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INSIDE THIS ISSUE

Comparative Returns on IRS Audits by Income Groups

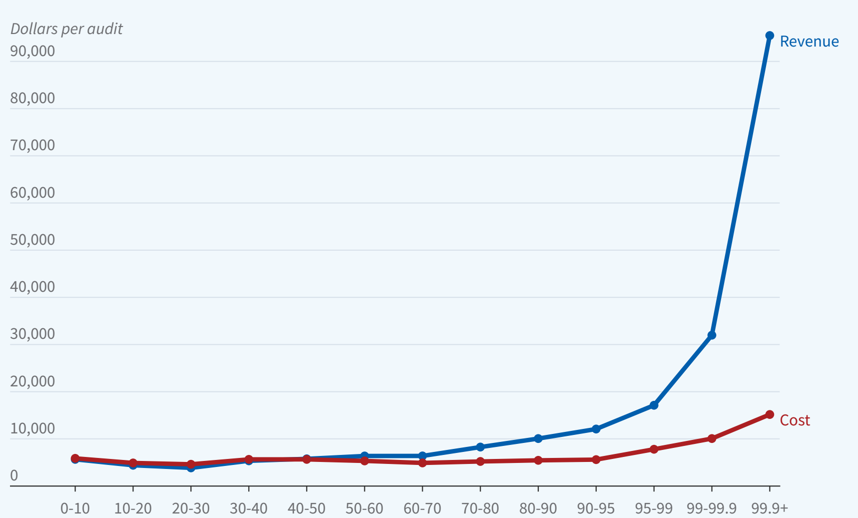
The US Internal Revenue Service (IRS) estimates that in the middle of the last decade, underreporting of income on individual income tax returns accounted for roughly $300 billion in unpaid taxes. Additionally, research suggests that more than half of this total is associated with taxpayers in the top 10 percent of the income distribution. Audits of tax returns are an important tool for collecting unpaid taxes. Audits of high-income taxpayers may have greater potential revenue yield, but they are also more resource-intensive and incur higher labor and overhead costs.

William C. Boning, Nathaniel Hendren, Ben Sprung-Keyser, and Ellen Stuart, in **A Welfare Analysis of Tax Audits across the Income Distribution** (NBER Working Paper 31376), examine the results of in-person individual income tax audits between 2010 and 2014. They also utilize internal accounting data from the IRS that enable them to compute the cost of performing each audit. For each audit, they calculate both the upfront revenue associated with the audit and also the deterrence effect that the audit has on future tax revenue paid by the person who is audited. The researchers find that the average upfront revenue per audit was $14,283, compared with an average cost, including exams, appeals, and collections, of $6,418. The average revenue yield was therefore $2.17 per dollar spent on audit resources.

This upfront return to audits varies significantly across the income distribution. Audits of taxpayers in the top 0.1 percent of the “total positive income” (TPI) distribution — the distribution of the sum of positive components of IRS-defined adjusted gross income — produced nearly triple that upfront return, yielding $6.29 for the IRS per audit dollar spent. The average cost per audit was higher for these audits than for the average audit, but the average revenue yield was greater by an even larger margin. The researchers also find that audits of tax returns in the bottom half of the TPI distribution generated an average revenue yield of $0.96 per dollar spent, or less than breakeven.

Audits of taxpayers in the top 0.1 percent of the income distribution returned more than $6 in revenue for every dollar spent in audit resources, much more than audits of lower-income taxpayers.

Audit Costs and Revenue Generated



Source: Researchers' calculations using data from the IRS

The researchers also explore whether an expansion of IRS audits would yield similar returns. To do so, they study the 40 percent decline in the overall audit rates of tax returns between the 2010 and 2014 tax filing years. By comparing the returns to audits of 2014 returns to those of 2010 returns, the researchers argue they can infer whether there is evidence of "decreasing returns" to additional audits. In practice, they find that the upfront returns to audits in 2014 are similar to returns to audits in 2010. They also note that some of the overhead costs would likely not increase if the IRS were to expand audits. This suggests the IRS could likely obtain these high returns if they were to return to the 2010 audit rates.

Finally, the authors explore how being audited can deter taxpayer noncompliance in the years following an audit. In a random sample of audits conducted between 2006 and 2014, they find that being audited leads to a persistent increase in future taxes paid. Summing over the 14 subsequent years they observe in their data, they show that this future deterrence revenue is three times as large as the upfront revenue collected during the audit. They find the same across taxpayers' positions in the income distribution. Combining the revenue gains from the initial audit with those from future deterrence raises the ratio of audit return relative to cost. For a taxpayer with TPI between the 90th and 99th percentiles, the deterrence-inclusive return is in excess of $12 per dollar spent on auditing. In contrast, they estimate a return of $5 for audits of taxpayers with below-median income.

—Leonardo Vasquez

A 'Light Touch' Intervention Gets Mothers Talking to Their Babies

The importance of verbal engagement for infant language and cognitive development is well established, but many low-income parents do not converse with their infants regularly. This compounds the disadvantages faced by children in poorer families. In **Informing Mothers about the Benefits of Conversing with Infants: Experimental Evidence from Ghana** (NBER Working Paper 31264), Pascaline Dupas, Camille Falezan, Seema Jayachandran, and Mark P. Walsh report on the effects of a cheap, scalable intervention designed to change mothers' beliefs about conversing with their infants.

While parents universally use baby talk to soothe an infant or get their attention, engaging in a richer form of infant-directed speech varies by socioeconomic status within and across societies. One explanation for low parental investment in conversing with infants is inaccurate beliefs about the benefits. The researchers hypothesize that because infants are not noticeably responsive to language, and the benefits materialize only later, talking to babies might not be a practice that arises organically. Rather, it may emerge only if parents are explicitly taught its value.

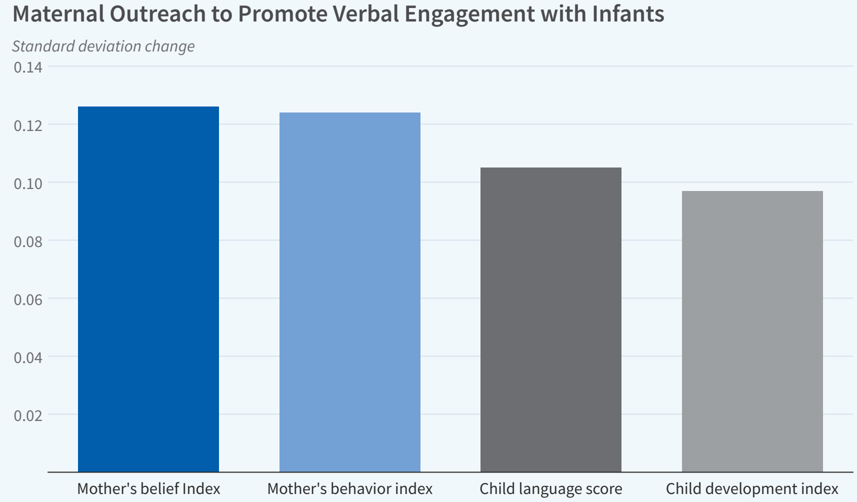
Pursuing this idea, the researchers develop an inexpensive informational intervention that consists of showing a recent or expectant mother a three-minute video about parent-infant conversations. The video is a simple animation with voice-over describing the value of parent-infant conversations. It encourages the mother to speak to her baby and to tell other family members to do so as well.

Mothers were also given wall calendars with visual reminders of the video's message. Beyond reminding the mother, the calendar also facilitates common knowledge among household members about the lessons, and supports formation of a parent-infant conversation habit by instructing treatment respondents to put stars on the calendar in each week in which they converse with their infant every day.

Six to eight months after North Ghanaian mothers watched an animated video and put up wall calendar reminders, their children displayed gains in language and cognitive skills.

To evaluate the intervention's effects, the researchers randomly selected 705 Northern Ghanaian women from a sample of 1,408 who were pregnant or had an infant. The video was shown and calendars were distributed to women visiting local government health clinics for pre- or post-natal checkups. Data from a follow-up survey conducted six to eight months later showed that mothers who received the intervention reported greater belief in the benefits of verbally engaging with infants, more frequent parent-infant conversa-

Maternal Outreach to Promote Verbal Engagement with Infants



Effect of intervention in Ghana showing recent or expectant mothers a 3-minute informational video, aimed at raising verbal engagement with infants, and giving them a themed wall calendar.

Source: Researchers' calculations using Endline data tions, and more advanced language and cognitive skills in their children. The intervention appears to deliver a 1 standard deviation improvement in a child's cognitive or language development at an estimated cost of between $4 and $8 at scale. The researchers conclude that this "light-touch" intervention is more cost-effective than either home visits or community-based programs.

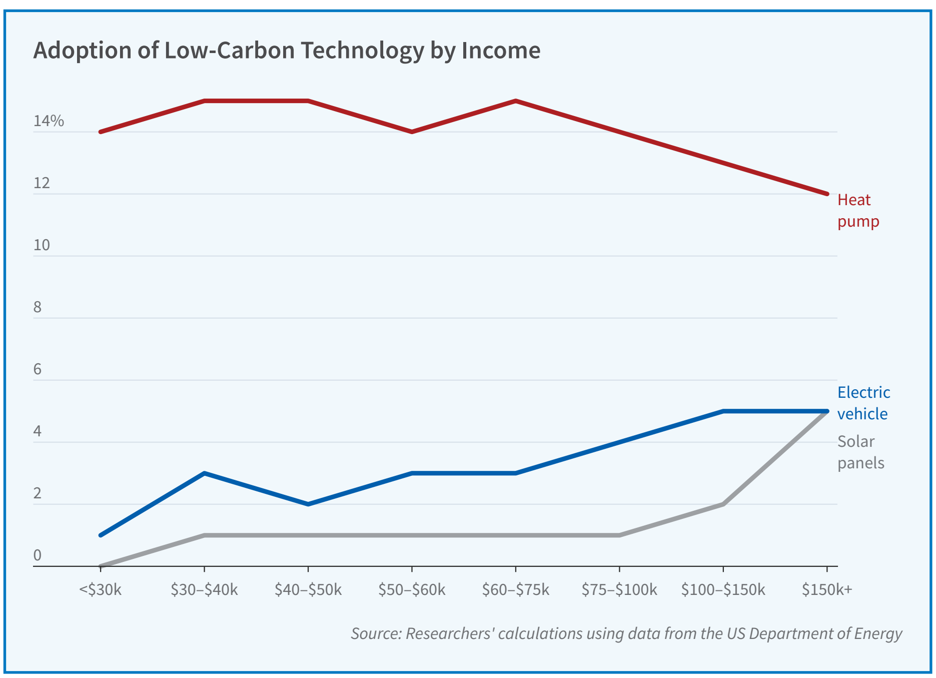
The intervention analyzed in this study could be implemented at scale by showing the video in waiting rooms of prenatal care centers and asking health workers to hand out the calendars to patients during their visits.

—*Lauri Scherer*

Heat Pumps: 'Green Tech' That Cuts across the Income Distribution

Green technologies tend to be adopted disproportionately by high-income households. For example, the top 20 percent of the income distribution in the United States receives 60 percent of the tax credits for rooftop solar power and 90 percent of the tax credits for electric vehicles. In contrast, heat pump adoption is broadly dispersed across the income distribution, according to a new study, **The Economic Determinants of Heat Pump Adoption** (NBER Working Paper 31344), by Lucas W. Davis.

Nationwide, 14 percent of US households identify heat pumps as their primary home heating source. While households with annual incomes above $150,000 are twice as likely to have solar panels and six times more likely to have an electric vehicle than households with income between $50,000 and $60,000, heat pump adoption is very similar at all income levels.



Davis estimates the determinants of heat pump adoption using household-level microdata from the 2020 US Department of Energy's (DOE's) Residential Energy Consumption Survey (RECS). These data include information on household income, demographics, and energy-related durable goods and behaviors for 18,496 households.

The paper shows that heat pump adoption is instead strongly correlated with geography and climate. In South Carolina, Alabama, North Carolina, Tennessee, and Florida, where winters are relatively mild, over 30 percent of households have heat pumps. By contrast, heat pump adoption rates are below 10 percent throughout the Midwest and the Northeast where winters are cold.

Heat pump adoption is sensitive to electricity prices, geography, and climate, but is nearly identical at all income levels.

Heat pump adoption is also shown to be strongly correlated with energy prices. In 2020, US electricity prices varied from less than 10 cents per kilowatt hour in Louisiana, Washington, and Idaho to more than 20 cents per kilowatt hour in California, Massachusetts, Rhode Island, Alaska, Connecticut, and Hawaii. Davis estimates that a 10 percent increase in electricity prices decreases heat pump adoption by 2 percentage points, a relatively large effect.

Cost estimates from the US DOE indicate that purchase and installation costs for an air source heat pump were typically between $6,900 and $8,600 in 2022. Central air conditioner costs ranged from $5,300 to $6,000, while natural gas furnaces were between $4,100 and $4,300. Because heat pumps move heat from outside to inside a home, they are most efficient at relatively high outdoor temperatures, such as 60 degrees Fahrenheit. At lower temperatures, heat pump efficiency decreases, and homeowners may need to use supplemental heating sources.

These results have implications for a large and growing number of government subsidies aimed at heat pumps. Before the Inflation Reduction Act (IRA) of 2022 took effect, heat pumps were subsidized under the Energy Policy Act of 2005 and could qualify for a maximum tax credit of $300. After the IRA took effect, the maximum credit became $2,000.

—*Linda Gorman*

The Evolving Role of Gig Work during the COVID-19 Pandemic

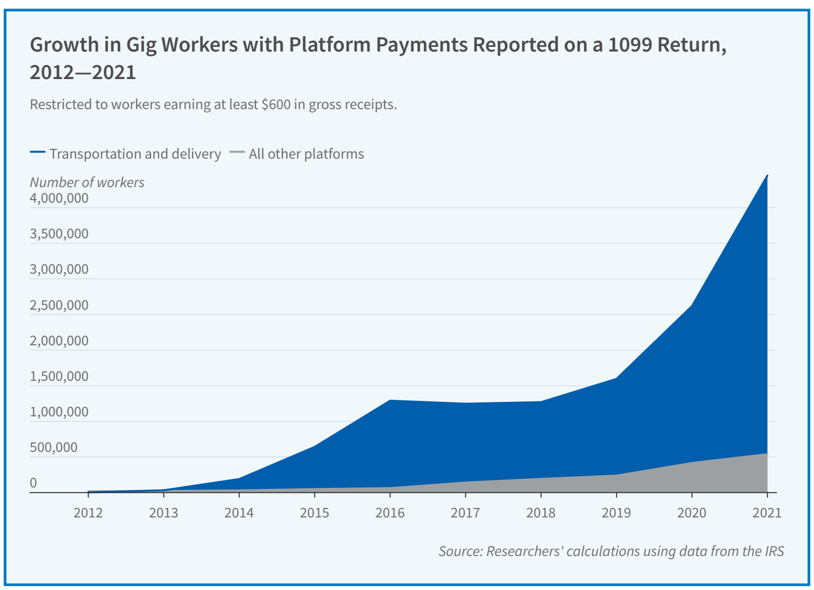
The COVID pandemic had a mixed effect on the gig economy. On the one hand, the overall number of contract and freelance workers fell. This is evident from the number of individual income tax returns that report Form 1099 income capturing these activities. On the other hand, the number of individuals with income from jobs in which assignments arrive via online platforms soared by 3.1 million between 2020 and 2021, with most of the increase in transportation and food delivery.

There were multiple health and economic shocks between 2019 and 2021 that affected the desirability of gig economy work. These included the direct health impacts of the pandemic on various occupations and the generosity of unemployment insurance, which may be an alternative to gig work for some individuals. In **The Evolution of Platform Gig Work, 2012–2021** (NBER Working Paper 31273), Andrew Garin, Emilie Jackson, Dmitri K. Koustas, and Alicia Miller analyze these various forces. They study payments from more than 90 online labor platforms.

One of the biggest obstacles to studying the platform gig economy in tax data is the "1099-K gap," a feature of the tax reporting landscape that can result in some gig economy income going unreported to tax authorities. Prior to 2017, platform gig economy companies commonly used the 1099-MISC tax form to report annual payments of $600 or more and/or reported all payments on a newer form, the 1099-K. Created in 2011, the 1099-K only technically requires firms to report payments if there were more than 200 transactions and their total payments exceeded $20,000 for the year. More platform gig firms began to report at these higher reporting thresholds beginning in 2017, and as a result, the pay of many gig economy workers goes unreported to tax authorities on 1099s.

The researchers estimate the magnitude of this gap by comparing payments to freelancers reported on state income tax forms in Massachusetts and Vermont, which set a $600 threshold for income reporting without any of the federal exemptions, and neighboring states, which follow the federal rules. They extrapolate the differential between these two states and national measures to estimate the unreported gig income in other states that follow the federal reporting rules. They estimate approximately 777,000 gig workers did not receive a 1099 due to the 1099-K gap by 2018, leading to approximately $323.4 million in unreported income.

Nearly 2.1 million new workers entered the gig economy in 2020, double the number of entrants in 2019. Another 3.1 million entered in 2021, but more than a million left.



Growth in Gig Workers with Platform Payments Reported on a 1099 Return, 2012—2021

Restricted to workers earning at least $600 in gross receipts.

Source: Researchers' calculations using data from the IRS

The resulting "corrected" time series on the number of gig economy workers suggests more expansion in the years after 2016. The number of gig workers in 2018 exceeded 2 million. For every year after 2014, more than 90 percent of gig workers were employed in transportation, and few grossed more than $20,000 a year.

In the second part of the paper, the authors examine the evolution of the gig economy during the COVID pandemic. In 2020, the first year of the pandemic, there were 2.1 million new gig workers. In 2021, there were 3.1 million more. Most of this activity is captured on the 1099-MISC, and this was not subject to the 1099-K gap. At the same time, this was a period of record exit from the gig economy, with millions exiting.

Some of these exits may be related to the generosity of unemployment insurance (UI). Prior to the pandemic, self-employed workers did not qualify for UI unless they held and lost a wage-paying job. Thanks to a temporary program called Pandemic Unemployment Assistance that expanded access to UI for gig workers who were unable to continue working, in 2020 over half of the workers whose primary income source in 2019 was platform work received UI benefits. Among those who received UI, the ratio of median benefits to former income was about 1.4 for those who were primarily platform workers in 2019, and 1.0 for self-employed workers who did not receive any platform income. UI benefits as a share of 2019 income were greatest for those with low prepandemic earnings: the average primarily platform gig worker making less than $2,500 in 2019 got more than $17,300 in aid during 2020, compared with about $19,700 for those who earned between $30,000 and $60,000.

The benefits seem to have affected willingness to work: for every additional dollar in benefits received in state-administered pandemic assistance, reported gig earnings fell by 48 cents, compared with 29 cents among the self-employed more broadly. The lost earnings, which appear to be due to a labor supply response, were most pronounced for platform gig workers earning more than $15,000 in 2019. While the authors attribute increased exits from primary gig work to the expanded unemployment insurance benefits, these exits are swamped by new entries. Self-employment outside of platform gig work also saw excess exits; however the disincentive effects of UI were smaller due to slacker demand outside of platform delivery.

— Laurent Belsie

Evaluating the Effect of Deferred Student Loan Repayments

A pandemic-driven debt relief measure freezing student loan repayments provided a large stimulus to the economy while raising long-term debt burdens, according to a study by Michael Dinerstein, Constantine Yannelis, and Ching-Tse Chen. Their findings, in **Debt Moratoria: Evidence from Student Loan Forbearance** (NBER Working Paper 31247), are based on comparison of financial outcomes of borrowers who were eligible for the repayment deferral and others who were not.

Until 2010, the federal government offered two loan programs that differed only in their funding sources. The US Treasury funded the William D. Ford Federal Direct Loan Program, and private banks — backed by government guarantees — funded the Federal Family Education Loan Program. In 2010, the government discontinued making new loans through private banks.

In March 2020, the federal government suspended payments by borrowers whose loans came from the Treasury. The moratorium suspended loan repayments, interest charges, and collections on defaulted loans.

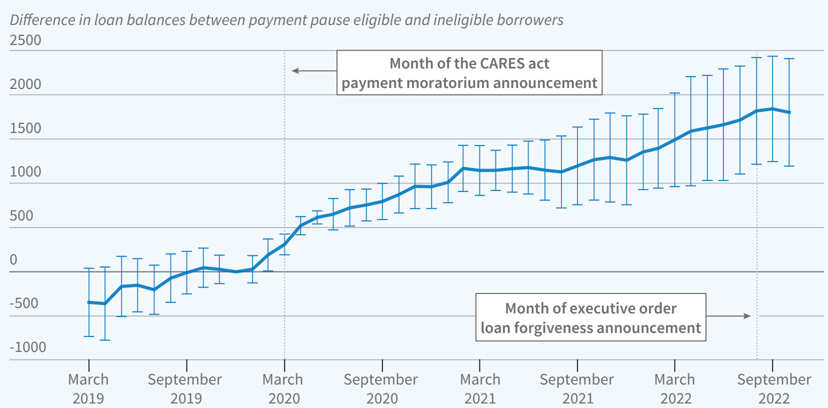
To study the impact of the payment deferral, the researchers compare individuals at similar points in the lifecycle who are members of cohorts of borrowers who had both loan options available to them. They use TransUnion credit records for the period 2000 to 2022. They restrict their sample to borrowers whose most recent loan was originated no later than 2010.

For the average eligible borrower, the pandemic-related deferral program increased monthly cash flow by $138 and coincided with increased credit card spending and borrowing for cars and homes.

The freeze on repayments put an extra $138 a month into the pockets of the average eligible borrower. By the end of 2021, the outstanding student loan balance had risen by an average of $1,500 for those who were eligible for deferral relative to those who were not.

Those who benefited from deferral do not seem to have used their additional liquidity to pay off other loans. On average, they spent more and took on more debt in the form of credit card balances, car loans, and mortgages.

Outstanding Balance on Non-Student Loans



Non-student loans include auto, mortgage, and credit card loans.
Thin blue bars represent 95% confidence intervals.
Source: Researchers' calculations using data from TransUnion

Average nonstudent debt increased by $1,800 for those eligible for deferral, relative to those who were not, by the end of 2022.

The payment pause also raised credit scores among eligible borrowers. Borrowers with a history of delinquencies saw the largest increase, but they were less likely than those with clean credit records to take on more debt. Borrowers with past delinquencies reduced their mortgage balances by an average of $120, while those without delinquencies increased their mortgage debt by $917. The researchers argue that this outcome suggests that access to credit may be a less important driver of consumption than liquidity and the capacity to make a down payment on a car or house.

Besides benefiting from the payment moratorium, borrowers whose loans came from the Treasury became eligible for $10,000 to $20,000 in debt forgiveness under an August 2022 executive order by President Biden. This announcement does not appear to have had a significant impact on consumption, perhaps because it has not affected borrower liquidity, or perhaps because borrowers were not convinced that the executive order would survive court challenges.

The researchers conclude that it is too soon to know whether the additional consumption spending and borrowing of those whose loan payments were deferred will strengthen the overall economy by supporting productive investments and durable goods consumption, or weaken it because the higher debt burdens will deter future consumption.

— Steve Maas

Early Findings on State Auto-Enrollment IRA Programs

In 2017, Oregon became the first state to implement an auto-enrollment Individual Retirement Account (IRA) program. Illinois and California soon followed. Another 19 states have taken steps to create one. Under such programs, the state receives payroll data from companies without retirement plans and informs their employees that they will be enrolled in the state's IRA program unless they opt out. For workers who do not opt out, the employer sends a share of each paycheck to the state, which deposits these funds in the employee's IRA. All three states started with a 5 percent contribution rate. Oregon and California have the option of boosting the rate by 1 percent per year, to a maximum of 10 percent and 8 percent respectively.

State-level programs increase the likelihood that employers offer retirement plans and the probability that employees enroll in them.

A new study, **How Do Firms Respond to State Retirement Plan Mandates?** (NBER Working Paper 31398) by Adam Bloomfield, Kyung Min Lee, Jay Philbrick, and Sita Slavov, finds that the introduction of state-run IRAs increased the availability and use of employer-sponsored plans, such as 401(k) plans. The researchers rely on data from the Current Population Survey (CPS) and Form 5500 filings to examine the impact of auto-IRA programs. For the CPS analysis, they focus on private-sector workers aged 25 to 54 and consider the 2009–20 period. The CPS asks the respondent whether their employer or union offers a retirement plan, and if one is offered, whether they participate.

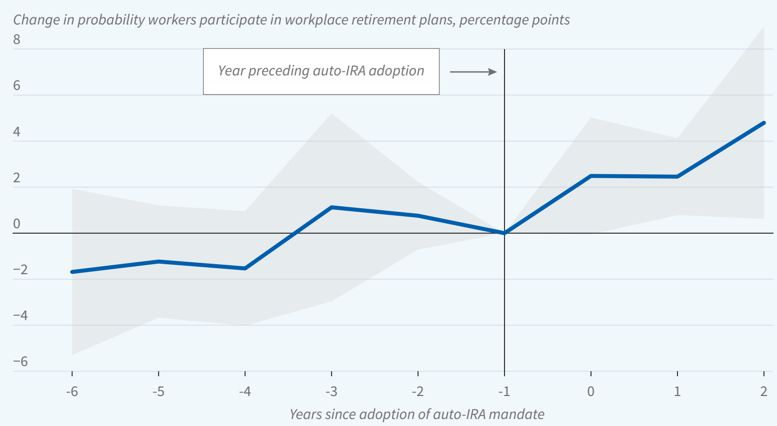
The three states that adopted auto-IRA programs have higher workforce shares of Asians and Hispanics, and smaller shares of Blacks and Whites, than states that did not. On other metrics, however, such as education levels, employment status, the size distribution of firms, and the share of workers enrolled in employer-sponsored retirement plans before the adoption of auto-IRAs, the three states that adopted these programs are broadly similar to the 47 that did not. These factors are controlled for in the estimation of effects.

To address the possibility that some CPS respondents may confuse a state auto-IRA with an employer-sponsored plan and to complement survey estimates with granular administrative data, the researchers also analyze firm-level information from Form 5500, a disclosure document that employers who sponsor retirement plans must file with the US Department of Labor.

The researchers exploit the different roll-out dates for the auto-IRA programs in the three states that implemented them as well as the roll-out dates at firms of different sizes within each state. The data from the CPS suggest that the probability that an individual works for an employer offering a plan rises by 1.4 percentage points, on a base of 44 percent, after a state adopts an auto-IRA program. The probability of an employee participating in an employer-sponsored plan rises by about 1.1 percentage points on a base of 37 percent. The firm-level data from Form 5500 suggest that the probability that a firm offers a retirement plan rises by about 0.8 percentage points on a base of 54 percent.

—Laurent Belsie

Auto-IRA Laws and Participation in Employer-Sponsored Plans



Auto-IRA programs dictate that employers not offering an employer-sponsored retirement plan must support payroll deductions to state-facilitated IRAs. Gray shaded area represents 95% confidence intervals.
Source: Researchers' calculations using data from the US Census