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Monopsony in Manufacturing

Chen Yeh, Claudia Macaluso, and Brad Hershbein

ARTICLE HIGHLIGHTS

■ *Recent research has suggested that labor markets may not be fully competitive, meaning workers are paid less than the value they add.*

■ *We develop a new approach to measuring and estimating "markdowns"—the gaps between wages and the value a worker adds—in the U.S. manufacturing sector.*

■ *Drawing on confidential survey data on U.S. manufacturers, we find that the typical worker at the average manufacturing plant earns 65 cents on each marginal dollar generated.*

■ *The degree of monopsony varies greatly across and within manufacturing industries, with markdowns generally higher for larger and more productive plants.*

■ *For U.S. manufacturing as a whole, markdowns shrank between 1980 and 2000 but have risen sharply more recently, suggesting manufacturing workers are increasingly underpaid relative to their value.*

Most textbook economic models assume that labor markets are perfectly competitive. In such a case, workers' pay equals the marginal contributions to their employers' revenues, or what economists call marginal revenue product of labor (MRPL). For example, a worker who generates $20 more in employer revenues per hour should be compensated $20 per hour. If an employer paid this worker less than that, the theory says the worker could simply switch to another employer who is willing to pay slightly more and still make a profit.

However, many researchers and policymakers have recently grown concerned that the textbook model is not accurate and that employers' market power over workers has increased. This power could arise from ways in which employers may restrict their workers from looking for other job opportunities, such as noncompete agreements (Starr, Prescott, and Bishara 2021), a growing reluctance for workers to change locations (Molloy, Smith, and Wozniak 2014), or business mergers that result in fewer employers competing for workers (Prager and Schmitt 2021). However, it has been remarkably challenging for researchers to find direct and general evidence on labor market power, and this has complicated the policy debate. The reason for this lack of evidence is simple: While wages are observable in some data sets, firms' MRPLs are hard to measure. Without the latter, it is almost impossible to determine whether MRPLs are equal to wages, as is predicted by perfect competition.

In a underlined recent paper, we develop a new technique to show that employer market power is substantial and widespread in the U.S. manufacturing sector. Using this approach, we find that over the past several decades, a worker in the average manufacturing plant receives only 65 cents on each dollar generated on the margin. Furthermore, we construct a novel aggregate measure for labor market power, across all manufacturing plants and workers in the United States, to understand how this phenomenon has evolved over time. We find

that employers' market power actually decreased between the late 1970s and the early 2000s, but that it sharply increased in the decade or so afterward. Our study thus provides direct evidence that many workers are paid less than their "fair share,"

> **An employer with labor market power compensates its workers with wage rates below the marginal revenue they add.**

complementing earlier studies (as reviewed in Sokolova and Sorensen 2020) which often relied on indirect methods. Despite recent gains in worker wages since the pandemic, employer market power likely remains considerable.

Measuring Employers' Labor Market Power

Under a perfectly competitive labor market, marginal gains in employer revenues generated by workers should go fully to workers. The intuition for this is straightforward: Employers that don't do this would see many or most of their workers depart to competitors.

The presence of labor market power, on the other hand, implies that employers can withhold some of these marginal gains. Hence, an employer with labor market power compensates its workers with wage rates below their MRPLs. Typically, economists have expressed labor market power through the gap (or ratio) between a firm's MRPL and the wages paid to workers, also known as the markdown.

The main problem with measuring markdowns is that their components are often not directly observable. MRPLs are never reported (and are, indeed, hard to measure), and even hourly wages are not always available, even in firm-level data. However, we show that by making some relatively weak assumptions about a firm's production function—how it combines labor, capital, and other inputs to make products—we can estimate

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plant-level markdowns. To do so, one requires a few additional pieces of information. The first is the revenue share of each input (that is, the effective spending on that input as

> **Labor market power is substantial for U.S. manufacturing plants: on average, workers collect only 65 cents of every dollar they generate on the margin for their employers.**

a share of a plant's revenues). Many firm-level data sets have revenue share of inputs readily available, including the confidential Censuses of Manufacturing and Surveys of Manufacturing we use for our analysis. The second component needed

is a measure of a plant's "output elasticities"—the percentage increase in physical output when a particular input increases by 1 percent. Because these quantities are not available, we estimate them using the rest of the data and a flexible form for a plant's production function, adapted from studies of industrial organization.

This "production function" approach also allows us to distinguish *labor* market power from *product* market power. In other words, a firm or plant could both pay workers below their MRPL (a wage markdown) and charge a price for its output product above the competitive rate (a product markup). Our approach allows us to isolate wage markdowns from product markups, an advantage over some other methods used to estimate labor market power. Moreover, it allows us

to characterize labor market power for each plant (or firm) in the U.S. manufacturing sector.

Labor Market Power in the U.S. Manufacturing Sector

The key takeaway from our main results, summarized in the table below, is that labor market power is substantial for U.S. manufacturing plants. At the average plant, workers collect only 65 cents of every dollar they generate on the margin for their employers. Because the distribution is skewed, the markdown at the median plant is not quite as severe, but it still implies that half of plants pay their workers below 73 cents on the dollar.

Labor market power is extensive across manufacturing industries, with the mean (and median) plant paying wages less than MRPL in each industry. However, these markdowns vary considerably across industries; they are greatest for plants in the petroleum refining and the computer and electronics industries, and they are smallest in the apparel and leather industry. Furthermore, markdowns also vary greatly *within* each industry, as evidenced by the last column, which shows the middle range across plants. While it is certainly plausible that industry-level factors (such as unionization rates) can explain variation in markdowns, our results indicate that factors specific to individual plants can be important.[1]

Aggregate Trends in Labor Market Power

The markdowns described above apply at the plant level over our whole sample period of 1976 through 2014. As mentioned earlier, however, some policymakers and academics have suggested that labor market power has increased over time for the whole economy. Despite our markdown estimates by plant and year, it is not obvious how to combine these plant-level measures to obtain a statistic that reflects the aggregate economy—a

Table 1 Estimated Plant-Level Markdowns in U.S. Manufacturing

Industry	Median	Mean	Typical range
Petroleum refining	0.42	0.39	0.26–0.78
Computers and electronics	0.44	0.39	0.28–0.67
Plastics and rubber	0.55	0.52	0.40–0.76
Food and kindred products	0.57	0.52	0.37–0.92
Paper and allied products	0.59	0.56	0.41– 0.85
Chemicals	0.62	0.55	0.37–1.06
Lumber	0.65	0.62	0.47–0.91
Primary metals	0.69	0.67	0.50–0.98
Motor vehicles	0.73	0.70	0.54–1.01
Printing and publishing	0.74	0.67	0.47–1.16
Electrical machinery	0.76	0.71	0.52–1.11
Fabricated metals	0.80	0.76	0.60–1.05
Nonelectrical machinery	0.80	0.76	0.56–1.16
Miscellaneous manufacturing	0.83	0.80	0.62–1.12
Textiles	0.83	0.79	0.58–1.23
Furniture	0.87	0.86	0.66–1.24
Nonmetallic minerals	0.88	0.82	0.58–1.44
Apparel and leather	0.97	0.87	0.59–1.65
All manufacturing	**0.73**	**0.65**	**0.45–1.22**

NOTE: The numbers shown represent the fraction of a dollar of revenue generated by workers that is paid in wages at the median plant, the average plant, and in a range of plants within one standard deviation of the mean, all for different manufacturing industries. If workers are paid their full value added, the value should be 1.00. Values below 1.00 thus represent wage markdowns. Values can be above 1.00 if workers are paid above their revenue value added. The sample size underlying the estimates is approximately 1.4 million plant-year observations. The industries shown approximately follow 3-digit NAICS categories. See the full paper for details of the estimation strategy.
SOURCE: Authors' calculations using Annual Surveys of Manufacturing and Censuses of Manufacturing, 1976–2014.

simple (or even weighted) average doesn't quite work.

To calculate aggregate markdown, we note that plant-level markdowns are a function of output elasticities and revenue shares. When we apply a similar logic to the aggregate markdown, we can derive a specific equation that properly weights the plant-level markdowns, accounting for their differences in output elasticities, revenue shares, and total revenues. This equation for the aggregate markdown is flexible, in that it does not depend on *how* plants are assumed to combine inputs to make a product, nor on any particular mechanism for employer market power.

Applying this method, Figure 1 shows how the aggregate markdown for the U.S. manufacturing sector has evolved over time. (We normalize the aggregate markdown in the first year, 1977, at a value of 1.00, with larger values intuitively representing increases in employer market power.) After moderately declining in the late twentieth century, the aggregate markdown reversed course, and employer market power sharply increased in the new millennium.

Because of the difficulties of directly measuring markdowns, previous studies have drawn conclusions on employers' market power based on the concentration of employment across firms. Concentrated labor markets—those with only a few firms—naturally limit alternative employment options for workers, which could lead to employers exercising their labor market power. Although this argument is attractive, employer concentration does not *necessarily* lead to a wage markdown. Indeed, we find that markdowns and concentration at the labor market level are only weakly correlated, and that their time paths at the national, aggregate level also diverge, especially recently (as illustrated by the blue line in Figure 1). Consequently, it is important to obtain independent estimates of markdowns

Figure 1 Aggregate Markdowns and Local Employment Concentration
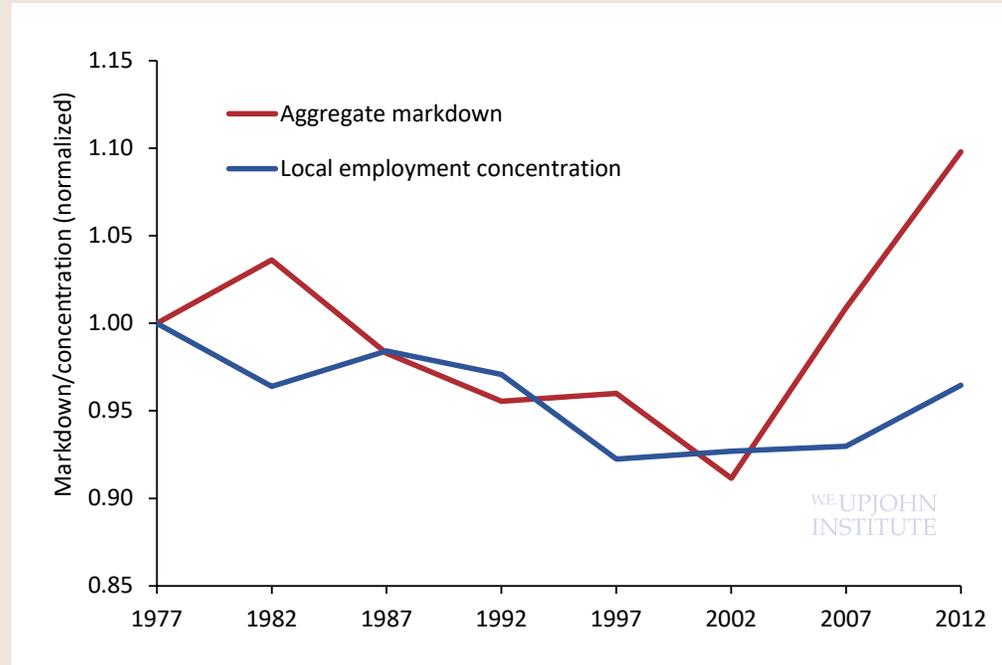
NOTE: The red line plots our measure of the aggregate markdown, normalized to have a value of 1.00 in 1977. The blue line plots an aggregate of local labor market concentration, also normalized to have a value of 1.00 in 1977. Details of the construction of both measures are in the full paper (Yeh, Macaluso, and Hershbein 2022).
SOURCE: Authors' calculations using Censuses of Manufacturing, 1977–2012.

to draw meaningful conclusions about labor market power.

Conclusion

Our recent research shows that labor market power is pervasive in the U.S. manufacturing sector. Workers are not fully compensated for their marginal contributions to their employers' revenues. Instead, a worker at the average U.S. manufacturing plant receives only 65 cents for every dollar of revenue generated on the margin. While labor market power is widespread, there is tremendous variation at plants both across and within industries.

Moreover, our aggregate measure of markdowns for the U.S. manufacturing sector as a whole indicates that employers' market power has switched course over time, falling between the late 1970s and early 2000s but then sharply rising over the next decade or so. This suggests that rising employer market power is unlikely to be the

driver behind the declining share of total income going to labor, which started its downward trend decades earlier.

Note: The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Note

1. In the full paper (Yeh, Macaluso, and Hershbein 2022), we examine relationships between the magnitude of markdowns and plants' age, size, and productivity. While plant age and productivity do not appear to be strongly related to the size of the markdown, plant size does. In particular, the larger the plant in terms of its share of employment in the local labor market (defined by county and industry), the higher the markdown. Intuitively, this should make sense: workers' outside options are more limited whenever the local labor market is controlled by only a handful of plants.

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For additional details, see see the full working paper at https://research.upjohn.org/up_workingpapers/364.

Chen Yeh and Claudia Macaluso are economists at the Federal Reserve Bank of Richmond, and Brad Hershbein is a senior economist and deputy director of research at the Upjohn Institute.

How Federal Pandemic Relief Helped Replenish State Unemployment Reserves

Christopher J. O'Leary and Kenneth J. Kline

Unemployment insurance (UI) pays temporary partial earnings replacement to involuntarily unemployed workers while they seek reemployment. Starting in March 2020, as states implemented economic shutdowns to stop the spread of the novel coronavirus (COVID-19), UI became a prime mechanism for income replacement for the many workers laid off during this time. However, the claims for UI were unprecedented in scope—35.4 million initial applications for state regular benefits were filed in the second quarter of 2020, more than four times the previous peak quarter, in early 2009. Consequently, many states ran out of UI reserves and had to borrow from the U.S. Treasury to pay benefits. After passage of the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020 and the American Rescue Plan (ARP) Act in March 2021, several states chose to use some of these federal relief funds to buttress their reserves. We argue this choice improved states' UI reserves and likely kept states from cutting UI benefits.

How States Normally Finance Their UI Programs

Regular state UI programs can quickly replace at least some income for unemployed workers. States establish weekly benefit amounts, the potential duration of benefits, and tax systems for financing these regular benefits. From the 1950s until after the 2008–2009 financial crisis, all states paid up to 26 weeks of regular UI benefits and usually replaced about 50 percent of prior earnings, up to state maximum weekly benefit amounts. State UI benefits are mainly financed by taxes on employer

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■ *Unemployment insurance (UI) claims reached all-time records during the COVID pandemic, with 35.4 million applications in the second quarter of 2020 alone.*

■ *Despite federal incentives following the Great Recession for states to shore up their UI reserves to pay benefits, state balances were inadequate to cover the unprecedented pandemic surge.*

■ *The federal government paid 80 percent of the total $937 billion in UI benefit spending in 2020 and 2021.*

■ *Consequently, many states used special federal funds to add to their own UI reserves or borrowed from the U.S. Treasury to avoid negative balances.*

■ *Although the federal government backstopped the UI system, its actions may delay states from fixing structural financing issues that will remain a problem.*

payrolls, with employers with more UI beneficiaries paying higher rates (a mechanism called experience rating). States are incentivized to "forward fund" benefits by building sufficient reserves, which are held in accounts with the Unemployment Trust Fund at the U.S. Treasury. Forward funding is part of what makes state UI systems countercyclical—they provide income to unemployed workers to counter economic downturns, but they also dampen expansions during recoveries through business tax increases to rebuild reserves. However, deep downturns can upset this balance. Benefits paid during and after the financial crisis exhausted UI reserves in 36 states, forcing them to borrow from the U.S. Treasury to continue benefit payments.

To incentivize states to build larger reserves for the future, the U.S. Department of Labor in 2014 made available zero-interest short-term loans, with a goal of states having reserves equal to at least one year of recession-level benefits by 2019. This threshold, called the average high-cost multiple (AHCM), was thus set at a minimum of 1.0, for one year's worth of benefits.[1] In 2007, before the financial crisis, only 19 states had reached the 1.0 standard; the average AHCM across states was 0.52. Following the financial crisis, the UI debt problem led to a range of state responses to either increase revenue or decrease benefits (O'Leary and Kline 2019). Some states allowed their existing tax systems to trigger higher tax rates and a few increased the share of payroll wages that get taxed, but others were reluctant to raise UI taxes quickly for fear of choking off business recovery and labor demand (Johnston 2021). Many states prevented rate increases on employers, preferring instead to repay debt by taking smaller federal UI credits. Eight states cut potential durations of regular state benefits, and one of these also cut weekly benefit amounts.[2]

The Surge in Federal UI Funding during the Pandemic

At the end of 2019, on the eve of the pandemic, 31 states had reserves that exceeded the 1.0 AHCM reserve standard, but the average across all states was still just 0.80, despite the federal incentives and record low unemployment (ET 394). These reserve levels would not have been adequate to finance benefits in the Great Recession, let alone for the unprecedented claims during the COVID-19 pandemic, and the federal government needed to step in. UI expenditures for 2020 and 2021 totaled $937 billion, of which the states (through normal employer payroll tax channels) paid only $185 billion (ETA 2112 and ET 394). The remaining 80 percent of spending was shouldered by the federal government through special UI programs.

The biggest share of federal spending went to providing supplements to weekly unemployment benefits. The Federal Pandemic Unemployment Compensation (FPUC) program added $600 per week to all UI benefit checks from early April through July 2020 (under the CARES Act), $300 per week from late December 2020 to mid-March 2021 (under the Continued Assistance Act), and $300 per week from mid-March 2021 to early September 2021 (under the ARP Act).[3] The FPUC payments totaled $349 billion through year-end 2021. The Pandemic Unemployment Assistance program provided $124 billion in benefits to persons not eligible for regular UI, which covers only employees with sufficient earnings and workforce attachment. Another federal program, Pandemic Emergency Unemployment Compensation, extended the duration of regular state UI benefits, distributing an additional $89 billion in federal funding. Under the CARES and ARP Acts and, the federal government also paid for 100 percent of benefits under the permanent Extended Benefits program,

which extends UI benefit durations when certain state-level unemployment rate "triggers" are met. By statute, the cost of those program benefits is nominally shared 50-50 between federal and state governments, but the federal government paid $12 billion of

Benefits paid during and after the Great Recession exhausted UI reserves in 36 states, forcing them to borrow from the U.S. Treasury.

the states' share during the pandemic. Additional, miscellaneous federal contributions added another $174 billion in benefits, collectively bringing the federal total to $752 billion.

Additional Federal Relief to States and Use for UI Reserves

Besides these direct federal outlays for UI benefits, other funds from the CARES and ARP Acts may have forestalled states' need to reduce UI benefits or increase taxes to avoid exhausting their UI reserves or having to borrow. Thirty-five states tapped CARES and/or ARP in 2020 and 2021 to shore up their UI trust funds—by a total of over $25 billion. Of these 35 states, California and Connecticut still had negative net reserves at the end of 2021, although California used just $6.5 million from the CARES Act while borrowing more than $19 billion from the Treasury. Had it not been for the infusion of cash, an additional 11 states would have had negative reserve positions at the end of 2021 (Figure 1).

Prior to the pandemic, at year-end 2019, these 35 states had average reserves of 1.14 (in AHCM terms); by the end of 2021, their AHCMs averaged 0.77—or just 0.20 without the cash infusions (ET 394, NCSL, authors' calculations adding wage data from UI Quarterly Data Summary). Of the 17 states (and territories) that did not use CARES or ARP funds to boost their

How Federal Pandemic Relief Helped Replenish State Unemployment Reserves

Figure 1 Average High-Cost Multiples among States Shoring Up Their UI Trusts with Federal Funds, by Year and Impact of Funds Infusion
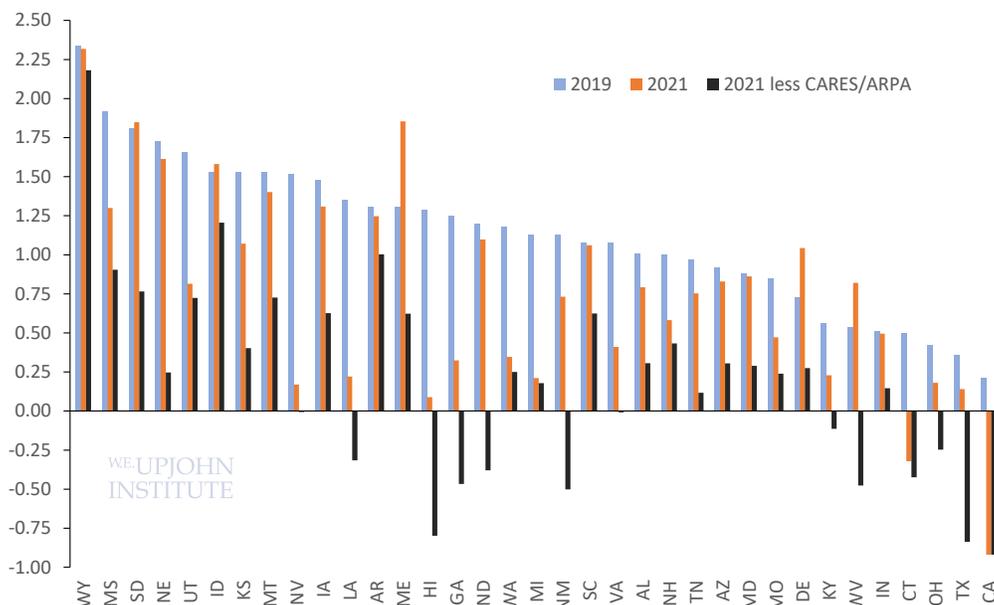
NOTE: The average high-cost multiple (AHCM) is the ratio of UI reserves to the average of paid benefits over the three highest payout years in the previous two decades. The chart includes the 35 states that infused CARES or ARP funds into their UI trust funds and shows AHCMs by year, with and without the federal funds infusions.
SOURCE: ET Handbook 394, National Conference of State Legislatures, and authors' calculations.

Figure 2 Average High-Cost Multiples among States Not Using Federal Funds to Supplement Their UI Trusts, by Year
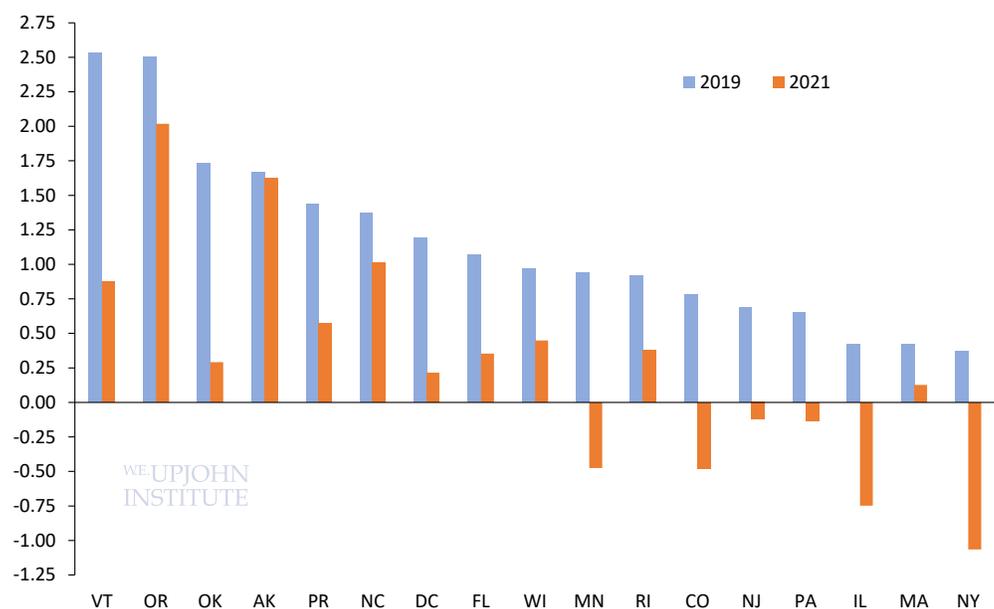
NOTE: See note to Figure 1 for definition of AHCM. This chart includes the 17 states and territories that did not use CARES or ARP funds to supplement their UI trust funds.
SOURCE: ET Handbook 394, National Conference of State Legislatures, and authors' calculations.

reserves, their 2019 year-end AHCMs averaged 1.16, which fell to 0.29 by the end of 2021 (ET 394, NCSL) (Figure 2).

During 2020 and 2021, despite the availability of federal funds, 23 states and territories still borrowed money for their UI programs from the U.S. Treasury. Collectively, their outstanding debt peaked at $55.2 billion in April 2021. Fifteen of these states used CARES and/or ARP funds to buttress reserves, and 10 still had outstanding debt at the end of 2021. Just two states, California and Connecticut, both used CARES/ARP money and had outstanding debt at the end of 2021 (NCSL, U.S. Department of Treasury, fiscaldata.treasury.gov).

State Legislative Responses to the Pandemic Surge in Benefit Payments

During the Great Recession, there were no sources of federal funding to replenish state UI reserves. In contrast, during the pandemic in 2020 and 2021, nearly 100 laws modified state UI systems but none reduced benefits. Many of these laws instead temporarily increased benefit receipt, often through time-limited suspension of both work search requirements and experience rating of UI tax rates (Levine 2021). Other laws mostly improved financing and benefits. Colorado and Connecticut raised their taxable wage bases; Virginia and West Virginia established work sharing programs (allowing partial benefits for workers whose hours are reduced); and California, Georgia, Maine, New York, and Oregon allowed workers a higher earnings threshold before losing UI eligibility. Furthermore, while eight states issued municipal bonds to finance UI debt after the financial crisis, only Massachusetts did so in the pandemic. Boosting UI reserves through CARES and ARP funds thus may have forestalled states from restricting UI and may have even accommodated expansions.

Conclusion

The federal government has extended unemployment benefits during every period of high unemployment since 1958. The federal share of all benefit payments was 7.9 percent that year and did not exceed 25 percent until 1983 (Figure 3). Between 2009 and 2013, UI benefit payments totaled $742 billion, with federal spending accounting for 64 percent of the total. Despite this federal generosity for UI, 36 states ended up borrowing from the U.S. Treasury, as their own UI reserves proved insufficient, and eight states cut benefit durations to reduce future obligations.

Despite these measures, the majority of states were still unprepared for the unprecedented spike in UI claims in 2020 when the pandemic hit and public health measures caused work stoppages beyond the control of employers. Federal financial support for UI was impressive, accounting for 88.2 percent of all benefits paid in 2021. For states reluctant to finance regular UI benefits, federal actions in the pandemic showed that help for workers during unemployment crises is possible even if state programs are modest. However, the generous federal response also may have discouraged states with meager UI systems from improving them. Without federal standards for state benefit amounts and durations, and only weak incentives for states to adequately build up their reserves, the nature of state UI programs as independent, self-financing systems for social insurance rests on tremulous foundations.

Notes

1. Technically, the AHCM is the number of years of benefits available in state reserves when paid out at the rate of the average of the three highest annual payout rates in the previous 20 years.

2. See O'Leary and Kline (2020) for a discussion of states accepting reductions in the Federal Unemployment Tax Act (FUTA)

Figure 3 Federal Share of Total UI Benefits in Recession Years and Shortly After
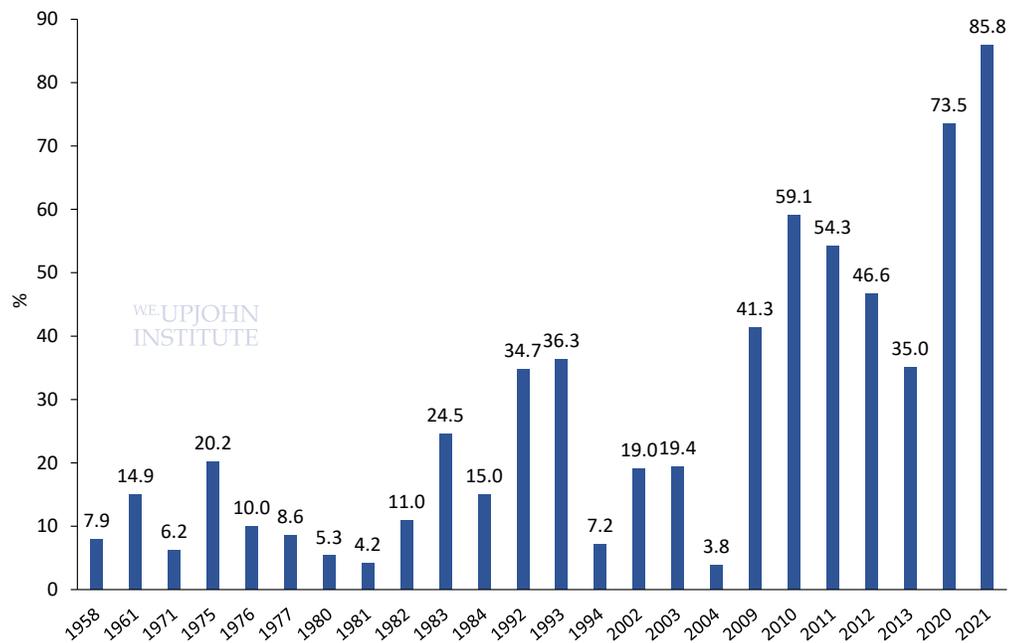
SOURCE: U.S. Department of Labor, Employment and Training Administration: 1) UI Financial Transaction Summary, ETA 2112; 2) ET Handbook 394; and 3) Monthly Program and Financial Data.

credit to repay outstanding debt, as well as the list of states that reduced benefits.

3. In an effort to address labor shortages, some states ended one or more of the federal unemployment assistance programs before the September 2021 expiration. Coombs et al. (2021) found these early withdrawals increased employment rates slightly, but estimated gains in earnings were small compared to the loss in benefits, such that net aggregate income fell.

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Christopher J. O'Leary is a senior economist and Kenneth J. Kline is a senior research analyst, both at the Upjohn Institute.

W.E. UPJOHN INSTITUTE
FOR EMPLOYMENT RESEARCH

300 S. Westnedge Avenue
Kalamazoo, MI 49007-4686

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