

The Digest

October 2026

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AI and the Performance of Workers with Disabilities

Workers with disabilities face persistent disadvantages in labor markets, including lower employment rates, wage gaps, and discrimination. Technologies that directly raise worker productivity have the potential to improve inclusion while aligning with employers' financial incentives. In China, food delivery platforms have become a significant source of employment for disabled workers, making them a useful setting for examining this issue.

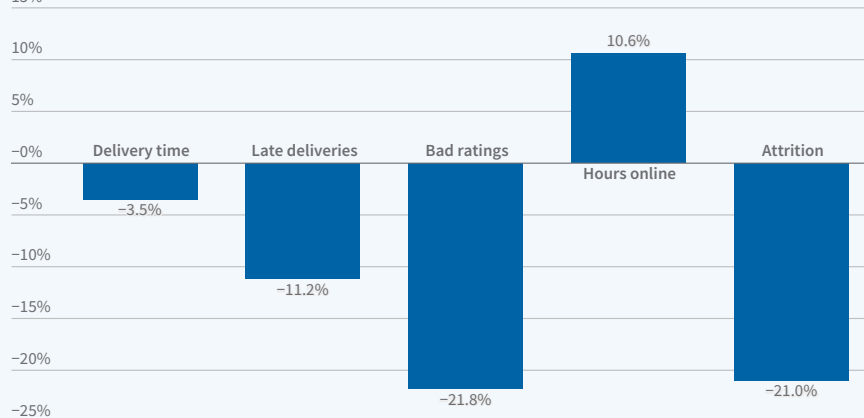
In [Empowering Inclusive Work](#) (NBER Working Paper 35372), [Yan-you Chen](#), [Mitchell Hoffman](#), [Huilan Xu](#), and [Zhe Yuan](#) examine the workplace performance of deaf or hard of hearing (DHH) workers on one of China's largest food delivery platforms. They evaluate the impact of an AI-based communication tool called the Intelligent Outbound Calling (IOC) system that converts text prompts into natural-sounding automated phone calls, allowing DHH workers to communicate with customers without speaking. It was rolled out to all DHH workers in mid-2022, but was not made available to non-disabled workers.

The researchers analyze proprietary administrative panel data covering all 4,284 newly registered DHH workers and nearly 40,000 randomly sampled non-disabled workers who joined the platform between 2021 and 2023. The dataset includes detailed measures of productivity—such as time spent at each stage of order fulfillment—as well as customer ratings, hours worked, attrition, and estimates of wages and platform profits.

The researchers compare the difference in outcomes for DHH and non-disabled workers before and after the tool's introduction. Before, DHH workers were

AI and Outcomes for Deaf or Hard of Hearing (DHH) Delivery Workers

Difference in percentage change for DHH delivery workers versus others following introduction of AI accessibility tool



Source: Researchers' calculations using data from one of the two largest Chinese delivery platforms which introduced, in 2022, an AI-based feature to help DHH workers communicate with customers.

4.5 percent slower between leaving the restaurant and delivering the order to the customer, and had 9 percent more late deliveries and 31 percent more bad customer ratings. At the same time, DHH workers worked approximately 5 percent more hours per week and were 41 percent less likely to leave the platform, patterns the researchers attribute to DHH workers having fewer outside employment options. DHH workers completed 5.3 percent more orders per week and generated 12 percent more profit per week for the platform, despite earning approximately 10 percent less per hour than non-DHH workers.

Following the introduction of the IOC tool, delivery times for DHH workers fell by 3.5 percent, closing roughly three-quarters of the prior gap. Late deliveries declined by

11 percent, fully eliminating the pre-AI disparity with non-DHH workers. Bad customer ratings fell by 22 percent, closing about two-thirds of the preexisting gap.

For DHH workers, weekly hours online increased by 10.6 percent and attrition fell by an additional 21 percent. Total weekly orders rose by 11 percent, and weekly platform profits from DHH workers increased by 17 percent. The hourly wage gap between DHH and non-DHH workers narrowed from approximately 10 percent to under 7 percent. The platform's cost of developing the tool—estimated at no more than \$20,000 in engineering labor—was recouped within approximately four days of deployment based on additional profit estimates.

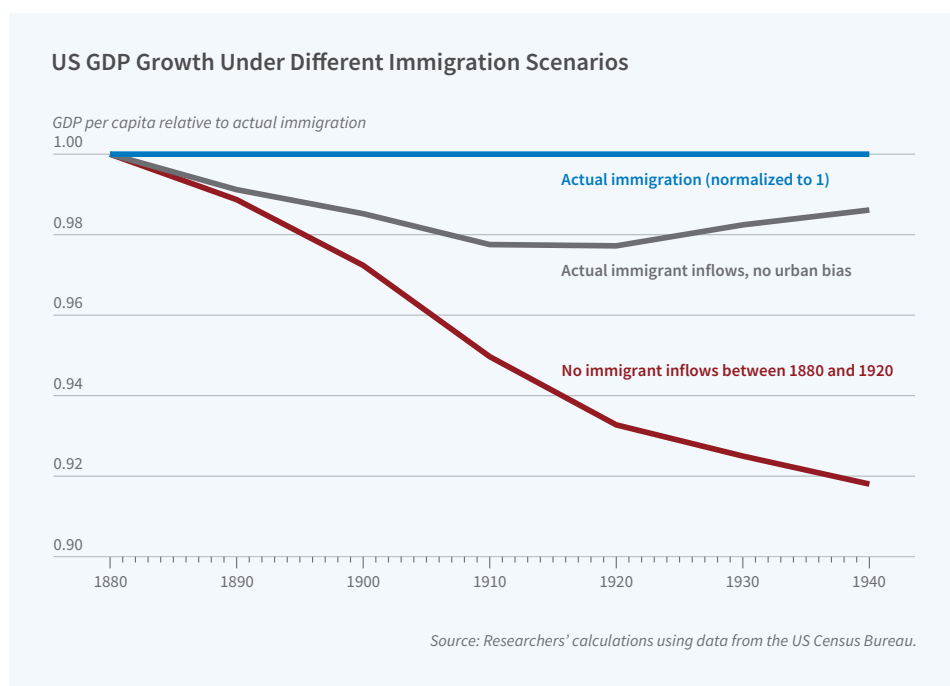
Where Immigrants Settle and US Economic Growth

Between 1880 and 1920, more than 20 million immigrants arrived in the United States. Economists have long debated how that wave shaped American growth, typically pointing out to two channels: immigrants enlarged the labor force and consumer market, and they brought skills and knowledge from abroad. In *Immigration, Innovation, and the Geography of Growth* (NBER Working Paper 35392), [Costas Arkolakis](#), [Sun Kyo-ung Lee](#), and [Michael Peters](#) add a third channel that has drawn far less attention: where immigrants settled, and how that geography shaped innovation and long-run growth.

To weigh all three channels, the researchers link the complete universe of historical US patents and millions of immigration records to individual census records, matching roughly 434,000 patents and over 600,000 immigrants between 1880 and 1920. Because they follow the same individuals across census waves, the data capture not just immigrants' pre-migration occupations and patenting, but their residential and migration choices over the life cycle, and how these varied with skill. Embedding this evidence in a spatial growth model, the researchers evaluate the three forces behind immigrants' contribution: their numbers, their skills, and their concentration in particular places.

Had immigration stopped between 1880 and 1920, the model implies, US income per capita would have been 8.2 percent lower by 1940. Because innovation compounds, the gap widens over time: even in 2000, income per capita would have been 9.6 percent lower, as the ideas of the missing immigrants and their descendants would never have materialized.

Skills account for the largest share of this effect. Had the same



Immigration to the US between 1880 and 1920 raised income per capita by an estimated 8.2 percent by 1940. Skills mattered most but the location choices of immigrants were also important.

immigrants arrived without their skills, holding the population unchanged, income per capita would still have been 5.9 percent lower by 1940, about three-quarters of the total. Skill differences across origin groups were stark: British and German immigrants were substantially more prolific in patenting than Italian and Irish immigrants, and the researchers show they were positively selected on their pre-migration occupations.

The study's distinctive finding concerns geography. Immigrants concentrated heavily in cities, where invention was also concentrated: counties in the most urban quintile had immigrant shares approaching 40 percent, against under 10 percent in rural counties, and those urban areas produced four to five times as many patents per capita. Had

immigrants instead spread across the country like the native-born, income per capita would have been close to 2 percent lower by 1920. Because invention was so geographically concentrated, where immigrants chose to settle mattered in its own right, amplifying their contribution to innovation.

The researchers also examine the 1921 Emergency Quota Act and the 1924 Johnson-Reed Act, the first major federal restrictions on immigration, which sharply curtailed arrivals from southern and eastern Europe and Asia. Removing these restrictions, the model implies, would have raised income per capita by about 1.7 percent by 2000, a modest effect because the excluded groups were small relative to the US population and, on average, less skilled than those who continued to arrive.

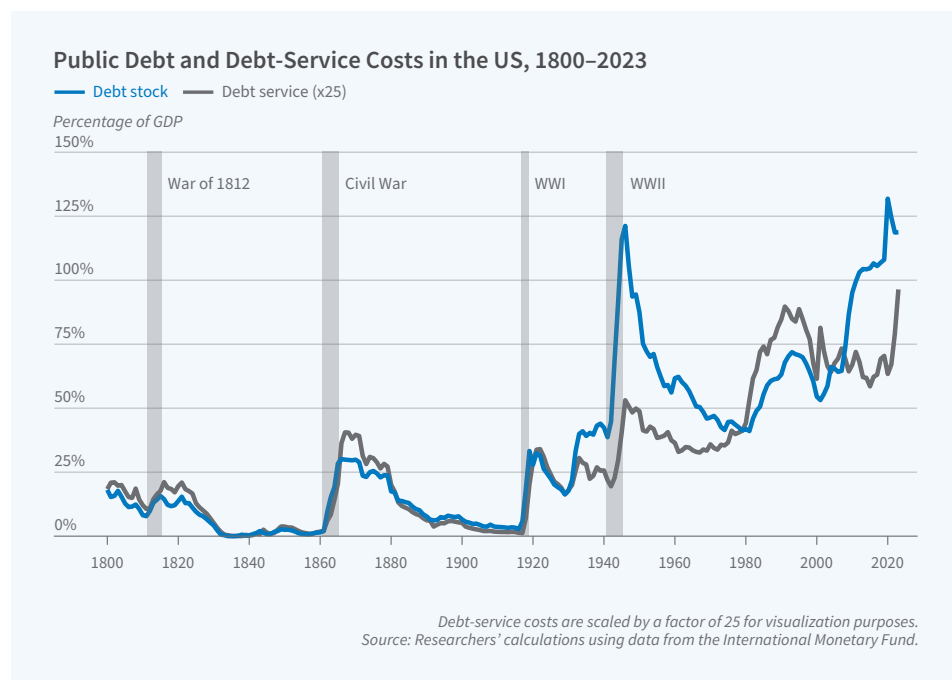
The researchers acknowledge funding from the National Science Foundation under RIDIR grant #1831524 and the NBER and Ewing Marion Kauffman Foundation for the Entrepreneurship Grant. Sun Kyoung Lee acknowledges support from the US Census Bureau under cooperative agreement no. CB16ADR0160001.

What Leads to Fiscal Adjustment?

Many analyses of fiscal sustainability focus on the ratio of debt to GDP and the gap between interest rates and economic growth rates. Yet some governments have carried debt loads exceeding annual GDP for extended periods without crisis, while others have faced fiscal pressure at comparatively modest debt-to-GDP levels. In [From Stocks to Flows: Debt Service and Fiscal Sustainability](#) (NBER Working Paper 35459), [Barry Eichengreen](#), [Maxime Menuet](#), and [Gregory Donnat](#) explore the links between the outstanding stock of debt, the cost of debt service as measured by the ratio of interest payments to GDP, and fiscal adjustment.

The study draws on US time series data from 1800 to 2023 as well as the IMF's Public Finances in Modern History database, a more recent panel dataset for 12 advanced economies. The researchers examine how primary surpluses, the difference between tax revenue and spending excluding interest payments, respond to the debt ratio and the cost of debt service. They find a much tighter relationship between changes in the primary surplus and debt-service costs than between primary surpluses and debt ratios themselves. In the US data, the effects of movements in the debt ratio are statistically distinguishable from zero, while increases in debt-service costs are associated with policy actions that boost primary surpluses. The response to higher debt-service costs builds gradually and persists over several years. Evidence from the cross-country panel points in the same direction.

Financing conditions also shape the adjustment. When government borrowing rates exceed economic growth, a condition that results in debt



Two centuries of US fiscal data suggest that rising interest costs as a share of GDP, rather than increases in the debt-to-GDP ratio, prompt fiscal policy adjustments.

burdens growing automatically, the fiscal response to higher debt-service costs is stronger and develops over several years. When the differential is negative, the response is smaller and not statistically significant at conventional levels.

A similar pattern holds for sovereign risk premia, the extra yield investors demand to hold a country's debt. Fiscal adjustment is faster to emerge but of more modest magnitude when risk premia are high, whereas it is slower to emerge but ultimately larger when risk premia are low.

Before the creation of the Federal Reserve and the federal income tax in 1913, US fiscal stabilization relied on sharp, short-lived corrections concentrated in the years following wars. The

level of fiscal responsiveness, however, was below the threshold needed for full debt stabilization. After 1913, primary surpluses became substantially more persistent, governments were able to sustain larger debt ratios under more favorable financing conditions, and long-run responsiveness rose to a level that is consistent with sustainability.

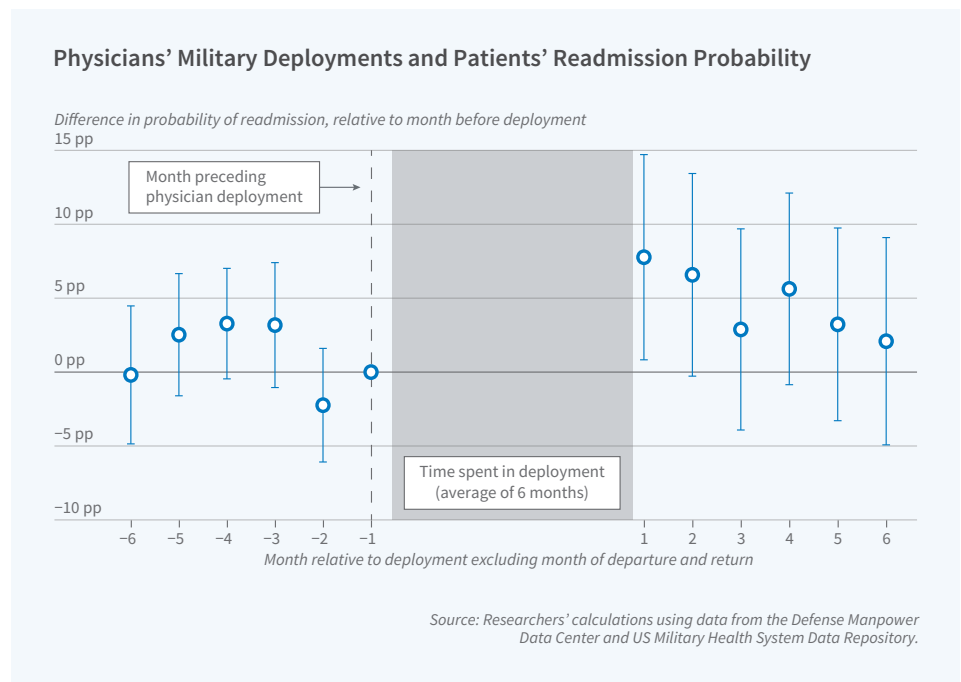
Taken together, the findings suggest that debt-service costs provide a more direct gauge of fiscal pressure than debt ratios alone. Interest payments constitute immediate claims on government resources, while even high debt ratios may remain manageable when financing conditions are favorable. Debt service is the channel through which the stock of debt translates into a current fiscal constraint.

Skill Erosion During Career Interruptions: Evidence from Military Physicians

Workers lose proficiency when they stop practicing a skill, yet directly measuring this “forgetting” and the subsequent relearning process has proved difficult. In [Physician Learning and Forgetting: Evidence from the US Military](#) (NBER Working Paper 35502), [Trevor Fitzgerald](#), [Atul Gupta](#), and [Stephen D. Schwab](#) examine surgeons and obstetricians/gynecologists in the US Military Health System (MHS). These physicians are periodically sent on combat deployments that last about six months on average.

These deployments are assigned based on operational need rather than physician quality or preference, and the procedures performed while deployed, largely wound care and stabilization, overlap little with routine home-base practice. Because patients in the MHS cannot choose their physician and physicians receive no financial incentive tied to procedure volume, this setting is a promising venue for isolating how a practice gap affects physician performance.

The study draws on patient-level claims data from the MHS Data Repository covering 2007 through 2017, linked to Defense Manpower Data Center personnel records identifying deployment dates. It includes 690 surgeons and 486 obstetricians, of whom 369 and 87, respectively, deployed at some point. The researchers compare patient outcomes for deploying physicians in the six months before and after deployment against outcomes for matched non-deploying physicians observed over the same calendar period.



A six-month break from routine practice is associated with a measurable but temporary decline in care quality.

In the first two months after returning from deployment, obstetricians' C-section rates rose by 18.5 percentage points, or 74 percent of their pre-deployment rate. There was no corresponding rise in the underlying medical risk profiles of their patients. This elevation in C-section rates persisted for roughly nine months before returning to baseline.

For surgeons, patient readmission rates within 90 days rose by 6.2 percentage points, or 48 percent of their baseline, during the first two months after returning from deployment. This effect faded within six months. A similar but more persistent pattern emerged for emergency

department visits following surgery, which remained elevated throughout the six-month observation window. The researchers found no evidence that these effects were explained by changes in patient case mix, procedure volume, or physician mental health following deployment.

The paper also estimates how quickly recent case experience improves performance. A doubling of recent procedure volume was associated with a 2.3 percentage point drop in readmission rates (17 percent of baseline) for surgeons and a 2.8 percentage point (11 percent of baseline) drop in C-section rates for obstetricians.

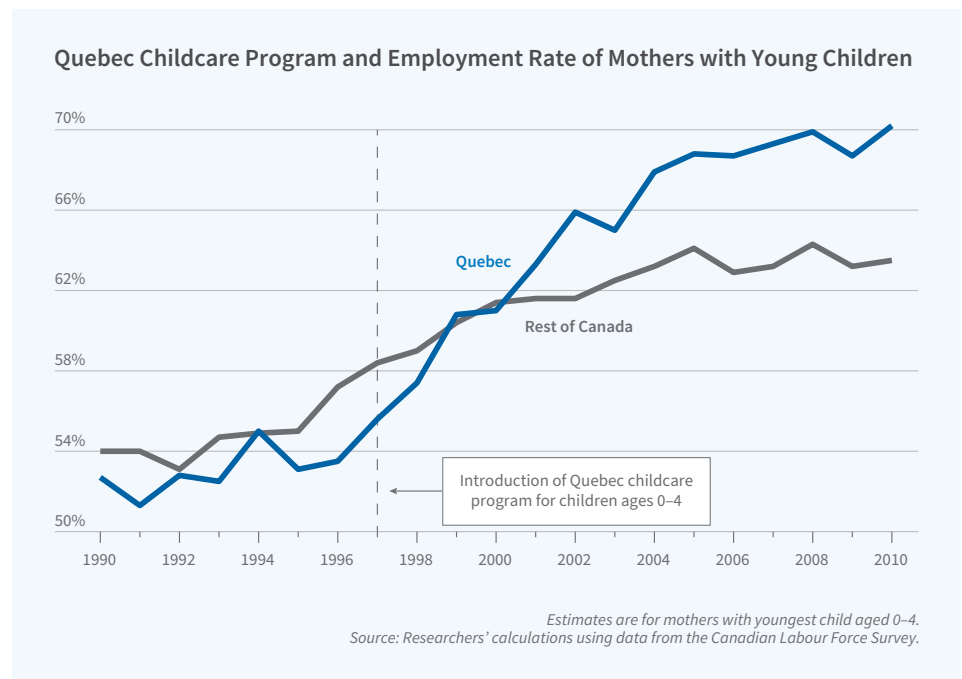
Subsidized Childcare and Mothers' Labor Outcomes in Quebec

Governments in many countries have expanded public childcare in part to help mothers remain attached to the workforce. Prior research has generally found that subsidized childcare raises mothers' employment while children are young, but less is known about whether these effects persist once children have grown. In [Investing in Mothers? The Long-Run Impact of a Universal Child Care Program on Maternal Work and Income](#) (NBER Working Paper 35514), researchers [Michael Baker](#), [Jonathan Gruber](#), and [Kevin S. Milligan](#) examine the long-run consequences of Quebec's universal, heavily subsidized childcare program, introduced in 1997 for children ages 0–4, on mothers' employment, earnings, use of social insurance programs, and tax payments.

The researchers combine two Canadian data sources: repeated cross-sections from the Labour Force Survey (LFS) and income tax records spanning 26 years from the Longitudinal Administrative Databank. They compare mothers in Quebec with mothers in the rest of Canada before and after the program's introduction, tracking outcomes as children age.

In the LFS data, the researchers find that mothers with children ages 0–4 who were fully exposed to the program were 5 percentage points more likely to be employed than mothers who were not exposed. This employment effect persists at least until children reach age 15.

In the longitudinal tax data, the employment effect grows with mothers' age, rising from 7 percentage points in their early 30s to 10 percentage points by their late 30s to 12 percentage points by age 50. The effect on earnings grows even faster, reaching an increase of 27 percent of earnings by age 50, roughly twice the proportional size of the employment effect at that age. The researchers



Even after their children left preschool, mothers who had access to Quebec's universal childcare program worked and earned more than mothers who did not.

attribute this widening earnings effect to increases in hours worked, higher hourly wages, and shifts into more highly compensated occupations, changes that continue to unfold long after children have left preschool.

Most of the increase, about two-thirds, reflects earnings growth within the same occupation rather than a move to a different one, pointing to a role for accumulated work experience. Program exposure increased mothers' total years of work by 1.7 years by age 50, relative to an average of 14.4 total work years for unexposed mothers. The researchers estimate that these additional years of work explain about 2.4 percentage points of the growth in hourly wages, roughly one-third of the estimated 6.8 percent increase in within-occupation hourly wages.

Overall, the researchers estimate that about a quarter of the increase in earnings associated with program

eligibility can be attributed to increased labor supply conditional on participation, a similar amount to the shift to higher-paying occupations, a smaller share to added experience, and nearly 40 percent to unexplained within-occupation wage growth.

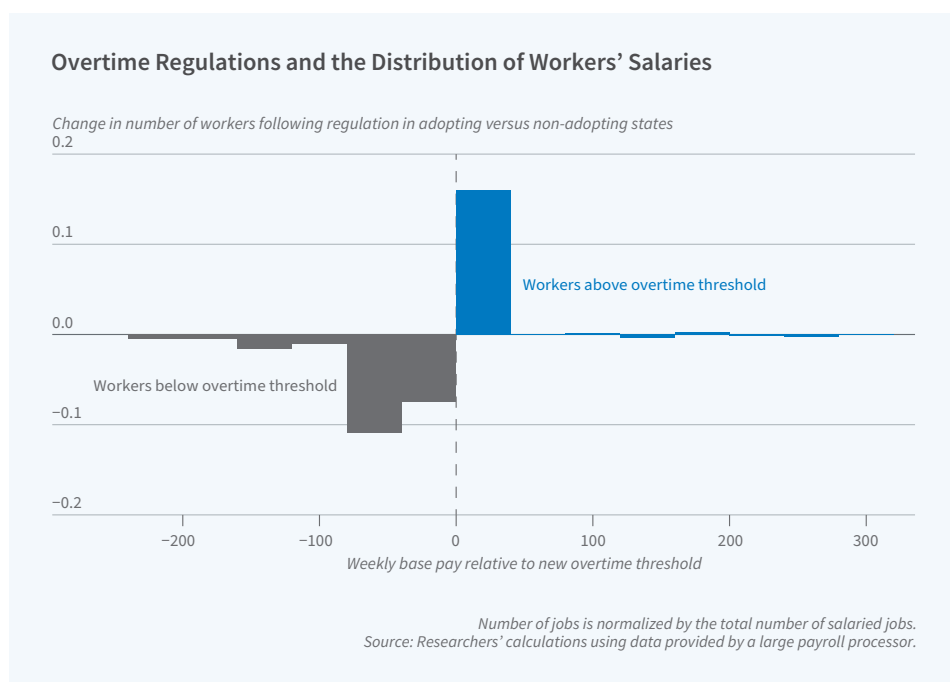
The researchers compare these labor market gains against the program's cost, estimated at about \$6,000 per eligible child. Because program costs are incurred upfront while fiscal benefits of higher taxes on earnings accrue later in mothers' careers, the net present value of the fiscal balance depends heavily on the discount rate applied. Using discount rates of 1.5 and 3 percent, and counting fiscal benefits through age 55, the researchers find that these gains recover 98 and 75 percent, respectively, of the program's costs, and imply a real internal rate of return of about 1.5 percent.

Firm Responses to Changes in Overtime Pay Thresholds

Under the Fair Labor Standards Act, salaried employees are guaranteed overtime pay if their base salary falls below a legally defined “overtime exemption threshold.” Workers earning above this threshold can be classified as exempt from overtime protections. Because this federal threshold has not kept pace with inflation, the share of salaried workers automatically covered for overtime fell from over 50 percent in 1975 to less than 10 percent by 2016. In response, a number of states have raised their own overtime exemption thresholds above the federal level.

In *The Labor Market Effects of Expanding Overtime Coverage* (NBER Working Paper 35433), [Simon Quach](#) studies 19 state-level overtime exemption threshold increases between 2014 and 2021. The analysis draws on anonymized monthly administrative payroll data from a major payroll processing company, covering more than a tenth of the US labor force, which allows for precise measurement of workers’ base pay as distinct from overtime compensation. Quach compares states that raised their thresholds to states that did not. He also draws on Current Population Survey data to examine effects on hours worked.

Raising the overtime threshold generally leads firms to raise workers’ base salaries above the new cutoff rather than adjust employment or hours. On average, in the month when a new threshold took effect, the number of salaried workers earning between the old and new thresholds



When states raise their overtime exemption thresholds, some firms offer affected workers raises to keep them above the new threshold.

fell by 21 percent. Three-quarters of this decline is explained by employers pushing salaries just above the new threshold, thereby preserving affected workers’ exemption from overtime protection.

Employment effects were small and statistically insignificant. Aggregate employment changes could not be distinguished from zero when accounting for both salaried and hourly workers. This finding contradicts the original rationale behind overtime law, which anticipated that firms would hire additional workers for reduced hours per employee in a “work-sharing” mechanism.

The study finds no evidence that firms lowered base wages to offset the cost of newly required overtime pay. Instead, workers’ total labor income rose. Affected salaried workers saw a 1.4 percent increase in earnings, driven primarily by higher base pay rather than overtime compensation itself. Because only about 16 percent of affected workers were pushed above the threshold, the benefits were concentrated: This subset of bunched workers experienced an estimated 8.5 percent increase in base salary, while other affected workers saw comparatively modest gains from overtime pay.

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