Development across borders: economics and public policy in the Americas


This is an international development book with a twist. It challenges the common view that the economies of wealthier and poorer countries are linked in a single direction, with the interests of the former always affecting the latter. Instead, using the example of the post-World War II era of nation building in the United States and Colombia, the book argues that this link can, in fact, operate in both directions. As the book’s narrative progresses, readers learn of the often misguided and counterproductive economic policy efforts of economists, government advisors, and elite business leaders from both countries. Serving as a lens into the past, the book gives readers a new understanding of post-World War II state building, detailing how the successes and failures of the ideologies underpinning it have shaped our current economic programs.

The book begins by retelling the history of the postwar U.S. economic boom, which led to the creation of many New Deal programs that improved the lives of Americans and encouraged tremendous wealth building in the United States. Seeking to expand the reach of their welfare economic policies, American economists and government advisors traveled to Colombia to promote them. While these experts were confident that their North American successes would be easily replicated in South America, they soon found that their exported policies and practices were redefined by local business leaders and politicians. Welfare programs quickly started to display features typical of a mixed economy (as indicated in the book’s title), with government agencies being treated as public–private organizations or, in some cases, private corporations. These programs combined elements of both free markets and centrally planned economic controls, landing somewhere in the middle between pure private competition and complete state ownership. After the adoption and modification of these programs in Colombia, economic experts deployed their ideas and practices back to the United States, changing domestic policy. Thus, the “sorting out” of the mixed economy refers to the modifications made to these programs in Colombia and their subsequent relaunching in America.
The book is divided into three parts, taking the reader through several case studies that demonstrate its central themes. These studies examine the creation of Colombia’s Cauca Valley Corporation (CVC) and the subsequent displacement of small landholders in the name of productivity and efficiency; the promotion of aided self-help housing programs, which failed to reach the people they were designed to help; the tangled relationship between economics and management as rival disciplines; and the rise of for-profit contracting for social services in the United States.

The book’s first part explores economic decentralization in Colombia, focusing on two large-scale programs: agricultural land reform and mass housing construction. These programs allowed landowners and capitalists to increase their economic power, thereby bending the economy to their own wills. With the help of Tennessee Valley Authority planners, Colombian businessmen, and U.S. funding, the CVC became Colombia’s first regional development agency. CVC administrators were given sweeping powers, and, under the strong influence of businessmen, their agency was soon run as a public–private company. This development led to single-crop agriculture and the displacement of tens of thousands of local farmers.

In addition, housing projects that had once been used to stimulate economic recovery in the United States were now popularized by the Colombian government, and massive public housing projects sprang up throughout the country. Bogota’s largest public housing project, Ciudad Kennedy, housed over 800,000 people. Residents were given land, materials, and expensive loans and then told to construct their own homes. By requiring residents’ free labor, but limiting state subsidies, these housing projects were “public” in name only.

The book’s second part explores the rise of economics and management as disciplines increasingly affecting the Colombian state. To accommodate this newfound push to economics, universities sprang up across the country. In addition, after seeing how much influence and power U.S. economists wielded over government policy, Colombian officials sought to create a corps of economists that would serve as state operatives and planners. While these state planners saw themselves as serving the public good, their work served, and was often funded by, private corporations.

The book’s third part follows the journey of Colombian businessmen, government officials, and community leaders back to the United States, focusing on President Lyndon B. Johnson’s War on Poverty. Using Colombian urban housing schemes as a guide, President Johnson sought to replicate them domestically, both in rural areas and on Indian reservations. However, as was the case in Colombia, these programs never reached the people who most needed them. Moreover, for the first time, the U.S. government allowed private companies to sign contracts with the federal government for the provision of social services such as job training and education. Social welfare contracts would now compete with for-profit company contracts like those for military or public works.

*Sorting Out the Mixed Economy* provides a fresh take on how we look at development. The book’s central message is that, to understand the history of international development, we need to understand both the kind of political economies that actors in wealthier and poorer countries try to construct and the kind of cross-border economic influences their respective projects make possible. Besides opening many avenues for social and cultural historians to pursue, the book would be of great interest to anyone passionate about the history of development, state building, and the intersection of U.S. and Latin American public policy.

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Inflation does not repeat itself, but it often rhymes

Nicholas A. Schaffer

W. H. Phillips’s 1958 article on wage inflation and unemployment represents a critical moment in the history of economics. His contribution, known as the Phillips curve, showed an inverse relationship between wage inflation and unemployment in the United Kingdom from 1861 to 1957. Phillips showed that when inflation was high, unemployment was low. Likewise, when inflation was low, unemployment was high.

This relationship suggests that inflation is partly fueled by gap variables, or variables that measure how much economic activity differs from its maximum potential. The modern variation of the Phillips curve depends on gap variables as well as on expected inflation. However, studies have shown that the relationship between changes in U.S. inflation and the output gap has faded in past decades. Over the same period, a positive correlation between the level of U.S. inflation and the output gap has become evident, reviving the original Phillips curve.

In their article “Return of the original Phillips curve” (Economic Letter, Federal Reserve Bank of San Francisco, August 9, 2021), Peter Lihn Jørgensen and Kevin J. Lansing demonstrate that inflation expectations have become more firmly anchored in recent decades, as shown by the reduced sensitivity of expected inflation to incoming data on inflation itself.

Jørgensen and Lansing begin by detailing the idea of a weaker link between changes in inflation and the output gap. To demonstrate this weak link, Jørgensen and Lansing use a plot of the estimated coefficient from a regression of change in Consumer Price Index inflation on the output gap. The regressions show that the estimated gap coefficient declines over time and is infrequently statistically significant for 20-year sample periods ending after mid-2003.

Several hypotheses exist as to why the gap coefficient has continued to decline. One hypothesis suggests that structural changes in the economy have decreased the inflationary pressure of gap variables. Another hypothesis points to successful monetary policy efforts in response to supply shocks that push inflation and the output gap in opposite directions. This divergence would create the illusion of a declining gap coefficient. Similarly, other researchers postulate that vigilant monetary policy has anchored inflation expectations and, therefore, inflation itself. Some believe that demographic shifts, among other slow-moving forces, have caused the gap variable to be mismeasured.

Jørgensen and Lansing suggest that an alternative Phillips curve regression can help explain the plausibility of some of these hypotheses. The authors regress the level of inflation, rather than the change in inflation, on a constant term and the value of the output gap. The form of this regression resembles the 1958 version of the Phillips curve. The authors present a new estimated gap coefficient for the alternative Phillips curve regression plot, noting that since 2012, the estimated gap coefficient has been positive and statistically significant.
and statistically significant link between the level of inflation and the output gap is an important finding because it signals that structural changes in the economy have not removed the inflationary pressure of gap variables.

The authors explore how improved anchoring, or insensitivity to incoming data, of expected inflation is achieved by watchful monetary policy that keeps inflation close to its target. They detail how improved anchoring can account for the trends in both the first and second regression plots. Jørgensen and Lansing construct a third plot to illustrate that the link between changes in inflation and changes in the output gap has strengthened in recent decades, true to a shift toward stronger anchoring of expected inflation.
Expected pandemic-driven employment changes: a comparison of 2019–29 and 2020–30 projection sets

In September 2020, the U.S. Bureau of Labor Statistics (BLS) published its 2019–29 employment projections. Because these projections did not reflect the potential long-term impacts of the coronavirus disease 2019 (COVID-19) pandemic, BLS developed alternate 2019–29 projections in early 2021, capturing those impacts for selected industries and occupations. These latter projections, based on two alternate pandemic scenarios (moderate impact and strong impact), were followed (in September 2021) by BLS projections for the 2020–30 decade. The present article compares target-year employment levels across these successive sets of projections, focusing on the industries and occupations identified in the alternate projections and discussing relevant developments associated with the COVID-19 pandemic.

The coronavirus disease 2019 (COVID-19) pandemic triggered significant economic disruption and swift changes in consumer behavior, business operations, and other facets of economic life. To estimate the extent of any pandemic-induced long-term structural changes to the U.S. labor market, the U.S. Bureau of Labor Statistics (BLS) Employment Projections program developed alternate employment projections in early 2021, aiming to supplement the 2019–29 baseline projections published in September 2020. These alternate projections used two different scenarios (and sets of assumptions) to model long-term pandemic impacts.

Because the 2019–29 baseline projections reflected data and research that preceded the pandemic, the alternate scenarios were designed to provide the public with a preliminary assessment of the pandemic's potential impacts.
on long-term employment changes. Specifically, these scenarios sought to identify industries and occupations whose employment trajectories might be subject to higher levels of uncertainty because of the pandemic.

BLS has since produced a set of projections for the 2020–30 period, and this set contains updated data and additional research on the economic impacts of the pandemic. The main objectives of the present article are to (1) compare the 2020–30 projections with the 2019–29 baseline and alternate projections for selected industries and occupations, (2) identify structural pandemic factors that were discussed in the alternate projections and are also present in the 2020–30 projections, and (3) discuss possible reasons for any differences in results across projection sets.

Background

BLS develops employment projections by using available historical data, statistical and econometric models, and research-based assumptions about the future. These projections focus on long-term structural change, which tends to be gradual. The COVID-19 pandemic was a significant shock to the U.S. economy, not just in its immediate impacts on employment but also in its potential to cause faster-than-usual change in long-term economic trends. As noted previously, the BLS 2019–29 projections released in September 2020 were based on data and research that preceded the pandemic. Because the next projections set was not scheduled to be released until September 2021, BLS determined that, given the rapidly changing pandemic environment, providing updated information sooner would benefit data users. This led to the development of the 2019–29 alternate pandemic scenarios.

These alternate scenarios, which included a moderate impact scenario and a strong impact scenario, were not a full set of projections, because they did not incorporate revisions to the labor force or macroeconomic projections. Instead, they were developed around a specific set of assumptions about consumer and firm behavioral changes sparked or amplified by the pandemic. In the moderate impact scenario, increased telework was assumed to be the primary driver of economic change and to have both direct effects on information technology (IT) infrastructure and services demand and spillover effects from reduced commuting and food and beverage consumption around workplaces. In the strong impact scenario, the changes detailed for the moderate impact scenario were assumed to persist, but the consumer and firm behaviors associated with them were expected to intensify. In addition, in the strong impact scenario, an assumed consumer preference for avoidance of in-person interactions was expected to drive further declines in demand for restaurant dining, travel, and accommodation.

The 2020–30 employment projections, on the other hand, fully implemented the projections process and were not limited to the specific assumptions included in the alternate scenarios. These projections also were based on additional data for 2020, as well as information about pandemic developments up through the finalization of the projections data in June 2021. These developments included signs of economic recovery from the recession that began in February 2020 and ended in April 2020, early indications that consumers were keen to resume activities such as dining out and traveling, and an expected widespread adoption of hybrid workplace models.

Approach
The present analysis examines a selected group of industries and occupations that were highlighted in the *Monthly Labor Review* article documenting the 2019–29 alternate pandemic scenarios. These industries and occupations cover the following areas:

- Retail trade
- Food and beverage service
- Travel and accommodation
- Medical research and development
- Information technology (IT)

For these areas, the analysis compares target-year employment levels across four sets of projections:

- 2019–29 baseline projections
- 2019–29 moderate impact alternate projections
- 2019–29 strong impact alternate projections
- 2020–30 projections

Because the recession triggered by the COVID-19 pandemic led to low employment levels for the base year of 2020, and because the 2020–30 projections included pandemic recovery (cyclical) growth, the projected growth rate for total employment for 2020–30 (7.7 percent) was faster than that expected in the 2019–29 baseline projections (3.7 percent). Therefore, differences in growth rates for occupations and industries across projection sets are not always indicative of differences in projected structural change. For this reason, the analysis below examines target-year employment levels across the four sets of projections, evaluating changes in structural demand.

For some industries and occupations discussed in the analysis, structural demand changes linked to the pandemic were expected to continue in the 2020–30 projections, resulting in 2030 employment levels similar to target-year levels in the alternate pandemic scenarios. For some other industries and occupations, the projected employment levels for 2030 more closely matched target-year levels estimated in the 2019–29 baseline projections, because the 2020–30 projections assumed more moderate changes for certain behaviors than did the alternate pandemic scenarios. Finally, for some industries and occupations, differences across projection sets could best be explained by factors unrelated to pandemic-driven changes.

It is important to note that BLS employment projections identify general trends. Each set of projections is developed after inputs and assumptions have been reviewed and updated, which naturally leads to variation in point estimates, even if these estimates reflect the same general trends. Because of the large number of inputs and assumptions in the projections model, it is not possible to identify the specific impact of any one factor on differences in employment levels across projection sets.

**Analysis**

The analysis below compares target-year employment levels across the four projection sets, focusing on the industry and occupational areas identified in the previous section.
Retail trade

In both alternate pandemic scenarios, the retail trade industry is projected to lose the largest number of jobs among all industries. In the 2020–30 projections, retail trade has a target-year (2030) employment level that is lower than the 2029 levels projected in the moderate and strong impact scenarios, as well as the 2019–29 baseline projections. (See chart 1.)

The factors expected to affect employment in retail trade in the alternate pandemic scenarios also result in a projected 2030 employment level for the industry that is notably lower than the target-year level in the 2019–29 baseline projections. Online shopping and “buy online, pickup in-store” (BOPIS) options are expected to continue to grow over the 2020–30 decade, partly because of pandemic-driven changes in consumer shopping preferences. For example, fiercer online competition is expected to particularly hurt employment in clothing stores, shoe stores, and bookstores. In addition, the automation of checkout positions and the introduction of other forms of contactless transactions, both driven by consumer demand for more convenient forms of shopping, should also weigh on employment in retail trade.

These factors are also expected to affect employment of cashiers, an occupation heavily concentrated in the retail trade sector (in 2020, 83.9 percent of cashier jobs were in that sector). Target-year employment for cashiers in the 2020–30 projections is in line with that in the alternate pandemic scenarios and below that in the 2019–29 baseline projections, indicating that employment in this occupation may be negatively affected by pandemic-induced increases in online shopping and ordering and by further capital–labor substitution associated with automated checkout.
The growth of BOPIS also is expected to affect occupational staffing patterns within retail trade over the 2020–30 projections decade. To help customers shop safely during the COVID-19 pandemic and to reduce the economic impact of lockdown measures, many retailers began to provide or expand their BOPIS offerings, and this retailer response proved to be highly popular among customers. According to one study, about 40 percent of consumers tried a new method of shopping during the pandemic, including using a delivery mobile app or curbside pickup, and of those who did, nearly three-quarters intended to continue to use that method after the pandemic. Before the pandemic, only about 7 percent of the 500 largest retailers with stores in the United States offered curbside pickup; however, by mid-2020, nearly 44 percent did. Because BOPIS allows for contactless payment either online or through mobile apps, it is expected to further reduce the employment demand for cashiers. Conversely, stockers and order fillers are expected to be in greater demand because of the need to pack and prepare online orders for in-store pickup.

**Food and beverage service**

Employment in the food services and drinking places industry is expected to be roughly 12.16 million in 2030, similar to the 2029 level expected in the moderate impact scenario and considerably lower than the target-year level of 12.94 million expected in the 2019–29 baseline projections. (See chart 2.)

The pandemic-related factors expected to affect food and beverage service industries and occupations in the alternate pandemic scenarios are also expected to drive employment changes in the 2020–30 projections. The increased use of remote and hybrid work models during the pandemic is expected to continue after the pandemic, albeit at a rate lower than that seen at the height of the pandemic. This shift in work location (from an office
building to one’s home) for many workers is expected to negatively affect employment in cafeterias and restaurants, especially those in or near workplaces.

In addition, like retailers, many restaurants and fast-food establishments responded to the pandemic by expanding delivery and takeout services, as well as payment options that have allowed customers to place orders online or through mobile apps. These alternative dining services have gained widespread popularity, accelerating prepandemic changes in consumer dining habits. An estimated 25 percent of all restaurant purchases in 2020 were made via some form of technology, either through online orders using a website or a mobile app or through a third-party delivery service. Given the convenience of digital ordering, takeout and delivery food services are expected to be long lasting.

Another prepandemic trend that has grown rapidly during the pandemic, in step with the demand for meal deliveries, is the increasing use of “ghost” kitchens, which prepare food solely for delivery. Because these kitchens do not cater to patrons and customers—and, hence, do not require front-of-house employees such as waiters and waitresses—their staffing needs are different from those of full-service and fast-food restaurants.

Many food preparation and serving occupations, including waiters and waitresses (the largest occupation in this occupational group), bartenders, and dishwashers, are projected to have 2030 employment levels that are in line with target-year employment levels in the moderate impact scenario. (See charts 3 and 4.) On the other hand, for hosts and hostesses, the projected employment level for 2030 falls between the 2029 employment levels expected in the baseline projections and the moderate impact scenario.
In both the 2020–30 and alternate projections, the accelerated adoption of online ordering and payment systems is expected to be a drag on employment of cashiers and waiter and waitresses in food services and drinking places. In addition, the expected continued rise in delivery and takeout services is projected to reduce demand for waiters and waitresses, hosts and hostesses, bartenders, and dishwashers, especially in full-service restaurants. Because target-year employment in the drinking places (alcoholic beverages) industry is lower in the 2020–30 projections than in the 2019–29 baseline projections, bartenders, who make up nearly 44 percent of workers in this industry, are also expected to see a lower employment level in 2030.

**Travel and accommodation**

Travel-related industries have been some of the most hard hit by the COVID-19 pandemic. According to BLS Current Employment Statistics data, employment in the traveler accommodation industry fell 27.1 percent from 2019 to 2020, a loss of roughly 544,200 jobs.\(^{15}\) Likewise, employment in the air transportation industry declined 14.8 percent from 2019 to 2020, a loss of about 74,600 jobs.\(^{16}\)

Target-year employment levels for both the traveler accommodation and air transportation industries are similar across the 2020–30 projections and the strong impact scenario. (See chart 5.) However, despite this similarity, the two projection sets are based on slightly different assumptions about travel habits in the target year.
The alternate pandemic scenarios and the 2020–30 projections both expect that, over the long term, reduced business travel will negatively affect employment in the air transportation and traveler accommodation industries. However, the strong impact scenario also expects some sustained reduction in leisure travel due to consumer behavioral changes resulting from a greater perceived risk of travel and persistent health concerns. On the other hand, given available information on the evolution of the pandemic (up to June 2021) and consumer behavioral responses to it, the 2020–30 projections expect leisure travel to fully recover by the target year of 2030. Therefore, the pandemic’s impact on the air transportation and traveler accommodation industries is expected to be weaker in the 2020–30 projections than in the strong impact scenario, and the difference in target-year employment levels for these industries between the 2019–29 baseline projections and the 2020–30 projections can be attributed to several other factors, including the inherent variation in estimates across projection sets.

Expected reductions in business travel are reflected in the projected 2030 employment levels for both the air transportation and traveler accommodation industries. The pandemic has led to extensive use of videoconferencing and virtual meetings, and many companies expect virtual work to persist over the long term. Some forms of business travel, such as those involving ongoing support for existing clients or intracompany meetings and trainings, will likely be more permanently replaced by virtual meetings and videoconferencing. That said, many forms of business travel, such as those for which in-person interaction is considered more advantageous (e.g., business travel for sales, attracting new clientele, and attending conferences and conventions), are expected to return to normal after the pandemic.
The 2020–30 projections for travel-related occupations show a range of target-year employment levels relative to the 2029 levels expected in the baseline and alternate projections. Employment of reservation and transportation ticket agents and travel clerks is projected to be about 114,700 in 2030, similar to the 2029 level projected in the moderate impact scenario. (See chart 6.) For the 2020–30 decade, the pandemic is expected to accelerate capital–labor substitution of this occupation with online booking systems and automated kiosks—an acceleration due to travel companies’ responses to the pandemic, such as minimizing in-person interactions and restructuring operations. On the other hand, the projected 2030 employment level of hotel, motel, and resort desk clerks is essentially unchanged from the baseline projection for 2029 and is consequently higher than the target-year levels expected in the alternate pandemic scenarios. Although self-service kiosks for customer check-in have been introduced in some motels and hotels, particularly in large hotel chains, this technology is not expected to become widespread, and hotel clerks are expected to remain in demand to assist incoming guests. This reassessment for the 2020–30 projections was based on further research into automated technologies, the current rate of their adoption by hotels and motels, and certain occupation-specific customer service responsibilities that are not easily automated.

Employment of maids and housekeeping cleaners is projected to be approximately 1.35 million in 2030, considerably lower than the 2029 level of about 1.47 million in the 2019–29 baseline projections and below the target-year levels in both alternate pandemic scenarios. (See chart 7.) In the 2020–30 projections, pandemic-induced reductions in cleanings of rooms occupied by the same customers over multiple days are expected to persist in the long term, reducing demand for hotel housekeeping cleaners.
Medical research and development

The COVID-19 pandemic has generated higher public demand for medical and scientific research and development related to infectious diseases. Finding ways to mitigate viral spread and developing treatments and vaccines have been areas of increased public interest in the wake of the pandemic. A Harvard T.H. Chan School of Public Health survey conducted in February–March 2021 found that 71 percent of those surveyed supported “substantially increasing federal spending on improving the nation’s public health programs” and that 72 percent thought “activities of public health agencies in the United States are extremely or very important to the health of the United States.” The American Rescue Plan Act of 2021 included $7.5 billion in funding for the Centers for Disease Control and Prevention for vaccine distribution and administration, along with additional funding for the U.S. Department of Health and Human Services for research and development in the areas of vaccines and therapeutics.

Employment in research and development in the physical, engineering, and life sciences industry is projected to be roughly 746,000 in 2030, in line with the 2029 level expected in the strong impact scenario. (See chart 8.) In both the 2020–30 and alternate projections, increased demand for treatments and vaccines also translates into higher pharmaceutical and medicine manufacturing employment, whose 2030 level is projected to be slightly higher than the target-year level in the 2019–29 baseline projections but lower than the 2029 levels in the alternate pandemic scenarios.
Within medical-related occupations, employment of epidemiologists is expected to reach a 2030 level similar to the 2029 levels projected in the alternate pandemic scenarios. (See chart 9.) Medical scientists are projected to have a 2030 employment level lower than the target-year levels projected in the alternate pandemic scenarios, but still higher (by about 10,000 jobs) than the 2029 level expected in the baseline projections.
The other occupations related to medical research and highlighted in the alternate pandemic scenarios are biochemists and biophysicists, and biological technicians. Employment of biochemists and biophysicists is projected to reach about 36,500 in 2030, close to the 2029 level of approximately 36,000 in the 2019–29 baseline projections. Employment of biological technicians is expected to be roughly 93,500 in 2030, which is between the target-year levels expected in the baseline projections (91,800) and the moderate impact scenario (95,600). For these occupations, then, the increased public demand for research into infectious diseases leads to projected 2030 employment levels that are higher than the 2029 levels expected in the baseline projections, but lower than the target-year levels expected in the alternate pandemic scenarios.

**Information technology**

In the alternate projections, expanded telework is one of the key assumptions underlying both the moderate and strong impact scenarios. With part of the workforce shifting toward remote work, demand for computer and information technology (IT) services, particularly those related to IT security, is expected to rise and, in turn, drive strong employment growth (in both scenarios) in the computer systems design and related services industry.

In the 2020–30 projections, expanded telework is also expected to be a lasting long-term factor affecting IT employment demand, because an increasing number of employers have announced plans to offer remote work permanently. According to an Ipsos survey conducted for the World Economic Forum, most of the employed people surveyed “want flexible working to become the norm,” and 30 percent “would consider looking for another job if they were forced to go back to the office full time.” Expanded remote work has boosted demand for IT
workers, particularly those in the cybersecurity field, because, as noted by one author, “the rise of remote work resulting from pandemic lockdowns has also led to an increase in cybersecurity threats.”

Although the computer systems design and related services industry is projected to have a 2030 employment level lower than the 2029 levels expected in the baseline projections and the two alternate pandemic scenarios, it is still expected to experience strong job gains over the 2020–30 decade, adding about 518,000 new jobs. (See chart 10.) Unlike the alternate pandemic scenarios, in which increased demand for IT services (partly fueled by expanded telework) is expected to be concentrated in the computer systems design and related services industry, the 2020–30 projections anticipate that this demand will be distributed across the economy and other IT-related industries, including the data processing, hosting, and related services industry.

Many of the computer occupations highlighted in the alternate projections are expected to have 2030 employment levels higher than the 2029 levels projected in the moderate and strong impact scenarios. Employment in the largest of these occupations, software developers, is expected to reach approximately 2.26 million by 2030, up notably from the 2029 level of about 1.79 million in the baseline projections and higher than the 1.85 million jobs projected for 2029 in the strong impact scenario. (See chart 11.)
Most of the other computer occupations highlighted in the alternate projections are expected to have 2030 employment levels above the projected target-year levels in the 2019–29 baseline projections. (See chart 12.) One exception is the occupation of network and computer systems administrators, whose projected 2030 employment level is below the 2029 baseline and considerably lower than the target-year levels projected in the alternate pandemic scenarios. Updated research done for the 2020–30 projections suggests that firms will likely take advantage of economies of scale offered by cloud services, which may decrease demand for system administrators.27
Conclusion

Although the pandemic’s structural economic impact remains highly uncertain, several factors identified in the alternate pandemic scenarios are likely to persist in the long term. Among these factors is increased remote work, which is likely to affect demand for computer and IT services, as well as food services and business travel. The ongoing shift from brick-and-mortar retail to e-commerce is also expected to accelerate, as consumer spending habits established during the pandemic continue over the 2020–30 projections decade. In addition, public demand for medical and scientific research and development is expected to grow, particularly in the area of infectious disease. Given that these factors were identified in the 2019–29 alternate projections and are expected to persist over the 2020–30 period, the alternate pandemic scenarios served their purpose of providing an early look at the potential long-term impacts of the pandemic, with the 2020–30 employment projections validating the direction of most expected impacts.

NOTES


6 Ice, Rieley, and Rinde, “Employment projections in a pandemic environment.”

7 In this discussion, cyclical change refers to short-term business cycle fluctuations around a trend. For example, employment may decline in a particular industry during a recession (cyclical decline) and grow during the recovery immediately following the recession (cyclical growth), eventually returning to the long-term trend. Structural change refers to the long-term trend and, in the case of employment, reflects changes in the allocation of employment by industry and occupation. Structural changes in industry or occupational employment are based on factors such as changes in consumer preferences that affect the demand for goods and services or new technology that affects production practices.


17 Malkani, “Going hybrid.”


19 Ibid.


Does part-time work offer flexibility to employed mothers?

Using data from the 2017–18 American Time Use Survey Leave and Job Flexibilities Module, we evaluate the relationship between part-time work and job flexibility among civilian employed mothers who are wage and salary workers. Results show that mothers working part time are employed in jobs that lack many of the attributes that would characterize these jobs as flexible. Mothers in part-time jobs were less likely to have paid leave, work-at-home access, and advanced schedule notice. Although part-time jobs require fewer work hours, these shorter work hours may come at a cost of reduced flexibility, pay, and availability of family-friendly benefits.

The preponderance of women among part-time workers is often attributed to mothers’ preferences to work in flexible or family-friendly jobs. Indeed, part-time work prevalence is higher among women and among mothers, in particular. Prior research argues that mothers may be more likely to work part time because of the effort expended on family obligations and caregiving and their “secondary earner” status in which women’s income is supplementary. Most couples do not have equally demanding careers, and mothers more often scale back to accommodate family needs.

The ability to work part-time hours may be considered a type of job flexibility. The shorter hours required in part-time jobs may allow workers to combine work and family responsibilities more easily. To the extent that jobs requiring long hours of work may be less compatible with family demands, scaling back to part time may enable some mothers to remain employed. Yet, research shows that part-time jobs typically lack benefits that would make them flexible and family friendly. Furthermore, jobs that predominantly employ mothers do not require less work effort. Nor are mothers more likely to work from home or have schedule flexibility compared with other workers. Rather, men are more likely to be employed in jobs with family-friendly characteristics because they are more likely to have authority and autonomy on the job.

Using the American Time Use Survey (ATUS) Leave and Job Flexibilities Module, we evaluate the job characteristics and benefits available to mothers who work part time. Specifically, we compare the ability of full- and part-time employed mothers to adjust their work hours and to work at home. In addition, we
evaluate paid leave access, schedule predictability, and prevalence of nondaytime work schedules in part-time jobs to assess whether part-time or full-time work has more family-friendly characteristics beyond the work-hour requirements of the job.

We begin by presenting an overview of part-time work, including prior research on the characteristics of part-time jobs, as well as the demographic characteristics of part-time workers. Next, we discuss the role of motherhood and its association with part-time and flexible work. Our data and methods section follows, summarizing the ATUS Leave and Job Flexibilities Module. Finally, we present our analyses and results showing that mothers who work in part-time jobs are more likely to work in jobs with reduced flexibility, pay, and availability of family-friendly benefits than their counterparts who work full time.

**Background**

In this section, we discuss the characteristics of part-time work and workers, examining the benefits, hours, and wage rates associated with part-time employment. Then, we discuss the effect of motherhood on work hours and access to family-friendly benefits for working mothers.

**Characteristics of part-time work and workers**

Part-time work is defined as working from 1 to 34 hours in a usual week. Most part-time workers either do not want to work 35 hours or more a week or are not available to do so. In the United States, part-time work has lower benefits and wages compared with full-time work. That is, wages and benefits are often not prorated, and part-time workers receive disproportionately fewer benefits and lower pay than full-time workers. Compared with its European Union counterparts, the United States offers limited part-time work protections and excludes protections, such as the right to request part-time hours with limited grounds for denial, equal access to pensions and leave benefits, or equal or prorated pay.

The Fair Labor Standards Act of 1938 requires the provision of overtime pay for nonexempt workers after exceeding a 40-hour work week, but workers are generally not subject to maximum or minimum work hours; nor are employers required to provide leave, schedule flexibility, and other benefits in most states. The Internal Revenue Code and the Employee Retirement Income Security Act of 1974 allow employers to exclude most part-time workers from health insurance benefits and pension plans. The Family and Medical Leave Act requires an employee to have worked at least 1,250 hours in the past year (about 24 hours a week) to qualify, which excludes from coverage some part-time workers who have not accumulated sufficient hours or maintained a 12-month tenure. Part-time workers are much less likely than full-time workers to have access to retirement and health insurance benefits, sick leave, holiday time, and vacation time. Research shows a larger proportion of part-time workers than full-time workers earn the federal minimum wage or less, and women working part time earn between 16 percent and 20 percent less per hour than their full-time counterparts, after adjusting for common control variables.

Part-time workers are more likely to be women and workers outside of their prime working years (25 to 54 years old). Among employed women, mothers with children under the age of 18 at home and women without children were about equally likely to work part time. About 26.6 percent of employed mothers worked part time compared with 27.6 percent of employed women without children (see chart 1). However, this masks considerable variation by age. Employed mothers were less likely to work part
time at younger (18–24) and older (55 and over) ages than women without children. Conversely, women without children were less likely to work part-time during their prime working years (25–54) compared with mothers.\textsuperscript{18}

**Chart 1. Percentage of employed mothers and employed women without children, working part-time, by age**

Low-wage retail and service jobs employ a disproportionate share of part-time workers.\textsuperscript{19} The economic shift away from a goods-producing sector to a growing service-providing sector contributed to the growth in part-time work throughout the economy over the past few decades.\textsuperscript{20} In lower wage service-providing sector jobs, employers keep hours low, in part, to avoid liability for provision of benefits, by keeping them below the work-hour threshold in which benefit provision may be required.\textsuperscript{21} Employers also use shorter work hours as a form of employer flexibility to increase demand as business conditions require, at times structured through just-in-time scheduling that provides minimal advanced schedule notice to employees.\textsuperscript{22} Just-in-time scheduling poses difficulties for working parents who may neither have access to childcare on short notice nor the availability to accommodate last-minute scheduling changes.\textsuperscript{23}

Part-time options are not expansive in managerial and professional occupations. In these occupations, management and human resources may oppose making part-time work options available and may only make them available to highly valuable employees as a retention strategy.\textsuperscript{24} Yet, because part-time work is less prevalent in managerial and professional occupations, those who work part time may feel more singled out and vulnerable. Research from Epstein and her colleagues shows that part-time workers in professional jobs experienced limited career prospects, less desirable work assignments, reduced networking and training, and greater vulnerability to layoffs.\textsuperscript{25}
Motherhood, part-time work, and flexibility

Following the birth of children, mothers are more likely to scale back their work hours compared with their hours before having children. Mothers in professional occupations scale back their work hours, though typically remain above the part-time threshold. Mothers in retail and service jobs tend to continue working part time after having children, because part-time hours are often a condition of employment in these sectors. Part-time workers may be limited in their ability to seek full-time hours to the extent that their lower wages make covering the costs of full-time childcare difficult. Research has shown that mothers are more likely to work full time rather than part time in states that have more affordable childcare and longer school days. Part-time workers are more likely than full-time workers to rely on family who may only be able to provide limited hours of care.

Location and timing of work are key dimensions of flexibility, allowing workers to combine work and family responsibilities more easily. Mothers in professional occupations have more access to these types of flexibility compared with mothers in other occupations, and they are more likely to use this flexibility to scale back their work hours by a few hours per week while remaining employed full time. Research shows that workers in more privileged positions and occupations with higher status and earnings are better able to shape their schedules and control their work hours and that workers with more education are more likely to have access to flexible schedules and telecommuting options. The use of these benefits enables workers to employ “time shifting” in which they move paid work to better accommodate unpaid work (e.g., household tasks or childcare) and increase work-family compatibility. However, many workers report stigma over the use of these benefits, and women without children are more likely to be able to work from home than mothers.

Whether access to work at home is a family-friendly benefit is disputed. Those who work from home tend to work longer hours. Those hours may also come as overwork, some uncompensated, blurring the boundaries of home and work. However, those who work at home may avoid long commutes, freeing time for other activities. Schedule flexibility and predictability are widely believed to increase compatibility between work and family responsibilities to the extent that the worker determines the flexibility rather than the employer.

Thus far, we have established that part-time work is concentrated in lower-wage jobs with access to fewer benefits. We have also established that mothers ages 25 to 54 are more likely to work part time than women without children. Now, we evaluate whether the perception that part-time jobs offer more flexibility to working mothers than full-time jobs is accurate. Although part-time jobs require fewer hours of work, which is a type of flexibility, we explore whether the scheduled hours of work for part-time workers are flexible and whether these jobs provide family-friendly benefits. Reduced hours alone may not offer a flexible working environment for mothers if the hours they are required to work are not flexible and a lack of benefits restricts the mothers’ ability to take time off for parental leave or to take care of a sick child. Therefore, we show whether mothers in part-time jobs have greater access to paid time off, to schedule flexibility, and to work-at-home benefits identified as key dimensions of flexibility.
compared with mothers in full-time jobs. We also evaluate whether mothers working in part-time jobs have more schedule predictability and equivalent wages.

**Data and methods**

To evaluate the differences in access to work benefits among full- and part-time working mothers, we used data from the 2017–18 ATUS Leave and Job Flexibilities Module. The ATUS is an ongoing survey conducted by the U.S. Census Bureau for the U.S. Bureau of Labor Statistics. The core of the ATUS is a single-day time diary administered to individuals ages 15 and older, with additional questions about the respondent’s household and employment status. Employment information includes industry and occupation, earnings, and full- and part-time status—in addition to other employment characteristics. The 2017–18 Leave and Job Flexibilities Module includes additional questions about ATUS wage and salary respondents’ main job. While the ATUS is designed to produce estimates of how respondents spend their time, the Leave and Job Flexibilities Module was designed to measure workers’ access to paid and unpaid leave and to work schedules and job flexibilities, such as advance knowledge of work schedules, ability to adjust work hours, or ability to work at home.

For this analysis, we restricted our sample to employed mothers ages 18 and older living with at least one child under 18 years of age. Using this sample, we estimated the share of workers who had access to paid leave, had the ability to adjust their start and stop times, had the ability to work at home, and worked at home at least occasionally, by full- and part-time status. While some research focuses exclusively on work that is done at home for pay, we include workers who worked at home irrespective of whether they were paid for some or all the work or if they were just taking their work home. Analyzing 2001 Current Population Survey data, Song suggested that unpaid work at home may be an investment workers make expecting future returns. To the extent that mothers can adjust when and where they work to accommodate their family, household, or personal needs, the ability to work at home may be viewed as a positive option. Conversely, work at home may be associated with more negative outcomes such as elevated work-to-family conflict among those who work at home to catch up on work. In addition to evaluating access to paid leave, schedule flexibility, and work from home, we also examined the share who worked a daytime schedule and how far in advance workers knew their schedules.

We examined the access to these benefits for selected occupational groups. Specifically, we looked at managerial and professional occupations, service occupations, and sales and office occupations. Collectively, 93.5 percent of all working mothers in our sample were employed within one of these three occupational groups.

Finally, using data collected in the ATUS, we examined median hourly wages among full- and part-time working mothers. Specifically, responses to questions about usual hourly earnings were used if available; when those data were not available, usual weekly earnings were divided by usual weekly hours. For workers whose usual weekly hours vary, weekly earnings were divided by the median number of hours usually worked among full- and part-time working mothers.

**Results**
Most employed mothers worked full time (see table 1). In 2017–18, among employed mothers with children younger than 18 in their home, about one-fourth (23.5 percent) worked part time and 76.5 percent worked full time. About 26 percent of mothers working part time and 22 percent of mothers working full time had children younger than 3 at home. Full-time working mothers were more likely than part-time working mothers to have a teenager as their youngest child (23.5 percent compared with 17.1 percent) (see chart 2).

Table 1. Percentage of employed mothers living with children under 18, by full- and part-time work status and percent distribution, by age of youngest child, and by occupation

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
<th>Usually works full time</th>
<th>Usually works part time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full- and part-time work status</td>
<td>100.0</td>
<td>76.5</td>
<td>23.5[^1]</td>
</tr>
<tr>
<td>Age of youngest child</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>0 to 2</td>
<td>22.8</td>
<td>21.8</td>
<td>25.9</td>
</tr>
<tr>
<td>3 to 6</td>
<td>23.7</td>
<td>23.2</td>
<td>25.3</td>
</tr>
<tr>
<td>7 to 12</td>
<td>31.5</td>
<td>31.5</td>
<td>31.7</td>
</tr>
<tr>
<td>13 to 17</td>
<td>22.0</td>
<td>23.5</td>
<td>17.1[^1]</td>
</tr>
<tr>
<td>Occupational groups</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Management, professional, and related</td>
<td>52.5</td>
<td>56.7</td>
<td>38.9[^1]</td>
</tr>
<tr>
<td>occupations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service occupations</td>
<td>17.7</td>
<td>13.0</td>
<td>32.7[^1]</td>
</tr>
<tr>
<td>Sales and office occupations</td>
<td>23.3</td>
<td>23.8</td>
<td>21.6</td>
</tr>
<tr>
<td>Other</td>
<td>6.5</td>
<td>6.4</td>
<td>6.7</td>
</tr>
</tbody>
</table>

[^1] Difference between full- and part-time estimates is statistically significant at the 5-percent level.

Looking at the likelihood of working part time by occupation, as expected given past research, we found that 43.6 percent of mothers employed in service occupations worked part time, a larger share than mothers employed in other occupations. Mothers in managerial, professional, and related occupations were the least likely to work part time (17.4 percent) (see chart 3).\(^{50}\)
Job benefits and flexibilities available to part- and full-time working mothers

Mothers who worked part time were less likely to have access to paid leave. Only 29.3 percent of mothers who were part-time workers had access to paid leave, compared with 76.0 percent of mothers who worked full time (see chart 4). In terms of job flexibilities, mothers who worked part time had less access to working at home compared with mothers who worked full time (see table 2). While 20.3 of part-time employed mothers could work at home, this share jumped to 36.5 percent among those working full time. And, in fact, mothers employed full time were more likely to work at home (paid or unpaid), with 31.4 percent of them doing so at least occasionally compared with 18.6 percent of part-time workers.

Table 2. Percentage of employed mothers living with children under 18, with access to family-friendly benefits, reasons for working at home, and nondaytime schedules, by full- and part-time work status

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
<th>Usually works full time</th>
<th>Usually works part time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job flexibilities and paid leave</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[1] Statistically significant at the 5-percent level.

[2] Statistically significant at the 10-percent level.

Note: Significance level refers to the difference between full- and part-time estimates.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
<th>Normally works full time</th>
<th>Normally works part time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has paid leave</td>
<td>65.0</td>
<td>76.0</td>
<td>29.3[^1]</td>
</tr>
<tr>
<td>Could work at home</td>
<td>32.7</td>
<td>36.5</td>
<td>20.3[^1]</td>
</tr>
<tr>
<td>Did work at home, at least occasionally</td>
<td>28.4</td>
<td>31.4</td>
<td>18.6[^1]</td>
</tr>
<tr>
<td>Among those who did work at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid for all work done at home</td>
<td>69.2</td>
<td>67.1</td>
<td>80.9[^1]</td>
</tr>
<tr>
<td>Paid for some or all work done at home</td>
<td>79.8</td>
<td>78.9</td>
<td>85.1[^2]</td>
</tr>
<tr>
<td>Main reason for working at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinate work schedule with personal or family</td>
<td>32.9</td>
<td>31.1</td>
<td>42.8[^1]</td>
</tr>
<tr>
<td>needs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finish or catch up on work</td>
<td>25.1</td>
<td>26.9</td>
<td>15.2[^1]</td>
</tr>
<tr>
<td>Job requires it</td>
<td>16.4</td>
<td>14.2</td>
<td>28.2</td>
</tr>
<tr>
<td>Personal preference</td>
<td>14.2</td>
<td>15.4</td>
<td>7.8[^2]</td>
</tr>
<tr>
<td>Reduce commuting time or expense</td>
<td>8.5</td>
<td>9.4</td>
<td>3.9[^1]</td>
</tr>
<tr>
<td>Weather</td>
<td>1.8</td>
<td>2.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>1.1</td>
<td>1.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Can adjust work hours</td>
<td>54.1</td>
<td>52.6</td>
<td>58.9[^2]</td>
</tr>
<tr>
<td>Work schedules and advance notice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advance knowledge of schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 week</td>
<td>12.5</td>
<td>9.7</td>
<td>21.7[^1]</td>
</tr>
<tr>
<td>1 to 4 weeks</td>
<td>21.4</td>
<td>19.3</td>
<td>27.9[^2]</td>
</tr>
<tr>
<td>4 weeks or more</td>
<td>66.1</td>
<td>71.0</td>
<td>50.4[^1]</td>
</tr>
<tr>
<td>Works a daytime schedule</td>
<td>88.1</td>
<td>90.0</td>
<td>81.9[^1]</td>
</tr>
<tr>
<td>Main reason for working a nondaytime schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better arrangements for family or childcare</td>
<td>40.1</td>
<td>37.7</td>
<td>44.3</td>
</tr>
<tr>
<td>Nature of the job</td>
<td>27.6</td>
<td>23.0</td>
<td>35.8[^2]</td>
</tr>
<tr>
<td>Personal preference</td>
<td>15.1</td>
<td>19.1</td>
<td>7.8[^1]</td>
</tr>
<tr>
<td>Could not get any other shift</td>
<td>7.6</td>
<td>8.2</td>
<td>6.6</td>
</tr>
<tr>
<td>Better pay</td>
<td>4.3</td>
<td>6.4</td>
<td>0.5[^1]</td>
</tr>
<tr>
<td>Allows time for school or other job</td>
<td>2.8</td>
<td>2.5</td>
<td>3.3</td>
</tr>
</tbody>
</table>

[^1]: Statistically significant at the 5-percent level.

[^2]: Statistically significant at the 10-percent level.

Note: Significance level refers to the difference between full- and part-time estimates.

For many mothers who work at home, an advantage is that it helps with work-life balance: the largest shares of both part- and full-time working mothers state that they work at home to coordinate their family or personal needs. This reason for working at home is especially common among part-time working mothers—42.8 percent say as much, compared with 31.1 percent of full-time working mothers (see table 2). At the same time, part-time working mothers were about twice as likely to work at home because their job required it (28.2 percent versus 14.2 percent for full-time working mothers). Conversely, mothers employed part time were less likely to say that they work at home to finish or catch up on work than were their full-time counterparts (15.2 percent versus 26.9 percent). Among those working at home to catch up on work, only 27.8 percent were fully compensated; thus, they were not paid for most of this work. Of mothers employed full time who worked at home (for any reason), 78.9 percent were paid for some or all of their work, compared with 85.1 percent of part-time working mothers (see table 2). Mothers employed

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[1] Statistically significant at the 5-percent level.

[2] Statistically significant at the 10-percent level.

Note: Significance level refers to the difference between full- and part-time estimates.

part time were less likely than were their full-time employed counterparts to cite personal preference or a desire to reduce their commute time or expenses as their main reason for working at home.

Mothers who worked part time were slightly more likely to be able to adjust their work hours, 58.9 percent compared with 52.6 percent for full-time working mothers (see chart 4 and table 2). Some of this flexibility may relate to the fact that part-time workers were more likely to be employed in jobs that lack regular hours and have last-minute scheduling. Mothers may be able to pick up shifts that are available; however, some of the schedule changes may be involuntary. One-fifth of part-time workers (21.7 percent) had less than a week of notice of their work schedule, compared with 9.7 percent of their full-time counterparts. Although part-time workers were more likely than full-time workers to have 1 to 4 weeks’ notice of their schedules (27.9 percent compared with 19.3 percent), they were less likely to have at least 4 weeks advanced notice (50.4 percent versus 71.0 percent for full-time workers) (see table 2).

Most mothers worked a daytime schedule, defined here as occurring between 6:00 a.m. and 6:00 p.m. (see table 2). Among mothers, 81.9 percent of part-time workers worked a day shift compared with 90.0 percent of full-time workers. Within the range of daytime hours, peak worktimes were between 8:00 a.m. and 3:00 p.m. on weekdays for both full- and part-time working mothers (see charts 5 and 6). The largest share of mothers working something other than a daytime schedule (e.g., evening shifts, night shifts, split shifts, or rotating shifts) said the main reason they did so was to provide better arrangements for their family and childcare. Just over 44.0 percent of part-time working mothers and 37.7 percent of full-time working mothers worked nondaytime schedules for this reason. To the extent that workers do shift work to balance caregiving obligations, this shift work could be considered a flexible benefit. Yet, a large share of part-time working mothers (35.8 percent) worked a nondaytime schedule because it was the “nature of the job”—certainly true for many service occupations (e.g., cooks, waiters, hairdressers). In comparison, 23.0 percent of full-time working mothers said the same.
Chart 5. Percentage of mothers working on weekdays, by time of day

Click legend items to change data display. Hover over chart to view data.
Note: Data include all wage and salary working mothers living with their children under age 18 on an average nonholiday weekday.

Chart 6. Percentage of mothers working on weekend days, by time of day

Click legend items to change data display. Hover over chart to view data.
Note: Data include all wage and salary working mothers living with their children under age 18 on an average weekend day or holiday.

Disparities in benefits and flexibility by occupational group
Differences in the types of occupations in which part- and full-time working mothers were employed may have substantially contributed to differences in access to job benefits and flexibilities. Compared with mothers working full time, mothers working part time were more likely to be employed in service occupations (32.7 versus 13.0 percent) and were less likely to be employed in managerial and professional occupations (38.9 versus 56.7 percent). Both groups of mothers were equally likely to work in sales and office jobs (see table 1).

Regarding access to paid leave, even within each of these three major occupational groups (managerial and professional, service, and sales and office), part-time working mothers were less likely to have leave than mothers employed full time (see chart 7). Among mothers working in managerial and professional occupations, those employed part time were about half as likely to have access to paid leave as full-time workers (42.7 percent versus 84.0 percent) (see table 3). The gap was bigger still among mothers in service occupations, with 18.4 percent of part-time workers having paid leave, compared with 56.1 percent of full-time workers.

Table 3. Percentage of employed mothers living with children under 18, with access to family-friendly benefits, by full- and part-time work status and occupational group

<table>
<thead>
<tr>
<th>Family-friendly benefits</th>
<th>Management, professional, and related occupations</th>
<th>Service occupations</th>
<th>Sales and office occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Full time</td>
<td>Part time</td>
</tr>
<tr>
<td>Could work at home</td>
<td>44.5</td>
<td>47.7</td>
<td>29.3[1]</td>
</tr>
<tr>
<td>Did work at home, at least occasionally</td>
<td>39.3</td>
<td>41.9</td>
<td>27.0[1]</td>
</tr>
<tr>
<td>Can adjust work hours</td>
<td>56.1</td>
<td>56.1</td>
<td>56.0</td>
</tr>
<tr>
<td>Has paid leave</td>
<td>76.8</td>
<td>84.0</td>
<td>42.7[1]</td>
</tr>
</tbody>
</table>

Work schedules and advance notice

<table>
<thead>
<tr>
<th>Advance knowledge of schedule</th>
<th>Management, professional, and related occupations</th>
<th>Service occupations</th>
<th>Sales and office occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Full time</td>
<td>Part time</td>
</tr>
<tr>
<td>Less than 1 week</td>
<td>9.5</td>
<td>7.3</td>
<td>19.6[1]</td>
</tr>
<tr>
<td>1 to 4 weeks</td>
<td>16.7</td>
<td>15.8</td>
<td>21.1</td>
</tr>
<tr>
<td>4 weeks or more</td>
<td>73.8</td>
<td>76.8</td>
<td>59.4[1]</td>
</tr>
<tr>
<td>Works a daytime schedule</td>
<td>91.4</td>
<td>93.6</td>
<td>81.1[1]</td>
</tr>
</tbody>
</table>

[1] Statistically significant at the 5-percent level.

[2] Statistically significant at the 10-percent level.

Note: Significance level refers to the difference between full- and part-time estimates.

Employed mothers working part time in managerial and professional occupations were less likely to be able to work at home than their full-time counterparts (29.3 percent versus 47.7 percent) (see table 3). At the same time, no statistically significant gap in access to work at home was found among full- and part-time service workers or among full- and part-time sales and office workers. Access to work at home in service occupations was quite low for all workers (6.9 percent).

Among mothers working in service occupations and sales and office occupations, part-time workers were more likely to be able to adjust the start and stop times of their jobs than full-time workers (see chart 7). Among mothers working in managerial and professional occupations, no difference in access to this form of flexibility was found.

In managerial and professional occupations and sales and office occupations, part-time workers were less likely than full-time workers to have advanced notice of their work schedule. For instance, 50.5 percent of part-time workers in sales and office occupations knew their schedule 4 or more weeks in advance compared with 67.4 percent of full-time workers (see table 3).
Mothers who worked part time earned 63 percent of full-time working mothers’ hourly wages, or $8 less per hour (see table 4). Part of this wage differential stems from the disproportionate concentration of part-time workers in service occupations with lower wages. Yet, within all occupational groups, mothers earned less per hour when they worked part time rather than full time. The hourly wage ratio was smallest in service occupations (0.75) and sales and office occupations (0.75) compared with management, professional, and related occupations (0.91). That is, women working part time in service occupations and sales and office occupations earned 75 percent of the earnings of their full-time counterparts, or 25 cents on the dollar less per hour. Women working part time in management, professional, and related occupations earned 91 percent, or 9 cents on the dollar less per hour, compared with their full-time counterparts. These results are in line with prior research showing that mothers pay an hourly wage penalty when working part time, in addition to the loss of benefits.

Table 4. Mothers’ median hourly wages and wage ratio, by full- and part-time work status and occupational group

<table>
<thead>
<tr>
<th>Occupational group</th>
<th>Hourly wages (dollars)</th>
<th>Wage ratio part time to full time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Full time</td>
</tr>
<tr>
<td>Total</td>
<td>18.9</td>
<td>20.6</td>
</tr>
<tr>
<td>Management, professional, and related occupations</td>
<td>26.6</td>
<td>27.1</td>
</tr>
<tr>
<td>Service occupations</td>
<td>11.9</td>
<td>13.1</td>
</tr>
<tr>
<td>Sales and office occupations</td>
<td>16.3</td>
<td>17.5</td>
</tr>
<tr>
<td>Other</td>
<td>11.8</td>
<td>12.0</td>
</tr>
</tbody>
</table>


Summary

Most mothers worked in full-time jobs. Mothers who worked part time were more likely to have younger children and work in service occupations, compared with those who worked full time. Although part-time jobs offer shorter work hours that can improve work-life balance, they may lack many attributes that would otherwise characterize them as family friendly. Mothers in part-time jobs were less likely to have access to paid leave, they had less access to and uptake of work at home, and they received less advanced notice of their work schedules, compared with mothers employed in full-time jobs. Mothers who worked part time also earned less per hour than their full-time counterparts in the same occupational group. On the other hand, mothers employed part time in service occupations and in sales and office occupations had more flexibility to adjust their schedules than full-time working mothers in these occupations. The ability to adjust starting and ending times is an important measure of flexibility and a predictor of mothers’ labor force participation. Yet, some of this flexibility may reflect the more variable schedules in these occupations, particularly in service occupations.
Overall, mothers working part time were employed in jobs that lacked many of the attributes that would characterize these jobs as flexible. In contrast, mothers employed full time had greater access to family-friendly benefits. One explanation is that these mothers were more likely to work in managerial and professional occupations, which tend to offer more flexibility. But even within occupational groups, most disparities in access to leave and benefits persisted between mothers working part time and full time.

Mothers may work part time in the hours that they have childcare coverage, such as during school hours or when family or friends can provide care. This may enable them to enter and remain in the labor force. Given the high costs of childcare and the low wages offered in service occupations and sales and office occupations, full-time childcare may be unaffordable. The evidence presented here, however, does not show that part-time jobs are family friendly or flexible on most measures beyond requiring fewer hours of work. Mothers who worked part time incurred lower wages and received fewer benefits, including having access to paid leave, the ability to work at home, and advanced schedule notice.

ACKNOWLEDGMENT: The views presented in this article are those of the authors and are not necessarily those of the U.S. Bureau of Labor Statistics or the U.S. Department of Labor.

SUGGESTED CITATION:

Notes


9 Glass and Camarigg, “Gender, parenthood, and job-family compatibility.”


11 Dunn, “Who chooses part-time work and why?”


14 Bishow, “The relationship between access to benefits and weekly work hours.”


16 Dunn, “Who chooses part-time work and why?”

17 Estimates presented in chart 1 include wage and salary and self-employed workers. All other tables and charts refer to wage and salary workers, the population for the ATUS Leave and Job Flexibilities Module.

18 In a model controlling for age, marital status, educational attainment, and occupation, mothers were about 2.2 times more likely to work part time than women without children. Among wage and salary workers only, who are the sample of workers in the ATUS Leave and Job Flexibilities Module, 23.5 percent of mothers living with a child under the age of 18 in the home worked part time and 22.4 percent of women without children worked part time.

19 In a model controlling for age, marital status, educational attainment, and occupation, workers in service occupations were 3.2 times more likely to work part time than workers in managerial and professional occupations.


Lambert, “Making a difference for hourly employees”; Lambert, “Opting in’ to full labor force participation in hourly jobs”; and Clawson and Gerstel, Unequal time.


Epstein et al., The part-time paradox.


Landivar, Mothers at work.

Ibid.


Weeden, “Is there a flexiglass ceiling?”


Clawson and Gerstel, Unequal time; Epstein et al., The part-time paradox; and Sylvia Fuller and C. Elizabeth Hirsh, “Family-friendly” jobs and motherhood pay penalties: the impact of flexible work arrangements across the educational spectrum,” Work and Occupations, vol. 46, no. 1, February 1, 2019, pp. 3–44.


Noonan and Glass, “The hard truth about telecommuting.”

Weeden, “Is there a flexiglass ceiling?”

Golden, “Part-time workers pay a big-time penalty”; and Bishow, “The relationship between access to benefits and weekly work hours.”

As mentioned earlier, the ATUS Leave and Job Flexibilities Module was sponsored by the U.S. Department of Labor’s Women’s Bureau. For more information, see https://www.bls.gov/news.release/pdf/leave.pdf and https://www.bls.gov/news.release/pdf/flex2.pdf.

Respondents for the ATUS are selected from households that have completed the Current Population Survey. Each year, the ATUS conducts approximately 10,000 interviews and is designed to nationally represent the U.S. noninstitutional population ages 15 and over. For more information, see https://www.bls.gov/opub/hom/atus/home.htm.

Self-employed workers were excluded from the module. The total sample for the 2017–18 Leave and Job Flexibilities Module was 10,071 workers.

The 2017–18 Leave and Job Flexibilities Module began with questions about access to leave, including whether respondents receive paid leave at their main job and, if so, the reasons for which they can take paid leave. Following the questions about access to leave, interviewers asked respondents about how much flexibility they have in arranging their work schedules. Specifically, respondents were asked if they can vary or change the times they begin and end work. Respondents were then asked how far in advance they know their work schedules. Respondents provided answers to additional questions about their work schedules, including the time of day and days of the week they usually work. Next, respondents were asked if they can work at home. Respondents who indicated they can work at home were asked whether they ever do work at home, whether they are paid for the hours they work at home, and the main reason they work at home. For more information, see the 2017–18 Leave and Job Flexibilities Module Questionnaire at https://www.bls.gov/tus/lvmquestionnaire1718.pdf.

Our sample included 2,271 employed mothers, of which 1,754 were employed full time and 517 were employed part time.


To evaluate the differences between full- and part-time workers, we tested the statistical difference of the means, using standard errors constructed from the replicate weights provided in the dataset, at the 10-percent level of significance. In selected tables, we provide 5-percent and 10-percent levels of significance on the difference between part-time and full-time workers.

Because a majority of mothers are employed in management, professional, and related occupations, a large share of part-time workers are employed in this occupational group—38.9 percent of part-time working mothers (see table 1).

This estimate is not presented in the tables or charts. This estimate is a calculation of the share of full-time working mothers who worked at home because they needed to catch up on work but were not paid for all the at-home work.

Lambert, “Making a difference for hourly employees.”

Enchautegui-de-Jesús, “Challenges experienced by vulnerable hourly workers.”
To calculate an hourly wage measure for all workers, we used hourly earnings, if available; when those data were not available, we divided weekly earnings by usual hours worked per week.

Golden, “Part-time workers pay a big-time penalty.”

Landivar, “Opting out, scaling back, or business-as-usual?”

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Challenges in calculating occupational fatality rates

The U.S. Bureau of Labor Statistics produces data on occupational injuries and fatalities. Calculating these data is generally straightforward. However, some occupations, like firefighters, young farm workers, and police officers, pose more of a challenge because of complications with available data. This article explores the data available for calculating fatality rates in these occupations and the challenges associated with producing accurate calculations.

Certain occupations have a higher risk of injury or fatality than others, and the U.S. Bureau of Labor Statistics (BLS) seeks to produce accurate information on those risks. However, although calculating those risks is straightforward for certain occupations, it is much more challenging for others. In particular, the risk among firefighters, young farmers, and police officers is difficult to assess because of complications with the data available.

In this article, we explore the data available on occupational fatalities among those working as firefighters, farmers, and police officers. In all three cases, the nature of work schedules and employment relationships makes it challenging to calculate fatal injury rates that completely align with the risk associated with working in these occupations. This information can help data users to better understand how to interpret the risk associated with these occupations and the challenges with producing fatality rates.

Census of Fatal Occupational Injuries

The Census of Fatal Occupational Injuries (CFOI) seeks to produce a complete count of all fatalities that occur during the calendar year that are the result of workplace injuries. The data are compiled from a variety of sources, including death certificates, coroners’ reports, and news articles. The CFOI program uses diverse state, federal, and independent data sources to identify, verify, and describe fatal work injuries. Using a wide range of data sources ensures that fatality counts are as complete and accurate as possible.

CFOI data help safety and health experts and policymakers monitor the number and types of deadly work injuries over time. The data are also used to identify factors associated with particularly high risks, such as driving a tractor-trailer truck or working in the commercial fishing industry. Fatal injury profiles can be generated from the CFOI database for specific worker populations (such as the self-employed or female workers), for certain types of machinery (such as farm equipment), and for specific fatal circumstances (such as pedestrian fatalities in a work zone). Such profiles help identify existing work standards that may require revision and help highlight safety hazards where intervention strategies may need to be developed.
Calculating rates

Fatality rates help data users to understand the relative risk of industries and occupations, as well as the demographic characteristics of those taking on the risks. For example, although there were more total fatalities among cashiers than logging workers in 2019 (51 versus 46), the risk is about 30 times higher for logging workers because of the differences in employment between logging workers and cashiers. Calculating the fatality rate of each occupation results in a common scale of risk, which allows comparisons across different groups of workers and across time.

The CFOI uses an hours-based method for calculating rates, measuring the number of fatalities among 100,000 full-time workers. In this calculation, we assume a full-time worker averages 40 hours per week, 50 weeks per year. Rates are calculated using the following formula:

\[
R = \left( \frac{N}{EH} \right) \times 200,000,000,
\]

where \( R \) is the hours-based rate of fatal injuries for a group, \( N \) is the number of fatal injuries in a group, \( EH \) is the total hours worked by all employees in a group during the calendar year, and 200,000,000 is the base number of hours for 100,000 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

The total hours worked by all employees in a group during the calendar year is calculated with data from the Current Population Survey (CPS). This household survey is conducted monthly by the U.S. Census Bureau on behalf of BLS and gathers information about employment from any person 16 years or older within a sampled household. People are considered employed if, during the reference week, they did any work at all as paid employees; worked in their own business, profession, or on their own farm; or worked without pay at least 15 hours in a family business or farm.

The scope of the CFOI is far broader. Data are collected for workers of any age, any worker status (including volunteers), and, in some cases, when the injury occurs to an off-duty worker. Because the scopes of the CFOI and the CPS differ, when calculating the rates the CFOI removes most fatalities that do not have a matching CPS hours measure. Although this allows BLS to compute rates with the same pool of workers in the numerator and denominator, it also means that certain rates may be misinterpreted by users who assume these rates account for all workers in a group.

As an example, in 2018 there were 5,250 fatalities resulting from occupational injuries. Using a CPS estimate of 292,528 million hours worked, BLS reported a fatality rate of 3.5 cases per 100,000 full-time equivalent workers.\(^2\) What is not clear from the reported table is that the actual numerator used to calculate the rate is 5,091 fatalities, which excludes volunteers, active-duty resident military personnel, and those under age 16. The CFOI removes these cases because workers in these occupations are not in scope for the CPS hours measures, and so they are excluded from both the numerator and denominator for consistency.

The CFOI bases the calculation on a full-time equivalent worker measure, effectively calibrating the hours by assuming a 2,000-hour work year, rather than simply dividing cases by the number of workers. This method makes it easier to compare industries and occupations characterized by many part-time workers with those that are mainly composed of full-time workers.\(^3\) However, although using an hours-based rate does allow a more straightforward comparison of risk per hour worked, it creates problems when considering the risks of jobs that are not characterized by a traditional 40-hour-per-week schedule, as well as jobs whose hours in the CPS may not include a complete measure of time exposed to work-related hazards.

To illustrate this concept, we explore the fatality rate calculations for firefighters, young farm workers, and police officers to demonstrate the challenges with calculating rates for populations that pose measurement challenges due to CFOI classifications, CPS hours measurement, or both.

Firefighters
One of the most challenging occupations for calculating risk in the CFOI is firefighters because a large portion of firefighters work as volunteers rather than as paid workers. The National Fire Protection Association estimates that out of approximately 1.1 million firefighters in the United States in 2018, only 370,000 of them worked as career firefighters (roughly 34 percent) and the rest were volunteers. Volunteers are much more common in rural areas while career firefighters are more common in urban areas. Although the number of career firefighters has been increasing steadily over the last several decades, volunteers still account for approximately two-thirds of firefighters in the United States.  

The CFOI program aims to capture information about fatalities for any worker status, which includes both paid workers and volunteers. For most occupations, there are very few volunteer fatalities, which means rates are straightforward to calculate. However, approximately half of all firefighter fatalities are among volunteers. (See chart 1.) Because volunteers are not included in the total hours worked used in our rate calculation, we also remove fatalities of volunteers from the numerator. That means our rate calculation can only be considered to show the risk for one-third of firefighters: those that are paid to work, and not the volunteers.

**Chart 1. Total fatalities among firefighters and supervisors of firefighters, wage and salary or volunteer, 2010–19**

In 2018, there were 66 fatalities among workers classified as volunteers; 18 of these were firefighters and 4 more were first-line supervisors of firefighters. There were 46 total fatalities among firefighters and their first-line supervisors, but only the 14 that were paid, nonsupervisory employees were used to calculate the published fatality rate of 3.4 cases per 100,000 full-time equivalent workers. The other cases involved volunteers and other categories that are outside the scope of the CPS hours calculations, or first-line supervisors of firefighters who are included in a different occupational code. The fact that paid firefighters are 34 percent of the workforce and 44 percent of cases suggests a higher risk profile. However, since we cannot compare using hours worked as a basis, we cannot determine an overall rate for this occupation.

A second issue is that firefighters often work more than a 40-hour workweek. It is common for firefighters to work 24-hour shifts followed by 48 or 72 hours off. Firefighters are even treated differently under the Fair Labor Standards Act, which states they can work up to 53 hours per week before it is required for employers to pay overtime; for most jobs, this is 40 hours per week.
If the goal of CFOI rates is to show the risk that 100,000 full-time equivalent workers face, the previously mentioned formula would not properly capture that information. Because paid full-time firefighters, on average, work more hours per week than do full-time workers in most occupations, the hours-based method underestimates the risk per worker. For example, if we assume that a full-time paid firefighter worked on average 50 hours per week in 2018, the fatality rate would be equivalent to 4.2 per 100,000 full-time equivalent workers, as opposed to the published rate of 3.4.\(^7\) 

**Young farm workers**

Farming also poses some challenges when calculating rates. Since 2011, there have been around 400 fatalities each year in farming occupations. (See table 1.) Given the number of fatalities in farm occupations each year, the CFOI would like to produce rates that accurately reflect the risk to these workers.

### Table 1. Total fatalities among farm workers, for select occupations, 2011–19

<table>
<thead>
<tr>
<th>Year</th>
<th>Farmers, ranchers, and other agricultural managers</th>
<th>Agricultural equipment operators</th>
<th>Farmworkers and laborers, crop, nursery, and greenhouse</th>
<th>Farmworkers, farm, ranch, and aquacultural animals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>268</td>
<td>11</td>
<td>78</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>2012</td>
<td>232</td>
<td>10</td>
<td>80</td>
<td></td>
<td>54</td>
</tr>
<tr>
<td>2013</td>
<td>231</td>
<td>5</td>
<td>72</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>2014</td>
<td>270</td>
<td>9</td>
<td>80</td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>2015</td>
<td>252</td>
<td>11</td>
<td>106</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>2016</td>
<td>260</td>
<td>14</td>
<td>78</td>
<td></td>
<td>61</td>
</tr>
<tr>
<td>2017</td>
<td>258</td>
<td>17</td>
<td>85</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>2018</td>
<td>257</td>
<td>8</td>
<td>78</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>2019</td>
<td>238</td>
<td>17</td>
<td>87</td>
<td></td>
<td>73</td>
</tr>
</tbody>
</table>

Note: The Census of Fatal Occupational Injuries uses the Standard Occupation Classification to define occupations.


Although some of these fatalities occur on large farms with large staffs, many farms are family-operated affairs with little or no staff from outside the family. The U.S. Department of Agriculture designates a family farm as “any farm organized as a sole proprietorship, partnership, or family corporation. Family farms exclude farms organized as nonfamily corporations or cooperatives, as well as farms with hired managers.” Under that definition, 96 percent of the approximately 2.2 million farms in the United States are considered family farms, and more than 1.9 million of those family farms gross less than $250,000 per year.\(^8\)

It is common for family members, even children who would normally be prohibited from working, to work on family farms. Federal law says that “[a] child of any age may be employed by his or her parent or person standing in place of the parent at any time in any occupation on a farm owned or operated by that parent or person standing in place of that parent.”\(^9\) Besides allowing children to work on farms owned by their parents or in instances in which parental consent is provided, federal law allows minors age 14 and over to do certain jobs on farms. While some state laws are stricter than these federal guidelines, there are many young farmworkers throughout the country. In 2014, the Centers for Disease Control estimated that more than 600,000 children under the age of 16 worked on farms in the United States.\(^10\)
Table 2 shows the number of fatalities each year among farmworkers under the age of 16. However, the challenge for calculating the risk to these workers is that the CPS program does not collect information regarding hours worked for those under the age of 16. Therefore, the CFOI program chooses to remove these workers from its calculations and only produces a rate for workers age 16 and older. This means we are not fully capturing the risk that exists to these workers and are specifically missing a vulnerable population.

Table 2. Fatalities among farm workers under age 16, by year, 2011–19

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>8</td>
</tr>
<tr>
<td>2012</td>
<td>14</td>
</tr>
<tr>
<td>2013</td>
<td>4</td>
</tr>
<tr>
<td>2014</td>
<td>3</td>
</tr>
<tr>
<td>2015</td>
<td>11</td>
</tr>
<tr>
<td>2016</td>
<td>9</td>
</tr>
<tr>
<td>2017</td>
<td>7</td>
</tr>
<tr>
<td>2018</td>
<td>9</td>
</tr>
<tr>
<td>2019</td>
<td>12</td>
</tr>
</tbody>
</table>


Besides excluding workers under the age of 16, the way in which we estimate fatality rates for workers 16 and older who work on farms owned by their families may lead to inaccuracies. Between 2011 and 2019, there were 36 fatalities among farm workers ages 16 to 18 who worked for their family business. Because of the nature of CFOI data collection, it is hard to know whether these workers would have been counted in the CPS hours estimates. In order to be counted as employed by CPS, the workers would either need to be paid workers or work in the family business without pay for at least 15 hours during the reference week. In 2018, the published fatality rate for farm workers was 18.0 per 100,000 full-time equivalent workers. If we remove all farm workers 18 and younger from the numerator because we cannot be sure they would be counted in the CPS numbers, the rate drops to 17.4 fatalities per 100,000 full-time equivalent workers. Because we do not know whether these workers would be counted in the CPS numbers, we cannot affirmatively say which of these figures best represents the fatality rate among farm workers, but we are confident that the true rate is in the range of these two figures. This challenge of aligning the numerator of fatalities with the CPS hours estimate in the denominator means that the published rate estimate may not fully capture the risk in this occupation.

Police officers

Since 1996, the CFOI has collected data on fatalities to police officers resulting from certain injuries that occur while the officer is off duty. The CFOI generally considers homicides occurring to off-duty police officers to be in scope. Additionally, other fatalities to off-duty police are in scope if the officers are performing a police-related function, such as directing traffic at the scene of an accident or rescuing someone from a fire. The decision to collect these data is with the recognition that it is not uncommon for off-duty police to be at risk even outside official work hours because of the nature of their occupation. Between 2010 and 2019, there were 37 fatalities among police officers who were off duty at the time of their injury.

In calculating the fatality rate for police, BLS includes the fatalities to off-duty police in the numerator. This addition is despite our inability to accurately account for the fatalities in the denominator, because the number of hours only captures on-duty time. The general goal of producing the hours-based rates is
that they estimate the risk of fatality a worker faces during the year while working a typical 40-hour workweek. However, because the risk can exist outside of on-duty hours, and we want to capture that information along with the risk faced while in work status, we include both values in the numerator. That means the rate of fatalities for police officers does not represent the on-duty risk in the same fashion as the rate does for other occupations. In 2017, the published fatality rate for police officers was 12.9 per 100,000 full-time equivalent workers. Removing the off-duty police from this number, the fatality rate drops to 12.5 per 100,000 full-time equivalent workers, which better represents the on-duty risk. However, while eliminating off-duty fatalities from the count of fatalities would result in a fatality measurement comparable to other occupations, it would also fail to account for the risks that police face while off duty.

Summary

Our goal in the CFOI program is to accurately represent the risk faced by employees in various occupations and industries. These risks are expressed as rates that are an estimate of the number of fatalities among 100,000 full-time equivalent workers. Although calculating these rates is straightforward for most occupations, it poses unique challenges in the case of firefighters, young farm workers, and police officers. The special circumstances of these occupations make it difficult for the CFOI program to accurately estimate and convey their risk levels.

The CFOI program strives for accuracy and transparency. Although the published fatality rates for firefighters, young farm workers, and police officers may not change drastically when we recalculate them with different assumptions, the goal of this article is to demonstrate the challenges we face in providing this crucial information and our attempts to reflect the data as accurately as possible while also acknowledging our shortcomings. In the short term, we will strive to improve our labeling to ensure that users understand exactly what is represented by our published statistics. In the long term, we will review our methods and make sure that our published rates represent the risk of workers as best as possible.

SUGGESTED CITATION:

Notes


2 For the data used in this example, see “Fatal occupational injuries, total hours worked, and rates of fatal occupational injuries by selected worker characteristics, occupations, and industries, civilian workers, 2018” (U.S. Bureau of Labor Statistics, 2019), https://www.bls.gov/iif/oshwc/cfoi/cfoi_rates_2018hb.xlsx.


7 Calculated using the formula

\[ R = \left( \frac{N}{EH} \right) \times 250,000,000, \]

where \( R \) is the hours-based rate of fatal injuries for a group, \( N \) is the number of fatal injuries in a group, \( E \) is the total hours worked by all employees in a group during the calendar year, and 250,000,000 is the equivalent of 100,000 workers working 50 hours per week, 50 weeks per year.


10 “Table D-5. National estimates of household youth (<20 years) on US farms by type of farm and age group” (National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, April 10, 2018), https://www.cdc.gov/niosh/topics/childag/cais/pdfs/d-5-508.pdf.

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Can bad air alerts help the public?

Jonas Trostle

If a dollar is spent to warn people about how much pollution is in the air, is that a dollar well spent? Michael L. Anderson, Minwoo Hyun, and Jaecheol Lee seek to answer this question in their paper “Bounds, benefits, and bad air: welfare impacts of pollution alerts” (National Bureau of Economic Research, Working Paper 29637, January 2022). Using 2016–17 data from South Korea's air-quality alert systems (AQAS), which cover 51 million people and warn them of high air pollution, the authors found that air-quality alerts saved over $7 for each dollar spent.

Anderson, Hyun, and Lee use a regression discontinuity design to determine how air pollution and the avoidance of air pollution can change how much a society spends on healthcare. Because AQAS issue air-quality alerts at particular but arbitrary levels, the authors can calculate expected medical expenditures for similar levels of pollution that are just above and below the cutoff needed for the system to issue an air-quality alert. This design allows the authors to compare healthcare costs across similar levels of pollution with the main difference between the groups just above and below the cutoff being whether or not the system sent an air-quality alert.

The authors reason that air-quality alerts allow people to take safety precautions, such as wearing particulate-filtering masks or avoiding outdoor activities, when air quality is low. These precautions in turn lowers levels of cardiovascular-illness expenditures and respiratory-illness expenditures. The authors calculate that the lower bound for total savings from the alert system was $41 million (when only considering health savings the day of an alert) or $51 million (when accounting for what the authors call “dynamic” reductions in health costs) in medical costs over the 2016–17 period studied. Of those figures, 70 percent is public cost reduction and represents saved taxpayer dollars and 30 percent is private cost reduction and represents saved income.

Air-quality monitoring systems are not costless, however. Anderson, Hyun, and Lee estimate the cost of managing the AQAS in 2016–17 at $4 million, which includes the cost of sending alerts via text messages, maintenance costs, electricity costs, management costs, and other smaller costs. This cost gives the program a public benefit-to-cost ratio lower bound of 7.1 to 1; or 9.2 to 1 when one counts the dynamic benefits.

The authors end by pointing out that their study only covered one country and that for a country in the Organization for Economic Cooperation and Development, it has particularly high air pollution. However, they believe that their findings may still be of interest in countries that have lower levels of pollution. They reason that other countries may have higher costs of healthcare compared with South Korea (for example, health expenditures per person in the United States are 270 percent higher than in South Korea) and so could see greater reductions in total healthcare costs.