women are 3.6 percentage points more likely to have access to such flexibility than men with similar personal characteristics, results from specifications 2 and 3 indicate no significant gender differential. Taken together, these results show no gender difference in access to scheduling flexibility, whether it is in lieu of leave or is more regularly available. Finally, using the ATUS in panel C of table 4, we find no significant gender differences in minutes spent working from home on a given day, suggesting that women are not disproportionately likely to work from

Table 7. Education-Stratified Regression Results, ATUS and NLSY97

	1 High School or Less	2 Some College	3 College or More
Panel A. Access to any leave, ATUS			
Female	−0.066	0.120**	−0.038
	(0.038)	(0.046)	(0.026)
Observations	1,194	861	1,917
Panel B. Access to scheduling flexibility in lieu of leave, ATUS			
Female	0.068	0.001	−0.094**
	(0.045)	(0.050)	(0.029)
Observations	1,194	861	1,917
Panel C. Access to paid parental leave, NLSY97			
Female	0.064***	0.080***	0.086**
	(0.013)	(0.017)	(0.031)
Observations	8,383	4,406	1,271
Panel D. Access to employer-subsidized or provided childcare, NLSY97			
Female	−0.006	−0.011	−0.050*
	(0.007)	(0.010)	(0.020)
Observations	8,383	4,406	1,271
Panel E. Access to regular scheduling flexibility, NLSY97			
Female	0.022	−0.027	−0.073*
	(0.014)	(0.018)	(0.030)
Observations	8,383	4,406	1,271

Source: Authors' calculations based on ATUS Leave Module and NLSY97 (BLS 2011, 2011–2015).
Note: All models include geographic fixed effects, individual controls, employer controls, and part-time status controls. See note to table 2 for information on individual and employer controls. All models are weighted using individual weights.
*$p < .05$; **$p < .01$; ***$p < .001$

home instead of using other forms of scheduling flexibility.

Education-Stratified Results

Educational attainment influences the types of firms and jobs into which workers sort. In supplemental models, we therefore examined results stratified by level of education (high school degree or less, some college but no degree, and a college degree or more). These regressions (shown in table 7) include state fixed effects, individual controls, employer controls and part-time status. In no case are women significantly less likely to have access to any leave than their male counterparts, and in the NLSY97 women in all education groups are significantly more likely to have access to paid parental leave. When considering childcare, the most highly educated women are 5 percentage points less likely to have access to employer-

provided or subsidized childcare than comparable men. Finally, our results indicate that women with a college degree or more are less likely to have access to regular flexibility than similar men, though women with less education do not appear to face these differentials.

POLICY IMPLICATIONS

Our analysis shows that though women have less access to any employer-provided paid leave than men, this is entirely explained by part-time status. It seems that women are sorting into part-time jobs to have more time for caregiving and, in so doing, are forgoing income and access to paid time off. However, we also found that young women, even those in part-time jobs, are more likely than men to have access to specifically designated paid parental leave. Furthermore, we found insignificant gender differentials in access to employer-provided or subsidized childcare and access to scheduling flexibility. Thus, the problem with access to family-friendly policies is not gender differences but overall low levels of access to such policies for both women and men.

Public policy could expand coverage by two primary mechanisms. One is to mandate that employers provide such coverage. Employer mandates are ill suited to many types of family-friendly policies because they can lead to discrimination against workers with children (Gruber 1994), particularly women, and can impose high costs on employers, particularly small businesses (Mathur et al. 2017). Employer mandates, however, may be the only alternative when the policies involve workplace practices such as scheduling.

The second mechanism—to provide such coverage through public provision—is more appropriate than employer mandates in situations with both high costs and the potential for discrimination. Family-friendly policies often can be funded through a small payroll tax on all workers or employers, thereby distributing the cost of coverage across workers rather than burdening the specific employers whose employees take leave. In addition, universal provision mitigates the potential for worker selection into jobs with family-friendly benefits and employer discrimination against these workers, although discrimination could still occur if employers face other costs and believe that particular groups of workers will be more likely to use the benefits.

With these considerations in mind, we turn to a discussion of whether and how family-friendly policies might be expanded to address the shortfalls in coverage that we found.

Access to Paid Family Leave

We find that young women are significantly more likely to have access to paid parental leave than comparable men. Yet overall levels of access to paid parental leave are low, estimates indicating that slightly less than half (NLSY97) to slightly more than half (ATUS) of all workers have access to this benefit. Although public support is strong for mandating employers to provide paid family leave (Horowitz et al. 2017), we do not believe it is the appropriate mechanism by which to provide paid family leave because it would likely be costly for employers and result in discrimination against women of childbearing age.[5] In regard to public provision, several states have paid family leave policies that are in effect (California, New Jersey, New York, and Rhode Island) or soon to be implemented (Massachusetts, Washington, Connecticut, Oregon, and Washington, D.C.). Although these policies vary widely in terms of length of leave, wage replacement rate, and eligibility requirements, they are generally funded through increased payroll taxes either solely on employees or on both employees and employers (National Partnership for Women & Families 2018). For example, California's program, which is funded by employee payroll taxes, costs the average worker $2 per month in additional payroll taxes (Milkman and Appelbaum 2013).

Although the costs to workers are low, the costs to employers are potentially greater. Firms in California argued that the indirect

5. A related option would be an employer incentive, such as the Tax Cuts and Jobs Act of 2017, which offers a 12.5 to 25 percent tax credit incentive for employers to provide paid family leave to lower-income workers, but the incentive does not offset the cost of providing this benefit and may not see a high take-up rate among employers who did not previously offer paid family leave (Mathur et al. 2017).

costs of the law, such as paying current workers overtime or hiring and training temporary workers to complete the work of the employee on leave, would be detrimental, although post-law surveys found that a majority of employers indicated they were either unaffected or positively affected by the law (Milkman and Appelbaum 2013). Some employers even report being helped by the law, in that the policy has replaced the costs of providing employees with paid family leave. Employer surveys in Rhode Island, New Jersey, and New York also indicate widespread support, with roughly two-thirds of employers supporting the law in their state and an additional 10 to 15 percent having neutral views (Bartel et al. 2017). On the federal level, several congressional representatives from both parties have proposed paid family leave policies (for a discussion of these proposals, see Mathur et al. 2017).

Access to Childcare

Employer mandates are probably ill suited to expand access to childcare. Not only would the cost of such a benefit be burdensome for employers, it could also result in discrimination against workers with children. Evidence indicates that employers discriminate against mothers: mothers who opt out of employment to care for children are seen as less committed, less capable, and less deserving of employment (Weisshaar 2018) and receive fewer callbacks for interviews (Correll, Benard, and Paik 2007; Weisshaar 2018).[6] A childcare mandate might exacerbate such discrimination or create additional discrimination to the extent that women would be seen as more costly to employ.

Also, as a practical matter, the share of employers offering this benefit is extremely low (only about one in ten). Thus, rather than mandating employers to dramatically increase childcare provision, which would be costly to employers and may result in gender discrimination, expanding public childcare programs may be the most feasible way to increase access. Although some states and cities have enacted universal pre-kindergarten programs, these programs typically provide only one (or two) years of care and currently serve less than a third of four-year-old children. Expanding childcare subsidies for low-income families while streamlining the application and renewal process and lengthening eligibility periods could greatly benefit households at the bottom of the income distribution. Other measures, such as expanded tax credits or more public funding through sliding-scale fees, will be needed to reach middle-income families who also face high costs but typically receive little employer or public support.

These public policies have little potential to impose costs on employers because they are generally funded through taxes on earners; employers even may benefit from a reduction in work absences and interruptions. Moreover, as mentioned, childcare access is believed to be particularly beneficial in reducing gender gaps because it allows women to avoid work interruptions or reductions in work hours; programs to support young children and their families may also be beneficial in reducing racial inequality in the workforce (see Rodgers 2019).

Access to Work Scheduling Flexibility

Employer mandates are the most appropriate mechanism by which to promote scheduling flexibility because scheduling involves workplace practices that cannot be provided by public services. Policies to promote scheduling flexibility must address the different issues that hourly workers and salaried workers face. For hourly workers, scheduling flexibility means protections against unpredictable schedules. This can be accomplished by equipping the worker with input into both the number of hours per week and the time of day the hours are worked. For salaried workers, scheduling flexibility often means providing the worker

6. Family-friendly policies may also lead to employer discrimination: if firms believe women will require a change in hours or decrease productivity after childbirth, they may not hire or invest in women (Blau and Kahn 2013; Thomas 2018). Mallika Thomas (2018) exploits variation from the introduction of the FMLA to examine the effect of increased access to job-protected leave on firm behavior. She finds that since the enactment of FMLA, women under the age of forty are 5 percent more likely to stay employed but 8 percent less likely to be promoted, relative to women hired before FMLA.

with the ability to adjust when (and potentially where) their work is done, as well as the right to request part-time or flexible work. However, scheduling flexibility policies also are associated with both hiring and wage penalties against women (Goldin 2014) and thus should be joined with equal pay and benefit policies to insure gender equality in the labor market.

Employers may worry that an inability to change workers' schedules at the last-minute will harm their bottom lines, as many employers—particularly in retail and service—have long relied on just-in-time scheduling to match the number of employees to in-store traffic. Experimental evidence indicates that this concern does not bear out: employers who give workers more scheduling control see an increase in sales far greater than the additional cost associated with giving workers greater scheduling control, and workers who control their schedules are significantly more productive on the job (Williams et al. 2018). Scheduling flexibility holds other potential benefits for employers. First, flexibility may boost retention, which could lower recruiting and training costs. On average, replacing a worker costs an employer about 20 percent of the worker's salary (about 16 percent for workers earning less than $30,000 per year) (Boushey 2016).

Several cities, including Emeryville, San Francisco, Seattle, and New York, as well as the states of New York and Oregon, have enacted scheduling control policies focused on low-wage workers (Williams et al. 2018). Although provisions vary, they generally mandate employers to adhere to a minimum amount of advance scheduling notice and to pay workers for any last-minute changes to schedules (Williams et al. 2018). Further, all workers, both hourly and salaried, in the cities of Berkeley, San Francisco, and New York, and in the states of New Hampshire and Vermont, have the right to request flexibility in work arrangements. On the federal level, congressional representatives from both parties have proposed policies focused both on scheduling flexibility and on scheduling control (1 Million for Worker Flexibility, n.d.).

CONCLUSION

EEO policies, in combination with other factors such as changing gender norms and roles, have contributed to substantial progress toward closing gender gaps in the workplace. However, after the birth of children, women's career trajectories diverge significantly from men's. In this article, we considered whether family-friendly policies are a potentially promising solution to promoting workplace gender equality among parents. Using data from the American Time Use Survey and the NLSY97, we provide new evidence on employer provision of these policies, finding that the gender differential in access to paid leave through employers is entirely explained by the greater likelihood of women being in part-time jobs. To accommodate caregiving responsibilities, women sort into part-time jobs and thereby forgo income and various types of paid leave. Offsetting this is the fact that young women are more likely to have access to paid parental leave. Gender differentials in access to childcare through an employer or access to scheduling flexibility are not significant.

Nonetheless, access to such policies remains rather low in the United States. Public policies—such as a federal provision for paid family leave, expanded public or subsidized childcare, and employer mandates for scheduling control and flexibility—could play an important role in helping all families, particularly those who are low income, navigate the tension between work and home and have the potential to continue progress made by EEO toward a more gender-equitable workforce.

Table A1. Access to Any Paid Leave: Regression Results, ATUS 2011

	1	2	3
Female	−0.056**	−0.050*	−0.006
	(0.020)	(0.021)	(0.021)
Race (ref = white)			
Black	−0.011	0.002	−0.012
	(0.032)	(0.032)	(0.031)
Hispanic	−0.057	−0.035	−0.044
	(0.038)	(0.036)	(0.036)
Other	−0.005	−0.008	−0.001
	(0.052)	(0.049)	(0.045)
Age	0.005	0.005	−0.001
	(0.012)	(0.012)	(0.011)
Age^2	−0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)
Relationship (ref = married)			
Cohabiting	−0.017	0.010	−0.008
	(0.046)	(0.045)	(0.044)
Single	−0.020	−0.014	−0.017
	(0.024)	(0.023)	(0.022)
Education (ref = college or more)			
High school or less	−0.170***	−0.052	−0.040
	(0.024)	(0.028)	(0.025)
Some college	−0.089***	−0.011	−0.012
	(0.025)	(0.027)	(0.026)
Household composition (ref = no children)			
Youngest child age six to seventeen	−0.010	−0.020	−0.005
	(0.025)	(0.024)	(0.023)
Youngest child age five or younger	0.006	0.005	0.020
	(0.027)	(0.026)	(0.025)
Citizenship (ref = native-born citizen)			
Foreign-born citizen	−0.051	−0.033	−0.041
	(0.045)	(0.046)	(0.045)
Foreign-born noncitizen	−0.246***	−0.209***	−0.203***
	(0.042)	(0.040)	(0.040)
Union coverage		−0.040	−0.027
		(0.068)	(0.057)
Sector (ref = private for-profit)			
Government		0.090*	0.084*
		(0.037)	(0.035)
Private nonprofit		−0.002	0.001
		(0.044)	(0.043)
Part-time worker			−0.377***
			(0.031)
Constant	0.659**	0.632*	0.692**
	(0.251)	(0.268)	(0.257)

Table A1. (*continued*)

	1	2	3
State fixed effects	Yes	Yes	Yes
Industry controls	No	Yes	Yes
Occupation controls	No	Yes	Yes
Observations	3,761	3,761	3,761
R^2	0.096	0.177	0.240

Source: Authors' calculations using ATUS Leave Module (BLS 2011).
Note: Industry controls use the 2007 Census Industry Classification system to categorize workers into: agriculture, forestry, and fishing; mining, quarrying, and oil; construction; manufacturing; wholesale and retail; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration. Occupation controls use the 2010 Census Occupation Classification system to categorize workers into: management, professional, and related; services; sales and office; farming, fishing, and forestry; construction and maintenance; and production, transportation, and material moving. All models are weighted using individual weights.
*$p < .05$; **$p < .01$; ***$p < .001$

Table A2. Access to Paid Parental Leave, NLSY97

	Primary Job			Any Job		
	1	2	3	4	5	6
Female	0.065***	0.045***	0.075***	0.073***	0.051***	0.077***
	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Race (ref = white)						
Black	0.039***	0.027*	0.028**	0.042***	0.029*	0.029*
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Hispanic	0.054***	0.027*	0.027*	0.057***	0.030*	0.030*
	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)
Other	0.009	0.026	0.032	0.026	0.046	0.051
	(0.041)	(0.042)	(0.039)	(0.043)	(0.044)	(0.042)
Age	0.099*	0.060	0.032	0.057	0.027	0.006
	(0.050)	(0.049)	(0.048)	(0.052)	(0.051)	(0.050)
Age^2	−0.002*	−0.001	−0.001	−0.001	−0.000	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Relationship (ref = married)						
Cohabiting	−0.061***	−0.040***	−0.031**	−0.070***	−0.051***	−0.045***
	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)
Single	−0.068***	−0.044***	−0.042***	−0.082***	−0.060***	−0.058***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.012)
Education (ref = college or more)						
High school or less	−0.147***	−0.068***	−0.060***	−0.154***	−0.075***	−0.067***
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Some college	0.031	0.007	0.009	0.027	0.004	0.003
	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Household composition (ref = no children)						
Youngest child age six to seventeen	−0.038**	−0.029*	−0.037**	−0.047***	−0.036**	−0.042**
	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)	(0.013)
Youngest child age five or younger	−0.014	−0.003	−0.002	−0.021	−0.009	−0.006
	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)
Citizenship (ref = native-born citizen)						
Foreign-born citizen	0.077**	0.043	0.029	0.061*	0.032	0.022
	(0.026)	(0.025)	(0.025)	(0.027)	(0.027)	(0.026)
Foreign-born noncitizen	−0.068*	−0.060	−0.049	−0.078*	−0.067*	−0.057
	(0.032)	(0.033)	(0.034)	(0.034)	(0.034)	(0.035)
Union coverage		0.085***	0.070***		0.071***	0.061***
		(0.014)	(0.014)		(0.014)	(0.014)

Table A2. (*continued*)

	Primary Job			Any Job		
	1	2	3	4	5	6
Sector (ref = private for-profit)						
Government		−0.003	0.005		−0.003	−0.01
		(0.016)	(0.016)		(0.017)	(0.017)
Private nonprofit		0.059**	0.067**		0.076***	0.073***
		(0.022)	(0.021)		(0.019)	(0.019)
Part-time worker			−0.256***			−0.218***
			(0.009)			(0.010)
Constant	0.322***	−0.507	−0.079	0.343***	−0.071	0.709
	(0.006)	(0.754)	(0.736)	(0.006)	(0.816)	(0.811)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	No	Yes	Yes	No	Yes	Yes
Occupation controls	No	No	Yes	No	No	Yes
Observations	14,060	14,060	14,060	14,060	14,060	14,060
R^2	0.008	0.113	0.153	0.009	0.117	0.144

Source: Authors' calculations using NLSY97 (BLS 2011–2015).

Note: Region fixed-effects use census region categories: Northeast, Midwest, South, and West. Industry controls use the 2007 Census Industry Classification system to categorize workers into: agriculture, forestry, and fishing; mining, quarrying, and oil; construction; manufacturing; wholesale and retail; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration. Occupation controls use the 2010 Census Occupation Classification system to categorize workers into: management, professional, and related; services; sales and office; farming, fishing, and forestry; construction and maintenance; and production, transportation, and material moving. All models are weighted using individual weights.

*$p < .05$; **$p < .01$; ***$p < .001$

Table A3. Access to Employer-Provided or Subsidized Childcare, NLSY97

	Primary Job			Any Job		
	1	2	3	4	5	6
Female	0.0001	−0.016**	−0.010	0.004	−0.014*	−0.009
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Race (ref = white)						
Black	0.034***	0.025***	0.025***	0.036***	0.025***	0.025***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Hispanic	0.012	0.001	0.001	0.014*	0.003	0.003
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Other	−0.014	−0.015	−0.014	−0.012	−0.013	−0.012
	(0.023)	(0.023)	(0.023)	(0.025)	(0.025)	(0.025)
Age	−0.005	−0.016	−0.022	−0.016	−0.022	−0.026
	(0.030)	(0.030)	(0.030)	(0.032)	(0.032)	(0.032)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Relationship (ref = married)						
Cohabiting	−0.012	−0.007	−0.005	−0.013	−0.008	−0.007
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Single	−0.019**	−0.014*	−0.013	−0.021**	−0.016*	−0.016*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Education (ref = college or more)						
High school or less	−0.034***	−0.008	−0.006	−0.036***	−0.007	−0.006
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Some college	−0.003	−0.007	−0.007	−0.004	−0.009	−0.010
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Household composition (ref = no children)						
Youngest child age six to seventeen	−0.010	−0.006	−0.008	−0.007	−0.003	−0.004
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
Youngest child age five or younger	0.003	0.007	0.007	0.003	0.009	0.009
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Citizenship (ref = native-born citizen)						
Foreign-born citizen	0.028	0.020	0.017	0.022	0.014	0.012
	(0.017)	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)
Foreign-born noncitizen	−0.034*	−0.035*	−0.033*	−0.039**	−0.042**	−0.040**
	(0.013)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
Union coverage		0.001	−0.002		−0.003	−0.006
		(0.008)	(0.008)		(0.008)	(0.008)

Table A3. (*continued*)

	Primary Job			Any Job		
	1	2	3	4	5	6
Sector (ref = private for-profit)						
Government		0.015	0.016		−0.018	−0.020
		(0.010)	(0.010)		(0.010)	(0.010)
Private nonprofit		0.045***	0.047***		0.028*	0.027*
		(0.014)	(0.014)		(0.013)	(0.013)
Part-time worker			−0.052***			−0.043***
			(0.005)			(0.006)
Constant	0.142	0.249	0.337	0.310	0.268	0.421
	(0.464)	(0.461)	(0.460)	(0.495)	(0.518)	(0.517)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	No	Yes	Yes	No	Yes	Yes
Occupation controls	No	No	Yes	No	No	Yes
Observations	14,060	14,060	14,060	14,060	14,060	14,060
R^2	0.007	0.029	0.034	0.008	0.035	0.038

Source: Authors' calculations using NLSY97 (BLS 2011–2015).

Note: Region fixed effects use census region categories: Northeast, Midwest, South, and West. Industry controls use the 2007 Census Industry Classification system to categorize workers into: agriculture, forestry, and fishing; mining, quarrying, and oil; construction; manufacturing; wholesale and retail; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration. Occupation controls use the 2010 Census Occupation Classification system to categorize workers into: management, professional, and related; services; sales and office; farming, fishing, and forestry; construction and maintenance; and production, transportation, and material moving. All models are weighted using individual weights.

*$p < .05$; **$p < .01$; ***$p < .001$

Table A4. Access to Any Scheduling Flexibility in Lieu of Leave, ATUS 2011

	1	2	3
Female	0.005	−0.014	−0.025
	(0.022)	(0.023)	(0.023)
Race (ref = white)			
Black	−0.031	−0.009	−0.006
	(0.035)	(0.034)	(0.034)
Hispanic	−0.037	−0.033	−0.031
	(0.037)	(0.038)	(0.038)
Other	0.074	0.084	0.082
	(0.052)	(0.051)	(0.050)
Age	0.001	−0.003	−0.001
	(0.014)	(0.013)	(0.013)
Age^2	−0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Relationship (ref = married)			
Cohabiting	0.004	−0.013	−0.008
	(0.049)	(0.045)	(0.045)
Single	0.021	0.014	0.014
	(0.027)	(0.026)	(0.026)
Education (ref = college or more)			
High school or less	−0.155***	−0.112***	−0.115***
	(0.026)	(0.030)	(0.030)
Some college	−0.075**	−0.073*	−0.073*
	(0.028)	(0.029)	(0.029)
Household composition (ref = no children)			
Youngest child age six to seventeen	0.027	0.018	0.014
	(0.029)	(0.028)	(0.028)
Youngest child age five and younger	0.044	0.031	0.027
	(0.030)	(0.029)	(0.029)
Citizenship (ref = native-born citizen)			
Foreign-born citizen	−0.145**	−0.167***	−0.164***
	(0.047)	(0.047)	(0.046)
Foreign-born noncitizen	−0.113**	−0.097*	−0.098*
	(0.041)	(0.042)	(0.042)
Union coverage		−0.209**	−0.211**
		(0.076)	(0.073)
Sector (ref = private for-profit)			
Government		0.201***	0.199***
		(0.041)	(0.041)
Private nonprofit		0.214***	0.211***
		(0.053)	(0.053)
Part-time worker			0.095**
			(0.031)
Constant	0.630*	0.444	0.430
	(0.274)	(0.294)	(0.294)

Table A4. (*continued*)

	1	2	3
State fixed effects	Yes	Yes	Yes
Industry controls	No	Yes	Yes
Occupation controls	No	Yes	Yes
Observations	3,785	3,785	3,785
R^2	0.063	0.113	0.116

Source: Authors' calculations using ATUS Leave Module (BLS 2011).
Note: Industry controls use the 2007 Census Industry Classification system to categorize workers into: agriculture, forestry, and fishing; mining, quarrying, and oil; construction; manufacturing; wholesale and retail; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration. Occupation controls use the 2010 Census Occupation Classification system to categorize workers into: management, professional, and related; services; sales and office; farming, fishing, and forestry; construction and maintenance; and production, transportation, and material moving. All models are weighted using individual weights.
*$p < .05$; **$p < .01$; ***$p < .001$

Table A5. Access to Scheduling Flexibility by Allowed Use Type, ATUS 2011

	1 Hour of day	2 Day of week	3 Location
Panel A. Specification 1, individual controls only			
Female	−0.021	0.020	−0.027
	(0.022)	(0.022)	(0.019)
Panel B. Specification 2, individual controls and employer controls			
Female	−0.032	−0.002	−0.015
	(0.023)	(0.023)	(0.021)
Panel C. Specification 3, individual controls, employer controls, and part-time status control			
Female	−0.038	−0.002	−0.018
	(0.024)	(0.023)	(0.022)
Observations	3,779	3,776	3,775

Source: Authors' calculations using ATUS Leave Module (BLS 2011).
Note: All models include state fixed effects. See note to table 2 for information on individual and employer controls. All models are weighted using individual weights.

Table A6. Access to Regular Scheduling Flexibility, NLSY97

	Primary Job			Any Job		
	1	2	3	1	2	3
Female	0.036***	−0.002	−0.003	0.047***	0.004	0.001
	(0.009)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)
Race (ref = white)						
Black	−0.024*	−0.004	−0.004	−0.025*	−0.001	−0.001
	(0.011)	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)
Hispanic	−0.022	−0.031*	−0.031*	−0.025*	−0.030*	−0.030*
	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)
Other	−0.015	−0.005	−0.005	0.013	0.012	0.012
	(0.044)	(0.044)	(0.044)	(0.046)	(0.044)	(0.044)
Age	−0.020	−0.022	−0.021	−0.016	−0.023	−0.021
	(0.053)	(0.051)	(0.051)	(0.054)	(0.053)	(0.053)
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Relationship (ref = married)						
Cohabiting	−0.040***	−0.038**	−0.038***	−0.040***	−0.044***	−0.044***
	(0.012)	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
Single	−0.050***	−0.048***	−0.048***	−0.049***	−0.050***	−0.050***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Education (ref = college or more)						
High school or less	−0.101***	−0.067***	−0.067***	−0.113***	−0.072***	−0.073***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
Some college	−0.028	0.005	0.005	−0.036*	−0.007	−0.007
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Household composition (ref = no children)						
Youngest child age six to seventeen	−0.028*	−0.012	−0.011	−0.028*	−0.010	−0.010
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Youngest child age five and younger	−0.044***	−0.029**	−0.029**	−0.050***	−0.031**	−0.031**
	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)
Citizenship (ref = native-born citizen)						
Foreign-born citizen	0.013	0.004	0.004	0.002	−0.002	−0.001
	(0.026)	(0.025)	(0.025)	(0.027)	(0.026)	(0.026)
Foreign-born noncitizen	−0.069	−0.066	−0.067	−0.063	−0.054	−0.055
	(0.035)	(0.036)	(0.036)	(0.037)	(0.038)	(0.037)
Union coverage		−0.066***	−0.065***		−0.061***	−0.060***
		(0.013)	(0.013)		(0.014)	(0.014)
Sector (ref = private for-profit)						
Government		0.100***	0.100***		−0.108***	−0.108***
		(0.016)	(0.016)		(0.017)	(0.017)
Private nonprofit		0.168***	0.168***		0.080***	0.080***
		(0.021)	(0.021)		(0.019)	(0.019)

Table A6. (*continued*)

	Primary Job			Any Job		
	1	2	3	1	2	3
Part-time worker			0.012			0.023
			(0.012)			(0.013)
Constant	0.767	0.860	0.839	0.726	0.850	0.769
	(0.816)	(0.797)	(0.797)	(0.836)	(0.872)	(0.872)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	No	Yes	Yes	No	Yes	Yes
Occupation controls	No	Yes	Yes	No	Yes	Yes
Observations	14,060	14,060	14,060	14,060	14,060	14,060
R^2	0.021	0.069	0.069	0.024	0.083	0.084

Source: Authors' calculations using NLSY97 (BLS 2011–2015).

Note: Region fixed effects use census region categories: Northeast, Midwest, South, and West. Industry controls use the 2007 Census Industry Classification system to categorize workers into: agriculture, forestry, and fishing; mining, quarrying, and oil; construction; manufacturing; wholesale and retail; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration. Occupation controls use the 2010 Census Occupation Classification system to categorize workers into: management, professional, and related; services; sales and office; farming, fishing, and forestry; construction and maintenance; and production, transportation, and material moving. All models are weighted using individual weights.

*$p < .05$; **$p < .01$; ***$p < .001$

REFERENCES

1 Million for Worker Flexibility. n.d. "Policy." Accessed July 27, 2018. https://www.workflexibility.org/policy.

Ahn, Haksoon. 2012. "Child Care Subsidy, Child Care Costs, and Employment of Low-Income Single Mothers." *Children and Youth Services Review* 34(2): 379–87.

Bartel, Ann, Charles L. Baum, Maya Rossin-Slater, Christopher J. Ruhm, and Jane Waldfogel. 2014. "California's Paid Family Leave Law: Lessons from the First Decade." DOL-OPS-14-C-0003. Washington: U.S. Department of Labor.

Bartel, Ann, Maya Rossin-Slater, Christopher Ruhm, and Jane Waldfogel. 2017. "Employer Attitudes to Paid Family Leave." Working Paper. Sanford, Calif.: Stanford University. Accessed June 25, 2019. https://web.stanford.edu/~mrossin/Bartel_et_al_EmployerAttitudesReport_Aug2017.pdf.

Baum, Charles L., and Christopher J. Ruhm. 2016. "The Effects of Paid Family Leave in California on Labor Market Outcomes." *Journal of Policy Analysis and Management* 35(2): 333–56.

Bedard, Kelly, and Maya Rossin-Slater. 2016. "The Economic and Social Impacts of Paid Family Leave in California: Report for the California Employment Development." Los Angeles: Employment Development Department. Accessed June 25, 2019. https://www.edd.ca.gov/disability/pdf/PFL_Economic_and_Social_Impact_Study.pdf.

Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz. 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sector." *American Economic Journal: Applied Economics* 2 (July): 228–55.

Black, Sandra E., Diane Whitmore Schanzenbach, and Audry Breitwieser. 2017. "The Recent Decline in Women's Labor Force Participation." In *The 51% Driving Growth through Women's Economic Participation*, edited by Diane Whitmore Schanzenbach and Ryan Nunn. Washington, D.C.: Brookings Institution.

Blau, Francine D., and Lawrence M. Kahn. 2013. "Female Labor Supply: Why Is the US Falling Behind?" *American Economic Review* 103(3): 251–56.

———. 2017. "The Gender Wage Gap: Extent, Trends, and Explanations." *Journal of Economic Literature* 55(3): 789–865.

Blau, Francine D., and Anne E Winkler. 2017. "Women, Work, and Family." *NBER* working paper no. 23644. Cambridge, Mass.: National Bureau of Economic Research.

Boushey, Heather. 2016. *Finding Time: The Economics of Work-Life Conflict*. Cambridge, Mass.: Harvard University Press.

Budig, Michelle. 2014. "The Fatherhood Bonus and the Motherhood Penalty." Washington, D.C.: Third Way. Accessed June 25, 2019. https://www.thirdway.org/report/the-fatherhood-bonus-and-the-motherhood-penalty-parenthood-and-the-gender-gap-in-pay.

Budig, Michelle, and Paula England. 2001. "The Wage Penalty for Motherhood." *American Sociological Review* 66(2): 204–25.

Budig, Michelle, and Melissa J. Hodges. 2014. "Statistical Models and Empirical Evidence for Differences in the Motherhood Penalty Across the Earnings Distribution." *American Sociological Review* 79(2): 358–64.

Budig, Michelle, Joya Misra, and Irene Boeckmann. 2015. "Work–Family Policy Trade-Offs for Mothers? Unpacking the Cross-National Variation in Motherhood Earnings Penalties." *Work and Occupations* 43(2): 119–77.

Chaudry, Ajay, Taryn Morrissey, Christina Weiland, and Hirokazu Yoshikawa. 2017. *Cradle to Kindergarten: A New Plan to Combat Inequality*. New York: Russell Sage Foundation.

Chung, YoonKyung, Barbara Downs, Danielle H. Sandler, and Robert Sienkiewicz. 2017. "The Parental Gender Earnings Gap in the United States." *CES* working paper no. 17–68. Washington: U.S. Census Bureau.

Correll, Shelley J., Stephen Benard, and In Paik. 2007. "Getting a Job: Is There a Motherhood Penalty?" *American Journal of Sociology* 112(5): 1297–339.

Craig, Lyn, and Killian Mullan. 2010. "Parenthood, Gender and Work-Family Time in the United States, Australia, Italy, France, and Denmark." *Journal of Marriage and Family* 72(5): 1344–61.

Dey, Judith. 2014. "How Has Labor Force Participation Among Young Moms and Dads Changed? A Comparison of Two Cohorts." *Beyond the Numbers* 3, no. 19 (September). Accessed June 25, 2019. https://www.bls.gov/opub/btn/volume-3/pdf/how-has-labor-force-participation-among-young-moms-and-dads-changed.pdf.

Goldin, Claudia. 2014. "A Grand Gender Conver-

gence: Its Last Chapter." *American Economic Review* 104(4): 1091–19.

Goldin, Claudia, and Lawrence F. Katz. 2016. "A Most Egalitarian Profession: Pharmacy and the Evolution of a Family-Friendly Occupation." *Journal of Labor Economics* 34(3): 705–46.

Goldin, Claudia, and Joshua Mitchell. 2017. "The New Life Cycle of Women's Employment: Disappearing Humps, Sagging Middles, Expanding Tops." *Journal of Economic Perspectives* 31(1): 161–82.

Gruber, Jonathan. 1994. "The Incidence of Mandated Maternity Benefits." *American Economic Review* 84(3): 622–41.

Ha, Yoonsook, and Daniel P. Miller. 2015. "Child Care Subsidies and Employment Outcomes of Low-Income Families." *Children and Youth Services Review* 59 (December): 139–48.

Henly, Julia R., and Susan J. Lambert. 2014. "Unpredictable Work Timing in Retail Jobs: Implications for Employee Work-Life Conflict." *Industrial and Labor Relations Review* 67(3): 986–1016.

Herbst, Chris M. 2010. "The Labor Supply Effects of Child Care Costs and Wages in the Presence of Subsidies and the Earned Income Tax Credit." *Review of Economics of the Household* 8(2): 199–230.

Herr, Jane Leber, and Catherine D. Wolfram. 2012. "Work Environment and Opt-out Rates at Motherhood across High-Education Career Paths." *Industrial and Labor Relations Review* 65(4): 928–50.

Hipp, Lena, Taryn W. Morrissey, and Mildred E. Warner. 2017. "Who Participates and Who Benefits From Employer-Provided Child-Care Assistance?" *Journal of Marriage and Family* 79(3): 614–35.

Holzer, Harry J., and David Neumark. 2000. "Assessing Affirmative Action." *Journal of Economic Literature* 38(3): 483–568.

———. 2006. "Affirmative Action: What Do We Know?" *Journal of Policy Analysis and Management* 25(2): 463–90.

Horowitz, Juliana M., Kim Parker, Nikki Graf, and Gretchen Livingston. 2017. "Americans Widely Support Paid Family and Medical Leave, but Differ over Specific Policies." Washington D.C.: Pew Research Center.

Klerman, Jacob Alex, Kelly Daley, and Alyssa Pozniak. 2012. *Family and Medical Leave in 2012: Technical Report*. Washington: U.S. Department of Labor and Abt Associates.

Kleven, Henrik, Camille Landais, and Jakob Egholt Søgaard. 2018. "Children and Gender Inequality: Evidence from Denmark." *NBER* working paper no. 24219. Cambridge, Mass.: National Bureau of Economic Research.

Kuziemko, Ilyana, Jessica Pan, Jenny Shen, and Ebonya Washington. 2018. "The Mommy Effect: Do Women Anticipate the Employment Effects of Motherhood?" *NBER* working paper no. 24740. Cambridge, Mass.: National Bureau of Economic Research.

Laughlin, Lynda. 2013. "Who's Minding the Kids? Child Care Arrangements: Spring 2011." *Household Economics Studies* no. P70-135. Washington: U.S. Census Bureau.

Loprest, Pamela, Shayne Spaulding, and Demetra Smith Nightingale. 2019. "Disconnected Young Adults: Increasing Engagement and Opportunity." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 221–43. DOI: 10.7758/RSF.2019.5.5.11.

Malik, Rasheed. 2018. "The Effects of Universal Preschool in Washington, D.C.: Children's Learning and Mothers' Earnings." Washington, D.C.: Center for American Progress. Accessed June 25, 2019. https://www.americanprogress.org/issues/early-childhood/reports/2018/09/26/458208/effects-universal-preschool-washington-d-c/.

Mathur, Aparna, Isabel V. Sawhill, Heather Boushey, Ben Gitis, Ron Haskins, Doug Holtz-Eakin, Harry J. Holzer, et al. 2017. "Paid Family and Medical Leave: An Issue Whose Time Has Come." AEI-Brookings Working Group on Paid Family Leave. Washington, D.C.: Brookings Institution.

Milkman, Ruth, and Eileen Appelbaum. 2013. *Unfinished Business: Paid Family Leave in California and the Future of U.S. Work-Family Policy*. Ithaca, N.Y.: Cornell University Press.

National Partnership for Women & Families. 2018. "State Paid Family Leave Insurance Laws." Accessed June 25, 2019. http://www.nationalpartnership.org/our-work/workplace/state-paid-leave-laws.html.

Organization for Economic Cooperation and Development (OECD). 2017. *Starting Strong 2017: Key OECD Indicators on Early Childhood Education and Care*. Paris: OECD Publishing.

Olivetti, Claudia, and Barbara Petrongolo. 2017. "The Economic Consequences of Family Policies: Lessons from a Century of Legislation in High-Income Countries." *Journal of Economic Perspectives* 31(1): 205–30.

Pal, Ipshita, and Jane Waldfogel. 2016. "The Family Gap in Pay: New Evidence for 1967 to 2013." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 2(4): 104–27. DOI: 10.7758/RSF.2016.2.4.04.

Rodgers, William M., III. 2019. "Race in the Labor Market: The Role of Equal Employment Opportunity and Other Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 198–220. DOI: 10.7758/RSF.2019.5.5.10.

Rossin-Slater, Maya. 2017. "Maternity and Family Leave Policy." *NBER* working paper no. 23069. Cambridge, Mass.: National Bureau of Economic Research.

Rossin-Slater, Maya, Christopher J. Ruhm, and Jane Waldfogel. 2013. "The Effects of California's Paid Family Leave Program on Mothers' Leave-Taking and Subsequent Labor Market Outcomes." *Journal of Policy Analysis and Management* 32(2): 224–45.

Stearns, Jenna. 2015. "The Effects of Paid Maternity Leave: Evidence from Temporary Disability Insurance." *Journal of Health Economics* 43 (September): 85–102.

Thomas, Mallika. 2018. "The Impact of Mandated Maternity Benefits on the Gender Differential in Promotions: Examining the Role of Adverse Selection." *American Economics Review* 84(3): 622–41.

U.S. Bureau of Labor Statistics (BLS). 2011. "American Time Use Survey (ATUS) Leave Module Microdata Files." Washington: U.S. Department of Labor. Accessed November 12, 2018. https://www.bls.gov/tus/lvdatafiles.htm.

———. 2011–2015. "National Longitudinal Surveys: The NLSY97." Washington: U.S. Department of Labor. Accessed October 20, 2018. https://www.bls.gov/nls/nlsy97.htm.

———. 2017. "National Compensation Survey." Washington: U.S. Department of Labor. Accessed October 29, 2018. https://www.bls.gov/ncs/#data.

U.S. Equal Employment Opportunity Commission (EEOC). 1997. "EEOC Notice 915.002." Washington: EEOC. Accessed June 25, 2019. https://www.eeoc.gov/policy/docs/guidance-inquiries.html.

Usdansky, Margaret L, and Douglas A Wolf. 2008. "When Child Care Breaks Down: Mothers' Experiences with Child Care Problems and Resulting Missed Work." *Journal of Family Issues* 29(9): 1185–210.

Waldfogel, Jane. 1997. "The Effect of Children on Women's Wages." *American Sociological Review* 62(2): 209–17.

Weeden, Kim A. 2005. "Is There a Flexiglass Ceiling? Flexible Work Arrangements and Wages in the United States." *Social Science Research* 34(2): 454–82.

Weeden, Kim A., Youngjoo Cha, and Mauricio Bucca. 2016. "Long Work Hours, Part-Time Work, and Trends in the Gender Gap in Pay, the Motherhood Wage Penalty, and the Fatherhood Wage Premium." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 2(4): 71–102. DOI: 10.7758/RSF.2016.2.4.03.

Weisshaar, Katherine. 2018. "From Opt Out to Blocked Out: The Challenges for Labor Market Re-Entry After Family-Related Employment Lapses." *American Sociological Review* 83(1): 34–60.

Williams, Joan C., Susan J. Lambert, Saravanan Kesavan, Peter J. Fugiel, Lori A. Ospina, Erin D. Rapoport, Meghan Jarpe, Dylan Bellisle, Pradeep Pendem, Lisa McCorkell, and Sarah Adler-Milstein. 2018. "Stable Scheduling Increases Productivity and Sales." San Francisco: WorkLife Law.

Race in the Labor Market: The Role of Equal Employment Opportunity and Other Policies

WILLIAM M. RODGERS III

Fifty years have passed since the release of the Kerner Commission's findings, conclusions, and policy recommendations. This article first reviews recent trend and cross-section analysis on racial employment and earnings inequality before synthesizing the evidence on racial inequality's causes and speculating how these factors might shape future African American outcomes. In conclusion, it offers a framework for addressing the nation's persistent racial inequality.

Keywords: inequality, race, discrimination, public policy, human and social capital

Last year marked the fiftieth anniversary of President Lyndon Johnson's Kerner Commission Report. The commission's goal was to explain why the summer of 1967 riots occurred and what could be done to prevent them in the future. It concluded that "our Nation is moving toward two societies, one black, one white—separate and unequal" (Harris and Curtis 2018).

Since then, African American workers have experienced dramatic changes in the U.S. labor market. They continue to do so. On the one hand, they narrowed education and skill gaps with whites. On the other, a disproportionate share of blacks came into contact with the criminal justice system. During this half century, the U.S. economy experienced its strongest economic expansions, yet at the same time globalization (immigration and trade) and technological innovation changed how all Americans work, when they work, where they work, and with whom they work.[1] Labor-market institutions changed dramatically. Enforcement of affirmative action and antidiscrimination laws was first supported, but then challenged.

Today, they are under renewed scrutiny. Organized labor's ability to influence employment and earnings has weakened. Union membership fell from 20.1 percent in 1983 to 10.7

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1. See, for example, U.S. Department of Labor 1999.

percent in 2017.[2] Increases in wage floors, such as the minimum wage, became increasingly difficult to implement. The last time the federal minimum wage was increased was in 2009. Given these and other dramatic shifts in the economy and policy over this period, to what extent have African Americans improved their absolute and relative standing in the U.S. economy?

To answer this broad question, this article first reviews recent trend and cross-section analysis on racial employment and earnings inequality, synthesizes the evidence on inequality's causes, offers a framework for addressing inequality, and concludes with thoughts on the future prospects of African Americans and their communities.

The main conclusion is that the relative earnings of African Americans are similar to what they were in 1979. If the widespread effects of incarceration are included, the relative position falls to what it was in 1950. These sobering comparisons are because we have and continue to choose policies that put less compensation and power in the hands of workers. Macroeconomic growth cannot compensate for the forces that generate overall inequality. A summary of the supporting evidence for this conclusion follows.

UNEMPLOYMENT AND EMPLOYMENT

Since the early 1970s, the African American unemployment rate has typically remained twice as large as the white, even among college graduates. The U-6 unemployment rate from the U.S. Bureau of Labor Statistics (BLS), which includes the underemployed, suggests a picture more synonymous with the historical ratio of black and white unemployment rates.[3]

The employment-population ratio provides the most comprehensive description of the labor-market prospects for blacks. Along with job search (unemployment), this measure captures labor-force participation decisions. It tells a different story than the official BLS unemployment rate. For the first five months of 2019, the African American employment-population ratio sat at 58.2 percent, relative to a record of 60.5 percent in 2000. Further, it has just recently made up ground lost during the Great Recession.

This lack of the macroeconomy's ability to move African American outcomes past their pre-recession levels is problematic. Previous work shows that young black men's labor-market outcomes are more responsive to improvements in the macroeconomy.[4] However, a 1 percent decrease in the unemployment rate is associated with a smaller increase in the employment-population ratio of young, non-college-educated African American men and women (Freeman and Rodgers, forthcoming). This means that macroeconomic growth as a tool to reduce racial employment and wage inequality is not as effective as it was in the past.

The final major employment theme is the adverse impact that mass incarceration had and continues to have on African Americans. The consensus is that the increase in incarceration has had a major impact on young non-college-educated men and women. Criminal justice policy became more punitive, particularly for nonviolent drug offenders.

EARNINGS

Today, the black-white earnings gap is larger than it was in 1979. This expansion did not emerge gradually. During the 1960s, earnings inequality narrowed rapidly, followed by an expansion starting in the mid-1970s and through-

2. See U.S. Bureau of Labor Statistics, "Union Members 2018," News Release, USDL-19-0079, https://www.bls.gov/news.release/pdf/union2.pdf (accessed July 18, 2019).

3. The Economic Policy Institute (EPI) estimates that as of December 2018, the U-6 rates are 11.9 percent for blacks, 10.1 percent for Latinos, and 6.3 percent for whites. The estimates for African Americans and Latinos are the lowest since 1989, when estimates were first made. The series record for whites is 5.6 percent from July 2000 to January 2001. Economic Policy Institute, *State of Working America Data Library*, "Underemployment," 2019.

4. See, for example, Freeman 1973; Freeman and Rodgers 2000.

out the 1980s. During the 1990s, especially the second half of the decade, racial inequality narrowed considerably. Since 2001, the racial wage gap expanded (Wilson and Rodgers 2016).

The primary factors for the narrowing of the gap during the 1960s were a closing of the gaps in human capital, and the passing, implementation, and enforcement of affirmative action and antidiscrimination laws. Almost fifty years ago, Richard Freeman (1973) undertook one of the first empirical studies to demonstrate the ability of "governmental and related antidiscriminatory activity" in the form of the 1964 Civil Rights Act to improve both the absolute and relative economic status of African Americans. The study also revealed a key role that the 1960s economic expansion played in narrowing racial inequality.

John Bound and Freeman (1992) show that the expansion of the earnings gap during the mid-1970s through the 1980s is attributable to a slowdown in the African American acquisition of human capital, an erosion in unions especially in the Midwest, and a failure to raise the federal minimum wage. Chinhui Juhn, Kevin Murphy, and Brooks Pierce (1991) took a different empirical approach and find that growing earnings inequality that disadvantaged all less-skilled workers contributed to racial inequality's widening. The sources of the growth in earnings inequality are consistent with what Bound and Freeman (1992) identify as contributing to expansion of the wage gap.

Moving to the 1990s, Freeman and William M. Rodgers III (2000) attribute the relative improvement of African Americans to the period's "tight" labor market and a slight improvement in institutions that help to raise the wages of all low- and moderate-wage workers. These race-neutral improvements had a disproportionate impact on blacks because they were more likely to be impacted by the policy changes. Valerie Wilson and Rodgers (2016) show that since the early 2000s, the erosion in the relative position of African Americans has primarily been because of discrimination (or racial differences in skills or worker characteristics that are unobserved or unmeasured in the data) and growing earnings inequality that has reemerged.

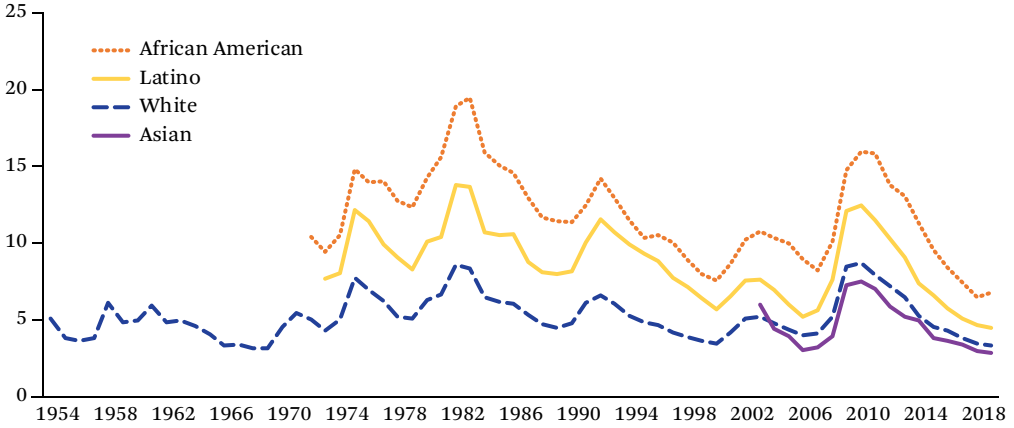
However, when racial differences in mass incarceration are taken into account, Patrick Bayer and Kerwin Charles (2016) show that the current economic status of African Americans is roughly equivalent to that in 1950. Criminal justice policies that led to widespread incarceration swamp the gains of African Americans over the period. They too exacerbate the growth in discrimination and factors such as trade, technology, and policies (such as the minimum wage) that led to greater general earnings inequality.

Documenting and explaining racial inequality is a complex task. Racial differences in labor supply, labor demand, and institutional factors all explain a portion of racial employment and earnings inequality. The reasons can depend on educational attainment, region of residence, age, and gender. They also depend on type of work. Elsewhere in this issue, Katharine Abraham and Susan Houseman (2019) show that a larger fraction of respondents who report working in informal jobs to earn money are less educated, minority, low income, unemployed, or experiencing financial distress. As Bound and Freeman (1992) conclude, no single causal explanation accounts for the nation's persistent racial inequality. Given the lack of a single narrative, no "silver bullet" policy will substantially improve the absolute and relative standing of African Americans. A comprehensive set of policies need to be not only developed but also committed to for a long time.

TREND ANALYSIS: EXPLAINING RACIAL DIFFERENCES IN EMPLOYMENT AND UNEMPLOYMENT

Figure 1 shows that during the 1970s, the African American unemployment rate fell, rose dramatically during the 1981–1982 recession, fell sharply between 1982 and 1989, rose slightly during the 1991–1992 recession, and then trended downward until the Great Recession, when it rose to above 15 percent. Since the end of the recession, it has fallen to a series record of 6.5 percent in 2018. The key observation is that even during times of prosperity (the 1980s, 1990s, and present) the African American unemployment rate typically remained twice as large as the white unemployment rate. At the time of writing, during the first five months of 2019, the black-white ratio sits at 2.1.

Figure 1. U.S. Unemployment Rates



Source: Author's compilation based on BLS unemployment rates from the Labor Force Statistics of the Current Population Survey (BLS 2019).

Regardless of educational attainment, black unemployment rates exceed white unemployment rates. For example, as of April 2019, adult African American college graduates (bachelor's degree only) have an unemployment rate of 2.7 percent, which corresponds to that of adult white high school graduates. This relationship has not changed over time.[5]

Given the prevalence of informal work (Abraham and Houseman 2019; Katz and Krueger 2019) and the presence of "fissured" labor markets (Weil 2019), the BLS U-6 unemployment rate and the employment-population ratio provide better descriptions of African American labor-market prospects.[6]

The U-6 unemployment rate measure does a better job of documenting underemployment (such as part-time work for economic reasons) that emerged prior to and during the recession and has lingered during the expansion.[7] BLS does not publish the U-6 statistic by race. The Economic Policy Institute does, however. Its estimate for December 2018 indicates a rate of 11.9 percent for African Americans, 10.1 percent for Latinos, and 6.3 percent for whites.

The employment-population ratio captures job search and participation decisions. Figure 2 reports the ratio by race. Both tell a different story than the official BLS rate. For the first five months of 2019, the African American employment-population ratio was 58.2 percent, relative to a record of 60.5 percent in 2000. Further, it took eight years of expansion before the ratio in figure 2 made up the ground lost during the Great Recession.

The employment-population ratio is important for understanding the challenges that young out-of-school and less-educated minorities face. Pamela Loprest, Demetra Nightingale, and Shayne Spaulding (2019) report the trends in participation by race and education for young adults. Of all race-gender-age demographic groups, young less-educated men typically have the lowest ratio.[8]

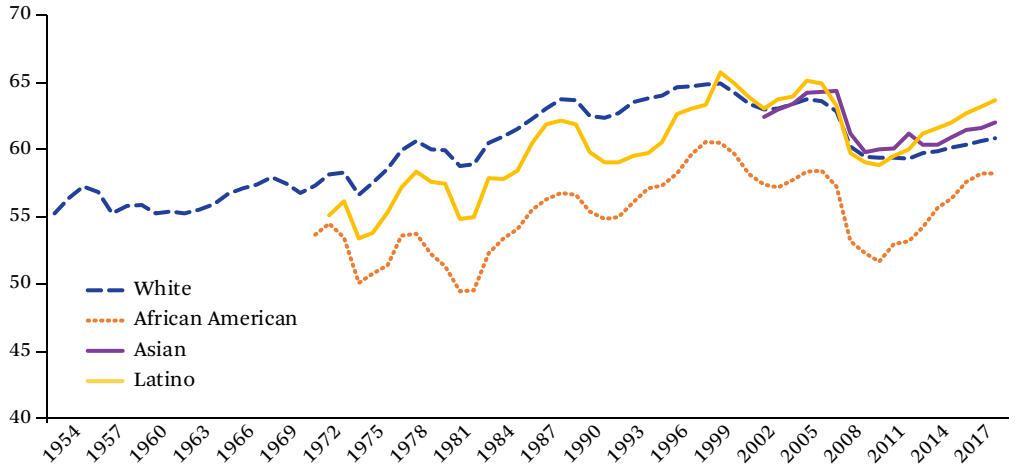
5. William Spriggs and Rhonda Williams conclude that "economic growth and black human capital acquisition are not sufficient to eradicate the two-to-one black white unemployment gap" (2000, 203).

6. Some studies on youth (sixteen-to-twenty-four-year-olds) use a measure of idleness—the percentage of the civilian population that is not employed, searching for a job, or enrolled in school.

7. The U-6 unemployment rate includes individuals working part time who want to work full time, as well as those who have actively stopped searching for work but say if they were offered a job, they would take it.

8. Freeman and his colleagues show that young less-educated black men's employment-population ratios are quite sensitive to macroeconomic conditions (Freeman 1973; Freeman and Rodgers 2000). Freeman and Rodgers

Figure 2. U.S. Employment-Population Ratio



Source: Author's compilation based on BLS unemployment rates from the Labor Force Statistics of the Current Population Survey (BLS 2019).

A large portion of racial inequality research focuses on explaining why young less-educated black men have the lowest labor-force attachment. Loprest, Nightingale, and Spaulding (2019) provide an excellent summary of the major reasons. To date, the chief factors are contact with the criminal justice system, structural racism and neighborhood effects of poverty, educational attainment differences, discrimination, and the challenges of being a youth parent (whether mother or father). The consensus is that mass incarceration has the worst impact on the employment prospects of all youth, but especially African American youth.

The following studies provide convincing evidence on incarceration's role in creating racial inequality. Bruce Western, Jeffrey Kling, and David Weiman (2001) show that the nonwhite prison population increased from 48 percent in 1979 to 67 percent in 1997, much more than their share of the overall population. One-third of African American male high school dropouts between the ages of twenty and thirty-five were in jail during the late 1990s. Western and Becky Pettit (2002) show for men in their thirties, in 1989, approximately 2 percent of white men had ever been incarcerated relative to 13 percent of black men. A decade later, these rates had jumped by 50 percent. The risks of incarceration are about three times higher for high school dropouts in their thirties. In 1999, 14 percent of white and 59 percent of black male high school dropouts in their early thirties had been incarcerated. Harry Holzer, Paul Offner, and Elaine Sorensen (2005) show that during the 1980s and 1990s, prior incarceration and child support enforcement can explain half or more of the erosion in employment among twenty-five-to-thirty-four-year-old African American males. Prior incarceration also explains some of the decline among younger cohorts.

How do these differences affect employment? Bayer and Charles (2016) show that mass incarceration even explains the overall black-white male employment gap, not just racial inequality among young less-educated men. They show that since 1960, the fractions of both African American and white men who are not working rose dramatically. A major divergence in the odds of employment between black and

(forthcoming) continue to find that a 1 percent decrease in the unemployment rate is associated with a bigger increase in the employment-population ratio of young, non-college-educated African American men.

white men occurred, the former working less than the latter.[9]

Bayer and Charles decompose the racial employment gap's growth from 1960 to 2010 into three gaps: unemployment, incarceration, and labor-force participation. They conclude that 22 percent of the growth in the probability of work racial gap is due to the increasing unemployment gap, 43 percent to the incarceration gap's widening, and 34 percent to the expansion in the labor-force participation gap.[10]

Kim Blankenship and Ana Maria Del Rio Gonzalez (2018) take a more granular approach and document the racially different experiences of ex-offenders who were jailed for drug-related offenses. Relative to whites, African Americans have fewer convictions but are more likely to be incarcerated. They are also more likely to experience incarceration as juveniles and to be incarcerated for drug charges. Whites are more likely to be let go when arrested. Incarceration had more adverse impacts on blacks' education, dropping out of school, job loss, eviction, and homelessness. Incarceration also negatively affected the personal relationships of blacks more than whites.

Finally, even a booming economy that generates extremely tight labor markets is unable to offset the adverse effects of incarceration's growth. William Darity and Samuel Myers explain this observation with their test of the Rusche and Kirchheimer hypothesis (Darity and Myers 2000; Rusche and Kirchheimer 1939). The hypothesis is that when superfluous labor exists, incarceration rates rise to drain off unwanted or unneeded workers. If true, during extremely tight labor markets such as in the 1990s, criminal justice policy should have adapted to release needed workers into the labor market. Darity and Myers find no empirical support for this explanation. In fact, they conclude that the continued surge in African American incarceration in the 1990s is due to the intersection of prison privatization and black males becoming a permanent surplus population. The criminal justice system's punishment became more punitive, particularly for nonviolent drug offenders.[11]

Earnings

Figure 3 reports BLS data on the black-white ratio of usual median weekly earnings of full-time workers. It reveals the widely documented pattern: a fall in the ratio during the 1980s, an increase during the 1990s boom, and a decline in the ratio since the early 2000s. Figure 4 presents the U.S. Census Bureau's data on the black-white ratio of median income for full-time, year-round workers. All comparisons are relative to white men. Switching to the census allows racial comparisons to extend back to 1955. The figure shows the strong relative gains of African Americans during the 1960s, especially women.

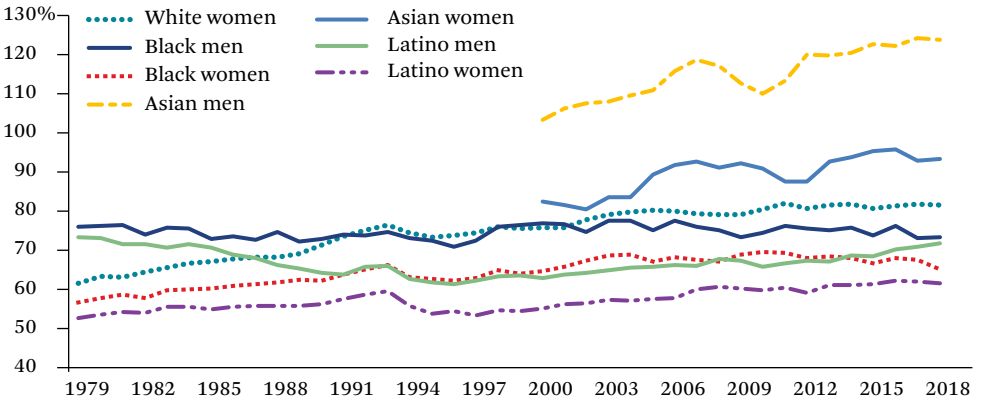
Many studies have sought to explain the ratio's movement over time. Narrowing gaps in educational attainment explain much of the gains prior to 1980. No single explanation dominates why earnings inequality expanded during the 1980s. Young, less-educated men were hurt by regional shifts in employment, the fall in the real minimum wage, deunionization, and increased crime. The expansion among college graduates is due to a large increase in the supply of black college graduates, plus heightened discrimination. Evidence indicates a re-

9. For black men, the rate jumped from 18 percent in 1960 to 37.8 percent in 2010; for white men, the rate moved from 7.9 to 18.6 percent.

10. The relative disadvantage that African American men face could be biased downward. Bayer and Charles can only infer current incarceration from their institutionalization variable. Because of that limitation, it is not possible to identify men who are unable to find work because of prior incarceration. As a result, a nontrivial share of the increase in the racial gaps in labor-force participation and unemployment could also be due to the effects of mass incarceration.

11. Derek Neal and Armin Rick (2016) also provide a detailed analysis of the causes of the increase in the criminal justice system's severity of punishment. They show that changes in sentencing policy are the primary driver for prison population growth. The movement to harsher sentencing policies disproportionately affected African Americans. The latter is startling given that most of this shift did not target blacks or crimes they commit relatively more than whites.

Figure 3. Ratio of Usual Median Weekly Earnings (Relative to White Men)



Source: Author's compilation based on BLS unemployment rates from the Labor Force Statistics of the Current Population Survey (BLS 2019).

trenchment in the enforcement of affirmative action and antidiscrimination laws. Gains during the 1990s are largely due to a reduction in discrimination as labor markets tightened and public policy became more favorable for reducing racial inequality. Continued progress in narrowing education gaps between young black and white men also contributed to improvements during this period. Yet sizable gaps remain.

Since the 1990s, the evidence has been more consistent with a worsening in discrimination, or the increased contribution of racial differences in unobservable characteristics, such as cognitive skills. As in the 1980s, the explanations depend on the background (for example, educational attainment, age, region of residence) of the African American worker. The racial gap in college completion has grown. Black-white wage inequality among less-educated workers has become less of a regional issue but a greater problem for Americans overall. Black-white wage gaps across regions have converged, but at higher levels of inequality.[12] Declining unionization has played a role in the growth of the black-white wage gap, particularly among new-entrant men. The union wage premium has also diminished.

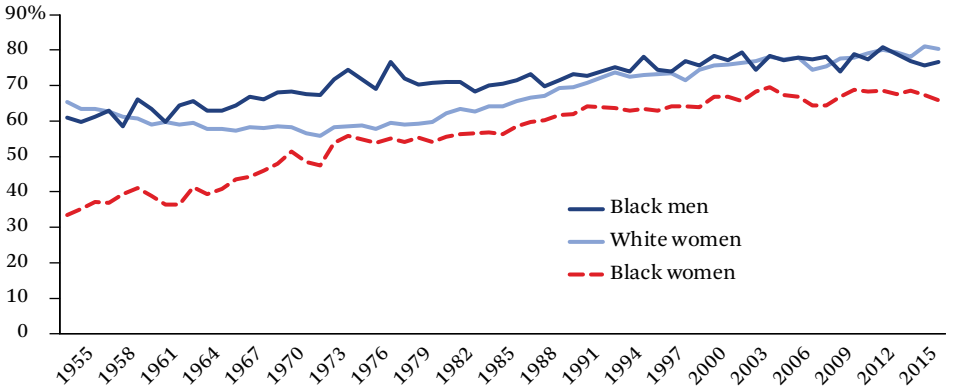
For the period from 1960 to 1980, David Card and Alan Krueger (1992) as well as others show that relative gains in the educational attainment of African Americans contributed heavily to the narrowing in the black-white wage gap among men. Specifically, they find that over this period, gains in the relative quality of black schools explain 20 percent of the convergence of black-white earnings.

Many of the early studies focus on black men, arguing that they face the greatest labor-market challenges. Two of the few studies that estimate racial wage gaps among women are Francine Blau and Andrea Beller's (1992) and Cecilia Conrad's (2001). Blau and Beller (1992) show wage gains were similar for both black men and women, but female annual earnings relative to men improved due to increased work time inputs. Because the gender earnings gap among whites narrowed during the period, black female's wages rose relative to white females as well as white males. The black female-to-white male wage ratio increased by 32.7 percent and the corresponding male ratio by 8.6 percent.

As in the employment trends, this improvement ended during the 1980s, and the gains dis-

12. The deterioration of regional economies has been bad news for less-educated blacks. Bound and Holzer (1993) show that the contraction of the nation's manufacturing sector had a more adverse impact on the employment of black men. Inasmuch as they could move to better regions, at least from a wage standpoint, this is no longer possible, or as feasible. Racial wage gaps have grown most in the Midwest and least in the South.

Figure 4. Ratio of Full-Time, Year-Round Workers' Median Income



Source: Author's compilation based on U.S. Census Bureau medium income data for full-time and year-round workers (U.S. Census Bureau 2018, table P-36).

sipated for African American men and women. The wage gap among men expanded during the 1980s (Bound and Freeman 1992; Juhn, Murphy, and Pierce 1991). One study, Bound and Freeman (1992), shows that the wage gap's widening results from shifts in demand for subgroups due to shifting regional employment, the falling real minimum wage, and deunionization. Those authors attribute the expansion of the gap among non-college-educated men to increased crime among this group and the expansion among college graduates to a large increase in the supply of black college graduates.

Juhn, Murphy, and Pierce (1991) find that race-neutral factors were a more important contributor to racial inequality's expansion in the 1980s than race-specific factors such as discrimination. These could be the factors that Bound and Freeman also identify. Agreement is less strong as to why the wage gap expanded between black and white women. Elaine McCrate and Laura Leete (1994), Deborah Anderson and David Shapiro (1996), and Blau and Beller (1992) attribute the expansion to a divergence in pay structures, especially in the returns to education.

Darity and Myers (1998) argue that retrenchment efforts to enforce affirmative action during the Reagan administrations play a key role in explaining racial inequality's expansion during the 1980s. The government's primary tools for implementing affirmative action and antidiscrimination laws is done through the Equal Employment Opportunity Commission (EEOC). Jonathan Leonard (1990, 1996) asserts that enforcement of EEO regulations ceased in the late 1970s, and discrimination worsened in the 1980s due to these retrenchment efforts.[13]

The literature is smaller on the effects that the EEOC and the Federal Contract Compliance Program have on employment diversity. Economists are not as active in this area. In a review of employment-based programs, Holzer and

13. Over the past fifty years, the EEOC's jurisdiction has grown and now includes the Equal Pay Act of 1963 (included in the Fair Labor Standards Act), Pregnancy Discrimination Act of 1978, Age Discrimination in Employment Act of 1967, Sections 501 and 505 of the Rehabilitation Act of 1973, Titles I and V of the Americans with Disabilities Act of 1990, Title II of the Genetic Information Nondiscrimination Act of 2008, and Lilly Ledbetter Fair Pay Act of 2009. These laws protect individuals from employment discrimination on the basis of race, color, religion, sex, national origin, age, disability, genetic information, and family medical history. They make it illegal to retaliate against a person for opposing employment discrimination, filing a discrimination charge, or participating in an employment discrimination investigation or lawsuit (https://www.eeoc.gov/eeoc/plan/2017budget.cfm#_Toc442168099, accessed September 7, 2019).

David Neumark (2000a, 2000b) find that affirmative action opens and expands the applicant pool for minorities without a meaningful reduction in the quality of minority candidates, and that it can be done with relatively little loss in economic efficiency. The statistical case against affirmative action based on efficiency has little merit. Ward Thomas (2000) also finds that the employment share of African Americans increases because federal contractors modify their search and application processes such that more African Americans are considered. Conrad Miller (2017) demonstrates that affirmative action increases the share of black workers and that the share of blacks continues to rise after a company is regulated.

To explain trends since the 1980s, two studies—Rodgers (2006) and Wilson and Rodgers (2016)—use the mean-based wage decomposition approach (Juhn, Murphy, and Pierce 1991). Meanwhile, a quantile distributional approach demonstrates that the general inequality explanation is limited to less-skilled workers and explains none of the erosion in the earnings of black college graduates (Rodgers 2006). The evidence in both studies is more consistent with a worsening in discrimination, or the increased contribution of racial differences in unobservable characteristics (such as cognitive skills).

Wilson and Rodgers (2016) describe and explain the black-white earnings gap by age, gender, education, and region of residence.[14] The black-white wage gap expanded more among women, but it is still largest among men. Today, black men's average hourly wages are 22.2 percent lower than those of white men in 1979. Black women were near parity with white women in 1979, but by 2015 faced a disadvantage of 19 percent.

Causes are numerous, but discrimination has consistently played a major role.[15] Since 1995, the narrowing of new-entrant racial wage gaps has largely been due to a reduction in discrimination as labor markets tightened and public policy became more favorable for reducing racial wage inequality. Continued progress in narrowing education gaps between young black and white men also contributed to improvements during the period. Yet, similar to earlier periods, the earnings gap remained large, especially among college graduates.

Since the Great Recession, gaps among new-entrant women have expanded more than among any other experience or gender group. As it was before 2000, growing discrimination is the primary source of the erosion. The growing racial gap in college completion is also a contributing factor.

Black-white wage inequality among less-educated workers is becoming less of a regional issue but more of a problem for all Americans. Since 1979, black-white wage gaps across regions have converged, but at higher levels of inequality. The gaps range from 18 to 20 percent.

Declining unionization has played a role in the growing wage gap, particularly for new-entrant males. Between 1983 and 2015, the gap grew 1.6 percent among new entrants and 3.0 percent among experienced men. Unionization's decline accounts for about one-fourth to one-fifth of this growth. Among new-entrant men and experienced men, a diminishing union wage premium accounts for 43 and 33 percent of the total growth in the men's racial wage gaps.

14. On the Great Recession's impact by race, see Vuolo, Uggen, and Lageson 2017.

15. The estimates for 1979 to 1985 in Wilson and Rodgers (2016) are similar to those in Bound and Freeman (1992) and Rodgers (2006). During the first half of the 1980s, the main sources of expansion of black-white wage gaps among new-entrant men and women were a worsening in discrimination or growing differences in unobserved skills, and the decline in relatively well-paying jobs for workers with less than a college degree. Among new-entrant men, these effects far outweighed the positive effects from narrowing the education gap. Increased discrimination was the sole cause of growing racial wage gaps for college graduates during this period. Between 1979 and 1985, racial wage gaps widened most in the Midwest and among men working in the manufacturing industry. Shifting patterns of employment across industries and occupations also contributed to growing racial wage gaps among new-entrant men during the period.

A long-standing concern with evidence in some studies is the widespread labor market exiting of young men, especially African American men, due to their contact with the criminal justice system (see, for example, Wilson and Rodgers 2016). The concern is that earnings gaps may be too small or the trend analysis for the 1990s overstates the relative gains that African Americans made because it is assumed that if incarcerated black men were employed, they probably would be earning wages at the lower end of the wage distribution. Thus, an adjustment of this nature would lower the average wage of African American men.

For example, Juhn (2003) shows that from 1969 to 1993, accounting for men who are out of the labor force, inflation-adjusted wage growth for prime-age black men falls by 40 percent and wage convergence between blacks and whites is reduced by one-third.[16] In a more recent trend analysis, Bayer and Charles (2016) include individuals who report zero earnings. Their use of quantile regression allows them to describe the black-white annual earnings gap at different points in the earnings distribution. Their analysis uncovers three key insights. First, incorporating nonemployment substantially changes the path of the earnings gap over the past thirty years. Instead of stagnating, the median earnings gap has expanded again, so much so that it is now as large as in 1950. Second, the narrowing of the median earnings gap is largely due to the narrowing of the earnings distribution and decrease in the returns to education. The earnings gap expansion since the 1980s is fully explained by the stretching of the earnings distribution.[17]

Third, the Bayer and Charles distributional analysis allows the authors to describe the differential experiences of African American workers at different points of the earnings distribution. At the bottom, sharp increases in incarceration, labor-force nonparticipation, and unemployment since 1970 have severely retarded the ability of black men to compete in the labor market. At the 90th percentile, black men made significant "positional" gains. Their relative improvement accounts for the majority of the earnings gap's narrowing at the 90th percentile from 1940 to 2014. These relative gains were largely due to blacks' catching up in their college completion rates during the 1960s and 1970s.[18]

To summarize, blacks made significant gains during the 1960s and 1990s. Losses occurred during the late 1970s and into the 1980s. Losses also occurred after the early 2000s. The collective nature of the losses outweighed the gains during the 1990s boom and current expansion. The conclusion in Wilson and Rodgers (2016) is sobering. The typical African American's relative earnings are where they were in 1979. The conclusion in Bayer and Charles (2016) is even more sobering. When mass incarceration is taken into account, the relative earnings of the typical black male are what they were in 1950.

16. Charles Brown (1984) developed a technique for adjusting for the greater censoring in African American men's wages. He also finds that the improvement is dampened when the correction for African American labor-market dropouts is incorporated in the estimates. Western and Pettit (2000) also develop an adjustment technique. It too reduces the employment rates of African Americans. They show that from 1982 to 1996, employment of young black male high school dropouts falls despite its being a period of low overall unemployment. They conclude that the standard CPS data which do not include incarceration data downward bias the black-white employment gap among young high school dropouts by 45 percent.

17. They do not find this result. Numerous studies show that increased earnings inequality contributed to a decline in the economic prospects of low- and middle-wage African Americans (Darity and Mason 1998; Juhn, Murphy, and Pierce 1991; Bound and Freeman 1992; Rodgers 2006; Wilson and Rodgers 2016).

18. Bayer and Charles speculate that these relative gains are due to the elimination of exclusionary practices that existed during the 1940s and 1950s in many professions, occupations, and higher education institutions. Since the 1980s, they argue, "affirmative action in college admissions may have better equalized effective college quality for high-ability black students, shrinking racial differences in unobserved skills within the upper part of the earnings distribution" (2016, 29–30).

CROSS-SECTION STUDIES

A wealth of analysis seeks to explain racial inequality at a point in time. These cross-section studies are the source of the greatest controversy about why racial wage inequality exists. One strand of the evidence tends to support the view that racial differences in pre-labor-market experiences (such as family, school, and neighborhood) are the key driver of the black-white gap.[19] These studies all use the National Longitudinal Study of Youth and the composite Armed Forces Qualification Test (AFQT) score to estimate how much of the black-white wage gap is explained by cognitive skill differences (O'Neill 1990; Maxwell 1994; Neal and Johnson 1996; Carneiro, Heckman, and Masterov 2005). All or most of the gap vanishes when the test score is added.[20] Premarket factors are not independent of racism and discrimination. The observed differences in premarket factors could be due to housing segregation, poverty, crime, poor public services, and schools with inadequate resources, all linked to persistent racist policies.

Another strand of evidence supports a view that these studies overstate the importance of pre-labor-market experiences and places greater emphasis on labor-market experiences. Rodgers and William Spriggs (1996, 2002) were the first to show that an AFQT score adjusted for racial differences in age at time of the exam and promotion rates explains much less of the earnings gap. The Rodgers and Spriggs adjusted score removes the large unexplained test score gap between blacks and whites.[21] What is the source of the large unobservable gap in test scores? The answer depends on how one interprets the results in Rodgers and Spriggs (2002). Derek Neal and William Johnson (1996) would interpret it as racial differences in premarket factors, but both Rodgers and Spriggs (1996) and Darity and Patrick Mason (1998) label the unobservable gap in test scores as a racial bias in the AFQT's ability to predict wages.

Two studies pursue this debate further, describing the framework on which this finding stands as one based on the notion that blacks have more pre-labor-market or cultural deficiencies than whites (Darity and Mason 1998; Myers and Chung 1998). Family, school, and neighborhood differences between black and white families (such as the larger share of black families led by single women) contribute to earnings inequality. They estimate earnings gaps between black and white family heads and find that rising female headship among black families explains a small portion of the 5 percent increase in the racial earnings gap between 1976 and 1985.

Alan Krueger (2017) adds additional support to the Darity, Myers, and Chung (1998) critique of the "deficiencies" hypothesis. Krueger links the opioid crisis to the decline in the participation of prime-age men. He shows that a larger share of prime-age white men are more likely to report having at least one of six functional disabilities (35.8 percent) than prime age, African American men are (32.3 percent).

In Krueger's regressions, blacks have a 2.8 to 4.2 percentage point lower odds of taking pain medication. Krueger goes on to connect the high rate of pain medication among men out of the labor force to Anne Case and Angus Deaton's (2015, 2017) findings of a rise in mortality for middle-age whites due to accidental drug poisonings, especially from opioid overdoses. Unfortunately, Krueger does not estimate a model with just race such that we can see whether the black-white male participation gap narrows when opioid use is added. This is not an issue with prime-age black and white women because they have the same participation rate.

The bottom line here is that the deficient

19. In early work, Cordelia Reimers (1983) concludes that although no significant labor-market discrimination was found, it occurred in the acquisition of characteristics, such as education.

20. Nan Maxwell (1994) concludes that the main source of black-white wage differential is the racial difference in quality rather than quantity of schooling. The racial gap in basic skills learned in school explains two-thirds of the wage gap. After correcting for the error in Maxwell, school quality's importance is reduced.

21. Rodgers and Spriggs (1996) do not say that the composite test score is culturally biased. In a parallel study, Rodgers is explicit that when the math and verbal scores are used to predict wages, the verbal score predicts only the wages of African Americans, and math scores predicts only the wages of whites.

family hypothesis is not as strong a factor as it was in the past for explaining racial differences (Darity, Myers, and Chung 1998). Black and white families are both suffering from excessive drug use and addiction. The opioid epidemic has brought to whites many of the problems that the crack epidemic brought to black families. Clearly, additional data on premarket and labor-market factors are needed so that social scientists can do a better job of explaining the large unexplained racial test score gap. The truth lies somewhere in the middle.

In fact, Roland Fryer, Devah Pager, and Jörgen Spenkuch (2013) show that discrimination and premarket factors both play key roles in explaining racial inequality. In a study of New Jersey workers at the end of the Great Recession, they find that discrimination accounts for at least one-third of the black-white wage offer gap of 33 percent. That is, after controlling for previous wage and a host of other characteristics, African Americans' offered wages are approximately 16 percent less than whites' offered wages. Premarket factors play a role as well. They conclude that "alleviating racial inequality may take a combination of policies to both eliminate barriers to investing in education and other premarket skills and enforce antidiscrimination policies, so that minorities are rewarded for those skills" (2013, 638).

Researchers use field and quasi experiments to test for discrimination. In-person audit studies provide the most direct and compelling evidence that discrimination remains a key feature of the black experience. They compare the odds of receiving a callback or job offer between matched pairs of black and white testers. These testers pose as real-world applicants (see, for example, Turner 1993; Bendick, Jackson, and Reinoso 1994; Pager 2003; Pager, Bonikowski, and Western 2009).[22] The consensus of these studies is that black testers face greater difficulty in the hiring process, which is attributed to discrimination. However, as James Heckman (1998) discusses, the methodology depends on the crucial assumption that the tester pairs not only are similar in observables but also share the same distribution of unobservable characteristics. Heckman also questions whether the marginal employer treats black and white candidates differently.

Correspondence studies address the first critique (Firth 1981; Esmail and Everington 1993; Bertrand and Mullainathan 2004). For example, Bertrand and Mullainathan distributed approximately five thousand fictitious resumes with randomly assigned black- or white-sounding names to more than 1,200 Boston and Chicago help-wanted ads. They found that resumes with white-sounding names received about 50 percent more follow-ups. These studies still do not address whether the marginal employer treats black and white candidates differently.

Similar to the trend analysis, a great deal of research focuses on incarceration's impact on labor-market outcomes. In fact, numerous studies find significant and persistent adverse impacts on the post-incarceration earnings of all individuals, especially blacks. In an early study, John Lott (1992) estimates the post-incarceration total monetary penalty associated with a drug conviction. Using District of Columbia data on heroin and cocaine distribution, importation, and possession violations, Lott finds that higher income is associated with higher fines but lower prison time.[23]

From the mid-1980s to late 1990s, the prison and jail population increased by 7.3 percent (Western and Pettit 2002). By 1996, a larger number of black male high school dropouts between the ages of twenty and thirty-five were in

22. In related work, Ian Ayres and Peter Siegelman (1995) conducted more than three hundred paired audits at new car dealerships. They find that car dealers gave white men significantly lower price quotes than to African American or female test buyers who used identical, scripted bargaining strategies. David Neumark, Roy J. Bank, and Kyle D. Van Nort (1995) perform an audit study of sex discrimination in hiring. They had matched pairs of men and women apply for waiters and waitresses in a variety of Philadelphia restaurants. Women had lower probabilities of a job offer and receiving an interview.

23. For example, a two-standard deviation income increase leads to a monetary penalty that is five times higher. If inflation-adjusted income pre-sentence equals $19,601 then income falls by 12.0 percent; however, if pre-sentence income equals $35,468 then income falls by 48.0 percent. Finally, conviction further reduces income.

custody than in paid employment. Over this same period, wage inequality increased, especially among minority men. To estimate the wage impacts, Western and Pettit regress wages on age, dummy variables that capture time incarcerated, and incarceration status. The evidence indicates that ex-offenders earn 7.0 percent less than non-offenders. When individual effects are included, ex-offenders earn 19.0 percent less than their counterparts. Incarceration wages after incarceration increase at a slower rate, causing the wage gap between ex-offenders and non-offenders to increase with age. Further, incarceration expands wage inequality among blacks and Hispanics and between blacks and whites by 8.0 to 9.0 percent.

Several Devah Pager studies are excellent examples in revealing the existence of a large adverse employment and earnings impact associated with having a criminal record (Pager 2003, 2007; Pager, Bonikowski, and Western 2009). Data from Washington State Department of Corrections and Unemployment Insurance Records reveal the compounding impact that incarceration has on wage growth (Lyons and Pettit 2011). Based on growth curve models, post-incarceration wage growth was 21 percent slower for blacks than for whites. Race differences in wage growth were insignificant before incarceration. Focusing on incarcerated men from 1990 to 2000, Christopher Lyons and Becky Pettit compare before and after jail experiences. A key finding is that wage returns to work experience after incarceration are about 40 percent lower. This may be due to the fact that African Americans tend to work in lower wage retail and service occupations after incarceration. Sentence length has an adverse impact on wage growth.

Blankenship and Del Rio Gonzalez (2018) continue to find that blacks are more likely to report negative effects from incarceration on well-being. They study the experiences of 302 men and women on probation or released from jail in New Haven, Connecticut. They find that blacks have fewer convictions but are incarcerated twice as often as whites. Juvenile incarceration rates and other juvenile infraction rates are higher for blacks and they are more likely to be incarcerated for drug charges. Whites are more likely to be released when caught. Blacks report more adverse impacts on education, on dropping out of school, and loss of longest job. Incarceration leads to home evictions and greater homelessness.

THE POLICY FRAMEWORK

This review confirms the seminal work by Freeman and his colleagues (Freeman 1973; Bound and Freeman 1992). The labor-market experiences of African Americans are not monolithic. In fact, the African American experience in the U.S. labor market has become increasingly more diverse. No single narrative fully explains persistent racial employment and earnings inequality.

For example, young out-of-school blacks have weaker cognitive or soft skills, face discrimination, and are more likely to come into contact with the criminal justice system. Those in the Midwest were hurt by the region's de-industrialization, and the use of robots is shown to have adverse impacts on employment of less-educated minority Midwestern workers (Freeman and Rodgers, forthcoming). Third, black college graduates faced growing discrimination in the 1980s and have been unable to recover from it, largely because of a retrenchment in policy after the Obama administration.

Thus no silver bullet policy or policy agenda will eradicate or substantially reduce the discrimination. A coordinated and comprehensive set of labor supply, labor demand, and institutional policies must be implemented and a long-term commitment to the framework and its policies is needed. Loprest, Nightingale, and Spaulding (2019) come to the same conclusion for addressing declining labor-force participation of young adults. Thus overlap in the policies we recommend for consideration is substantial.

Based on this heterogeneity of policy needs, the following section presents a policy scaffolding for addressing the nation's persistent racial employment and earnings inequality—a menu of race-neutral and race-specific approaches that will assists all Americans, especially African Americans.[24]

24. Many of these recommendations were presented in Wilson and Rodgers (2016).

BLUEPRINT FOR NARROWING RACIAL INEQUALITY

Building Human and Social Capital

- Provide children and parents with the resources and support such that they have a "high quality" preschool experience.
- Professionalize preschool teachers. Raise their status to that of K–12 teachers.
- Expand community schools and strengthen economic and financial literacy.[25]
- Expand teenagers' employment, internship, and volunteer opportunities such that they acquire soft skills. A large literature shows a strong link between teenage employment and education, wages, and contact with the criminal justice system.[26]
- Increase investment in career technical occupations, such as auto technicians, HVAC technicians, and plumbers. Simultaneously reduce the stigma that youth and parents have with working in such careers. Stress that these jobs are less likely to be outsourced, providing greater economic security that many Americans crave.[27]
- Convene policymakers, researchers, practitioners, current high school students, current college students, and recent graduates to identify and recommend ways to narrow the black-white wage gap among college graduates.
- Create a balanced policy that not only reduces child support arrearages, but also preserves and builds a noncustodial parent's connection to their children.[28]

25. According to the Coalition for Community Schools, a community school uses a public school as the anchor and then creates partnerships between the school and other community resources. It is a one-stop approach to academics, health and social services, youth and community development, and community engagement. The vision is that this integrated approach leads to improved student learning, stronger families and healthier communities (see "About," http://www.communityschools.org/aboutschools/what_is_a_community_school.aspx, accessed July 19, 2019).

26. For evidence on the links, see Pager 2003. On June 26, 2018, the Department of Labor's Employment & Training Administration awarded $84.4 million to forty-one nonprofits and state and local governments with the goal of helping Americans transition from the justice system to the workforce. The projects assist eighteen-to-twenty-four-year-old adults who have been involved in the juvenile or adult justice system, or adults age twenty-five and older who were formerly incarcerated (see https://www.dol.gov/newsroom/releases/eta/eta20180626, accessed July 19, 2019).

27. I learned about this stigma when I served on the boards of the Williamsburg–James City County Public Schools and the New Horizons Regional Education Centers. The latter provides career technical education to students from six surrounding public school districts. Students can study automotive technology, construction technology, engineering–manufacturing technology, health sciences, human services, information technology, and public service. Staff had to work with local school district counselors to sell the programs to students. Many in these communities thought that the "best" path for their children was a four-year degree. In the past, the perception was that many children sent to the once-called vocational school were trouble makers. Career technical was seen as a last resort. A 2017 Brookings report provides an outstanding overview of the challenges with promoting career technical education (Jacob 2017). The federal government has a wealth of resources that seek to help youth make decisions about careers (see, for example, "Career Exploration & Skill Development," https://youth.gov/youth-topics/youth-employment/career-exploration-and-skill-development, accessed September 7, 2019).

28. States are required to update and evaluate their child support guidelines every four years. Recently, the federal government required the use of labor-market data to assist in setting "reasonable" orders, especially for low-income obligors. The regulation was amended in December 2016 and reads as follows: "a State must consider economic data on the cost of raising children, labor market data (such as unemployment rates, employment rates, hours worked, and earnings) by occupation and skill-level for the State and local job markets, the impact of guidelines policies and amounts on custodial and noncustodial parents who have family incomes below 200 percent of the Federal poverty level, and factors that influence employment rates among noncustodial parents and compliance with child support orders" (U.S. Department of Health and Human Services 2016).

Improving Opportunity

- Expand the demand for workers in "innovation" areas of the economy and increase education and training investments in these sectors.[29] Use the forfeiture funds program of the U.S. Department of Justice (DOJ) to fund workforce development in these sectors. Explore whether the DOJ's victim compensation and equitable sharing programs can be an additional source of funding for providing education and training to communities affected by crime. This approach is consistent with the program's strategic goal no. 3, which is to compensate victims with recovered assets.[30]
- Strengthen social safety nets and rebuild the capacity of nonprofits to assist vulnerable families.[31] The Great Recession was so severe that a new set of families needed assistance. Families and communities are resilient, but recent experiences suggest that in many communities, a job loss, a natural disaster, or failed public water sources now seem to have larger individual, family, and community impacts than in the past.
- Reduce the difficulty African Americans face with either commuting or moving to suburban employment opportunities.[32]
- At the time of incarceration, assist ex-offenders, especially nonviolent drug offenders with returning to school, obtaining employment and training, driving, and voting. The First Step Act includes a few of these elements.
- An infrastructure initiative might be implemented. If so, urge elected officials to run the procurement process through federal and state governments and add provisions for education and job training. Doing so will ensure that all workers, but especially minorities and women, have a chance to compete for the infrastructure jobs (Rodgers 2016).
- Strengthen the ability of workers to bargain with their employers by combating state laws that restrict public employees' collective bargaining rights or the ability to collect "fair share" dues through payroll deductions, pushing back against the proliferation of forced arbitration clauses that require workers to give up their right to sue in public court.
- Secure greater protections for freelancers and workers in gig employment relationships.

Lessening Inequality

- Urge Congress and the president to increase the minimum wage to $15.00 per hour, create new work scheduling standards and rigorously enforce wage laws aimed at preventing wage theft.
- Urge elected officials to ensure that the Federal Reserve pursues monetary policy that targets full employment, with wage growth that matches productivity gains.

29. The economic historian Joseph Schumpeter developed the concept of *creative destruction*. As one industry contracts, other industries expand. Workers with the assistance of the public, private, and nonprofit sectors shift from contracting to expanding industries.

30. This was a suggested during a presentation at Newark's Institute for Social Justice. The Asset Forfeiture Program's mission is to punish and deter criminal activity by depriving criminals of property used in or acquired through illegal activities; promote and enhance cooperation between federal, state, local, tribal, and foreign law enforcement agencies; recover assets that may be used to compensate victims when authorized under federal law; and ensure the program is administered professionally, lawfully, and in a manner consistent with sound public policy (U.S. Department of Justice 2018). The federal government should consider using recovered assets to further fund education and training programs in areas where criminal activity has occurred. This would be a way of compensating and increasing the safety of communities with large drug and gang activity.

31. With respect to the Unemployment Insurance system, see, for example, O'Leary and Kline 2016.

32. This phenomenon is called *spatial mismatch*. Low-income urban residents, especially minorities, have difficulty commuting or moving to the suburbs, where job growth is occurring.

- Counter the Trump administration's Labor Department efforts to chip away at its practices that help to ensure safe and fair workplaces for all Americans.[33]
- Respond to the Trump administration's efforts and build a New Labor Policy based on the four features that Thomas Kochan and William Kimball (2019) lay out.[34]

Relatedly, the 2020 presidential election has sparked a public conversation about reparations. Again, this is not new. On January 3, 2017, Representative John Conyers Jr. introduced House Resolution 40, which calls for the creation of a commission that would study and consider a national apology and proposal for reparations for the institution of slavery. This would be an interesting and important national conversation.[35]

Fighting Discrimination

- Under the leaderships of the U.S. Census Bureau and BLS, identify the "unobservable measures" that impact racial inequality and include them in national surveys.
- Urge Congress to get the EEOC to develop metropolitan area measures of discrimination that could be linked to individual records in the federal surveys so that researchers could directly assess the role that local area discrimination plays.
- Urge members of Congress to request a reversal in the decision of the Trump administration's Justice Department to withdraw the Obama administration guidance documents that encouraged schools and colleges to promote diversity through their admissions process.[36] Although affirmative action policy has not changed, the pulling back of the documents sends the message to colleges and universities that the administration is placing less value on the existence of diverse learning environments.
- Advocacy groups need to gear up for a Supreme Court fight because Supreme Court Justice Anthony Kennedy, who sided with the court's liberal block in 2016 *Fisher v. University of Texas*, retired and conservative justice Brett Kavanagh took his place.
- In 2018, the EEOC experienced its first budget increase in eight years. Urge members of Congress to request more resources for the EEOC. The administration's FY18 EEOC's budget would have continued flat at $365 million, but advocacy groups' pressure to address sexual harassment led to Congress adding an additional $13 million to the budget that the president signed in early spring of 2018.
- Reduce the large backlogs and the number of days for an EEOC claim to get resolved.

33. EPI developed the Frances Perkins Project, which tracks the administration's efforts to erode wages and worker protections (https://www.epi.org/blog/how-president-trump-and-congressional-republicans-are-undercutting-wages-and-protections-for-working-people, accessed September 7, 2019).

34. The new labor policy framework should be based on four foundations. First is freedom of association. Second is a labor policy integral to a set of national economic policies that support high and growing productivity. This growth accompanies wage growth and economic security. Third is a worker voice that has no single approach or set of strategies. Fourth is labor policies that support high-quality labor-management relationships that generate worker voice and strong economic performance.

35. The argument for providing African Americans reparations is not new. Robert Browne (1990) presents a variety of present value estimates for the slavery period but also during Jim Crow and to the present. Thomas Craemer (2015) reviews these and other estimates and concludes that reparations debt ranges from $2.5 to $15.0 trillion dollars. He compares the amount to the Bush-Obama stimulus package of $1.6 trillion and the size of the U.S. economy of $15.0 trillion. Even if the estimates are placed in per capita terms, the reparations estimates are larger than the stimulus package and GDP per capita.

36. "Attorney General Jeff Sessions Rescinds 24 Guidance Documents," press release, July 3, 2018, https://www.justice.gov/opa/pr/attorney-general-jeff-sessions-rescinds-24-guidance-documents (accessed July 19, 2019).

They remain much higher than a decade ago.

LOOKING FORWARD

Implementing any type of comprehensive agenda to address racial inequality will be a challenge. President Trump's behavior toward women, minorities, immigrants, and people with disabilities has empowered and emboldened not only conservatives, but also neo-Nazi and alt-right groups to publicly express themselves. The president has also framed the national debate on income inequality solely in terms of national and personal security. He is capitalizing on the fact that many Americans feel bullied by globalization and technology, and are nervous with how the country is becoming more racially and ethnically diverse. If left unchecked, public support for even race-neutral remedies that address overall income inequality will weaken.

Although there are no signs of recession,[37] the economy has peaked, thus "maxing out" its ability to narrow racial inequality.[38] In fact, the policy direction that the Trump administration is taking has the potential of further expanding black-white employment and earnings gaps. There seems to be little appetite by this administration and the Republican Congress to increase the federal minimum wage, or provide workers with greater voice, such as strengthening the ability of unions to collectively bargain. Evidence is now emerging that the tax reform benefits that were implemented in early 2018 have gone to corporations in the form of stock buybacks, and not capital investment. Many analysts predict that the household tax cuts will favor high-income families and thus not have large micro effects on middle- and lower-income families (see, for example, Gale et al. 2018; Tankersley 2018). Further, congressional support to significantly invest in what the United Nations calls "human priority" investments is scant. These are investments in human and social capital. In fact, the Senate majority leader pointed to "entitlements," an important social capital investment, as the "key cause of rising federal deficits, and blamed Democrats for refusing to go along with proposals to cut spending by Medicare, Medicaid and Social Security" (Miller 2018).

These examples of the apparent inability to compromise and support productivity-enhancing investments do not bode well for the future. The signing of the First Step Act into law may provide a glimmer of hope. The measure is significant because it is one of the few substantive bipartisan pieces of public policy that have become law during the Trump administration. The law has four main components. It makes retroactive the reforms enacted by the Fair Sentencing Act of 2010, which lessened the disparity between crack and powder cocaine sentences at the federal level. The Marshall Project estimates that this could affect nearly 2,600 federal inmates. Second, the law reduces mandatory minimum sentences under federal law. Third, it increases "good time credits" that federal inmates can accumulate. Fourth, it allows inmates to get "earned time credits" by participating in more career, technical, and rehabilitative programs. The goal is to address prison overcrowding and use education programs to reduce the likelihood that an inmate will commit another crime once released and, as a result, reduce both crime and incarceration in the long term.

The act has its limitations. It does not re-

37. Some economists are citing evidence that the yield curve has begun to flatten, inflation has ticked upward, home sales are starting to decline in key markets, and credit card debt and late payments are rising (see Sean Motley, "6 signs we're closer to the next recession that you think," *USA Today*, September 5, 2018, https://www.usatoday.com/story/money/markets/2018/09/05/recession-signs-getting-closer/37630241, accessed July 19, 2019).

38. Freeman and Rodgers (forthcoming) find that for metropolitan areas where jobless rates fell by at least 5 percentage points from 2009–2010 to 2016–2017, men benefit the most. All men experience an increase in their employment-population ratios; women in these areas have modest employment gains. None experience increases in their inflation-adjusted wages. Further, the employment-population ratios of young black men increase only from 52.5 to 59.5 percent. Those for young black women increase from 50.4 to 54.7 percent, which leaves considerable room for improvement.

duce the number of offenders sent to prison. It does not address length of sentences or mandatory minimums. It will have limited impact because the reform focuses on federal prisons, which house only 13 percent of the nation's prisoners. The rest are in state facilities. Undocumented immigrants are not able to cash in their time credits for early release (see Haynes 2018).

Finally, the system will use an algorithm to determine who can cash in earned time credits. Critics are concerned that this algorithm could perpetuate racial and class discrimination. For example, an algorithm that prohibits offenders from earning credits due to their past criminal history may pass over African Americans and poor offenders, who are more likely to be incarcerated for crimes even though they are not more likely to actually commit those crimes. Clearly, a second chance act is needed.

Along with legislative gridlock, the economy and public policy continue to evolve in ways that are adversely affecting the income of all Americans. Bound and his colleagues (2019) find a major decline in appropriations to public universities. This decline in public resources could adversely impact the ability to narrow racial employment and wage gaps because it might reduce blacks' access to its major source of higher education opportunities. Unfortunately, Bound and his colleagues do not directly answer this question. Future research perhaps needs to explore whether the decline in appropriations has impacted black enrollment.

Shifting to the labor market, the adoption and diffusion of technology in the workplace has many workers frightened. Employers are implementing robotics and artificial intelligence in their production processes. Little is known about whether it is having disparate effects across race and ethnicity. To begin to assess the impacts, Freeman and Rodgers (forthcoming) estimate the impact that industrial robots have on the wages and employment on American workers by race, ethnicity, age, and gender.[39] First, they find that industrial robot intensity does not explain racial, ethnic, and gender differences in employment and wages. Second, their measure of a metropolitan area's robot intensity is associated with lower employment and wages in the East North Central (ENC) region. The negative effects are the worst for all young less-educated ENC men and women.

Based on these estimated relationships, Freeman and Rodgers (forthcoming) predict that without the current economic expansion, changes in metropolitan area industrial robot intensity would have led to ENC youth employment-population ratios to be 10 to 15 percentage points lower than their actual 2017 values.[40] Even though the effects are concentrated in a particular region and demographic group they are nontrivial. Like George Borjas and Freeman (2019), they conclude that the continued rapid growth in the use of robots could have adverse effects in the future.

Support is growing for public policies that reduce inequality. Abraham and Houseman (2019) show that informal work has become quite prevalent throughout the economy and that minorities are more likely to report that earnings from informal jobs are important to

39. They find that prior to the Great Recession, industrial robot intensity trended upward. However, during the recession robot intensity plummeted. Since 2009, robot intensity has sharply increased. The East North Central Census region which contains, Michigan, Ohio, Indiana, Illinois, and Wisconsin have the highest robot intensities. Minorities and youth with no more than a high school diploma live in metropolitan areas that have similar industrial manufacturing robot intensities as whites and adults. The top ten metropolitan areas with respect to robot intensity are (1) Los Angeles-Long Beach-Santa Ana, California; (2) Chicago-Naperville-Joliet, Illinois; (3) Houston-Baytown-Sugar Land, Texas; (4) Phoenix-Mesa-Scottsdale, Arizona; (5) Detroit-Warren-Dearborn, Michigan; (6) Milwaukee-Waukesha-West Allis, Wisconsin; (7) Philadelphia, Pennsylvania, Camden, New Jersey, and Wilmington, Delaware; (8) San Jose-Sunnyvale-Santa Clara, California; (9) Indianapolis, Indiana; and (10) Cleveland-Elyria, Ohio.

40. Their estimates do not control for the impact of productivity on manufacturing employment. Without robots, fewer firms might have been able to be competitive against internal suppliers, leading to less manufacturing employment. Thus their model may overstate the impact of robots on overall employment levels of different populations.

household income. A major policy concern with these employment arrangements is the lack of benefits. Future work needs to examine how informal work contributes to the racial wage gap.

Many families, especially minority families, face the challenges of balancing work and family responsibilities. One way to assist all families, black families in particular, is to implement family-friendly policies such as paid family leave, expanded public or subsidized childcare, and employer mandates for scheduling control and flexibility. Elizabeth Doran, Ann Bartel, and Jane Waldfogel (2019) show that these polices can assist all families, especially low-income families, and help them create a balance between work and home responsibilities. Although race is not a focus of their study, they do find that blacks have greater access to employer provided or subsidized childcare than whites. They also have more access to paid parental leave than whites. Blacks do have less access to regular schedule flexibility, but this seems to be fully explained by racial differences in marital status, education, household type, and type of employment.

More of the public support making changes to strengthening the Fair Labor Standards Act, such as increasing the federal minimum wage or adjusting overtime laws. Supporters argue that these policy shifts are good race-neutral ways to address racial inequality. Charles Brown and Daniel Hamermesh (2019) conclude, however, that the effect of these efforts would yield small improvements. This is consistent with my view that if as a society, we are serious about reducing persistent racial inequality, a coordinated and comprehensive set of labor supply, labor demand, and institutional policies must be implemented and that a long-term commitment must be made to the framework and its policies.

SUMMARY AND CONCLUSIONS

This article demonstrates that employment and earnings inequality between blacks and whites continues to be large and persistent. By one measure, African American relative earnings are where they were in 1979. If incarceration and nonparticipation are included, the relative status takes us back to 1950. Further, since the Great Recession, the gaps have expanded. Discrimination continues to contribute to the lives of women and minorities, but other factors also drive the disadvantages that African Americans so persistently face. Racial differences in education, experience, type of work, marital status, industry of employment, and coverage by collective bargaining agreements still contribute to the large and persistent employment and earnings gaps. However, the erosion in the relative position of all low-wage workers regardless of race and ethnicity plays a key role. The effects of incarceration on ex-offenders and their communities, especially on less-educated and less-skilled African Americans, continues to be quite substantial. The pay gap among black and white college graduates also remains largely unexplained. A variety of political, cultural, and economic headwinds, if left unchecked, will cause inequality to expand.

Continuing the current path and pace at which we are addressing the nation's racial inequality will have serious consequences. A few of these, just a few, follow.

- Larger class sizes, fewer teacher resources, and continued parental hurdles to participating in the development of their children.
- Lower labor-force participation, elevated worker idleness, higher crime and incarceration rates, and higher recidivism rates.
- Elevated levels of hunger, food insecurity, stress, anxiety, and clinical depression.
- Lower individual and community productivity, and thus competitiveness.
- Slower city, state, regional, and national economic growth.

In the aggregate, these consequences mean lower U.S. productivity and lower economic growth, that is, a less competitive economy, and a competitive economy is a must in today's globalized world. All of this adds up to a lower standard of living for all Americans.

As former National Urban League president Hugh Price said, "We have many of the solutions at our finger tips. We need the political courage to make the necessary investments

that make workplaces safe and fair for all workers."[41] Building on Price's statement and the Kerner Commission's call to action from fifty years ago, these solutions need a moral recommitment to their strengthening. Like Hugh Price, Kochan and Kimball (2019) believe that we have all the ideas needed to improve policy, but we need a major public awareness campaign that educates Americans about the weak state of labor policy. The evidence in this article and the rest of the articles in this issue provides the content.

REFERENCES

Abraham, Katharine G., and Susan N. Houseman. 2019. "Making Ends Meet: The Role of Informal Work in Supplementing Americans' Income." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 110–31. DOI: DOI: 10.7758/RSF.2019.5.5.06.

Anderson, Deborah, and David Shapiro. 1996. "Racial Differences in Access to High-Paying Jobs and the Wage Gap Between Black and White Women." *Industrial and Labor Relations Review* 49(2): 273–86.

Ayres, Ian, and Peter Siegelman. 1995. "Race and Gender Discrimination in Bargaining for a New Car." *American Economic Review* 85(3): 304–21.

Bayer, Patrick, and Kerwin Kofi Charles. 2016. "Divergent Paths: Structural Change, Economic Rank, and the Evolution of Black-White Earnings Differences, 1940–2014." *NBER* working paper no. 22797. Cambridge, Mass.: National Bureau of Economic Research.

Bendick, Marc, Jr., Charles W. Jackson, and Victor A. Reinoso. 1994. "Measuring Employment Discrimination through Controlled Experiments." *Review of Black Political Economy* 23(1): 25–48.

Bertrand, Marianne, and Sendhil Mullainathan. 2004. "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination." *American Economic Review* 94(4): 991–1013.

Blankenship, Kim M., and Ana Maria Del Rio Gonzalez. 2018. "Mass Incarceration, Race Inequality, and Health: Expanding Concepts and Assessing Impacts on Well-Being." *Social Science and Medicine* 215(1): 45–52.

Blau, Francine D., and Andrea H. Beller. 1992. "Black-White Earnings over the 1970s and 1980s: Gender Differences in Trends." *Review of Economics and Statistics* 74(2): 276–86.

Borjas, George J., and Richard B. Freeman. 2019. "From Immigrants to Robots: The Changing Locus of Substitutes for Workers." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 22–42. DOI: 10.7758/RSF.2019.5.5.02.

Bound, John, Breno Braga, Gaurav Khanna, and Sarah Turner. 2019. "Public Universities: The Supply Side of Building a Skilled Workforce." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 43–66. DOI: 10.7758/RSF.2019.5.5.03.

Bound, John, and Richard B. Freeman. 1992. "What Went Wrong? The Erosion of Relative Earnings and Employment Among Young Black Men in the 1980s." *Quarterly Journal of Economics* 107(1): 201–32.

Bound, John, and Harry J. Holzer. 1993. "Industrial Shifts, Skills Levels, and the Labor Market for White and Black Males." *Review of Economics and Statistics* 75(3): 387–96.

Brown, Charles. 1984. "Black-White Earnings Ratios Since the Civil Rights Act of 1964: The Importance of Labor Market Dropouts." *Quarterly Journal of Economics* 99(1): 31–44.

Brown, Charles C., and Daniel S. Hamermesh. 2019. "Wages and Hours Laws: What Do We Know? What Can Be Done?" *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 68–87. DOI: 10.7758/RSF.2019.5.5.04.

Browne, Robert S. 1990. "Achieving Parity Through Reparations." In *The Wealth of Races: The Present Value of Benefits from Past Injustices*, edited by Richard F. America. New York: Greenwood Press.

Card, David, and Alan B. Kreuger. 1992. "School Quality and Black-White Relative Earnings: A Direct Assessment." *Quarterly Journal of Economics* 107(1): 151–200.

Carneiro, Pedro, James J. Heckman, and Dimitry V. Masterov. 2005. "Labor Market Discrimination and Racial Differences in Premarket Factors." *Journal of Law and Economics* 48(1): 1–39.

Case, Anne, and Angus Deaton. 2015. "Rising Mor-

41. Price said this in a conversation about the National Urban League's annual publication, "The State of Black America."

bidity and Mortality in Midlife Among White Non-Hispanic Americans in the 21st Century." *PNAS* 112 (49): 15078–83.

———. 2017. "Suicide, Age, and Well-Being: An Empirical Investigation." In *Insights in the Economics of Aging*, edited by David A. Wise. Cambridge, Mass.: National Bureau of Economic Research.

Conrad, Cecilia A. 2001. "Racial Trends in Labor Market Access and Wages: Women." *In America Becoming: Racial Trends and Their Consequences*, vol. 2, edited by Neil J. Smelser, William Julius Wilson, and Faith Mitchell. Washington, D.C.: National Academies Press.

Craemer, Thomas. 2015. "Estimating Slavery Reparations: Present Value Comparisons of Historical Multigenerational Reparations Policies." *Social Science Quarterly* 96(2): 639–55.

Darity, William A., Jr., and Patrick L. Mason. 1998. "Evidence on Discrimination in Employment: Codes of Color, Codes of Gender." *Journal of Economic Perspectives* 12(2): 63–90.

Darity, William A., Jr., and Samuel L. Myers Jr. 1998. *Persistent Disparity: Race and Economic Inequality in the United States Since 1945*. Northampton, Mass.: Edgar Elgar.

———. 2000. "The Impact of Labor Market Prospects on Incarceration Rates." In *Prosperity For All? The Economic Boom and African Americans*, edited by Robert D. Cherry and William M. Rodgers. New York: Russell Sage Foundation.

Darity, William A., Jr., Samuel L. Myers Jr., and Chanjin Chung. 1998. "Racial Earnings Disparities and Family Structure." *Southern Economic Journal* 65(1): 20–41.

Doran, Elizabeth L., Ann P. Bartel, and Jane Waldfogel. 2019. "Gender in the Labor Market: The Role of Equal Opportunity and Family-Friendly Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 168–97. DOI: 10.7758/RSF.2019.5.5.09.

Esmail, A., and S. Everington. 1993. "Racial Discrimination Against Doctors from Ethnic Minorities." *British Medical Journal* 306(6879): 691–92.

Firth, Michael. 1981. "Racial Discrimination in the British Labor Market." *Industrial Labor Relations Review* 34(2): 265–72.

Freeman, Richard B.. 1973. "Changes in the Labor Market for Black Americans, 1948–72." *Brookings Papers on Economic Activity* 1973(1): 67–131.

Freeman, Richard B., and William M. Rodgers III. 2000. "Area Economic Conditions and the Labor Market Outcomes of Young Men in the 1990s Expansion." In *Prosperity for All? The Economic Boom and African Americans*, edited by Robert D. Cherry and William M. Rodgers. New York: Russell Sage Foundation.

———. Forthcoming. "The Impacts of Robots on the Labor Market Outcomes of Young Men and Women." New York: The Century Foundation.

Fryer, Roland G., Jr., Devah Pager, and Jörgen L. Spenkuch. 2013. "Racial Disparities in Job Finding and Offered Wages." *Journal of Law and Economics* 56(3): 633–89.

Gale, William G., Hilary Gelfond, Aaron Krupkin, Mark J. Mazur, and Eric Toder. 2018. "Effects of the Tax Cuts and Jobs Act: A Preliminary Analysis." Tax Policy Center. Washington, D.C.: Urban Institute and the Brookings Institution.

Harris, Fred, and Alan Curtis. 2018. *Healing Our Divided Society: Investing in America Fifty Years After the Kerner Report*. Philadelphia, Pa.: Temple University Press.

Haynes, Chrysse. 2018. "The First Step Act: A Pros and Cons List." Equal Justice Under the Law, August 30. Accessed July 19, 2019. https://equaljusticeunderlaw.org/thejusticereport/2018/8/21/the-first-step-act-a-pros-and-cons-list.

Heckman, James J. 1998. "Detecting Discrimination." *Journal of Economic Perspectives* 12(2): 101–16.

Holzer, Harry J., and David Neumark. 2000a. "Assessing Affirmative Action." *Journal of Economic Literature* 38(3): 483–568.

———. 2000b. "What Does Affirmative Action Do?" *Industrial and Labor Relations Review* 53(2): 240–71.

Holzer, Harry J., Paul Offner, and Elaine Sorensen. 2005. "Declining Employment Among Young Black Less-Educated Men: The Role of Incarceration and Child Support." *Journal of Policy Analysis and Management* 24(2): 329–50.

Jacob, Brian A. 2017. "What We Know About Career and Technical Education in High School." Washington, D.C.: Brookings Institution. Accessed July 19, 2019. https://www.brookings.edu/research/what-we-know-about-career-and-technical-education-in-high-school.

Juhn, Chinhui. 2003. "Labor Market Dropouts and Trends in the Wages of Black and White Men." *ILR Review* 56(4): 643–62.

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1991. "Accounting for the Slowdown in Black-White Wage Convergence." In *Workers and Their*

Wages: Changing Patterns in the United States, edited by Marvin H. Kosters. Washington, D.C.: American Enterprise Institute.

Katz, Lawrence F., and Alan B. Krueger. 2019. "Understanding Trends in Alternative Work Arrangements in the United States." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 132–46. DOI: 10.7758/RSF.2019.5.5.07.

Kochan, Thomas A., and William T. Kimball. 2019. "Unions, Worker Voice, and Management Practices: Implications for a High-Productivity, High-Wage Economy." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 88–108. DOI: 10.7758/RSF.2019.5.5.05.

Krueger, Alan B. 2017. "Where Have All the Workers Gone? An Inquiry into the Decline of the U.S. Labor Force Participation Rate." *Brookings Papers on Economic Activity* 2017(2): 1–87.

Leonard, Jonathan S. 1990. "The Impact of Affirmative Action Regulation and Equal Employment Law on Black Employment." *Journal of Economic Perspectives* 4(4): 47–63.

———. 1996. "Wage Disparities and Affirmative Action in the 1980's." *American Economic Review* 86(2): 285–89.

Loprest, Pamela, Shayne Spaulding, and Demetra Smith Nightingale. 2019. "Disconnected Young Adults: Increasing Engagement and Opportunity." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 221–43. DOI: 10.7758/RSF.2019.5.5.11.

Lott, John R. 1992. "An Attempt at Measuring the Total Monetary Penalty from Drug Convictions: The Importance of an Individual's Reputation." *Journal of Legal Studies* 21(1): 159–87.

Lyons, Christopher J., and Becky Pettit. 2011. "Compound Disadvantage: Race, Incarceration, and Wage Growth." *Social Problems* 58(2): 257–80.

Maxwell, Nan L. 1994. "The Effect on Black-White Wage Differences of Differences in the Quantity and Quality of Education." *ILR Review* 47(2): 249–64.

McCrate, Elaine, and Laura Leete. 1994. "Black-White Wage Differences among Young Women, 1977–86." *Industrial Relations* 33(2): 168–83.

Miller, Conrad. 2017. "The Persistent Effect of Temporary Affirmative Action." *American Economic Journal: Applied Economics* 9(3): 152–90.

Miller, Mark. 2018. "Social Security and the U.S. Deficit: Separating Fact From Fiction." *U.S. News Money*, November 1. Accessed July 19, 2019. https://money.usnews.com/investing/news/articles/2018-11-01/social-security-and-the-us-deficit-separating-fact-from-fiction.

Myers, Samuel L., and Chanjin Chung. 1998. "Criminal Perceptions and Violent Criminal Victimization." *Contemporary Economic Policy* 16(3): 321–33.

Neal, Derek A., and William R. Johnson. 1996. "The Role of Premarket Factors in Black-White Wage Differences." *Journal of Political Economy* 104(5): 869–95.

Neal, Derek A., and Armin Rick. 2016. "The Prison Boom and Sentencing Policy." *Journal of Legal Studies* 45(1): 1–41.

Neumark, David, Roy J. Bank, and Kyle D. Van Nort. 1995. "Sex Discrimination in Restaurant Hiring: An Audit Study." *NBER* working paper no. 5024. Cambridge, Mass.: National Bureau of Economic Research.

O'Leary, Christopher, and Kenneth J. Kline. 2016. "Are State Unemployment Insurance Reserves Sufficient for the Next Recession?" *Upjohn Institute* working paper no. 16-257. Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research.

O'Neill, June. 1990. "The Role of Human Capital in Earnings Differences between Black and White Men." *Journal of Economic Perspectives* 4(4): 25–45.

Pager, Devah. 2003. "The Mark of a Criminal Record." *American Journal of Sociology* 108(5): 937–75.

———. 2007. "The Use of Field Experiments for Studies of Employment Discrimination: Contributions, Critiques, and Directions for the Future." *The ANNALS of the American Academy of Political and Social Science* 609(1): 104–33.

Pager, Devah, Bart Bonikowski, and Bruce Western. 2009. "Discrimination in a Low Wage Labor Market: A Field Experiment." *American Sociological Review* 74(5): 777–99.

Reimers, Cordelia W. 1983. "Labor Market Discrimination Against Hispanic and Black Men." *Review of Economics and Statistics* 65(4): 570–79.

Rodgers, William M., III. 2006. "Male White-Black Wage Gaps, 1979–1994: A Distributional Analysis." *Southern Economic Journal* 72(4): 773–93.

———. 2016. "Trump's Infrastructure Plan Can't Neglect Human Needs." *New York Times*, December 20. Accessed July 19, 2019. https://www.nytimes

.com/roomfordebate/2016/12/20/can-trumps-infrastructure-plan-work/trumps-infrastructure-plan-cant-neglect-human-needs.

Rodgers, William M., III, and William E. Spriggs. 1996. "What Does the AFQT Really Measure: Race, Wages, Schooling and the AFQT Score." *Review of Black Political Economy* 24(4): 13–46.

———. 2002. "Accounting for the Racial Gap in AFQT Scores: Comment on Nan L. Maxwell, 'The Effect on Black-White Wage Differences of Differences in the Quantity and Quality of Education.'" *ILR Review* 55(3): 533–41.

Rusche, Georg, and Otto Kirchheimer. 1939. *Punishment and Social Structure*. Oxford: Oxford University Press.

Spriggs, Willam E., and Rhonda M. Williams. 2000. "What Do We Need to Explain About African American Unemployment?" In *Prosperity for All: The Economic Boom and African Americans*, edited by Robert D. Cherry and William M. Rodgers. New York: Russell Sage Foundation.

Tankersley, Jim. 2018. "How the Trump Tax Cut Is Helping to Push the Federal Deficit to $1 Trillion." *New York Times*, July 25. Accessed July 19, 2019. https://www.nytimes.com/2018/07/25/business/trump-corporate-tax-cut-deficit.html.

Thomas, Ward. 2000. "Mitigating Barriers to Black Employment Through Affirmative Action Regulations: a Case Study." *Review of Black Political Economy* 27(3): 81–102.

Turner, Margery Austin. 1993. "Limits on Neighborhood Choice: Evidence of Racial and Ethnic Steering in Urban Housing Markets." In *Clear and Convincing Evidence: Measurement of Discrimination in America*, edited by Michael Fix and Raymond J. Struyk. Washington, D.C.: Urban Institute.

U.S. Bureau of Labor Statistics (BLS). 2019. "Labor Force Statistics from the Current Population Survey." Washington: Government Printing Office. Accessed August 7, 2019. www.bls.gov/cps/data.htm.

U.S. Census Bureau. 2018. "Historical Income Tables: People." Washington: Census Bureau. Last revised August 28, 2018. Accessed August 7, 2019. https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-people.html.

U.S. Department of Health and Human Services. 2016. "Flexibility, Efficiency, and Modernization in Child Support Enforcement Programs." *Federal Register* 81(244): 93492. Accessed July 19, 2019. https://www.govinfo.gov/content/pkg/FR-2016-12-20/html/2016-29598.htm.

U.S. Department of Justice, Office of the Inspector General. 2018. "Audit of the Assets Forfeiture Fund and Seized Asset Deposit Fund Annual Financial Statements Fiscal Year 2018." Audit Division 19-05. Washington: Government Printing Office. Accessed July 19, 2019. https://oig.justice.gov/reports/2018/a1905.pdf.

U.S. Department of Labor. 1999. *Futurework: Trends and Challenges in the 21*st *Century*. Washington: Government Printing Office.

Vuolo, Mike, Christopher Uggen, and Sarah Lageson. 2017. "Race, Recession, and Social Closure in the Low-Wage Labor Market: Experimental and Observational Evidence." *Research in the Sociology of Work* 30:141–83.

Weil, David. 2019. "Understanding the Present and Future of Work in the Fissured Workplace Context." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 147–65. DOI: 10.7758/RSF.2019.5.5.08.

Western, Bruce, Jeffrey R. Kling, and David F. Weiman. 2001. "The Labor Market Consequence of Incarceration." *Crime and Delinquency* 47(3): 410–27.

Western, Bruce, and Becky Pettit. 2000. "Incarceration and Racial Inequality in Men's Employment." *Industrial Labor Relations Review* 54(1): 3–16.

———. 2002. "Beyond Crime and Punishment: Prisons and Inequality." *Contexts* 1(3): 37–43.

Wilson, Valerie, and William M. Rodgers III. 2016. "Black-White Wage Gaps Expand with Rising Wage Inequality." Washington, D.C.: Economic Policy Institute.

Disconnected Young Adults: Increasing Engagement and Opportunity

PAMELA LOPREST, SHAYNE SPAULDING, AND DEMETRA SMITH NIGHTINGALE

Even in a strong job market with low overall unemployment, a substantial number of youth are disconnected from work and schooling. Being disconnected during early ages (between sixteen and twenty-four) can have negative impacts on future labor-market success and other outcomes. This article presents data and summarizes the literature on the causes and consequences of youth disconnection. It discusses evidenced-based policies and programs that show promise for engaging or reengaging young people and meeting the needs of particular groups of disconnected youth, including effective education and training programs (both in secondary and postsecondary contexts), targeted reforms to community college systems, strategies for addressing barriers to work and school including provision of comprehensive services, and demand-oriented solutions that improve job opportunities for youth.

Keywords: youth, disconnected, employment, unemployment, education, training

Over the past several decades, the United States has seen declines in employment among young adults in their late teens and early twenties. These trends have led to widespread concerns about the consequences for young people, especially those who are also not enrolled in school. Early adult years are critical for building human capital through work and schooling, and are the stage of life during which young people start to make career decisions and build connections that can be pivotal for future labor-market success. Early work experience not only provides income for young people and their families in the immediate term, but also can provide foundational skills and experience for later employment and careers. The possible consequences for those not working or in school in these early years include being less prepared for work, facing unstable employment, and following a trajectory of lower-wage

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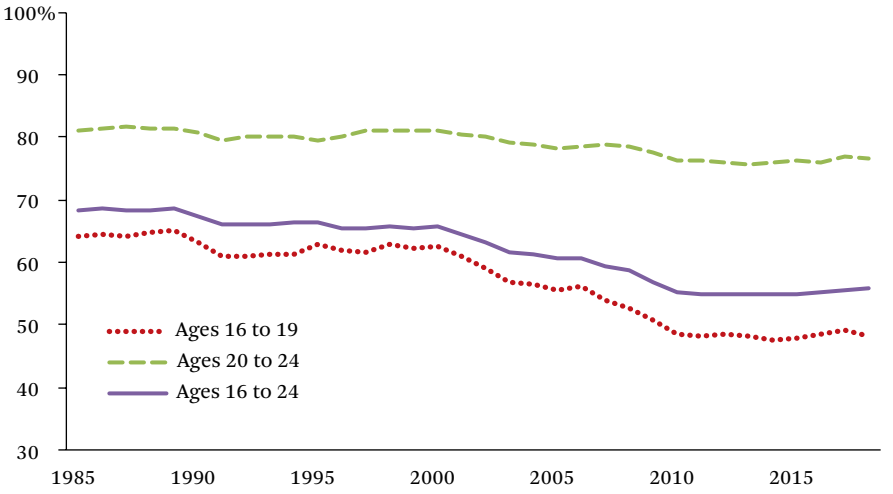
Figure 1. Labor-Force Participation of Youth, by Age



Source: Authors' compilation based on Current Population Survey data (BLS 2018).

employment. Disconnection from work and school correlates with other issues such as increased criminal activity, increased drug use, and lower levels of educational attainment overall. For young people who are parents themselves, the effects of not working can be particularly serious, increasing the likelihood that their children will grow up in poverty.

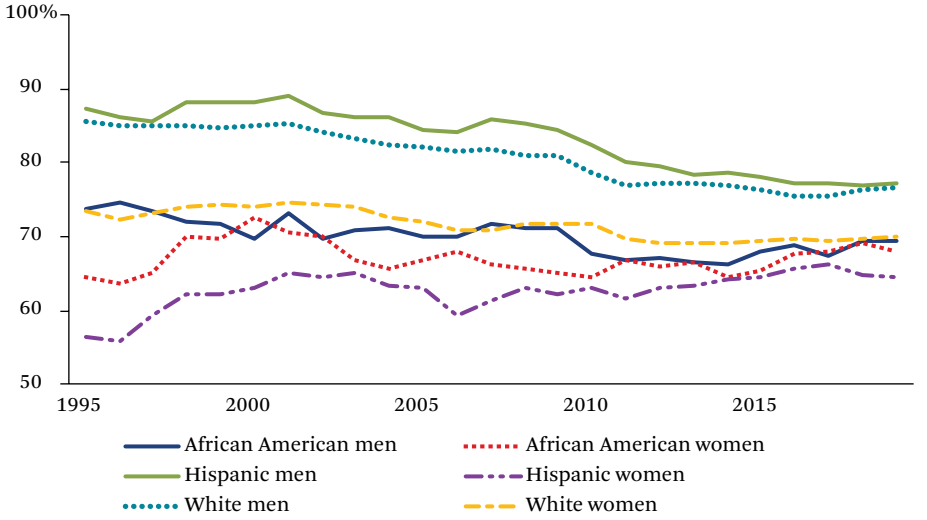
Research suggests that a large part of the decline in youth employment stems from increasing numbers of young adults attending school, both secondary and postsecondary. However, despite this trend, a significant group of young people are disconnected, that is, neither in the labor force nor in education or training. This article summarizes trends in youth employment, focusing on youth who are disconnected from both work and school during these formative years. It synthesizes the literature on the causes for and consequences of youth being disconnected and discusses evidenced-based policies and programs that show promise for engaging or reengaging young people to improve their labor-market opportunities now and in the future. We argue that tackling the issue of youth disconnection requires going beyond efforts to improve overall economic conditions; it is essential to develop and implement programs targeted to meet the specific needs of this population, as well as system reforms and policy changes that address the variety of causes of youth disconnection.

EMPLOYMENT AND DISCONNECTION AMONG YOUNG PEOPLE

Labor-force participation (LFP) of young people ages sixteen to twenty-four has been declining since the 1980s, though it has been fairly flat since 2010 (figure 1). Youth employment fell during the recession that began in 2007 and has been recovering since 2010, but remains below pre-recession levels. The decline in youth LFP is largest among those ages sixteen to nineteen. As many youth in this younger age group live with parents and attend secondary school, it is not surprising that LFP levels for this younger group are lower than for youth ages twenty to twenty-four. The LFP for the younger ages hovered near 48 percent in recent years and the older group at approximately 75 percent. The U.S. Bureau of Labor Statistics (BLS) projects that LFP will continue to decline for both groups, with LFP in 2026 projected to be 32 percent for youth sixteen to nineteen and 69 percent for youth ages twenty to twenty-four (BLS 2018).

Among older youth ages twenty to twenty-four, declines in LFP have occurred since 1995 across gender and race-ethnicity groups with

Figure 2. Labor-Force Participation of Youth Ages Twenty to Twenty-Four, by Gender and Race



Source: Authors' compilation based on Current Population Survey data (BLS 2018).
Note: Published LFP data not available prior to 1995 for Hispanic men and women.

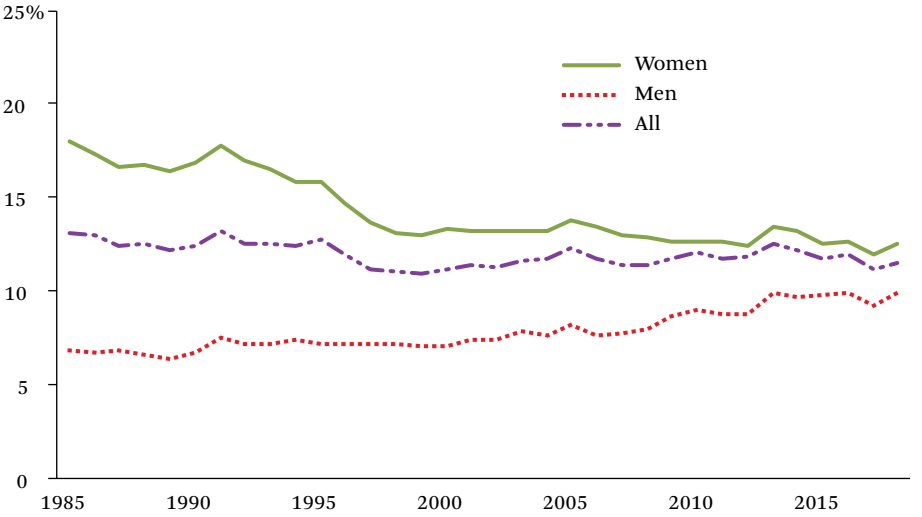
the exception of Hispanic women. Young white men and young Hispanic men have had the largest declines, but their LFP remains higher than the other groups. Most recently, in the last five years, rates have been fairly steady for all groups (figure 2).

At the same time that youth LFP was falling, more youth were attending school. From 1998 to 2014, the years of greatest decline in youth LFP, the percentage of youth in school rose, particularly among those ages sixteen to nineteen (Canon, Kudlyak, and Liu 2015). A recent study showed that over roughly the last decade, declines in employment among school enrollees coupled with an increase in school participation accounted for the majority of the overall decline in employment for those ages sixteen to twenty-four (Abraham and Kearney 2018). When young people's employment falls while they are in school, there may be less reason for concern about the consequences of lower employment, at least in the near term. This is especially true for those ages sixteen to nineteen, who are more likely to be in secondary school.

Despite these trends, there is still reason for concern about low employment rates among those not attending school, particularly for youth of postsecondary school age. Youth who are not in the labor force and not in school are variously referred to as disconnected, opportunity youth, idle, or NEET (not employed or in education or training). (We refer to this group as disconnected throughout the rest of the article.) The percentage of youth ages twenty to twenty-four who are disconnected has remained relatively steady since 2007 (the beginning of the Great Recession), hovering around 12 percent despite small declines in LFP (figure 3). This suggests that the Great Recession, and recovery from it, did not have a large impact on the total numbers disconnected in this age group. However, the longer-term trends since 1985 show that, over time, young men have experienced an increasing rate of being disconnected and young women have experienced a decline. In 2018, almost 10 percent of all men ages twenty to twenty-four and 13 percent of all women were not working, actively seeking work, or in school. These numbers do not include those living in institutions, such as those incarcerated, so these percentages could be even higher.

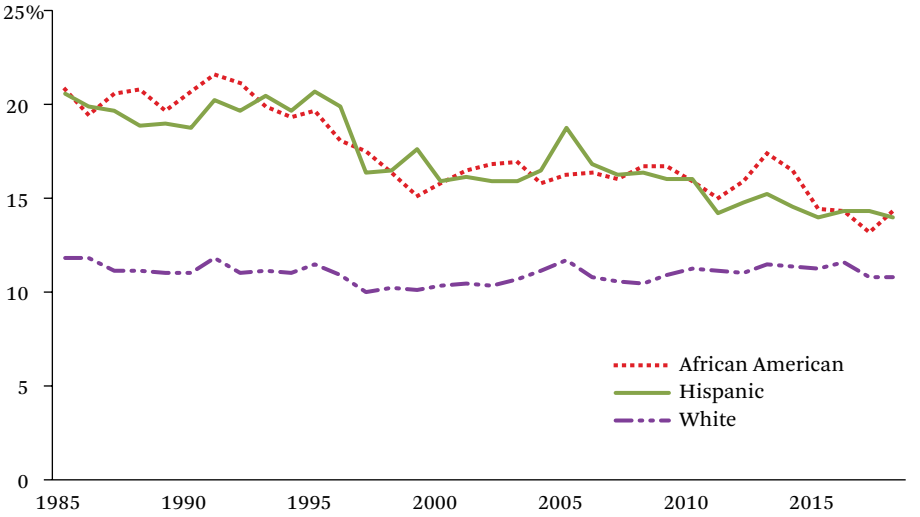
The percentages of youth who are not working and not in school also differ by race and ethnicity (figure 4). Trends since 1985 show a decline in the percentage of African American

Figure 3. Percentage of Disconnected Youth Ages Twenty to Twenty-Four, by Gender



Source: Authors' compilation based on Current Population Survey data (BLS 2018).

Figure 4. Percentage of Disconnected Youth Ages Twenty to Twenty-Four, by Race and Ethnicity

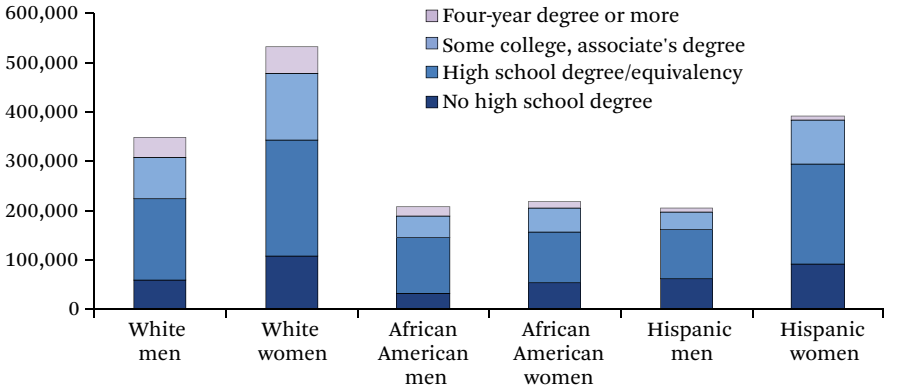


Source: Authors' compilation based on Current Population Survey data (BLS 2018).

and Hispanic youth who are disconnected; the percentage of comparable white youth has remained relatively flat. An increase in the labor force participation of young Hispanic women may play a role in this decline (see figure 2). Despite the declines, the rate of disconnected African American youth and Hispanic youth remains higher than that of white youth.

Being disconnected from work and school is more common among youth with less education (Canon, Kudlyak, and Liu 2015). Of youth ages twenty to twenty-four with less than a high school degree, 29 percent are disconnected; of those with a high school degree or equivalency certificate, 16 percent are. This is relative to only 5 percent of those who have some college

Figure 5. Number of Disconnected Youth Ages Twenty to Twenty-Four



Source: Authors' calculations from Current Population Survey, ASEC 2018 (U.S. Census Bureau 2019).

or a college degree.[1] This pattern is true across gender and race groups. More than 65 percent of disconnected youth of all gender and race groups have not attended school beyond receiving a high school diploma or equivalent (figure 5).

It is likely that some informal work activity among disconnected youth occurs and is not being captured in these data. However, little information is available on the extent of this activity among youth and whether it has the positive future impact of formal work. This is an area to continue to explore in future research.

CAUSES OF YOUTH DISCONNECTION

Despite increases in the number of youth who are in school over time, over the last several decades, a substantial and steady percentage of youth who are not in school and not in the labor force remains. Understanding the reasons for these continued levels of disconnection among youth, particularly certain subgroups, can help target potential solutions.

A considerable literature addresses the causes of the overall decline in labor-force participation in the United States. Some of the reasons for the decline in prime-age labor-force participation are relevant for youth being disengaged from the labor market as well. For the population overall, declining employment has been accompanied by declining or stagnant wages over the last several decades, particularly for less-educated men. In his article in this issue, William Rodgers (2019) discusses the disparities in wages for African American men relative to other groups. The wage premium for more educated workers continued to rise through 2000 and has remained relatively constant since then with continuing positive returns to those earning a college degree (Abel and Dietz 2014). Rodgers notes that the gap in wages for college-educated black men relative to similarly educated white men has actually widened over the past several decades. For less-skilled workers, the demand for labor has been negatively affected by multiple forces. Katharine Abraham and Melissa Kearney (2018) review the literature on the potential demand-side causes of the decline in prime-age employment, concluding that global competition and increases in automation are important factors. Technology that increases the relative productivity of higher-skilled workers has a negative impact on demand for less-skilled workers (Autor, Katz, and Kearney 2008). George Borjas and Richard Freeman (2019) discuss the particular impact of technology replacing immigrant workers in the labor market. Similar factors play a role in the increase in schooling of young people but are relevant for the lack of employment opportunities for less-skilled youth not in school as well.

1. Authors' calculations from the 2018 Annual Social and Economic (ASEC) Supplement to the Current Population Survey (U.S. Census Bureau 2019).

Another potential factor contributing to young people's being disconnected is a societal shift that may be making being out of work and school more culturally acceptable for young adults. For example, Alan Krueger (2017) presents measures of self-reported subjective well-being that show young men and women who are not in the labor force have as positive (if not more positive) a view of their life circumstances as employed youth. One theory is that improvements in video game technology have contributed to decreased employment among young men (Aguiar et al. 2017). Abraham and Kearney (2018) suggest an alternate explanation, that for young men, the stigma of being disconnected (and playing video games) has declined. Research on youth labor-market participation in the 1990s suggests that one way young workers adapted to depressed labor demand was to continue living with their parents, which in turn buffered against decreased income (Card and Lemieux 1997). In fact, a great deal of literature addresses the lengthening of adolescence and slower transitioning to adulthood, though this is often associated with higher income families (Twenge and Park 2017).

Another possible reason for young people being disconnected may be the increased abuse of opioids, although it is unclear whether drug abuse leads to declining labor-force participation or declining participation leads to drug abuse. Krueger (2017) discusses this for nonemployment of prime-age men, but it may also play a role for youth. Nonmedical use of prescription drugs is highest among youth ages eighteen to twenty-five (relative to older groups) and deaths due to prescription drug overdose increased fourfold from 1999 to 2014 for this group (National Institute on Drug Abuse 2015). It is not clear whether or how much this translates into or is related to declines in employment and schooling for this age group. One recent study, however, finds that opioid abuse leads to economic losses resulting from reduced hours in productive employment and household activity (Florence et al. 2016).

Involvement with the criminal justice system is another cause of disconnection among youth. Criminal justice involvement peaks in the teenage years and declines in the early twenties, but can have lasting impacts. Of course, those incarcerated are, by definition, detached from the labor market. Youth involved in the juvenile justice system often have trouble transitioning into adulthood. Criminal justice involvement interrupts connections to school, family, and work. Involvement in the system itself exposes youth to negative influences and increases the likelihood of further involvement in criminal activities (Scott and Steinberg 2008). Time incarcerated may lead to worse labor-market outcomes when released, due to less work experience and human capital as well as the stigma with employers of incarceration. Studies suggest incarceration as a juvenile or adult leads to diminished labor-market outcomes (Aizer and Doyle 2015; Mueller-Smith 2015; Holzer, Raphael, and Stoll 2006; Pager 2003) and a host of additional issues that could also affect employment including worse health, diminished social relationships and community connections, and increased likelihood of recidivism (Western 2006).

Other factors are important for understanding the lower employment rate of specific groups of young people, especially African Americans, youth involved with the criminal justice system, and young parents. Criminal justice involvement has a disproportionate effect on certain racial groups and, in turn, impacts employment. Despite decreases over the last decade in overall rates of incarceration and in racial disparities among those incarcerated (Carson 2018), differences remain for certain groups. African American, Latino, and Native American youth under eighteen are incarcerated at disproportionate rates relative to white youth (W. Haywood Burns Institute 2016). Young adults of color (ages eighteen to twenty-nine), both men and women, are also incarcerated at disproportionate rates, although rates are higher for men than women. In 2010, 8 percent of African American men ages twenty to twenty-four were incarcerated (Child Trends 2012). Other measures of justice system involvement—such as arrests, convictions, and sentence lengths—also reflect racial disparities. These differences reflect higher rates of criminal justice involvement, but are also likely the result of higher rates of surveillance and racial bias in law enforcement and sentencing (Liberman and Fontaine 2015).

Some of the differences across racial groups are likely due to structural racism and neighborhood effects of poverty, which disproportionately affect different groups and, in turn, can affect employment prospects of young adults (Spaulding et al. 2015). Young people of color tend to live in low-income, racially segregated communities due to both housing discrimination and income inequality (Rawlings 2015). Social isolation can limit access to employment networks, which are critical for finding and securing employment, particularly at young ages (Granovetter 1995). A related issue is a spatial mismatch to available job opportunities and limited transportation options to access jobs, and some research has shown that African Americans are more subject to these geographic issues than whites (Hellerstein, Neumark, and McInerney 2008; Ellwood 1986). Other neighborhood effects include a higher likelihood of attending substandard schools, as well as higher rates of crime and chances of arrest (Liberman and Fontaine 2015; Holzer, Offner, and Sorensen 2005).

Discrimination is also a key issue for understanding lower employment rates and higher rates of unemployment and nonparticipation among African American youth. Discrimination in hiring has direct impacts on employment, confirmed by employment audit studies (where white and nonwhite job candidates of similar qualifications apply for jobs) that have shown worse outcomes for nonwhite candidates (Pager, Western, and Bonikowski 2009). Discrimination in other arenas, such as housing, criminal justice, and education systems, can all have an impact on the labor-market outcomes of these youth.

Educational disparities by race also affect young people's employment prospects. Although all groups of youth have experienced increases in school participation, a gap remains in educational attainment by race, which, given changes in returns to education, can disadvantage these groups in the labor market. African American and Latino youth ages twenty to twenty-four are less likely to have completed or be attending postsecondary schooling. In part, this reflects differences in earlier schooling levels by race, including the neighborhood effect of attending substandard schools (Rawlings 2015), differences in early childhood education and school readiness (Magnuson and Waldfogel 2005), and lower high school graduation rates (U.S. Department of Education 2018). Postsecondary education also poses difficulties. For example, students of color are disproportionately more likely to take out student loans and have higher rates of student loan debt (Holzer and Baum 2017).

Young adults who are parents may face particular challenges with respect to employment and education that could increase disconnection. In an analysis of young parents ages eighteen to twenty-four who live with their children, researchers found that about 27 percent did not hold a job in 2013 (Sick, Spaulding, and Park 2018). Nonparents age eighteen to twenty-four had only slightly higher rates of employment during the year, but were much more likely to go to school, 65 percent of nonparents attending school relative to only 23 percent of parents age eighteen to twenty-four.

For some young mothers, teen parenting creates challenges to completing school and diminishes economic opportunity. Teen birthrates have fallen significantly for all race and ethnic groups since 1990, but rates for Latino and African American teens remain more than twice as high as for white teens (Martin et al. 2018). Young women ages twenty to twenty-nine who gave birth in their teenage years are less likely to have a high school diploma relative to their counterparts who did not have a teen birth; rates are lowest for African American and Latina teen mothers (Manlove and Lantos 2018).

For young fathers, teen and out-of-wedlock childbearing also have labor-market consequences. It can lead some men to work more but accept low-paying jobs and drop out of school to pay for the immediate financial needs of their children. Some noncustodial fathers may also withdraw from the formal labor force if their child support orders are too high for them to pay, resulting in arrearages, which are often owed to the state, not the custodial parent and child. This may lead the young father to decide that it is more advantageous to work "off the books," where they will not be subject to arrears payments and the money they make can instead go directly to support their child (Holzer, Offner, and Sorensen 2005).

Lack of access to childcare is also a cause of disconnection for young parents. While managing schedules is a challenge for any parent, it can be especially challenging for young parents who work and go to school (Spaulding, Derrick-Mills, and Callan 2016). Availability of care for infants and toddlers is limited (Adams, Zaslow, and Tout 2007) and securing part-time and nontraditional hourly care can be difficult (Dobbins et al. 2016). Such care is often provided by friends and neighbors, and the childcare subsidy system has been moving away from such care as a result of improved quality standards that tend to focus on center-based care (Henly and Adams 2018). Also, resources to support childcare are limited; only 15 percent of those eligible for childcare subsidies are estimated to be able to access the vouchers to pay for care (Chien 2015). The limited availability and limited funding are major obstacles to employment for low-income parents (Chien 2015; McCready 2015).

The complexity and challenges of these interrelated issues and circumstances can contribute to trauma for young people. The traumatic conditions could emanate from childhood experiences, or could represent an intergenerational transmission of trauma that affects youth's ability to successfully transition to adulthood or to emerge from a high-risk or difficult situation.

CONSEQUENCES OF DISCONNECTION AMONG YOUTH

What do we know about the consequences of low work, unemployment, or periods of no work and no school among youth? To start, research shows several positive effects of young people working. Work can increase specific job-related skills, build work readiness skills, and provide connections and labor-market knowledge for future work. In addition, work provides income, potentially increasing resources for future schooling. Being out of work or unemployed, especially for those not in school, could make it more difficult to find work if there is a loss of human capital.

Some employment while in school, if well planned as in internships or cooperative arrangements, can complement education and help build work experience. However, working while in school, at least for a substantial number of hours, particularly for teenagers, can have negative impacts on schooling and therefore future labor-market outcomes. Working too many hours while in school has the potential to distract from or leave less time and energy for school, potentially having negative consequences on academics or school completion (Mortimer 2010).

The literature is extensive on the question of whether youth unemployment might be "scarring," that is, leading to diminished labor-market outcomes later in life. Some of this research is in response to concerns about youth starting their working lives during periods of high unemployment. Several studies from the early 1980s found that work among youth generally led to higher future wages and that the impact of youth unemployment was not persistent.[2] Later studies have found negative impacts of youth unemployment on future wages and work. In one study, a period of unemployment for young workers led to increases in participation in training, but even so, left a lasting impact of lower wages even nine years later (Mroz and Savage 2006). Using United Kingdom data, David Bell and David Blanchflower (2011) found that periods of unemployment when young had negative impacts for adults, even decades later.

Peter Edelman and his colleagues suggest that youth, particularly less-educated African American youth, who are not in school or work have responded to what appears to them to be a decline in long-term employment opportunities by giving up on mainstream possibilities and institutions (Edelman, Holzer, and Offner 2006; Edelman and Holzer 2013). This behavior is framed as being largely a response to declining demand for their labor.

In addition to negative impacts on future labor-market outcomes, being disconnected is correlated with other negative outcomes, including criminal activity, depression, and substance abuse—though the direction of causality is not clear. Furthermore, impacts on the children of young adults are possible, especially

2. See multiple studies in Freeman and Wise 1982.

if childbearing occurs when the parents are teens or young adults (Berzin and De Marco 2010; Mosle and Patel 2012).

PROGRAM AND POLICY SOLUTIONS TO INCREASE ENGAGEMENT AND OPPORTUNITY

Given the consequences of being disconnected, we discuss here specific program and policy solutions that can bring such youth back into education and labor-market activity. We focus on four sets of solutions: programs to increase young people's work readiness and occupational skills; ways to improve community college systems to better serve disadvantaged youth; solutions that address barriers to work and schooling faced by disconnected youth; and demand-side policies that can improve job opportunities for youth. Our focus in each is on policies and program options rooted in evidence that target or include youth in their late teens or early twenties. To actually reverse the overall downward trend in youth employment that occurred over the past several decades will require multiple interventions on a large national scale, not just one approach. It will also require targeted approaches to meet the needs of specific youth, for example those without a high school credential, who have been involved with the criminal justice system, or who are young parents.

The behavior of young people reflects the institutions, environment, and culture in which they grow up. This means that changes to broader factors—such as improvements in early childhood and secondary education, reductions in neighborhood violence and family poverty rates, changes to the criminal justice system and reduced discrimination—could each affect the individual and family circumstances of these youth. This in turn could affect their employment and educational opportunities and choices. Ideas and research on how to improve these societal conditions are plentiful, but beyond the scope of this article. These changes are important for the role they could play in preventing youth from being disconnected in the first place.

The broader economic factors that play a role in declining labor-market participation for prime-age workers, including the role of global competition, stagnant wages, and the impact of automation and technology, likely play a role in declining opportunities for young workers as well. A number of policy solutions have been put forward on these fronts, including ways to improve overall productivity, increase the average workers' share of productivity gains and wages, increase worker power through unions or other strategies, and increase demand for labor (Shambaugh and Nunn 2018). Other articles in this volume focus on some of these issues, including the evidence on the minimum wage and regulation of hours. Thomas Kochan and William Kimball (2019), for example, examine the history of unions and explore ideas for improving labor-management relations, increasing productivity, and developing a wage-enhancing social contract for the current and future labor market. Discussion of these broader policies is beyond the scope of this article, but if successful, they could open important opportunities and increase incentives for youth.

Increasing Work Readiness and Occupational Skills

One way to improve outcomes for disconnected youth is to improve their human capital, including "soft skills" or work readiness skills, educational levels (including completing high school), and occupational job skills. Improving these skills should open new opportunities for higher paying jobs and careers that increase the incentives to engage in the labor market. Programs targeted to disconnected youth with multiple challenges can also help youth address these challenges and envision a more positive future. For adults, evidence shows that sector-focused training working toward credentials that are in demand by employers has positive impacts on work and earnings (Maguire et al. 2010; Hendra et al. 2016). In the following section, we review programs that incorporate these aspects of training for in-demand skills and connecting with employers, as well as services focused particularly on disconnected youth.

Integrated Academic and Technical Skills in High School

Integrating academic and technical education at the high school level, referred to as career and technical education (CTE), provides stu-

dents with marketable skills as well as information about and exposure to potential careers. This combination can have positive results on high school completion, seeking additional education, and employment. Although CTE is widespread and gaining in popularity, researchers and other experts agree that the quality and characteristics of the way CTE is offered—such as the presence of smaller learning communities, depth of student involvement, and inclusion of work-opportunities or internships—are important for success.

In the last decade, interest is renewed in CTE, formerly referred to as vocational education, at the federal and state levels. In 2018, Congress passed and the president signed into law H.R. 2353, the Strengthening Career and Technical Education for the 21st Century Act, which reauthorizes the 2006 Carl D. Perkins Career and Technical Education Act and provides funding to states for CTE programs at the secondary and postsecondary levels. Several states have recently increased funding for CTE programs (Jacob 2017). In fact, about 85 percent of high school students take at least one CTE course (U.S. Department of Education 2018). One goal of the rebranding from vocational education to CTE is to reduce some of the longstanding stereotypes associated with vocational or trade schools. Today, a positive shift in public support for CTE is apparent (Jacob 2017). For example, some CTE courses, programs, and camps for high school (and younger) students focus on in-demand subjects like computer coding, robotics, advanced manufacturing, and various science, technology, engineering, and mathematics (STEM) programs.

Models and implementation of CTE vary and studies of effectiveness are limited, but show some promising results. Two recent studies of technical high schools found positive results on student outcomes. One study of high-quality regional technical high schools in Massachusetts used a quasi-experimental design and found positive impacts on graduation and receipt of industry-recognized credentials, particularly for low-income students (Dougherty 2018). Another found higher earnings and lower rates of "idleness" (not working nor in school) among those taking upper-level vocational classes, suggesting the value of more intensive involvement in CTE (Kreisman and Stange 2017).

Career academies, a specific model of integrating secondary-level academic and career skill learning, have strong positive impacts on young men. These academies provide smaller supportive learning communities within the larger high school focusing on a specific career theme and often include exposure to employers through work-based opportunities and internships. The National Career Academy Coalition estimates the total number of career academies in the United States at seven thousand. An evaluation of nine career academies found positive and sustained impacts on earnings (16 percent annual increase) eight years after the year of graduation for men. Impacts for young women were not significant. Those on high school completion or postsecondary education were entirely lacking, but even with increases in work, no negative impact on future schooling was discernable (Kemple 2008). In California, the Linked Learning program expanded the career academy model to nine school systems. A study found that participating students had decreased dropout rates, increased graduation rates, earned more credits, and were as likely to enroll in college compared with a matched group of students in traditional high school. Results were similar for female and male students. The study did not include employment outcomes (Warner et al. 2016). A current evaluation of a career academy model called Youth Career Connect, which is targeted to particular occupations and has formal linkages between high schools and postsecondary schools, will also soon have findings (U.S. Department of Labor 2018).

Job Training and Employment Programs for Youth

Outside the school setting, the most successful efforts to increase the work readiness and specific skills of youth include strong connections to in-demand sectors and careers and often paid work experiences, such as internships. Programs showing promise include some summer employment programs, and youth targeted sector-based training programs including apprenticeships. For disconnected youth who

face particular challenges, such as dropping out of high school, involvement in the criminal justice system, having physical or cognitive limitations, or coming from difficult family circumstances, evidence is fairly strong that including developmentally appropriate comprehensive supportive services in addition to training and work experiences are necessary to achieve the most benefits.

Summer youth employment programs (SYEP) are perhaps the most widespread training programs for young people, and large-scale programs operate in many urban areas. Summer jobs offer youth exposure to employers and the opportunity to build work habits and skills while still in school. Outcomes of these programs are mixed, but some evidence suggests well-designed programs—including ones incorporating classroom "work readiness" components, can have positive effects on youth. Evaluations have found relatively limited impacts on subsequent employment or earnings, although some impacts for certain subgroups. For example, a study of Boston's SYEP found no overall impact on employment and wages, but significant impacts on employment and quarterly earnings for older (ages nineteen to twenty-four) African American males during the subsequent academic year (Mayor's Office of Workforce Development 2017). A study of a Chicago SYEP again found no overall impacts on employment but did find improved employment for youth who were less criminally involved and more engaged in school (Davis and Heller 2017). Multiple evaluations have also found that SYEP led to significant declines in criminal activity and violence, some improvements in academic outcomes, and improved social, emotional, and work readiness skills.[3]

Apprenticeship programs combine classroom instruction, structured work-based training, jobs with wages, and contributions to work. Apprenticeships for adults raise wages and are cost-effective (Reed et al. 2012). Robert Lerman and Arnold Packer (2015) describe the benefits of apprenticeships for youth including mentorship, income, accommodating different learning styles, and developing real-world skills. Youth apprenticeship programs for in-school youth in Wisconsin and Georgia have shown promising results. Georgia youth apprentices have higher graduation rates than comparable youth. Wisconsin provides apprenticeship opportunities to 2,500 juniors and seniors. Increasing the availability of apprenticeships to youth in and out of school is a way to increase skills and employment.

Challenges in expanding apprenticeships include obtaining and maintaining business interest in engaging in apprenticeships on a regular basis (rather than just when it is difficult to recruit) and providing opportunities for individuals that employers might not otherwise consider (Case Western Reserve University 2016). Increasing the number of young woman in apprenticeships is also a challenge. Overall, woman are underrepresented in apprenticeships, partly because many apprenticeship programs are in traditionally male-dominated fields. Female apprentices expressed the need for greater access to childcare supports and the need to address harassment and discrimination (Reed et al. 2012). Female apprentices make far less than men, but African Americans garner the lowest wages of all apprentices. Historical racial and gender disparities in apprenticeship have led many to argue that expansions in apprenticeship in the United States must reflect strategies to address these inequities (Kuehn 2017; Spaulding et al. 2015).

Several nationwide youth-targeted job training programs with a sector-based, career focus have shown positive impacts and serve relatively large numbers of youth. Year Up is a program for urban young adults aged eighteen to twenty-four with a high school diploma or equivalent. The program provides six months of full-time customized training in the IT and financial service sectors followed by six-month internships at major firms. The full-time program provides extensive supports— including weekly stipends—and puts a heavy emphasis on professional as well as technical skills. Employer payments to Year Up for interns finance 59 percent of the program's $28,290 per participant cost. The program has grown rapidly following its inception in Boston in 2000: by 2018 it served more than four thousand young adults

3. For a brief review of these studies, see Ross 2018.

in sixteen metropolitan areas. Early evaluation findings show large positive impacts on earnings of 53 percent, almost $2,000 a quarter higher than control participants six to seven quarters after random assignment. Impacts decreased but remained large (about 40 percent) over the following year (Fein and Hamadyk 2018).

YouthBuild is a nationwide program serving more than ten thousand low-income, out-of-school youth ages sixteen to twenty-four each year. The program provides construction-related training along with educational services, counseling, and leadership-development opportunities. Early results from a rigorous evaluation find that, relative to a control group, two and a half years after entering the program participants had higher completion of GED, enrollment in community college, and receipt of industry certifications, but limited impacts on employment (Miller et al. 2016). Longer-term results are forthcoming. Both programs can be expanded to additional communities.

Job Corps is a federally funded educational and vocational residential program, serving sixty thousand low-income youth ages sixteen to twenty-four annually.[4] Its 120 Job Corps centers are located throughout the United States. Many participants are deficient in basic skills and more than half have dropped out of high school. Job Corps provides comprehensive one-on-one career preparation services, including work toward high school equivalence diploma, career counseling, work readiness services, and small stipends during job training. Because most participants live at Job Corps centers, they also receive food and shelter. An evaluation of Job Corps found it increased literacy and educational attainment (high school or GED completion), reduced criminal involvement, and increased earnings for the first two years after participation. Longer-term follow-up over ten years found earnings gains persisted for youth who were older when they enrolled (twenty-to-twenty-four-year-olds) (Schochet, Burghardt, and McConnell 2008). Recent work using data from the Job Corps evaluation found a large increase in earnings and a decrease in disability benefits in the four-year period after enrollment for participants with medical limitations (Hock et al. 2017).

Another program serving disconnected youth is the National Guard Youth ChalleNGe program, targeting low-income high school dropouts ages sixteen to eighteen at thirty-nine sites in twenty-eight states. The program does not provide job skills training but focuses on helping prepare disadvantaged young people reengage with work and schooling. The program is a twenty-week residential quasi-military educational program that focuses on building life and work-readiness skills, as well as leadership, self-discipline, personal responsibility and service to community. Students work toward earning their high school equivalency diploma. After the residential phase is a fifty-two-week phase during which each student works one-on-one with an adult mentor. Evaluation results show that the program increased high school or equivalency completion and showed positive earnings outcomes (about 20 percent higher than control group members) three years after program entry, which would be about a year after program completion (Millenky et al. 2011). This program is promising for a subset of youth who may have considerable disadvantages to overcome. An evaluation testing the impact of adding a job-specific component to the Nation Guard Youth ChalleNGe model is under way and will provide new findings on this approach.[5]

Several of the interventions discussed in the previous sections also incorporate developmentally appropriate interventions and supports. For example, several SYEP programs include social-emotional learning curriculum, based on cognitive behavioral therapy principles alongside work. YouthBuild and National Guard Youth ChalleNGe provide periods of posttraining follow-up, including mentorship. Career Academies recognize the importance of smaller learning communities that provide

4. https://www.jobcorps.gov/citizens, accessed September 7, 2019.

5. See U.S. Department of Labor, Chief Evaluation Office, "National Guard Youth Challenge and Job Challenge Evaluation," Project Summary, accessed July 7, 2019, https://www.dol.gov/asp/evaluation/currentstudies/National_Guard_Youth_Challenge_and_Job_Challenge_Evaluation.htm.

peer support and relationships with teachers. Efforts to engage the most disadvantaged youth—for example, those who have experienced violence or trauma, are involved in or exiting the criminal justice system, have aged out of the foster care system, or are teen parents—require services and considerations, in addition to education and training.

IMPROVING COMMUNITY COLLEGES TO BETTER SERVE DISCONNECTED YOUTH

Access to postsecondary education and credentials could open up better job opportunities and the promise of a career for many disconnected youth. In most communities, the community college system is the natural place for these youth to turn. These public institutions offer two-year degrees, vocational and technical certificates, and a pathway to transfer to a four-year institution. Because community colleges have mostly open-access admissions policies and low tuition, they serve many low-income and other students underrepresented in colleges. However, disconnected youth who dropped out of high school, would be first-generation college students, lack financial support, or have not done well in academic settings may find it challenging to succeed at these institutions. Rates of community college completion in general are low: six-year completion rates (at starting or transfer institutions) for the 2011 entering cohort of 42 percent for first-time, full-time degree seeking students and 30 percent for first-time, part-time students (National Student Clearinghouse 2018).

Focus is considerable on the need to reform community colleges to improve completion rates (Loprest and Hyman 2018). The design of community college programs often does not meet the needs of disconnected youth, for example, not having clear program pathways oriented toward careers, assuming the presence of family support and guidance, or not accommodating work and family responsibilities of students. Addressing these barriers could increase attainment of postsecondary credentials and subsequent employment.

A substantial number of young people do not have the reading, writing, and mathematics skill levels to start college-level coursework. More than one-third of community college students are taking developmental classes to address these basic skills deficiencies (U.S. Department of Education 2018). When students are required to complete a number of these noncredit classes before moving on to a degree or credential program, it can extend overall time in school and derail progress toward completion. A number of models for redesigning basic skills education at community colleges focus on ways to target and accelerate acquisition of basic skills necessary for success. For example, Accelerating Opportunity, an initiative operating in seven states and eighty-five colleges, integrates basic skill learning with occupational classes. This program encouraged states to reform their policies and practice by allowing community and technical colleges to enroll students with low basic skills in for-credit courses on defined career pathways while they earn their high school credentials, improve their basic academic skills, or build their English-language abilities. The evaluation of this effort found it had a positive impact on the number of credentials students earned and mixed impacts across sites on employment and earnings (Eyster et al. 2018). A structured approach to guidance and counseling can be quite important for low-income and first-generation college students. Some colleges are creating more structured program pathways (sometimes called guided pathways) that clarify what classes are necessary to reach certain goals, particularly degrees and credentials that are in demand by employers (Loprest and Hyman 2018). This keeps students from floundering and taking more credits than necessary. In addition, some colleges are attempting to support students with expanded college and career advising by "navigators" that are either on staff at educational institutions or embedded partners from community-based organizations (Eyster et al. 2018; Choitz 2010). These navigators can help students adjust to college. When students of color and first-generation college students feel supported and have a sense of belonging in college, the impacts on academic performance and persistence are positive (Yeager et al. 2016). Some evidence indicates that mentoring can also help students, although impacts have generally been small and shown variation depending on the struc-

ture and focus of mentorship programs (Eby et al. 2008).

One successful community college reform initiative, Accelerated Study in Associate Programs (ASAP) at the City University of New York (CUNY), combines multiple proven approaches. The three-year program provides students with financial assistance (including tuition waivers, textbooks, and transportation assistance), structured pathways to "support momentum" including full-time enrollment, block scheduling of classes to make it easier for students to combine work and study, integrated or simultaneous basic skills education enrollment, and extensive advising, tutoring, and career advancement supports over the course of the three years. A rigorous evaluation found that the program substantially increased associate degree completion, from 22 percent to 40 percent, almost doubling graduation rates relative to a comparison group, and increased the rates of transfer to four-year colleges (Scrivener et al. 2015). Although ASAP did require meetings with a career counselor every semester, the evaluation has not yet tracked student employment or earnings outcomes. Additional studies of outcomes found that ASAP led to substantially higher graduation rates for all race, ethnicity, and gender subgroups. ASAP has since been expanded to a greater number of students, including implementation of ASAP for all students of Bronx Community College, adoption of a similar model at some four-year CUNY schools, and replication in three Ohio community colleges. A recent evaluation of the Ohio effort showed similar positive impacts as the initial CUNY study with a more than doubling of graduation rates for the treatment group (Sommo, Cullinan, and Manno 2018).

One challenge in reforming community colleges is bringing to scale the many smaller programs, such as ASAP, that have been found to be effective. The U.S. Department of Labor implemented the Trade Adjustment Act Community College and Career Training (TAACCCT) grant program, which awarded billions of dollars to community colleges to build their capacity around career pathways and demand driven occupational training, among other areas. Colleges across the country implemented changes to integrate adult education with career-focused content; accelerate the pace of credential attainment by changing program requirements, scheduling, and structures; increase engagement with industry and the development of skills that are in demand; and transform the supports available to students so that they are better able to complete programs and obtain credentials. The national TAACCCT evaluation is still under way and may yield lessons about broader changes needed to help community colleges better meet the needs of young people so they can succeed.

REDUCING BARRIERS TO WORK AND SCHOOLING

Many disconnected youth have challenges that make it difficult for them to participate in training or school or maintain a job. Efforts to engage the most disadvantaged youth—for example, those who have experienced violence or trauma, have dropped out of high school, are involved in or exiting the criminal justice system, have disabilities, have aged out of the foster care system, or are teen parents—require services and considerations in addition to education and training. Here we discusse several important steps that can be taken to reduce some of the most common barriers.

Interest is growing in trauma-informed policy and practice, which involves designing interventions and programs that acknowledge the compounding effect of an individual's circumstances, environment, and social condition (SAMHSA 2014). Research is being done on programs serving those with criminal justice involvement or mental health conditions, and also in Native American and some low-income urban communities where populations have been subjected to generations of discrimination in society. Existence of deep trauma conditions among some subgroups of disconnected youth suggest that services or interventions that could lead to economic well-being should address that trauma as well as provide remedial training or education.

For young adults who are parents, access to affordable childcare is critical if they are to work or go to school. In some cases, childcare services are included in public workforce development, job training, and community college systems. Intuitively this should improve out-

comes for parents, but rigorous research is still scant on the outcomes of these efforts for young parents (Spaulding and Gebrekristos 2018). "Two-Generation" strategies, where high quality early childhood education is available for children of parents who are in school or training, aim to address parents' needs for childcare, education, and training yet also recognize the needs of their children (Chase-Lansdale, Lindsay and Brooks-Gunn 2014). The federal government is focusing on participants' need for childcare while in education and training through the Strengthening Working Families Initiative, funded by the Department of Labor.[6] Finally, businesses and employers are also supporting expanded access to childcare. Ready Nation, for example, involves a public-private partnership with businesses involved in training programs (Ready Nation 2017). Better integration of childcare into work more generally is needed, along with further research to understand the role that childcare plays in helping low-income young adults be successful in education, training, and jobs. Funding for childcare is also an issue in terms of making it more accessible to young parents, as is the need to increase the supply of quality care in communities.

For noncustodial parents, child support responsibilities, especially arrearages, can be a disincentive to formal work. This is particularly true in cases when custodial parents are receiving welfare benefits or when arrearages are owed, because money earned by the noncustodial parent often goes back to the state rather than to the custodial parent and their child or children. Some states have addressed this issue by allowing more money to "pass through" to the custodial parent and their child and disregarding child support paid when determining the level of TANF (Temporary Assistance for Needy Families) assistance for the family. Employment programs that combine education and training with assistance navigating the child support system appear promising (Spaulding, Grossman, and Wallace 2009).

Criminal justice involvement and the record of that involvement often are barriers to employment for young adults, particularly for young African American, Latino, and Native American men. Policy reforms and strategic interventions are needed to address the causes of mass incarceration and reform the criminal justice system, as well as to mitigate the negative effects that contact with the criminal justice system can have on employment prospects. Emerging evidence from neuroscience and adolescent development suggests the brain continues to develop into the mid-twenties, affecting youth behavior related to criminal activity, such as impulsivity. Recognition of this evidence is leading to some transformations in the juvenile criminal justice system, including limiting the circumstances in which youth are treated as adults and consideration of mitigating factors in sentencing (Scott and Steinberg 2008). Reforms to policing and sentencing that address racial inequities are also important systemic reforms.

For those who are arrested or incarcerated, programs that help justice-involved youth build skills and connect to the labor market should be expanded. Many prison-based education programs have been eliminated except for those that involve pursuing secondary school credentials. This is due in part to restrictions on use of federal financial aid funding through the Pell Grants program for postsecondary school and training by individuals with felony convictions as well as other concerns about the costs of such programs (Esperian 2010). A number of studies have shown that prison-based education programs, including apprenticeship programs, for adults are associated with reduced recidivism, even though employment impacts are limited or often fade over time (Davis et al. 2013). Expanding prison-based education and training for young adults could prepare more people for employment once they return to their communities.

To improve employment opportunities for those with criminal records once they are released, some experts support limiting the use of criminal background checks and disclosed

6. See "US Labor Department Announces $54m in Grants to Improve Access to Skills Training and Quality, Affordable Child Care for Parents," News Release, June 14, 2016, https://www.dol.gov/newsroom/releases/eta/eta20160614, accessed July 14, 2019.

information on criminal justice involvement in the hiring process. Employers often ask about arrest records even in the absence of conviction, juvenile records, or crimes related to the work being performed. Given the high rates of young African Americans and Latinos involved in the criminal justice system, particularly young men, these groups are at a disadvantage in the labor market. These concerns have led states and localities to pass "ban the box" laws, which prohibit employers from asking about criminal justice involvement on job applications, thus allowing applicants to get further in the hiring process before disclosing their criminal background. According to the National Employment Law Project, thirty-two states and 150 municipalities have passed such legislation.[7] Further research is needed to assess whether such policies are associated with increased hiring of individuals with criminal records or result in unintended consequences. For example, some evidence indicates that criminal background checks by employers actually reduce discrimination against African American men who do not have criminal records (Holzer, Raphael, and Stoll 2006).

Finally, because services disconnected youth need might involve a variety of systems and programs, communities across the country are consciously trying to improve the ways systems coordinate, sometimes referred to as community-wide collective impact activities. No evaluations have yet been made, but the initiatives are serving very large numbers of youth, and a review of recent efforts shows some promise (Treskon 2016). Citywide reengagement centers, where youth can connect to services and programs, are intended to help them move forward in education and training. Data from fifteen of these centers showed ten thousand youth were placed in education and training programs. Similarly, efforts such as Philadelphia's Project U-Turn, serving youth, hire dedicated staff to coordinate services across a number of agencies, using common terminology and performance metrics and sharing program data to track student activities and progress. The Aspen Institute's Opportunity Youth Incentive Fund is another initiative supporting community-wide efforts to improve employment, promote high school graduation, and provide internships in twenty-one communities, serving more than ten thousand young people, roughly three-fourths of whom are African American, Latino, or Native American (Community Solutions 2017).

ADDRESSING DEMAND-SIDE ISSUES

Building the skills and supporting work for disconnected youth is only one part of the answer. Finding jobs (and for some youth even getting employers to consider them for jobs) is still an issue, despite national low unemployment rates. Increasing job opportunities, especially with higher wages, is a solution for engaging young people into the labor market.

Some of the negative consequences of disconnection for young adults could be addressed by developing a well-structured subsidized jobs program, at scale, that aims to help people, including youth, build skills valued in the labor market and avoid some of the negative consequences of being unemployed. Subsidized employment offers are often targeted to individuals who face challenges to employment and aim to provide income, work experience, and the opportunity to develop skills. Subsidized jobs are also sometimes adopted to address severe cyclical concerns during recessions. Evidence is limited that subsidized jobs programs have lasting effects on employment, though they do provide participants with income (Dutta-Gupta et al. 2016). However, with the appropriate structure, primarily through connection to skill training for jobs that are in demand and supports targeted to individual needs (ranging from social services, to mentoring or more intensive counseling), this type of paid employment may have potential to enhance outcomes for disadvantaged youth. Some models, such as the Milwaukee New Hope Project, in the 1990s provided a guaranteed publicly funded job when individuals were unable to find regular work or full-time hours. A combi-

7. See Beth Avery, "Ban the Box: U.S. Cities, Counties, and States Adopt Fair Hiring Policies," NELP, April 18, 2019, https://www.nelp.org/publication/ban-the-box-fair-chance-hiring-state-and-local-guide, accessed July 8, 2019.

nation of guaranteed job plus training could be particularly beneficial to young people just beginning their work lives to buffer them from labor-market instability. Ensuring that young people have quality job placements that make it possible to build skills needed for the labor market remains a challenge.

On-the-job training (OJT), a type of subsidized employment, has been a part of federal workforce programs since their inception in the 1960s. In federal OJT programs, employers are reimbursed for part of the cost of formal and informal training for newly hired workers. In theory, OJT can be an effective tool for assisting young adults who lack experience and skills by providing resources to employers for initial hiring and training costs. Burt Barnow and Shayne Spaulding (2015) review the evidence of federal OJT programs and find that, although OJT appears to be as effective as classroom training, none of the research has involved randomized control trials on the effects of OJT alone. Furthermore, impacts on youth have been mixed, suggesting the need for more intensive supports for youth (Dutta-Gupta et al. 2016). One option would be to provide subsidies for formal apprenticeships, which have strong evidence of improving employment outcomes. More research is needed to understand the effectiveness of OJT and other forms of subsidized jobs and to determine how to effectively structure these efforts to meet the needs of young adults.

Publicly provided wage supplements offer an additional way to increase the incentives to work. The federal Earned Income Tax Credit (EITC) has been shown to increase employment, but it is focused mainly on individuals with children (Meyer 2010). A pilot project to evaluate the impact of a wage subsidy for workers without dependent children, Paycheck Plus, is being tested in New York City and Atlanta. Interim results for New York City found the wage supplement led to a modest increase in employment, and that results were larger for women than men (Miller et al. 2017). Wage supplements could be explored on a pilot basis with young adult job seekers to determine whether it is a viable strategy for increasing employment. One study, using evidence from the early 2000s, suggests that increased wages do draw disconnected youth back into the labor market (Morissette, Chan, and Lu 2015).

Finally, efforts can be made to change employer perceptions of youth and reduce discrimination, especially for certain populations of young people. One effort is the Grads of Life public service campaign, which seeks to change employers' perceptions of disconnected young people. Another is the 100,000 Opportunities Initiative, launched in 2015, a large-scale effort by a coalition of employers that focuses on improving employment outcomes for disconnected youth by changing hiring, retention, and advancement strategies and creating opportunities for employment, internships, and apprenticeships. Individual workforce organizations can also work to change employer perceptions and practices through the partnerships they create with employers to meet their hiring needs (Spaulding and Blount 2018; Dawson 2016). Engagement of employers appears to be a critical feature of effective workforce program models (Barnow and Spaulding 2015), but these relationships can be difficult to build and maintain, particularly when working with hard-to-employ populations. Evaluations of employer-focused efforts may provide important information on what works in this emerging field.

CONCLUSIONS AND FINAL THOUGHTS

Labor-force participation of young people has been falling over the last few decades, mainly due to declines from youth ages sixteen to twenty who have increased their participation in school. Participation by older youth from twenty to twenty-four has remained relatively steady, although unpacking this by race, ethnicity, and gender shows some declines in the participation of white and Hispanic young men. We argue that for youth an even greater concern than declining labor force participation is the rate of young people who are not working, searching for work, or in school. These youth are disconnected from the most important avenues in our society for building human capital and getting on a path to a successful future.

Even in a strong job market and overall unemployment of less than 4 percent, youth disconnection from work and schooling remains a challenge, more so for African Americans and

Hispanics than for whites or youth overall. Declines in the rate of disconnected youth in past decades notwithstanding, since 2000 data trends show the rate of disconnected youth has been relatively stable, even through the Great Recession and subsequent recovery. This suggests the need for targeted strategies, beyond improving overall economic conditions, to increase participation of youth. Improving employment outcomes for young people will require implementing programs and changing systems and policies to specifically target and meet the needs of these youth, including subgroups of youth characterized by varying causes and consequences of disconnection. Only then can we ensure that those who are not working and not in school reengage and acquire the skills needed to access available and future jobs.

Increasing young people's human capital through education and training is a key part of the solution. A growing evidence base shows that effective education and training programs for youth target in-demand sectors and include connections to employers or work-based learning, whether as part of secondary school education, at community colleges, or postsecondary job training. For youth, exposure to and knowledge about the world of work and career opportunities is also important. Programs successfully engaging disconnected youth (those targeting low-income, justice-system involved, young parents, or other disadvantaged groups) reflect comprehensive programming and services, including work readiness classes, mentoring, counseling or trauma-informed services. Barriers to school and work, some individual and some systemic, also need to be addressed. Improved access to childcare, reforms in the juvenile justice system, and changes to child support systems are critical areas for disconnected youth. Communities with high rates of youth disconnection may require a more integrated approach that aim to address the variety of causes and consequences of detachment from work and school. Finally, demand-side changes that improve job opportunities for youth, such as subsidized jobs programs, wage supplements, or ways to change employer perceptions about some youth are also an important part of the solution.

We have described a number of promising programs and approaches, but further evaluation is necessary to expand our knowledge of what increases employment and economic well-being in the short and long term. In particular, program evaluation that focuses on the impact for youth of different models of comprehensive services in combination with job training are needed. Another gap in knowledge is our understanding of the longer-term effects of different interventions. Few evaluations are able to follow participants for a long enough period to estimate these impacts, which are particularly important for youth. Increasing evaluators' access to existing federal data sources on employment and earnings, such as the National Directory of New Hires, could reduce the cost of assessing these long-term impacts. Finally, the need for official statistics measuring disconnection is clear. The Bureau of Labor Statistics produces labor-force participation statistics, but does not produce a statistic or series that combines that information with whether an individual is in school. The federal government should produce statistics that track disconnection, for all youth and subgroups.

Another need is to scale and expand effective programs and find ways to integrate these into public systems. This will ensure that the issues that currently prevent large numbers of disconnected youth from accessing programs are addressed. Community-wide interventions that take an integrated approach to solving the problem of youth disconnection, especially in localities with large numbers of disconnected youth, should be explored. Large-scale programs and systemic reforms will require significant resources and political will. Wider access to skill-building opportunities as well as strategies to improve access to jobs would likely carry a high cost. Mobilizing these resources to affect change will require the involvement of stakeholders at every level of government, the private sector (including businesses and philanthropy), service providers, and young people themselves.

REFERENCES

Abel, Jaison R., and Richard Deitz. 2014. "Do the Benefits of College Still Outweigh the Costs?"

Current Issues in Economics and Finance 20(3): 1—11.

Abraham, Katharine G., and Melissa S. Kearney. 2018. "Explaining the Decline in the U.S. Employment-to-Population Ratio: A Review of the Evidence." *NBER* working paper no. 24333. Cambridge, Mass.: National Bureau of Economic Research.

Adams, Gina, Martha Zaslow, and Kathryn Tout. 2007. "Early Care and Education for Children in Low-Income Families: Patterns of Use, Quality, and Potential Policy Implications." Washington, D.C.: Urban Institute.

Aguiar, Mark, Mark Bils, Kerwin Kofi Charles, and Erik Hurst. 2017. "Leisure Luxuries and the Labor Supply of Young Men." *NBER* working paper no. 23552. Cambridge, Mass.: National Bureau of Economic Research.

Aizer, Anna, and Joseph J. Doyle Jr. 2015. "Juvenile Incarceration, Human Capital, and Future Crime: Evidence from Randomly Assigned Judges." *Quarterly Journal of Economics* 130(2): 759–803.

Autor, David H., Lawrence F. Katz, and Melissa S. Kearney. 2008. "Trends in U.S. Wage Inequality: Revising the Revisionists." *Review of Economics and Statistics* 90(2): 300–23.

Barnow, Burt S., and Shayne Spaulding. 2015. "Employer Involvement in Workforce Programs: What Do We Know?" In *Transforming U.S. Workforce Development Policies for the 21st Century,* edited by Carl Van Horne, Tammy Edwards, and Todd Greene. Kalamazoo, Mich.: W.E. Upjohn Center for Employment Research.

Bell, David B., and David G. Blanchflower. 2011. "Young People and the Great Recession." *IZA* discussion paper no. 5674. Bonn: Institute of Labor Economics.

Berzin, Stephanie Cosner, and Allison C. De Marco. 2010. "Understanding the Impact of Poverty on Critical Events in Emerging Adulthood." *Youth & Society* 42(2): 278–300.

Borjas, George J., and Richard B. Freeman. 2019. "From Immigrants to Robots: The Changing Locus of Substitutes for Workers." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 22–42. DOI: 10.7758/RSF.2019.5.5.02.

Canon, Maria, Marianna Kudlyak, and Yang Liu. 2015. "Youth Labor Force Participation Continues To Fall, But It Might Be for a Good Reason." *Regional Economist*, January 26. St. Louis, Mo.: Federal Reserve Bank.

Card, David, and Thomas Lemieux. 1997. "Adapting to Circumstances: The Evolution of Work, School, and Living Arrangements Among North American Youth." *NBER* working paper no. 6142. Cambridge, Mass.: National Bureau of Economic Research.

Carson, E. Ann. 2018. "Prisoners in 2016." *Bulletin* NCJ251149. Washington: U.S. Department of Justice, Bureau of Justice Statistics.

Case Western Reserve University. 2016. *The Benefits and Costs of Apprenticeship: A Business Perspective*. Washington: U.S. Department of Commerce. Accessed June 27, 2019. https://files.eric.ed.gov/fulltext/ED572260.pdf.

Chase-Lansdale, P. Lindsay, and Jeanne Brooks-Gunn. 2014. "Two-Generation Programs in the Twenty-First Century." *The Future of Children* 24(1): 13–39.

Chien, Nina. 2015. "Estimates of Child Care Eligibility and Receipt for Fiscal Year 2012." Washington: U.S. Department of Health and Human Services.

Child Trends. 2012. *Young Adults in Jail or Prison*. Washington, D.C.: Child Trends. Accessed June 27, 2019. https://www.childtrends.org/indicators/young-adults-in-jail-or-prison.

Choitz, Vicki, with Louis Soares and Rachel Pleasants. 2010. "A New National Approach to Career Navigation for Working Learners." Washington, D.C.: Center for American Progress.

Community Solutions. 2017. "Opportunity Youth Incentive Fund Annual Evaluation Report, Year 2." Washington, D.C.: Aspen Institute.

Davis, Johnathan M.V., and Sara B. Heller. 2017. "Rethinking the Benefits of Youth Employment Programs: The Heterogeneous Effects of Summer Jobs." *NBER* working paper no. 23443. Cambridge, Mass.: National Bureau of Economic Research.

Davis, Lois M., Robert Bozick, Jennifer L. Steele, Jessica Saunders, and Jeremy N.V. Miles. 2013. *Evaluating the Effectiveness of Correctional Education: A Meta-Analysis of Programs That Provide Education to Incarcerated Adults*. Santa Monica, Calif.: RAND Corporation.

Dawson, Steven L. 2016. "Employer Engagement and the Myth of the Dual Customer." *The Pinkerton Papers, Job Quality Series*, no. 2. New York: Pinkerton Press.

Dobbins, Dionne, Jessica Tercha, Michelle McCready, and Anita Liu. 2016. *Child Care Deserts:*

Developing Solutions to Child Care Supply and Demand. Arlington, Va.: Child Care Aware of America.

Dougherty, Shaun M. 2018. "The Effect of Career and Technical Education on Human Capital Accumulation: Causal Evidence from Massachusetts." *Education Finance and Policy* 13(2): 119–48.

Dutta-Gupta, Indivar, Kali Grant, Matthew Eckel, and Peter Edelman. 2016. *Lessons Learned from 40 Years of Subsidized Employment Programs: A Framework, Review of Models, and Recommendations for Helping Disadvantaged Workers*. Washington, D.C.: Georgetown University, Center on Poverty and Inequality.

Eby, Lillian T., Tammy D. Allen, Sarah C. Evans, Thomas Ng, and David DuBois. 2008. "Does Mentoring Matter? A Multidisciplinary Meta-Analysis Comparing Mentored and Non-Mentored Individuals." *Journal of Vocational Behavior* 72(2): 254–67.

Edelman, Peter B., and Harry J. Holzer. 2013. "Connecting the Disconnected: Improving Education and Employment Outcomes Among Disadvantaged Youth." *IZA* policy paper no. 56. Bonn: Institute for the Study of Labor. Accessed June 27, 2019. http://ftp.iza.org/pp56.pdf.

Edelman, Peter B., Harry J. Holzer, and Paul Offner. 2006. "Reconnecting Disadvantaged Young Men." Washington, D.C.: Urban Institute.

Ellwood, David. 1986. "The Spatial Mismatch Hypothesis: Are There Jobs Missing in the Ghetto?" In *The Black Youth Employment Crisis*, edited by Richard Freeman and Harry J. Holzer. Chicago: University of Chicago Press.

Esperian, John H. 2010. "The Effect of Prison Education Programs on Recidivism." *Journal of Correctional Education* 61(4): 316–34.

Eyster, Lauren, Theresa Anderson, Robert Lerman, Daniel Kuehn, Burt S. Barnow, Maureen Conway, Ranita Jain, and Marcela Montes. 2018. "Findings from the Accelerating Opportunity Evaluation: Building the Evidence on Integrated Career Pathways." Washington, D.C.: Urban Institute.

Fein, David, and Jill Hamadyk. 2018. "Bridging the Opportunity Divide for Low-Income Youth: Implementation and Early Impacts of the Year Up Program." *OPRE* report no. 2018-65, Washington: U.S. Department of Health and Human Services, Administration for Children and Families.

Florence, Curtis, Luo Feijun, Likang Xu, and Chao Zhou. 2016. "The Economic Burden of Prescription Opioid Overdose, Abuse and Dependence in the United States, 2013." *MedCare* 54(10): 901–06.

Freeman, Richard B., and David Wise. 1982. *The Youth Labor Market Problem: Its Nature, Causes, and Consequences*. Chicago: University of Chicago Press.

Granovetter, Mark. 1995. *Getting a Job: A Study of Contacts and Careers*, 2nd ed. Chicago: University of Chicago Press.

Hellerstein, Judith K., David Neumark, and Melissa McInerney. 2008. "Spatial Mismatch or Racial Mismatch?" *Journal of Urban Economics* 64(2): 464–79.

Hendra, Richard, David Greenberg, Gayle Hamilton, Ari Oppenheim, Alexandra Pennington, Kelsey Schaberg, and Betsy Tessler. 2016. "Encouraging Evidence on a Sector-Focused Advancement Strategy: Two-Year Impacts from the WorkAdvance Demonstration." New York: MDRC.

Henly, Julia R., and Gina Adams. 2018. "Increasing Access to Quality Child Care for Four Priority Populations: Challenges and Opportunities with CCDBG Reauthorization." Washington, D.C.: Urban Institute.

Hock, Heinrich, Dara Lee Luca, Tim Kautz, and David Stapleton. 2017. "Improving the Outcomes of Youth with Medical Limitations Through Comprehensive Training and Employment Services: Evidence from the National Job Corps Study." Washington, D.C.: Mathematica Policy Research.

Holzer, Harry J., and Sandy Baum. 2017. *Making College Work: Pathways to Success for Disadvantaged Students.* Washington, D.C.: Brookings Institution.

Holzer, Harry J., Paul Offner, and Elaine Sorensen. 2005. "Declining Employment among Young Black Less-Educated Men: The Role of Incarceration and Child Support." *Journal of Policy Analysis Management* 24(2): 329–50.

Holzer, Harry J., Steven Raphael, and Michael A. Stoll. 2006. "Perceived Criminality, Criminal Background Checks and the Racial Hiring Practices of Employers." *Journal of Law and Economics* 49(2): 451–80.

Jacob, Brian A. 2017. "What We Know About Career and Technical Education in High School." Washington, D.C.: Brookings Institution.

Kemple, James J. 2008. "Career Academies: Long-

Term Impacts on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood." New York: MDRC.

Kochan, Thomas A., and William T. Kimball. 2019. "Unions, Worker Voice, and Management Practices: Implications for a High-Productivity, High-Wage Economy." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 88–108. DOI: 10.7758/RSF.2019.5.5.05.

Kreisman, Daniel, and Kevin Stange. 2017. "Vocational and Career Tech Education in American High Schools: The Value of Depth Over Breadth." *NBER* working paper no. 23851. Cambridge, Mass.: National Bureau of Economic Research.

Krueger, Alan B. 2017. "Where Have All the Workers Gone? An Inquiry into the Decline of the U.S. Labor Force Participation Rate." *Brookings Papers on Economic Activity* 2017(2): 1–87.

Kuehn, Daniel P. 2017. "Diversity and Inclusion in Apprenticeship Expansion." Washington, D.C.: Urban Institute.

Lerman, Robert, and Arnold Packer. 2015. "Youth Apprenticeship: A Hopeful Approach for Improving Outcomes for Baltimore Youth." *The Abell Report* 28(2).

Liberman, Akiva M., and Jocelyn Faintaine. 2015. "Reducing Harms to Boys and Young Men of Color from Criminal Justice Involvement." Washington, D.C.: Urban Institute.

Loprest, Pamela, and Cheryl Hyman. 2018. "Stepping on the Gas: Community Colleges as Engines of Economic Mobility." Washington, D.C.: US Partnership for Mobility from Poverty.

Magnuson, Katherine, and Jane Waldfogel. 2005. "Early Childhood Care and Education: Effects on Ethnic and Racial Gaps in School Readiness." *Future of Children* 15(1): 169–96.

Maguire, Sheila, Joshua Freely, Carol Clymer, Maureen Conway, and Deena Schwartz. 2010. "Tuning In to Local Labor Markets: Findings From the Sectoral Employment Impact Study." Philadelphia, Pa.: Public Private Ventures.

Manlove, Jennifer, and Hannah Lantos. 2018. "Data Point: Half of 20-to-29-Year-Old Women Who Gave Birth in Their Teens Have a High School Diploma." Washington, D.C.: Child Trends.

Martin, Joyce A., Brady E. Hamilton, Michelle J. Osterman, Anne K. Driscoll, and Patrick Drake. 2018. "Births: Final Data for 2016." Hyattsville, Md.: National Center for Health Statistics.

Mayor's Office of Workforce Development. 2017. "Reducing Inequality Summer by Summer: An Analysis of the Short-Term and Long-Term Effects of Boston's Summer Youth Employment Program." Boston, Mass.: Mayor's Office of Workforce Development.

McCready, Michelle. 2015. "Parents and the High Cost of Child Care: 2015 Report." Arlington, Va.: Child Care Aware of America.

Meyer, Bruce. 2010. "The Effects of the Earned Income Tax Credit and Recent Reforms." In *NBER Book Series Tax Policy and the Economy*, edited by Jeffrey R. Brown. Cambridge, Mass.: National Bureau of Economic Research.

Millenky, Megan, Dan Bloom, Sara Muller-Ravett, and Joseph Broadus. 2011. "Staying the Course: Three-Year Results of the National Guard Youth Challenge Program." New York: MDRC.

Miller, Cynthia, Lawrence Katz, Gilda Azurdia, Adam Isen, and Caroline Schultz. 2017. *Expanding the Earned Income Tax Credit for Workers Without Dependent Children: Interim Findings from the Paycheck Plus Demonstration in New York City*. New York: MDRC.

Miller, Cynthia, Megan Millenky, Lisa Schwartz, Lisbeth Goble, Jillian Stein. 2016. *Building a Future: Interim Impact Findings from the YouthBuild Evaluation*. New York: MDRC.

Morissette, René, Ping Ching Winnie Chan, and Yuqian Lu. 2015. "Wages, Youth Employment, and School Enrollment: Recent Evidence from Increases in World Oil Prices." *Journal of Human Resources* 50(1): 222–53.

Mortimer, Jeylan T. 2010. "The Benefits and Risks of Adolescent Employment." *Prevention Research* 17(2): 8–11.

Mosle, Anne, and Nisha Patel. 2012. "Two Generations, One Future: Moving Parents and Children beyond Poverty Together." Washington, D.C.: Aspen Institute.

Mroz, Thomas, and Timothy H. Savage. 2006. "The Long-Term Effects of Youth Unemployment." *Journal of Human Resources* 41(2): 259–93.

Mueller-Smith, Michael. 2015. "The Criminal and Labor Market Impacts of Incarceration." Working paper. Ann Arbor: University of Michigan.

National Institute on Drug Abuse. 2015. "Abuse of Prescription Drugs Affects Young Adults Most." Washington, D.C.: National Institute on Drug Abuse. Accessed June 27, 2019. https://www.drugabuse.gov/related-topics/trends-statistics/infographics/abuse

-prescription-rx-drugs-affects-young-adults-most.

National Student Clearinghouse. 2018. "Yearly Success and Progress Rates (Fall 2011 Entering Cohort)." Snapshot Report. Washington, D.C.: National Student Clearinghouse Research Center.

Pager, Devah. 2003. "The Mark of a Criminal Record." *American Journal of Sociology* 108: 937–75.

Pager, Devah, Bruce Western, and Bart Bonikowski. 2009. "Discrimination in a Low-Wage Labor Market: A Field Experiment." *American Sociological Review* 74(5): 777–99.

Rawlings, Lynette A. 2015. "Understanding the Environmental Contexts of Boys and Young Men of Color." Washington, D.C.: Urban Institute.

Ready Nation. 2017. "The Business Case for Early Childhood Investments." Washington, D.C.: Council for a Strong America.

Reed, Debbie, Albert Yung-Hsu Liu, Rebecca Kleinman, Annalisa Mastri, Davin Reed, Samina Sattar, and Jessica Ziegler. 2012. "An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States." Oakland, Calif.: Mathematica Policy Research Associates.

Rodgers, William M., III. 2019. "Race in the Labor Market: The Role of Equal Employment Opportunity and Other Policies." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(5): 198–220. DOI: 10.7758/RSF.2019.5.5.10.

Ross, Martha. 2018. "Let's Invest in Summer Jobs Programs to Maximize Their Impact." Washington, D.C.: Brookings Institution.

Schochet, Peter, John Burghardt, and Sheena McConnell. 2008. "Does Job Corps Work? Impact Findings from the National Job Corps Study." *American Economic Review* 98(5): 1864–86.

Scott, Elisabeth S., and Laurence Steinberg. 2008. "Adolescent Development and the Regulation of Youth Crime." *Future of Children* 18(2): 15–33.

Scrivener, Susan, Michael Weiss, Alyssa Ratledge, Timothy Rudd, Colleen Sommo, and Hannah Fresques. 2015. "Doubling Graduation Rates: Three Year Effects of CUNY's Accelerated Study in Associate Program's for Developmental Education Students." New York: MDRC.

Shambaugh, Jay, and Ryan Nunn. 2018. *Revitalizing Wage Growth: Policies to Get American Workers a Raise.* Hamilton Project. Washington, D.C.: Brookings Institution.

Sick, Nathan, Shayne Spaulding, and Yuhu Park. 2018. "Understanding Young-Parent Families: A Profile of Parents Ages 18 to 24 Using the Survey of Income and Program Participation." Washington, D.C.: Urban Institute.

Sommo, Colleen, Dan Cullinan, and Michelle S. Manno. 2018. "Doubling Graduation Rates in a New State: Two-Year Findings from the ASAP Ohio Demonstration." New York: MDRC.

Spaulding, Shayne, and David C. Blount. 2018. "Employer Engagement by Community-Based Organizations: Meeting the Needs of Job Seekers with Barriers to Success in the Labor Market." Washington, D.C.: Urban Institute.

Spaulding, Shayne, Teresa Derrick-Mills, and Thomas Callan. 2016. "Supporting Parents Who Work and Go to School: A Portrait of Students Who Are Employed." Washington, D.C.: Urban Institute.

Spaulding, Shayne, and Semhar Gebrekristos. 2018. "Family-Centered Approaches to Workforce Program Services: Findings from a Survey of Workforce Development Boards." Washington, D.C.: Urban Institute.

Spaulding, Shayne, Jean Baldwin Grossman, and Dee Wallace. 2009. "Working Dads: Final Report on the Fathers at Work Initiative." Philadelphia, Pa.: Public/Private Ventures.

Spaulding, Shayne, Robert L. Lerman, Harry J. Holzer, and Lauren Eyster. 2015. "Expanding Economic Opportunity for Young Men and Boys of Color Through Employment and Training." Washington, D.C.: Urban Institute.

Substance Abuse and Mental Health Services Administration (SAMHSA). 2014. *SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach*. HHS publication no. (SMA) 14-4884. Rockville, Md.: Substance Abuse and Mental Health Services Administration.

Treskon, Louisa. 2016. "What Works for Disconnected Young People: A Scan of the Evidence." *MDRC* working paper. New York: MDRC.

Twenge, Jean, and Heejung Park. 2017. "The Decline in Adult Activities Among U.S. Adolescents, 1976–2016." *Child Development*. DOI: 10.1111/cdev.12930

U.S. Bureau of Labor Statistics (BLS). 2018. "BLS Data Finder 1.1: Various Series from Labor Force Statistics from the Current Population Survey." Washington: U.S. Department of Labor. Accessed July 1, 2018. https://beta.bls.gov/dataQuery/find?fq=survey:%5Bln%5D&s=popularity:D.

U.S. Census Bureau. 2019. "Current Population Sur-

vey 2018 Annual Social and Economic (ASEC) Supplement." Washington: Census Bureau. Downloaded May 1, 2019. https://thedataweb.rm.census.gov/ftp/cps_ftp.html#cpsmarch.

U.S. Department of Education. 2018. *Digest of Education Statistics 2016.* Washington: National Center for Education Statistics.

U.S. Department of Labor. 2018. "Youth Career Connect Evaluation Project Summary." Washington: U.S. Department of Labor Chief Evaluation Office.

W. Haywood Burns Institute. 2016. "Stemming the Rising Tide: Racial & Ethnic Disparities in Youth Incarceration & Strategies for Change." Oakland, Calif.: W. Haywood Burns Institute.

Warner, Miya, Kyra Caspary, Nicole Arshan, Regie Stites, Christine Padilla, Deepa Patel, Matt McCracken, Erin Harless, C. J. Park, Laila Fahimuddin, and Nancy Adelman. 2016. "Taking Stock of the California Linked Learning District Initiative: Seventh-Year Evaluation Report." Menlo Park, Calif.: SRI International.

Western, Bruce. 2006. *Punishment and Inequality in America*. New York: Russell Sage Foundation.

Yeager, David S., Gregory M. Walton, Shannon T. Brady, Ezgi N. Akcinar, David Paunesku, Laura Keane, Donald Kamentz, Gretchen Ritter, Angela Lee Duckworth, Robert Urstein, Eric M. Gomez, Hazel Rose Markus, Geoffrey L. Cohen, and Carol S. Dweck. 2016. "Teaching a Lay Theory Before College Narrows Achievement Gaps at Scale." *Proceedings of the National Academy of Sciences of the United States of America* 113(24): E3341–48.