

# Will State-Based Retirement Savings Plans Boost Retirement Saving? New Evidence from OregonSaves

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## Abstract

Many low-paid American workers lack access to company-based retirement plans. In response, eight states to date have launched mandatory plans with automatic enrollment to help such employees save, with additional states following suit soon. We study the oldest of these, OregonSaves, which significantly expanded access, as intended. We document that overall opt-out rates are high (50+%), particularly for the lowest-paid, savings balances are low, and many withdraw assets, although repeated exposure slightly reduces opt-outs. While the program may offer useful “rainy day” savings, our findings raise important questions about the fraction of workers for whom it will enhance retirement wellbeing.

*Keywords: retirement saving; automatic enrollment; low-wage worker; job turnover; opt out*  
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## Highlights

- OregonSaves, a state-sponsored automatic-enrollment program for workers lacking employer-based retirement plans, is successfully expanding access to employees in low-paying jobs.
- Nevertheless, about half of these workers opt out of the program within 12 months, and around 70% either opt out or experience job turnover, ending their contributions.
- Opt-out rates are lower in lower-wage industries, but low-paid individuals within their firms are more likely to quickly stop contributing.
- Employees exposed to OregonSaves for the second or third time are approximately three percentage points less likely to opt out. Workers hired three or more months after a firm implements OregonSaves, making reductions in take-home pay less salient, are 15% less likely to opt out. Both findings imply slightly lower steady-state opt-out rates.
- Workers' average effective contribution rate is 4.7% of pay for those who contribute to the program and remain employed for 12 months with positive contribution rates, but it is only 1.3% when averaged across all eligible employees.
- Around 10% of OregonSaves accounts are closed each year, and around a third of all contributions through December 2023 were withdrawn.
- It remains to be seen whether the typical participant uses their OregonSaves account mainly as a "rainy day" emergency saving account or retirement saving account.

Around one-third of American workers lacks access to employer-sponsored retirement plans (ESRPs), and many of them are low-paid and experience high turnover.<sup>1</sup> Though they could contribute to individual retirement accounts (IRAs), few avail themselves of this option.<sup>2</sup> Whether this lack of retirement savings deserves the attention of policymakers is a matter of ongoing debate: some characterize low-paid workers' low retirement saving as a "crisis" (e.g., Miller, Madland, and Weller 2015), while others assert it is not, since low-income households receive high Social Security replacement rates (e.g., Biggs 2019a, 2019b). To increase access to employer-based savings plans, eight states have recently implemented "automatic IRA" programs requiring employers to automatically enroll employees into state-created IRAs to boost workers' retirement savings (CRR 2024); an additional 13 states have programs underway; and recently-proposed federal legislation seeks to extend these plans to the national level (Degen 2024). Consequently, it is an opportune time to assess the nation's oldest program, Oregon's pioneering automatic IRA, to learn whether these plans can boost retirement savings in a meaningful way, and to investigate whether they offer other potential benefits.

Recent US retirement savings legislation<sup>3</sup> has been strongly informed by the academic literature on automatic enrollment, and the OregonSaves' automatic IRA design is no exception. In a large corporate 401(k) plan, Madrian and Shea (2001) found that introducing automatic enrollment simultaneously increased plan participation rates and reduced heterogeneity in contribution rates for new hires relative to existing employees, with larger effects for younger and lower-income employees. To the extent that the OregonSaves plan covers even lower-paid workers with less job security, the marginal utility of current consumption for an OregonSaves' participant is likely to be higher. Consequently, we would anticipate lower participation in OregonSaves, and

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<sup>1</sup> See, for example, Dushi, Iams, and Lichtenstein (2015); Myers (2022), Gale and John (2018), John, Koenig, and Malta (2022).

<sup>2</sup> The Investment Company Institute (2023) reports that only 15% of US households contributed to IRAs in 2022. See also Appendix Table 1.

<sup>3</sup> US regulation includes the Pension Protection Act (2006), SECURE 1.0 (2019), SECURE 2.0 (2022); and in the UK, the Pension Act (2008).

possibly also more active choice with respect to contribution rates, compared to private-sector plans (Carroll et al. 2009). Furthermore, because state-based “automatic IRAs” cannot offer employer contributions, employees’ incentives to participate are weaker than in plans having employer matches, which have been the focus of most prior research.<sup>4</sup> Nevertheless, state-based plan participants may withdraw money from their state-created Roth IRAs without penalty, so OregonSaves effectively provides short-term liquid savings, and that greater liquidity (versus traditional ESRPs) could increase participation rates.<sup>5</sup> Relatedly, because there is no requirement to liquidate account balances following job change, we anticipate less leakage around the time of job separations.<sup>6</sup>

Oregon law required private-sector firms lacking an employer-sponsored retirement plan to automatically enroll their employees in OregonSaves, with a default before-tax contribution rate of 5% and 1% annual automatic escalation.<sup>7</sup> For employees who do not opt out, employers transfer payroll deductions to OregonSaves which makes deposits into participants’ Roth IRAs.<sup>8</sup> Because employers are required to enroll employees in the plan, the program was designed to minimize employer costs and shield them from liability under the Employee Retirement Income Security Act (ERISA).<sup>9</sup> Participants can withdraw funds from their Roth IRAs with minimal tax implications, easing the burden of opting out and accessing contributions. This design allows OregonSaves to function as both a retirement savings plan and a liquid savings account. The investment menu consists of a money market fund, a S&P 500 index fund, and a target date fund (TDF) suite. Unlike with 401(k) plans, employers cannot make matching contributions.

To date, there has been considerable interest in evaluating the OregonSaves program. As of year-end 2023, it had 124,570 funded accounts and held \$243.6 million in total assets. In September 2019, Quinby et al. (2020) reported that 43.3% of actively employed employees had

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<sup>4</sup> State plans cannot offer employer matching to avoid federal ERISA (Employee Retirement Income Security Act) regulation. Beshears et al. (2023) offers a review of the automatic enrollment literature.

<sup>5</sup> Briere, Poterba, and Szafarz (2022) found that increased restrictions on retirement plan withdrawals in French defined contribution plans were associated with lower participation rates.

<sup>6</sup> Hung et al. (2021) found that participants in auto-enrollment plans were 19 percentage points more likely to take cash distributions following job change than plan participants having voluntary enrollment.

<sup>7</sup> OregonSaves applies the contribution rate to before-tax income, which results in a larger percentage contribution rate when measured relative to after-tax income. For more detail on the history and design of OregonSaves, see Belbase and Sanzenbacher (2018), Bradford (2017), Quinby et al. (2020) and Chalmers et al. (2022).

<sup>8</sup> Zhong (2021) used administrative data to estimate a structural model of optimal default savings rates and concluded that the optimum saving rate in Oregon would be 7%.

<sup>9</sup> Scott and Hines (2020) surveyed OregonSaves employers and found that approximately 80% of them reported zero out of pocket costs associated with the program.

both a positive contribution rate and a positive account balance. They also noted that 20% of the accounts with positive balances in September 2018 experienced withdrawals by September 2019, and the likelihood of withdrawal rose significantly with job turnover during that period. Chalmers et al. (2022) used administrative data through April 2020 to confirm low earnings and high turnover rates for the average employee served by OregonSaves; in addition, their survey data indicated that the top two reasons employees gave for opting out of OregonSaves were “I can’t afford to save” (27.8% of those opting out) and “I have my own retirement plan” (23.3%). Both studies confirmed that OregonSaves participation rates were far below those in most private-employer plans (Beshears et al. 2023), with Chalmers et al. (2022) concluding that workers’ lower earnings played an important role in explaining this difference. Dao (2024) reported that OregonSaves increased Roth IRA ownership among Oregonian employees by 12%, compared to similar workers in other states.

The present study offers several new insights into the efficacy of OregonSaves. First, incorporating data on ESRPs from the US Department of Labor, we confirm that OregonSaves serves workers in a very different set of industries and jobs than firms offering 401(k) plans. Second, by following employees over their first 12 months of eligibility, we document that opt-out rates, job turnover rates, and earnings levels vary across industries. Most eligible employees in OregonSaves either opt out or experience job turnover by month 12, a fact with important implications for the calculation of annual contribution rates. When we condition on employees being actively employed and making a positive contribution in month 12, the industry-level effective annual contribution rate ranges from 4.2-5.0%, indicative of workers’ acceptance of the 5% default contribution rate. If we condition on an employee having made at least one contribution to OregonSaves, the effective annual rate falls to 2.9-3.9%; averaged over all eligible employees, it varies from 0.6% for agriculture to 1.9% for management.

Third, we shed new light on the important role that income plays in retirement plan participation. Workers with higher industry-level earnings have modestly higher opt-out rates, likely due to a higher likelihood of having pre-existing retirement savings. Yet holding industry constant, employees who earn less than their coworkers are more likely to stop contributing quickly, which might be optimal for such low-paid individuals. Workers hired after their firms registered for OregonSaves are also less likely to opt out, perhaps because the impact of OregonSaves contributions on their take-home pay is less salient. Workers being exposed to the

program for a second or third time are also less likely to opt out. Fourth, we study the evolution of account balances. A year after making an initial contribution, the average account balance is \$699 (median is \$354). If we exclude the 10% of accounts where all contributions are withdrawn by year-end, the average increases to \$777 (\$453), but it is still an order of magnitude below that of ESRP participants with “0-1” year of tenure (Vanguard, 2023). These low OregonSaves participant account balances are driven by several factors, including workers’ lower wages, higher job turnover, and the lack of an employer match. The steady outflows from workers’ accounts attest to the accounts’ high liquidity.

### **OregonSaves: Structure and Datasets Used**

OregonSaves launched in July 2017 with a voluntary pilot program, followed by six compulsory waves based on firm size. Larger firms had to register first, and the deadline for firms with 100+ employees was October 2017.<sup>10</sup> Once registered, employers have 30 days to submit employee names to OregonSaves. If employees do not formally opt out during the first 15 days, OregonSaves attempts to verify their identities and, if successful, opens a Roth IRA for each worker. Thereafter, employers send employee contributions to OregonSaves, updating employee savings rates and employment status as needed.

OregonSaves shared (anonymized) administrative data for August 2018 to April 2020, covering 11,088 employers and 289,657 employees. Employer data includes enrollment date, industry classification, zip code, and the date on which the firm first contributes to OregonSaves (if ever). Employee data includes age, mailing address, the date of any formal opt out decision, and monthly data on contribution rates, contribution and withdrawal amounts, asset allocation, account balances, and changes in employment status. OregonSaves plan statistics for August 2020 to December 2023 are obtained from the OregonSaves Program Monthly Dashboard. OregonSaves also provided data on the distribution of account balances for the cohort of funded accounts in June 2022, and the Oregon Employment Department (OED) provided quarterly earnings data at the industry-county level for 2017- 2020. Data on 9,946 ERISA-covered retirement plans sponsored by other Oregon-headquartered employers in 2020 were obtained from Form 5500 and 5500-SF filed with the US Department of Labor.

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<sup>10</sup> The original deadline for firms with fewer than four employees was May 2020, delayed due to the pandemic. Penalties for employer noncompliance were also delayed.

## **Findings for Opt-out, Turnover, Effective Contribution Rates, and Participation Patterns**

### ***For Whom is OregonSaves Increasing Access to Retirement Savings?***

OregonSaves has generated savings for a substantial number of Oregonian workers. There were 3,747 OregonSaves accounts with a positive balance on January 31, 2018, and 22,883 with a positive balance by December 31, 2018; this 11-month increase accounts for 9.5% of all Roth IRAs opened in the US with a contribution that year.<sup>11</sup> Furthermore, the types of jobs provided access to retirement savings through OregonSaves differ from the types of jobs with access to ESRPs. We demonstrate this by comparing industries served by OregonSaves to those of Oregon employers offering ERISA-covered retirement plans in Figure 1, for 19 industries categorized using the first two digits of their 6-digit North American Industry Classification System (NAICS).<sup>12</sup> The green bars represent the predicted fraction of participants utilizing OregonSaves by industry (see Appendix Table 2), and the yellow bars represent the fraction of 401(k) participants by industry covered by the 9,946 Oregon-headquartered firms offering ERISA-covered plans. The comparison confirms that OregonSaves serves a quite different mixture of industries than those providing traditional ESRPs. For example, 37.9% of OregonSaves participants work in food services versus only 2.9% of ESRP participants; moreover, only 5.3% of OregonSaves participants work in manufacturing versus 18.6% of ESRP participants. The correlation between the two sets of market shares is only 0.13.

*Figure 1 here*

There are other notable differences in the types of jobs performed by OregonSaves participants versus ERISA-covered workers. Consider health care, the second-largest industry served by OregonSaves, and the largest industry served by ERISA-covered plans. The top five (6-digit) NAICS categories for health care in OregonSaves (see Appendix Table 3) are Assisted living facilities for the elderly (18.9%), Services for the elderly and disabled (17.2%), Home health care services (11.2%), Child day care services (10.9%), and Residential disability facilities (7.5%). By contrast, for the private sector plans, the top five categories are Hospitals (39.9%), Nursing &

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<sup>11</sup> Holden and Schrass (2021) estimated that in 2018 in the US, 200,786 new Roth IRAs were opened with a new contribution, rather than a rollover; 9.5% is a likely underestimate because we do not observe how many OregonSaves accounts were opened during January 2018. Dao (2024) reported that OregonSaves led to a 12% increase in Roth IRA ownership among Oregon workers. Although employers could substitute state-sponsored plans for existing employer-sponsored plans, Guzoto et al. (2022) found no evidence of crowd-out in states offering automatic IRAs.

<sup>12</sup> We observe NAICS for 96.4% of the 11,088 employers, which employed 95.6% of the 289,657 employees.

Residential Care Facilities (19.5%), Offices of Physicians (except Mental Health Specialists) (12.5%), Offices of Dentists (4.7%), and Individual and Family Services (4.7%). The fact that the only overlap in categories relates to residential care facilities reinforces the conclusion that OregonSaves has greatly expanded access to retirement savings accounts to workers with different job types.

### ***Opt Out, Turnover, and Effective Contribution Rates***

To learn more about employee behavior under OregonSaves, it is useful to compare opt-out rates, job turnover rates, account status, account balances, imputed earnings, and effective contribution rates by industry. For this analysis, our event-time sample includes 118,865 eligible employees whose 12<sup>th</sup> month of eligibility was on or before April 2020, and who worked at one of the 2,219 employers directing payroll contributions to OregonSaves.<sup>13</sup> In columns (1)-(5) of Table 1, the unit of observation is employee  $i$  in the 12<sup>th</sup> month of eligibility.<sup>14</sup> Table 1 is sorted by the number of OregonSaves-eligible employees within each industry: industries with the most participants are food services, business support, and health care, while those with the fewest are real estate, information, and management.<sup>15</sup>

#### *Table 1 here*

Column (2) reports the fraction of employees who formally opt out of OregonSaves or set their contribution rate to 0% by the end of 12 months (the latter we define as informal opt out behavior). Overall, 49.8% of participants opt out by the end of 12 months, including 7.6% who do so informally. The opt-out rate is highest in agriculture (72.0%) and lowest in management (42.1%). Column (3) measures the fraction of employees classified by their employer as inactive by month 12.<sup>16</sup> Within 12 months, 37.0% of all employees are classified as inactive, ranging from 16.1% in real estate to 63.2% in management.<sup>17</sup> After 12 months, 69.2% of all employees either opt out or experience job turnover, ranging from a low of 58.0% in business support to a high of 84.3% in agriculture. Although only 30.8% of employees are classified as actively employed with

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<sup>13</sup> Our administrative data include information entered by employers, employees, and the record keeper. We exclude a small number of participants with recorded ages below 18 or above 90. By April 2020, there were 289,657 employees that had registered with OregonSaves. We focus on the employees with a 12-month history to allow comparability to the existing literature. We describe our data filters in section A.3 of the Online Appendix.

<sup>14</sup> By contrast, Quinby et al. (2020) calculated participation rates for the subset of active employees in September 2019 and worked at participating employers, without conditioning on when they were enrolled in OregonSaves.

<sup>15</sup> The sorting differs slightly from Figure 1, due to our focus on employees rather than predicted participants.

<sup>16</sup> Since workers leaving their jobs are not required to cash out their retirement saving, turnover is independent of whether employees opt out of OregonSaves.

<sup>17</sup> To the extent that employers do not update job status in a timely manner, these data will underestimate turnover.



a positive contribution rate in month 12 (column (4)), 39.6% had a positive account balance at some point during their first 12 months of eligibility (column (5)).

Next, we trace patterns of workers' account balances and earnings. We focus on a set of 23,593 accounts receiving their first contribution between August 2018 and May 2019. This filter allows us to observe contributions, withdrawals, and account balances over a full 12-month period (where month 1 of event time is now defined as the month of the initial contribution rather than the first month of eligibility). Column (6) reports average account balances in month 12 for account holders still classified as actively employed with a positive contribution rate in month 12, while column (7) reports average account balances in month 12 for anyone who made at least one contribution. Not surprisingly, active employees with positive contribution rates accrue larger balances. The variation across industries in both columns is highly correlated with variation in imputed before-tax earnings. To impute earnings, we divide each monthly contribution observed during months 1-12 by the employee's corresponding contribution rate (excluding employees with multiple active employment relationships during the month). For example, dividing a \$100 monthly contribution by the default 5% contribution rate yields estimated monthly before-tax earnings of \$2,000. These imputed monthly earnings range from \$1,038 for management jobs to \$3,832 for construction jobs, averaging \$1,835 overall.<sup>18</sup>

The remaining columns of Table 1 convert the imputed earnings and 12-month account balances into effective annual contribution rates by industry. The effective contribution rate is 4.7% for workers still actively employed with a positive account balance at the end of 12 months, close to the program's default contribution rate of 5%.<sup>19</sup> The effective contribution rate drops to 3.2% for employees making at least one contribution before opting out or experiencing job turnover. Because we only observe account balances when employees make at least one contribution, variation in account balances does not control for non-participation across industries, reported in column (5). When we include the 60.4% of employees who never have a positive account balance, the effective contribution rate drops to 1.3%, ranging from a low of 0.6% for agriculture, to 1.0% for business support, 1.7% for arts and entertainment, and a high of 1.9% for

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<sup>18</sup> Appendix Table 4 reports average imputed before-tax earnings for a larger sample of OregonSaves contributors than we consider in Table 1, along with matched industry-level before-tax earnings from OED, which covers all employers within an industry, regardless of whether they are enrolled in OregonSaves. Excluding the missing industry category, the correlation between our imputed industry-level earnings measures and the corresponding OED measures is 0.79.

<sup>19</sup> Appendix Table 5 documents widespread acceptance of the default contribution rate.

management.

### ***Predicting Participation in OregonSaves***

To examine which employee and employer types are associated with employee opt out and positive account balances, Table 2 uses employee-level administrative data to predict opt-out decisions and positive account balances after 12 months of plan eligibility. The dependent variable in columns (1) and (2) equals 100 if employee  $i$  formally opts out of OregonSaves by month 12, and zero otherwise.<sup>20</sup> In column (3), the dependent variable equals 100 if the participant informally opts out by setting the contribution rate to 0% by month 12 without formally opting out. In column (4), the dependent variable equals 100 if the employee has a positive account balance in month 12. The average formal opt-out rate is 42.9%, the average informal opt-out rate is 7.0%, and the fraction of employees with a positive account balance is 36.9%.

#### *Table 2 here*

Control variables include the participant's age in month 12 (reference group age 18-25). To capture local economic conditions, we include the lagged county unemployment rate based on the employee's zip code. We also control for whether the employee lives in an urban county in Oregon (reference), a rural county in Oregon, or Washington. Two earnings measures (described below) are included, as well as an indicator of whether the employee was classified as inactive by the end of month 12. We also incorporate two variables with possible implications for steady-state opt-out rates. The first indicates whether the employee was exposed to OregonSaves through a previous employer (which should be increasingly common over time), while the second indicates whether the employee joined the firm three or more months after the company first registered with OregonSaves, under the hypothesis that new employees would be less likely to notice the decrease in take-home pay due to the OregonSaves contribution. As a proxy for firm size, we include the natural logarithm of the number of employees when the employer enrolled. To measure employer enthusiasm for OregonSaves, we include indicators of whether the employer joined the program during the voluntary pilot phase, and whether the employer registered after its OregonSaves deadline. Finally, we include year-month fixed effects corresponding to each participant's month 12 in event time and cluster standard errors on the 2-digit NAICS industry classification.

The table confirms that an employee's likelihood of formally opting out increases with age,

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<sup>20</sup> This scaling allows us to interpret coefficients as changes in percentage points. We report summary statistics for all dependent and independent variables in Appendix Table 6.

the county-level unemployment rate, and incomes by 6-digit industry-county combination. The monotonic age gradient is striking, with younger employees being significantly less likely to opt out. Workers in counties with higher lagged unemployment rates have slightly higher opt out rates, perhaps due to higher levels of economic uncertainty discouraging them from saving. A one-standard-deviation increase in the unemployment rate in column (2) is associated with a 2.2 percentage point increase in the formal opt out rate (on a base of 42.9%). Higher industry-level earnings are also associated with slightly higher opt out rates, possibly because more employees in relatively higher-paying industries have pre-existing retirement savings. Column (1) uses average quarterly before-tax earnings data from OED, which is disclosed only for a subset of industry-county combinations in Oregon, but which is not influenced by employee participation decisions. Column (2) uses median imputed before-tax earnings at the industry-county level, observed for more industry-county combinations, but only for employees making at least one contribution.<sup>21</sup> Economic significance is modest; a one-standard-deviation increase in either industry-level earnings measure is predicted to increase formal opt out by approximately two percentage points.

Employees exposed to OregonSaves for the second or third time are between 2.4 and 3.6 percentage points less likely to opt out, suggesting that the steady-state participation rate will be slightly higher than the current participation rate (where the latter largely reflects initial exposure). Employees hired three or more months after their employer first registered with OregonSaves are approximately 15 percentage points less likely to opt out, which we surmise is because the 5% reduction in before-tax earnings is likely to be less salient than for existing employees. Inactive employees are 10 percentage points less likely to formally opt out, presumably because contributions to OregonSaves automatically end when workers leave their jobs. With respect to employer characteristics, column (2) confirms that formal opt out rates are lower at larger firms, and at firms in the pilot program.

Informal opt outs, in column (3), are more difficult to predict, with less of an age gradient. Employees classified as inactive are much more likely to have a contribution rate set to 0%, possibly because employers simultaneously update both measures for OregonSaves. Employees exposed to OregonSaves for the second or third time are slightly less likely to informally opt out.

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<sup>21</sup> Income measures correspond to the employer's county and industry. OED data are not available for industry-county combinations outside Oregon.

In column (4), we focus on asset accumulation by examining factors predictive of positive account balances in month 12. Not surprisingly, given their lower opt-out rates, younger employees are more likely to generate positive account balances during their first 12 months of eligibility. Employees hired three or more months after the employer joined OregonSaves, and employees exposed to OregonSaves for the second or third time, are both significantly more likely to have a positive balance. By contrast, employees classified as inactive are much less likely to have a positive balance, either because they make no contributions or because they withdraw their contributions by month 12. The higher opt-out rates in higher-paying industries explain the lower likelihood of having a positive account balance, but it is unclear why workers at larger employers have both lower opt-out rates and a lower chance of positive account balances.

### ***Within-Industry Evidence on Income and Participation in OregonSaves***

Having found that employees in industry-county cells with higher before-tax earnings are more likely to opt out, Table 3 investigates whether employees earning less within their industry (or firm) are less likely to participate in OregonSaves. Here, the dependent variable is the participant's estimated before-tax earnings in the first month they contribute to OregonSaves. The two independent variables of interest are whether the participant made exactly one or exactly two monthly contributions to OregonSaves before ending contributions (where the reference category consists of participants who make three or more contributions). Of the contributors in our sample, 6,898 made only one monthly contribution, 5,692 made only two monthly contributions, and 43,813 made three or more monthly contributions. We limit the sample to the participant's first contribution and exclude anyone who experienced job turnover or opted out that same month. Column (1) includes year-month and 6-digit industry fixed effects; column (2) introduces additional independent variables; and column (3) replaces the year-month and 6-digit industry fixed effects with a separate fixed effect for each employer in each month of the sample. Standard errors are clustered on 2-digit industry.

#### *Table 3 here*

We find clear evidence that participants who opt out after only one or two contributions have significantly lower before-tax monthly earnings than do other contributors. Without controls, employees making only one contribution earn \$429 less per month and employees making only two contributions earn \$281 less per month, on average, than employees making three or more contributions; the latter earn an average monthly before-tax earnings of \$1,915. Including

employer-by-date fixed effects then compares earnings of employees in the same firm making their initial contribution in the same month, and here we continue to find economically and statistically significant differences. In other words, while participation rates are slightly lower when we compare higher-earning to lower-earnings industries, there are large within-industry differences in the earnings of those who do and do not become regular contributors. This finding is reassuring insofar as it suggests that employees with the highest marginal utility from consumption—the lowest paid—are also most likely to opt out from OregonSaves. The other estimates in Table 3 reveal that monthly earnings in our sample peak at ages 46-55, new hires earn less than existing employees, and employees in counties with higher unemployment rates earn less.

### ***Results for the Evolution of Account Balances in OregonSaves***

Next, we investigate the evolution of OregonSaves account balances. Table 4, Panel A focuses on the subset of 23,593 accounts for which contributions, withdrawals, and balances are observed for at least 12 months. Here, the average account balance increased from \$84 in event-time month 1 to \$699 in month 12 (matching sample average in column (8) of Table 1); the median rose from \$58 to \$348; and the ratio of the mean to median increased from 1.4 to 2.0. Insofar as the employees contributing to OregonSaves were not previously contributing to other retirement accounts, these balances reflect incremental retirement savings.<sup>22</sup>

*Table 4 here*

While all of these accounts receive an inflow in month 1 (by construction), the fraction still contributing by month 12 declines to 41.3%, partly attributable to the rising opt outs and turnover. In addition, approximately 1/3<sup>rd</sup> of those still classified as having a positive contribution rate and actively employed in month 12 fail to contribute, likely reflecting staleness in the observed classifications (see Appendix Table 7). The fraction of accounts experiencing an outflow is 0.5% in month 1, then fluctuates between 2.2-2.9% over each of the next 11 months. The fraction of positive-balance accounts declines from 99.8% to 90.0%, implying that 90% of those who contributed initially still had a positive balance at the end of 12 months. The rows labeled Month 6 and Month 12 summarize the distribution of account balances when we limit the sample to “funded accounts,” or accounts with a positive balance. Excluding zero balance accounts boosts

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<sup>22</sup> In Chalmers et al. (2022), approximately 11% of the employees who opted out of OregonSaves cite existing savings as their reason for doing so. Appendix Table 1 shows that only 22% of employees with no ESRP have an IRA and only 1/3<sup>rd</sup> of the 22% are actively contributing.

the mean and median balances in month 12 to \$777 and \$453, respectively, and reduces the ratio of the mean to the median to 1.7. The 30<sup>th</sup> percentile increased from \$101 to \$167, and the 90<sup>th</sup> percentile from \$1,803 to \$1,887. This last statistic underscores the finding that accrued program balances after one year remain modest, even in the upper tail of the distribution.

Panel B of Table 4 summarizes the evolution of account balances in calendar time for the cohort of participants with a positive account balance on June 30, 2022. Dividing total plan assets of \$146.0 million by 115,046 funded accounts yields an average account balance of \$1,269. Excluding zero balance accounts, the mean account balance increases from \$1,269 to \$1,988 between June 2022 and June 2023; the median increases from \$424 to \$605; the ratio of the mean to the median increases from 3.0 to 3.3; and the 90<sup>th</sup> percentile grows from \$3,248 to \$5,320.<sup>23</sup> Over the same period, 13.3% of the accounts are liquidated.

For purposes of comparison, Vanguard (2023: Figure 55) reports 2022 mean account balances for ESRP participants with “0-1” year of tenure of \$14,341; the median account balance is \$3,441. The ratio of the mean to the median is even higher than observed for OregonSaves in 2022 (4.2 versus 3.1), confirming that skewness in account balances is not unique to OregonSaves. While the much lower means and medians in Panel A underscore the fact that Roth IRA contribution limits are substantially lower than 401(k) limits, and that participants in 401(k) plans typically benefit from employer matching contributions, they also reflect the much lower earnings and higher job turnover rates of employees eligible for OregonSaves. Indeed, account balances in OregonSaves are closer to those in the UK’s National Employment Savings Trust (Nest). Similar to OregonSaves, UK employers must offer pension plans featuring automatic enrollment with the explicit goal of expanding access, yet unlike OregonSaves, those plans feature a generous employer match. As of May 2022, Nest had 11.3 million funded accounts and \$29.5 billion in assets under management, implying an average balance of \$2,613 per funded account.<sup>24</sup>

### ***Are OregonSaves Short- or Long-Term Liquid Savings?***

OregonSaves’ Program Monthly Dashboard reports that contributions through December 2023 totaled \$337.0 million while withdrawals totaled \$111.3 million, implying that approximately 1/3<sup>rd</sup> of all OregonSaves’ contributions through that date have been subsequently

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<sup>23</sup> OregonSaves provided us with the remaining data in this panel, allowing us to track both changes in the distribution of positive balances and the fraction of accounts that reach \$0.

<sup>24</sup> Nest statistics are from Wessel (2022); assets of GBP 24.2 billion to USD 29.5 billion are converted using an exchange rate of 1.22 USD per GBP from July 31, 2022.

withdrawn. While some of the withdrawals reflect opt outs shortly after an initial contribution, some plausibly reflect workers' use of OregonSaves account balances to cover emergency expenditures. Indeed, after our administrative dataset ended in April 2020, many employees in food services, construction, and retail faced extended periods of pandemic-induced unemployment. If participants used OregonSaves accounts to smooth consumption following such income shocks, we might expect that withdrawals would spike with job turnover. Analyzing public data, we find that monthly outflows averaged 1.6% of plan assets between September 2020 (when Monthly Dashboard data became available) and December 2023, with a standard deviation of 0.3 (see Appendix Table 8). The average withdrawal rate increased modestly from 1.4% between September 2020-December 2021 (the period over which the CARES Act made direct payments to individuals), to 1.7% between January 2022 and December 2023, but we cannot directly determine how withdrawal rates varied with employment status. During our sample period, we find that withdrawals spike when participants opt out of the plan, rather than in the months surrounding job turnover (see Appendix Table 9). That said, we also find that monthly outflows are much harder than monthly inflows to predict (R-squared of 0.107 versus 0.427), perhaps because of stale data on employment status. Therefore, while the ability to withdraw contributions is an attractive feature of the program, additional data are required to assess whether low-income workers served by OregonSaves are actively benefiting from the liquid savings provided by OregonSaves accounts. It is also unclear, given the small account balances and high turnover rates, how much of the saving will remain in the program by the time the workers retire.

## **Conclusions**

Automatic IRAs are mandated in eight states and under consideration by many more, possibly becoming subject to a federal mandate. Our study of OregonSaves offers new insights into the challenges and opportunities these plans present. We show that OregonSaves has greatly expanded access to retirement savings, yet targeted workers, who are predominantly low-paid and experience high turnover, exhibit higher opt-out rates compared to private-sector plans. Approximately 40% of eligible employees have a positive account balance within the first 12 months. These findings, and their industry-specific differences, will be of interest to policymakers and academics seeking to model participation rates in automatic IRAs.

Our results also complement research on employer-based 401(k) plans such as Beshears et

al. (2023), who studied a 401(k) plan with a default contribution rate of 12% (minimum 4%). They find higher employee acceptance of the 12% contribution even among those with below-median salaries, suggesting that lower-income employees likely face greater barriers to “active decision-making.” In our setting, there has been widespread acceptance of the 5% default contribution rate, but lower-income workers are far more likely to actively stop contributing in response to the take-home pay reduction.

Given the modest balances observed in OregonSaves after 12 months, when the majority of employees have either opted out or left their job, it remains uncertain what fraction will eventually accumulate meaningful retirement savings. Regardless, OregonSaves is likely generating new liquid savings for low-income workers who would otherwise lack savings.<sup>25</sup> Participation rates in OregonSaves are comparable to participation rates in the short-term savings accounts featuring automatic enrollment studied by Berk et al. (2023), with the caveat that OregonSaves features much *higher* average account balances due to the higher average contribution amounts. Whether participants will treat OregonSaves accounts as a source of liquid savings is an important topic for future research, because the optimal default investment options for retirement savings and liquid savings may differ fundamentally.

In sum, we have identified the limitations of automatic-enrollment savings plans when offered to workers with low and volatile earnings and high turnover. The possibility that liquid savings generated by employee contributions were drawn down to smooth consumption during the COVID pandemic should not be seen as diminishing the value of the program. What is less clear is whether these accounts will eventually grow into important vehicles for retirement saving. This remains an important outstanding question.

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<sup>25</sup> Beshears et al. (2020) discussed combining retirement savings with emergency savings in an auto-enrollment plan.



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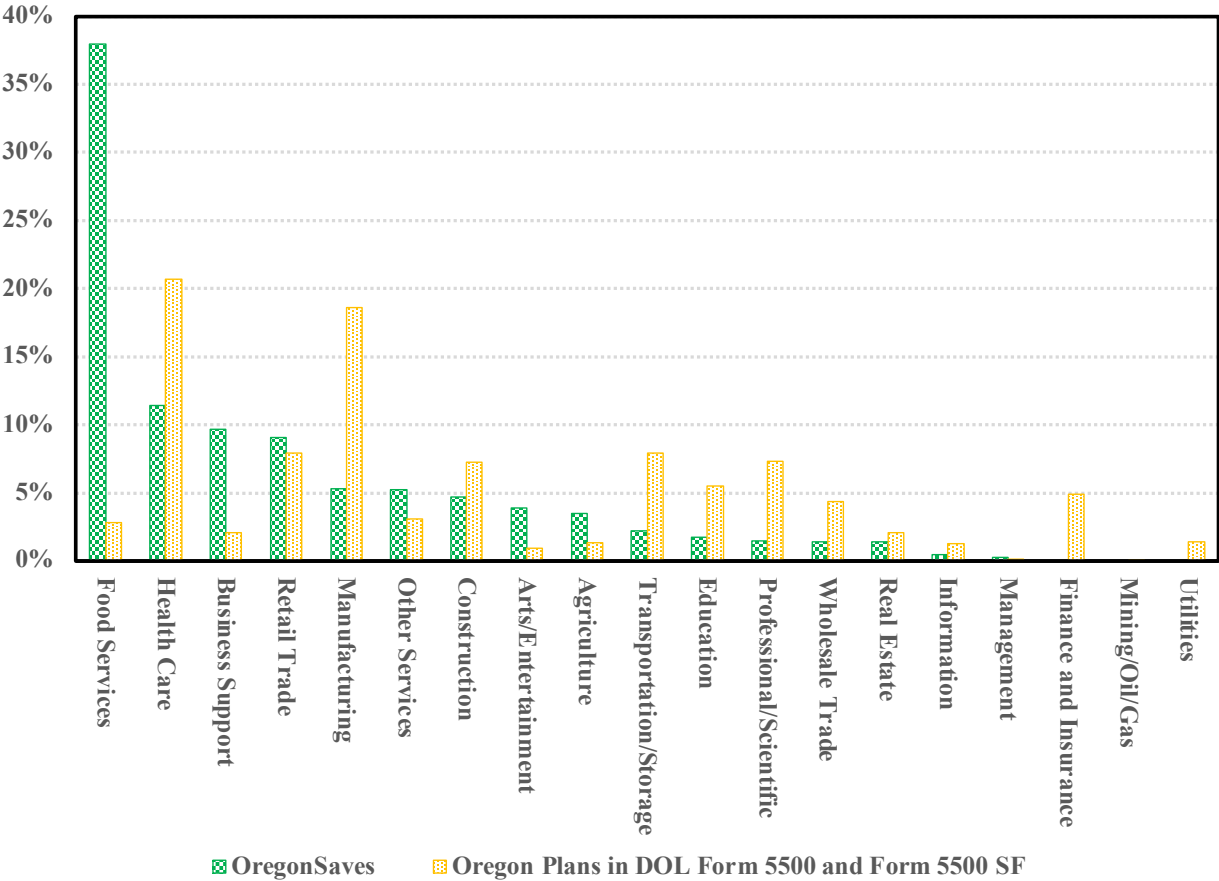
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**Figure 1.**  
**OregonSaves Targets Industries with Relatively Few Employer-Sponsored Retirement Plans**

This figure plots in green the fraction of predicted OregonSaves participants for 19 broad industry classification, against the fraction of active participations in employer-sponsored retirement plans offered by Oregon-headquartered firms in yellow. We predict the number of OregonSaves participations in Appendix Table 2, using administrative data through April 2020. We extract the number of active participants at the end of 2020 from Form 5500 and Form 5500 SF filed with the Department of Labor. Industries are sorted by the predicted number of OregonSaves participants. Source: Authors calculations.



**Table 1.****OregonSaves Opt-out Rates, Account Status, and Effective Contribution Rates after 12 months, by Industry.**

In this table, the unit of observation is employee  $i$  in month 12 (where month 1 is initially defined as the first month in which the employee would be eligible to contribute to OregonSaves if her identity is verified and she remains employed). Column (1) reports the number of employees within each industry who are potentially eligible to contribute. Columns (2) reports the fraction of employees who either formally opt out of the program or informally opt out by setting their contribution rate to 0%. Column (3) reports the fraction of employees who are classified as inactive by month 12. Because it is possible for employees to, for example, formally opt out and then become inactive, column (4) reports the fraction of employees in column (1) for which at least one of the conditions in columns (2) and (3) applies. Column (5) reports the fraction of the employees in column (1) who ever had a positive account balance through the end of month 12. Columns (6) and (7) report average account balances for the subsample of 23,593 employees who made at least one contribution to OregonSaves, within 12 months of the first contribution (i.e., month 1 is now defined as the month of the first contribution). Averages include accounts with zero-dollar balances. Column (6) focuses on contributors who are classified as active, with a positive contribution rate, 12 months after the first contribution. Column (7) focuses on any account that received at least one contribution during the 12 months. Accounts are assigned to industries based on the employee's industry in month 12; 4.3% of the 23,593 account holders change their 2-digit industry at least once during the 12 months. Column (8) reports the average imputed monthly earnings using all contribution amounts and matched contribution rates, for employees who are actively employed with a positive contribution rate, during any of months 1-12. Account holder's earnings in month  $t$  is assigned to their industry in month  $t$ . The remaining columns use the average account balance data and imputed earnings data to calculate effective contribution rates. Column (9) scales the average account balances in column (6) by twelve times the mean imputed monthly earnings in column (8). Similarly, column (10) scales the average account balances in column (7) by twelve times the mean imputed monthly earnings in column (8). Finally, column (11) estimates an effective contribution rate for the full sample of employees by scaling the effective contribution rate in column (10) for those who ever contribute by the fraction of employees in column (5) who ever have a positive balance. Source: Authors calculations.

Industry	Employers Processing Contributions by Month 12					Account Balance		Mean Imputed Before-tax Earnings	Effective Contribution Rate		
	Number Employees	Opt out	Inactive	Opt out	Account	Active	Ever		Active	Ever	All
				or	Balance	& > 0%	Contrib.	Contrib.	& > 0%		
	(1)	(2)	(3)	inactive	Ever > \$0	(6)	(7)	(8)	(10)	(11)	(12)
Food Services	43,158	46.4%	41.7%	69.9%	44.3%	891	587	1,564	4.7%	3.1%	1.4%
Business Support	15,275	43.7%	34.3%	58.0%	31.3%	629	441	1,159	4.5%	3.2%	1.0%
Health Care	14,302	45.2%	37.6%	65.9%	45.3%	889	609	1,697	4.4%	3.0%	1.4%
Retail Trade	9,419	56.0%	42.1%	76.0%	38.0%	1,117	741	2,006	4.6%	3.1%	1.2%
Manufacturing	7,229	60.5%	28.8%	73.8%	34.5%	1,526	1,033	2,677	4.8%	3.2%	1.1%
Agriculture	6,289	72.0%	30.5%	84.3%	17.4%	1,451	1,054	2,620	4.6%	3.4%	0.6%
Missing	4,015	40.2%	41.8%	66.6%	44.7%	1,031	777	2,005	4.3%	3.2%	1.4%
Other Services	3,796	51.8%	34.6%	69.8%	45.5%	1,186	836	2,096	4.7%	3.3%	1.5%
Arts/Entertainment	3,262	43.7%	27.6%	61.2%	47.6%	668	523	1,228	4.5%	3.5%	1.7%
Construction	3,001	57.1%	21.9%	69.0%	37.8%	1,930	1,376	3,832	4.2%	3.0%	1.1%
Education	2,157	52.2%	29.9%	71.5%	40.1%	881	715	1,591	4.6%	3.7%	1.5%
Professional/Scientific	2,007	57.5%	36.0%	73.3%	29.9%	1,502	1,222	2,628	4.8%	3.9%	1.2%
Wholesale Trade	1,629	57.9%	26.0%	73.8%	34.9%	1,891	1,208	3,257	4.8%	3.1%	1.1%
Transportation/Storage	1,494	59.8%	38.2%	81.6%	37.2%	1,700	980	2,859	5.0%	2.9%	1.1%
Real Estate	1,233	51.9%	16.1%	61.0%	35.0%	1,556	1,206	2,609	5.0%	3.9%	1.3%
Information	343	56.3%	31.2%	71.4%	39.4%	1,424	1,091	2,724	4.4%	3.3%	1.3%
Management	242	42.1%	63.2%	75.6%	56.2%	619	425	1,038	5.0%	3.4%	1.9%
Main Sample	118,865	49.8%	37.0%	69.2%	39.6%	1,026	699	1,835	4.7%	3.2%	1.3%

**Table 2.**  
**Predicting Opt Outs from OregonSaves and Positive Account Balances, by Month 12.**

This table predicts three outcomes using linear probability models. In columns (1) and (2), the dependent variable equals 100 if employee *i* formally opted out of OregonSaves, and zero otherwise. In column (3), the dependent variable value equals 100 if employee *i* sets her contribution rate to 0% without formally opting out from OregonSaves, and zero otherwise. In column (4), the dependent variable equals 100 if employee *i* has a positive account balance. The unit of observation is employee *i* in month *t*, twelve months after the employee was enrolled in OregonSaves. The sample is limited to employees with a mailing address in Oregon or Washington, working for an employer processing OregonSaves contributions. The independent variables are summarized in Appendix Table 5. Employee-level independent variables include age category dummy variables (omitted category is ages 18-25); account holder location dummy variables (omitted category is account holder lives in an urban Oregon zip code); a dummy variable indicating whether the employee was hired 3 or more months after the employer registered with OregonSaves; a dummy variable indicating whether the account is linked to a prior OregonSaves employment spell; and a dummy variable indicating if the employee was terminated during the first 12 months. To control for lagged economic conditions, we include both the average county-level unemployment rate and a measure of income within the same industry and county. Column (1) controls for the average earnings within the same industry and county, from Oregon Employed Department (OED), lagged five quarters. Columns (2) through (4) control for the median imputed earnings with the same industry and county in the current quarter. Employer-level independent variables include firm size (natural logarithm of the number of employees when the employer registered with OregonSaves) and dummy variables indicating whether the employer joined OregonSaves during the pilot phase and whether the employer registered for OregonSaves after the registration deadline based on firm size. All columns include year-month fixed effects. Standard errors are clustered on broad industry (NAICS2). Statistical significance at the 1-percent, 5-percent, and 10-percent levels is indicated by \*\*\*, \*\*, and \*, respectively. Source: Authors calculations.

Dependent variable:	Employees in month 12 sample (limited to employers processing contributions)			
	Formal opt out	Formal opt out	Informal opt out	Balance > 0
	(1)	(2)	(3)	(4)
Age 26-35? (t)	4.96 *** (0.47)	5.23 *** (0.75)	-3.09 *** (0.99)	1.94 (1.41)
Age 36-45? (t)	7.33 *** (0.99)	7.98 *** (1.11)	-2.91 *** (0.64)	-0.48 (1.10)
Age 46-55? (t)	9.46 *** (1.20)	9.86 *** (1.21)	-2.47 *** (0.60)	-2.79 *** (0.88)
Age 56-65? (t)	15.87 *** (1.58)	15.83 *** (1.58)	-3.44 *** (0.51)	-6.56 *** (1.50)
Age 66-75? (t)	26.05 *** (1.74)	26.72 *** (1.56)	-2.98 *** (0.65)	-17.50 *** (1.82)
Age > 75? (t)	33.34 *** (2.73)	33.67 *** (2.79)	-2.44 (1.98)	-18.41 *** (2.95)
Account holder in rural Oregon? (t)	-2.41 ** (1.00)	-1.61 (1.45)	0.16 (0.44)	-0.24 (1.17)
Account holder lives outside Oregon? (t)	-4.48 ** (1.77)	-4.52 (2.80)	2.90 (2.00)	-4.71 *** (1.12)
Hired after employer joins OregonSaves (t)	-15.61 *** (2.27)	-15.74 *** (2.19)	-0.07 (1.89)	3.33 ** (1.55)
OregonSaves job number 2+ (t)	-3.55 ** (1.34)	-2.39 * (1.23)	-1.11 ** (0.42)	9.12 *** (2.44)
Employee inactive? (t)	-10.31 *** (1.87)	-10.32 *** (2.16)	10.01 *** (1.34)	-13.91 *** (2.92)
Average earnings from OED within industry-county (q-5)	1.94 ** (0.73)			
Median imputed earnings within industry-county (q)		1.46 ** (0.53)	0.18 (0.18)	-1.57 ** (0.58)
Average county unemployment rate (t-14 to t-12)	3.26 *** (0.62)	2.84 *** (0.68)	-0.79 (0.54)	-0.22 (0.54)
Ln (number of employees at enrollment)	-1.44 (0.85)	-2.07 ** (0.86)	0.76 (0.65)	-2.90 *** (0.51)
Pilot employer? (t)	-5.53 (3.23)	-5.81 ** (2.67)	-2.25 (2.26)	-11.63 (8.48)
Employer registered late? (t)	-0.11 (0.84)	0.40 (1.13)	1.37 (1.03)	1.62 (1.18)
Limited to accounts in OR or WA?	Yes	Yes	Yes	Yes
Year-month FE?	Yes	Yes	Yes	Yes
N	81,314	102,275	102,275	102,275
Adj. R2	0.0741	0.0756	0.1111	0.0353
Mean Dependent:	41.86	42.92	6.96	36.85

**Table 3.****Does Imputed Monthly Earnings Vary with Total Number of Contributions?**

In this table, the dependent variable is imputed before-tax monthly earnings. We compare the monthly earnings of employees making exactly one and exactly two contributions to OregonSaves, to those of employees who making more than two contributions. Of necessity, the sample is limited to employees of employers that have begun processing contributions into OregonSaves. For each type of participant, we limit the sample to the month of the initial contribution. To allow for at least three contributions, we require that the first contribution be received by February 2020. For consistency with other tables, we also limit the sample to employees with account addresses in Oregon or Washington. Imputed earnings in month  $t$  is set to missing if the employee opts out during month  $t$  or experiences job turnover during month  $t$ . Columns (1) and (2) include 19 year-month fixed effects and 528 industry (NAICS6) fixed effects. In column (1), the coefficient on “Only one contribution” is identified using 6,898 unique employees, the coefficient on “Only two contributions” is identified using 5,692 unique employees, and the omitted category consists of 43,813 unique employees. Column (3) replaces the separate industry and date fixed effects with 7,601 employer-by-year-month fixed effects. The coefficients are identified using imputed earnings data on 5,913, 4,983, and 40,059 unique employees, respectively. Standard errors are clustered on broad industry (NAICS2). Statistical significance at the 1-percent, 5-percent, and 10-percent levels is indicated by \*\*\*, \*\*, and \*, respectively. Source: Authors calculations.

	Imputed Before-Tax Monthly Earnings		
	(1)	(2)	(3)
Only one contribution	-429.30 *** (41.77)	-374.99 *** (37.93)	-501.31 *** (29.65)
Only two contributions	-280.84 *** (43.72)	-222.90 *** (44.21)	-253.25 *** (29.97)
Age 26-35 (t)		357.31 *** (28.29)	291.63 *** (16.08)
Age 36-45 (t)		528.20 *** (48.76)	500.60 *** (35.39)
Age 46-55 (t)		633.49 *** (59.42)	620.71 *** (53.11)
Age 56-65 (t)		509.19 *** (81.27)	509.78 *** (57.01)
Age 66-75 (t)		110.35 * (61.47)	165.57 *** (48.00)
Age > 75 (t)		-108.86 (107.71)	233.82 *** (68.70)
Account holder in rural Oregon? (t)		-132.07 *** (39.22)	-30.00 (27.28)
Account holder live outside Oregon? (t)		350.98 *** (88.93)	49.22 (102.13)
Hired after employer joins OregonSaves (t)		-334.51 *** (32.99)	-442.35 *** (67.23)
OregonSaves job number 2+ (t)		-0.56 (26.03)	-41.36 ** (18.27)
Average county unemployment rate (t-3 to t-1)		-180.55 *** (18.25)	-55.03 ** (23.42)
Year-month FE?	Yes	Yes	--
Industry (NAICS6) FE?	Yes	Yes	--
Employer-by-year-month FE?	--	--	Yes
N	56,403	56,053	50,955
Adj. R2	0.1273	0.1419	0.4666
Mean Dependent:	1915.00	1914.93	1927.28

**Table 4.**  
**Evolution of OregonSaves Account Balances.**

In this table, the unit of observation is account  $i$  in month  $t$ . The top panel reports statistics in event time. We limit the sample to the 23,593 accounts for which the first contribution is made between August 2018 and May 2019. This filter allows us to track each account over its first twelve months (no contribution date is observed before August 2018, and our data end in April 2020.) We report the fraction of accounts with an inflow, outflow, and positive account balance at the end of each month. We also report the mean and the 10th, 30th, 50th, 70th, and 90th percentiles of the OregonSaves account balance, including accounts with \$0 balance. Source for Panel A: Authors calculations. The bottom panel reports statistics in calendar time. It describes the balances of the 115,046 accounts with a positive balance on June 30, 2022, and then the subset of those accounts with positive balances on December 31, 2022 and on June 30, 2023. Source for Panel B: OregonSaves personal communication.

	Accounts	% with Inflow	% with outflow	% with bal > \$0	Account balance						Incl. \$0?	Attrition
	(1)	(2)	(3)	(4)	Mean (5)	10th (6)	30th (7)	50th (8)	70th (9)	90th (10)	(11)	(12)
<b>Panel A. Event Time</b>												
Month 1	23,593	100.0%	0.5%	99.8%	84	15	36	58	92	170	Yes	0.2%
2	23,593	83.4%	2.6%	98.3%	163	24	75	127	191	327	Yes	1.7%
3	23,593	75.6%	2.3%	97.1%	239	26	101	189	289	489	Yes	2.9%
4	23,593	67.9%	2.5%	96.1%	308	24	114	239	381	654	Yes	3.9%
5	23,593	62.1%	2.2%	95.2%	371	23	121	279	467	813	Yes	4.8%
6	23,593	58.0%	2.5%	94.4%	430	19	123	308	545	969	Yes	5.6%
7	23,593	54.1%	2.4%	93.5%	485	16	122	327	616	1,118	Yes	6.5%
8	23,593	51.1%	2.4%	92.9%	534	13	119	342	677	1,259	Yes	7.1%
9	23,593	48.4%	2.4%	92.1%	581	10	115	349	728	1,407	Yes	7.9%
10	23,593	45.5%	2.7%	91.5%	626	7	112	354	774	1,549	Yes	8.5%
11	23,593	42.9%	2.9%	90.7%	661	4	106	352	815	1,679	Yes	9.3%
12	23,593	41.3%	2.9%	90.0%	699	0	101	348	855	1,803	Yes	10.0%
Month 6	22,261				456	39	154	336	569	993	No	5.6%
Month 12	21,226				777	40	167	453	957	1,887	No	10.0%
<b>Panel B. Calendar Time</b>												
6/30/22	115,046				1,269	33	144	424	1,154	3,248	No	
12/31/22	106,846				1,552	34	163	508	1,470	4,068	No	7.1%
6/30/23	99,702				1,988	36	188	605	1,887	5,320	No	13.3%



Online Appendix for

## **Will State-Based Retirement Savings Plans Boost Retirement Saving? New Evidence from OregonSaves**

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### **A.1. Survey of Income and Program Participation**

Appendix Table 1 presents the fraction of individuals without access to an employer-sponsored retirement plan (ESRP) from the nationally representative 2014 Survey of Income and Program Participation (SIPP), from the Social Security Administration Supplement Dataset. Panel A shows the percent of SIPP survey respondents that lack access to an employer-based retirement program such as a defined benefit plan, a 401(k) plan, or a 403(b) plan. These are the types of employees targeted by OregonSaves. Panel B reveals that only 22% of employees without access to an ESRP have an IRA, and that only 7.6% are actively contributing to their IRA. To the extent that these statistics are representative of IRA usage in Oregon, they imply that the vast majority of those targeted by OregonSaves lack an IRA. Indeed, Dao (2024) finds that IRA usage and balances increase in Oregon because of OregonSaves. Panel C compares the socioeconomic characteristics of workers with access to OregonSaves to those not included in a retirement plan in the SIPP.

### **A.2. Industry Coverage of OregonSaves**

Appendix Table 2 compares the industry coverage in OregonSaves to DC plans offered by Oregon-headquartered firms that file Form 5500 or Form 5500 SF with the Department of Labor (DOL). OregonSaves statistics are for April 2020, the end of our sample period. To predict the

number of active participants within each industry, in column (3), we multiply the number of registered employees in column (2) by industry-specific rates from column (5) of Table 1 that capture the probability that an employee has a positive account balance during their first 12 months of eligibility. This back-of-the-envelope calculation assumes that all employers will eventually process contributions and, when they do, that the fraction of employees with a positive account balance will match the existing fraction within each industry. We estimate that 106,702 (of the 276,862) employees will participate in OregonSaves during their first 12 months of eligibility. The data for columns (4) and (5) come from the 2020 filings of Form 5500 and Form 5500 SF. The participant count data in column (5) come from *tot\_active\_partcp\_cnt* in Form 5500 and from *sf\_tot\_act\_partcp\_eoy\_cnt* in Form 5500 SF, and are for the end of 2020. We limit the DOL sample to defined contribution plans (i.e., there is at least one “2” in *type\_pension\_bnft\_code* in Form 5500 or *sf\_type\_pension\_bnft\_code* in Form 5500 SF), offered by Oregon-headquartered employers (i.e., *spons\_dfe\_mail\_us\_state* in Form 5500 or *sf\_spons\_us\_state* in Form 5500 SF equals “OR”). We find that there are 701,790 active participants in DC plans headquartered in Oregon at the end of 2020, around 6.5 times the predicted number of OregonSaves participants based on enrollment through April 2020.

We sort industry names in each panel based on the total number of employees (column (3)). Panel B scales the values in each row by the total for that row. We find that the industries with high shares in OregonSaves, like Food Services and Business Support, have far lower shares when we focus on ESRPs. More generally, the correlation between the shares of participants in each broad industry is 0.133 (columns (3) and (5)). As we discuss in the text, although Health Care is the second most popular industry among predicted OregonSaves participants and the most popular industry in the DOL sample, the DOL sample is skewed towards hospitals, which do not

appear in the OregonSaves sample. In other words, even when there is overlap in broad industry categories, OregonSaves tends to cover employers operating in different industry categories.

Appendix Table 3 reports the most popular 6-digit NAICS industries served by OregonSaves employers within each of our broad 2-digit industry classifications. The unit of observation is employee  $i$  in April 2020, and the sample is limited to those employees classified as actively employed. When the broad industry consists of more than five distinct NAICS codes, we report the top five based on the number of active employees at the end of April 2020. When the broad industry consists of five or fewer NAICS codes, we report them all. The most popular broad industries in OregonSaves (based on the numbers of employees with data uploaded to OregonSaves, in Appendix Table 4) are food services, business support, and health care. The most popular categories in food services, business support, and health care are “full-service restaurants,” “temporary help services,” and “assisted living facilities.,” respectively.

### **A.3. Summary Statistics**

The unit of observation in the administrative data is employee-employer-month. Of the 3,810,098 employee-employer-month observations, there are 2,246 for which the employee’s year of birth is missing. After replacing 3,441 years of birth that are likely mistaken (e.g., replacing 1885 with 1995, 1901 with 2001, etc.), we calculate age as the current calendar year minus the year of birth and limit the sample to employees who are between 18 and 90 years old during at least one month of our sample. This filter leaves us with 3,806,384 employee-employer-month observations (a reduction of 0.1%), ranging from 72,092 observations in August 2018 to 289,657 observations in April 2020.

Appendix Table 4 reports that 11,088 employers registered with OregonSaves and 289,657

employees were registered by these employers through April 2020.<sup>1</sup> When we limit our sample to employees that become eligible to contribute at least 12 months before the end of our sample and to employers that have begun processing contributions to OregonSaves, we are left with 2,219 employers and 118,865 employees. This is the sample of employees that we analyze in columns (1) through (5) of Table 1. The average age is 37.

We use data on monthly contribution amounts and contribution rates to impute monthly before-tax earnings. We limit the imputed earnings sample to contributions made during months 1-12, where event-time month 1 is now defined as the month of employee  $i$ 's first contribution to OregonSaves. Mean imputed monthly earnings are \$2,266, median earnings are \$1,820, and the interquartile range (pooling all imputed earnings observations within the same industry) is \$1,920. The main limitation of our imputed earnings measure is that it (necessarily) excludes the earnings of non-participants. For comparison, in column (9), we report average before-tax earnings statistics per employee from the Oregon Employment Department (OED). While we would ideally observe OED data for the subset of Oregon employers targeted by OregonSaves, OED cannot distinguish employers targeted by OregonSaves from employers with access to pre-existing retirement plans. In addition, OED data are limited to a subset of industry-county combinations with a sufficient number of employers to ensure employer confidentiality. Average monthly before-tax earnings according to OED are only slightly higher than our estimate (\$2,529 versus \$2,266), and the correlation between the two industry-level averages is 0.794.

#### **A.4. Contribution Rates**

Appendix Table 5 reports the distribution of OregonSaves contribution rates after 12 months of eligibility for three (overlapping) samples of employees. Column (1) focuses on the

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<sup>1</sup> In Appendix Table 2, we use the 276,862 employees for whom we observe an industry classification to predict OregonSaves participants by industry.

118,865 employees that we can follow for at least 12 months, in their 12<sup>th</sup> month of eligibility. We see that 97.2% have a contribution rate of 0%, 5%, or 6%. The default rate is 5% and the default rate after one round of automatic escalation is 6%. (To be eligible for automatic escalation in January, employees must have worked at least six months in the prior calendar year and not have opted out of the automatic escalation provision.) Column (2) excludes the 49.8% of employees who formally or informally opt out by month 12 (i.e., anyone with a contribution rate of 0%). Again, the vast majority have a contribution rate of 5% or 6%. When employees choose to deviate from the default options, lower rates are more popular than higher rates; 4.1% choose a rate between 1% and 4% versus 1.5% who choose a rate above 6%. Patterns are similar, in column (3), when we limit the sample to employees with a positive contribution rate who are still classified as actively employed (which is 30.8% of the full sample).

#### **A.5. Predicting Employee Opt-Out Decisions and Positive Account Balances**

Appendix Table 6 reports summary statistics for the dependent and independent variables used to estimate the linear probability models in Table 2. The unit of observation is employee  $i$  working at employer  $j$ , in the employee's 12<sup>th</sup> month of eligibility. There are 102,275 employees for whom we can observe all of the independent variables (with the exception of the industry-county earnings measures from OED, which we only observe for 81,903 employees). We use a similar set of variables in Table 3, when we predict the imputed before-tax monthly income of employees who contribute to OregonSaves exactly once, exactly twice, or more than twice. The sample in Table 3 is different, however, because it is limited to contributors, in the month of their initial contribution, regardless of whether we would be able to follow them over 12 months before April 2020.

#### **A.6. Likelihood of Contributing Throughout Year of Initial Contribution**

Appendix Table 7 expands on the event-time analysis of account inflows and outflows in Table 4. Columns (1), (8), and (9) report the fraction of the 23,593 accounts with inflows, outflows, and positive balances, respectively, in months 1 through 12 (where event-time month 1 is now defined as the month of the first contribution into OregonSaves). These columns replicate columns (2), (3), and (4) in Table 4. Columns (2) through (6) of Appendix Table 7, which sum to 100% within each month, partition contributors into three groups, to shed light on data quality. The three groups are active employees with positive contribution rates, active employees with contribution rates set to 0%, and inactive employees. To the extent that the administrative data accurately reflect the employment status and contribution rates of account holders, we expect that the vast majority of contributions will come from those who are actively employed with a positive contribution rate. A small fraction of contributions come from employees who are classified as inactive or active but with a contribution rate of 0%, either because those data are incorrect or because the employees make contributions during the month before becoming inactive or opting out. When we focus on account holders classified as actively employed with a positive contribution rate, we find that all of them contributed in month 1, but that only about 2/3<sup>rd</sup> made a contribution by month 12 (38.0% divided by 38.0% plus 18.2% equals 67.7%). The most likely explanation is that the administrative data on employment status and contribution rates are updated with a lag, if at all.

#### **A.7. Growth in OregonSaves Assets, Monthly Inflows, and Monthly Outflows**

Although OregonSaves formerly launched in October 2017, after a brief pilot period, our administrative data cover August 2018 to April 2020. Appendix Table 8 presents aggregate data for our sample period, calculated using our administrative data, and corresponding aggregate data for August 2020 through December 2023, taken from public reports issued by the Oregon

Retirement System Board.<sup>2</sup> During our sample period, assets under management jump from \$6.7 million to \$51.1 million. Between April 2020 and December 2023, they almost quintuple, to \$243.6 million. While net flows measured as a percent of lagged assets under management are steadily falling, and total dollar outflows are rising, dollar inflows and dollar net flows are also rising. (The program administrator transitioned from Ascensus to Sunday in November 2021, which likely explains the abnormally low inflows during that month.) As we note in the text, between September 2020 and December 2023, monthly outflows average 1.6% of lagged assets, with a standard deviation of 0.3%.

#### **A.8. Predicting Monthly Inflows and Outflows**

To understand the factors associated with participant inflows and outflows, we estimate two linear probability models in Appendix Table 9. Column (1) predicts any account inflows in month  $t$ , while column (2) predicts any account outflows. As in earlier tables, the dependent variables equal either 100 or zero. Since outflows are much lumpier than inflows, the unconditional likelihood of outflows is only 2.6%, while the unconditional likelihood of inflow is 55.4%. (The typical outflow is equal to around 80% of the lagged account balance.) We limit the sample to the 59,043 accounts for which the first contribution is August 2018 or later, and follow each account for 18 months or until April 2020, whichever comes first. (We observe the average account for 10 months.)

To quantify the impact of turnover on flows, we include indicator variables that capture whether the employee is classified as being actively employed in month  $t$ , whether the employee experiences turnover in month  $t$ , and whether the employee experiences turnover in month  $t-1$ . To

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<sup>2</sup> The public reports are available of the Oregon State Treasury website. For example, the report containing values for August and September 2020 can be found here: <https://www.oregon.gov/treasury/financial-empowerment/Documents/ors-board-meeting-minutes/2020/2020-09-Program-Report-OregonSaves-Monthly.pdf>. We were unable to locate reports that cover May 2020, June 2020, and July 2020.

quantify the impact of opt-out decisions on flows, we include additional indicators that capture whether the employee set her savings rate equal to 0% in month  $t$  and whether she set her savings rate equal to 0% in month  $t-1$  or earlier. We include age category fixed effects (reference category is age 18-25); fixed effects that capture the number of months since the initial contribution; calendar year-month fixed effects; and 6-digit NAICS industry fixed effects (which we do not report). Standard errors are clustered on broad (2-digit) NAICS industry.

As expected, employment status is a significant predictor of inflows. Being classified as active increases the likelihood of any inflow by 56.2%, nearly equal to the unconditional average of 55.4%. For those who experience job turnover during month  $t$ , the coefficient is 27.6%, likely reflecting inflows by some employees within the month prior to the turnover. Predictably, setting the savings rate to 0% is also associated with a reduced probability of any inflows. The large negative coefficient on having set the savings rate to 0% in a prior month largely offsets the coefficient on being classified as actively employed. Controlling for employment status, we find that the likelihood of any inflow is decreasing in months since the initial contribution, even controlling for our direct measures of turnover and opt out. These time-trend coefficients likely capture job turnover not being reported to OregonSaves (as implied by the patterns in Appendix Table 7). The most striking pattern with respect to the calendar year-month fixed effects is the decline of 17.4% in April 2020. It is conceivable that this reflects a significant loss of earnings due to COVID-19 that is not yet captured by the employment status variable.

The linear probability model does a much poorer job of predicting outflows. While the R-squared in Column (1) is 0.43, it is only 0.11 in Column (2). The main predictor of outflows in month  $t$  is the decision to set the savings rate equal to 0% in month  $t$ . The coefficient is 42.7% and the R-squared drops from 0.11 to 0.01 when the variable is excluded. While the coefficients on



turnover in month  $t$  or  $t-1$  are both positive and statistically significant, they are an order of magnitude smaller. All else equal, the likelihood of any outflow increases with months since the initial contribution. Younger participants are also slightly more likely to withdraw contributions than older participants.<sup>3</sup>

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<sup>3</sup> Quinby, et. al. (2020) use data for September 2018 to September 2019 to classify OregonSaves participants into full-year contributors, part-year contributors, active non-savers, job changers, and full-year inactives. They find the probability of outflows is highest among the subset of job changers, followed by part-year and full-year contributors.

**Appendix Table 1.**  
**Coverage of Pension Plans and IRAs among 2014 SIPP Survey Respondents.**

Data for this table come from the 2014 Social Security Administration Supplement Data, which is part of the 2014 Survey of Income and Program Participation (SIPP). Panel A shows that approximately 30% percent of SIPP survey respondents lacked access to an employment-sponsored retirement plan (ESRP) in 2014. ESRPs include defined benefit plans, 401(k) plans, and 403(b) plans. Panel B classifies the 30% of employees without access to an ESRP into three categories: 78% lack an individual retirement account (IRA), 14.5% have an IRA but are not actively contributing, and 7.5% have an IRA to which they are actively contributing. Panel C compares selected socioeconomic characteristics between workers covered by OregonSaves and SIPP respondents not included in a pension plan. The average age for both groups is 37. Average monthly earnings are \$2,887 (before-tax) for OregonSaves workers and \$2,933 (before-tax) for SIPP respondents lacking access to a pension plan. Pre-tax earnings for OregonSaves workers are computed using the after-tax earnings imputed from the OregonSaves data, the marginal federal tax rate in 2019, and the marginal state tax rate in Oregon in 2019. Monthly earnings are more volatile for OregonSaves workers than SIPP respondents. Following the previous literature summarized in Hannagan and Morduch (2015), we calculate income volatility as the standard deviation of monthly earnings divided by average monthly earnings. Previous studies found that the income volatility measure is usually between 0.15 and 0.45. To calculate the income volatility for OregonSaves workers who still participated in the OS program in April 2020, we use their imputed monthly earnings records in 2019 to minimize the impact of the COVID-19 on income volatility in 2020. For SIPP respondents, we use their monthly earnings in 2014 reported in the SIPP survey. Source: Authors calculations.

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Panel A. Access to Employer-Sponsored Retirement Plans

	N	Percent
Access to plan	6,928	70.0%
Lack access to plan	2,963	30.0%
Total	<u>9,891</u>	<u>100.0%</u>

Panel B. Percent of workers who lack access to ESRP and have IRA

With an IRA & actively contributing	224	7.6%
With an IRA but not actively contributing	432	14.6%
Without an IRA	2,307	77.9%
Total (who lack access to plan)	<u>2,963</u>	<u>100.0%</u>

Panel C. Comparing socioeconomic characteristics of workers with access to OregonSaves and workers who lack access to a retirement plan in SIPP sample

Year	2020	2014
Sample size	289,657	2,963
Average age	37	37
Average monthly pre-tax earnings (in 2020 dollars)	2,887	2,933
Income volatility	0.40	0.16

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**Appendix Table 2.**  
**Comparing OregonSaves industry coverage to DOL Form 5500 and Form 5500 SF.**

In Panel A, we calculate the number of employers or employees that fall within each of the broad industry codes (based on the first two digits of NAICS6). The count data for columns (1) and (2) come from the corresponding columns of Appendix Table 1, except that we exclude employers and employees for which NAICS is missing. The number of employees predicted to ever have a positive account balance during their first 12 months of eligibility is equal to column (2) times the industry-specific fraction of employees that ever had a positive account balance during their first 12 months (column (5) of Table 1). Rows are sorted on the value in column (3). The data for columns (4) and (5) come from the 2020 versions of Form 5500 and Form 5500 SF. The participant count data in column (5) come from *tot\_active\_partcp\_cnt* in Form 5500 and *sf\_tot\_act\_partcp\_eoy\_cnt* in Form 5500 SF, and are for the end of 2020. Note that we limit the DOL filing sample to defined contribution plans (there is at least one “2” in *type\_pension\_bnft\_code* in Form 5500 or *sf\_type\_pension\_bnft\_code* in Form 5500 SF) offered by Oregon employers (*spons\_dfe\_mail\_us\_state* in Form 5500 and *sf\_spons\_us\_state* in Form 5500 SF equals “OR”). In Panel B, we convert the count data into industry shares.

Industry	OregonSaves			Oregon	
	All	All	Employees	Oregon	Oregon
	Employers	Employees	Predicted Bal > \$0	Plans	Active Participants
	(1)	(2)	(3)	(4)	(5)
Panel A. Total numbers of employers and participants					
Food Services	2,523	91,342	40,484	260	20,083
Health Care	837	26,893	12,175	1,830	145,317
Business Support	571	32,930	10,298	239	14,467
Retail Trade	1,322	25,509	9,693	635	55,908
Manufacturing	708	16,510	5,689	1,006	130,691
Other Services	909	12,375	5,630	651	21,939
Construction	1,066	13,344	5,047	973	51,181
Arts/Entertainment	324	8,770	4,178	122	6,461
Agriculture	687	21,593	3,763	292	9,518
Transportation/Storage	250	6,472	2,409	199	55,686
Education	236	4,704	1,886	128	38,927
Professional/Scientific	459	5,376	1,610	1,990	51,253
Wholesale Trade	265	4,403	1,538	472	30,752
Real Estate	330	4,255	1,487	354	14,685
Information	94	1,249	492	188	8,926
Management	18	576	324	12	1,163
Finance and Insurance	75	417	0	545	34,519
Mining/Oil/Gas	12	144	0	12	213
Utilities	0	0	0	38	10,101
All	10,686	276,862	106,702	9,946	701,790
Participants per plan			10		71

## Panel B. Fractions of employers and participants

Food Services	23.6%	33.0%	37.9%	2.6%	2.9%
Health Care	7.8%	9.7%	11.4%	18.4%	20.7%
Business Support	5.3%	11.9%	9.7%	2.4%	2.1%
Retail Trade	12.4%	9.2%	9.1%	6.4%	8.0%
Manufacturing	6.6%	6.0%	5.3%	10.1%	18.6%
Other Services	8.5%	4.5%	5.3%	6.5%	3.1%
Construction	10.0%	4.8%	4.7%	9.8%	7.3%
Arts/Entertainment	3.0%	3.2%	3.9%	1.2%	0.9%
Agriculture	6.4%	7.8%	3.5%	2.9%	1.4%
Transportation/Storage	2.3%	2.3%	2.3%	2.0%	7.9%
Education	2.2%	1.7%	1.8%	1.3%	5.5%
Professional/Scientific	4.3%	1.9%	1.5%	20.0%	7.3%
Wholesale Trade	2.5%	1.6%	1.4%	4.7%	4.4%
Real Estate	3.1%	1.5%	1.4%	3.6%	2.1%
Information	0.9%	0.5%	0.5%	1.9%	1.3%
Management	0.2%	0.2%	0.3%	0.1%	0.2%
Finance and Insurance	0.7%	0.2%	0.0%	5.5%	4.9%
Mining/Oil/Gas	0.1%	0.1%	0.0%	0.1%	0.0%
Utilities	0.0%	0.0%	0.0%	0.4%	1.4%
All	100.0%	100.0%	100.0%	100.0%	100.0%

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**Appendix Table 3.****Composition of Narrow (6-digit) Industries within Broader (2-digit) Industries.**

In this table, we list the NAICS codes with the most active employees at the end of April 2020 within each of the broad (2-digit) industry classifications. For 2-digit industries with more than five 6-digit industries, we only list the top five. The rightmost columns report the number of active employees within the NAICS6 classification at the end of April 2020, as well as the share of all active employees within the 2-digit industry classification.

2-Digit Industry	Narrow Industry Description	NAICS6	# Active	% 2-Digit
Agriculture	Farm labor contractors and crew leaders	115115	4487	27.3%
Agriculture	Other noncitrus fruit farming	111339	3047	18.6%
Agriculture	All other miscellaneous crop farming	111998	1391	8.5%
Agriculture	Nursery and tree production	111421	1363	8.3%
Agriculture	Berry, except strawberry, farming	111334	1150	7.0%
Arts/Entertainment	Fitness and recreational sports centers	713940	2716	40.7%
Arts/Entertainment	All other amusement and recreation industries	713990	1097	16.4%
Arts/Entertainment	Golf courses and country clubs	713910	666	10.0%
Arts/Entertainment	Amusement arcades	713120	398	6.0%
Arts/Entertainment	Promoters with facilities	711310	329	4.9%
Business Support	Temporary help services	561320	13782	61.1%
Business Support	Janitorial services	561720	2259	10.0%
Business Support	Landscaping services	561730	1827	8.1%
Business Support	Telemarketing and other contact centers	561422	1481	6.6%
Business Support	Security guards and patrol services	561612	1082	4.8%
Construction	New single-family general contractors	236115	1572	14.0%
Construction	Residential remodelers	236118	1125	10.0%
Construction	Residential drywall contractors	238311	987	8.8%
Construction	Residential plumbing and HVAC contractors	238221	651	5.8%
Construction	Residential painting contractors	238321	595	5.3%
Education	Elementary and secondary schools	611110	934	26.1%
Education	Fine arts schools	611610	622	17.4%
Education	Miscellaneous schools and instruction	611699	547	15.3%
Education	Sports and recreation instruction	611620	527	14.7%
Education	Exam preparation and tutoring	611691	348	9.7%
Finance and Insurance	Insurance agencies and brokerages	524210	259	64.4%
Finance and Insurance	All other nondepository credit intermediation	522298	44	10.9%
Finance and Insurance	Miscellaneous intermediation	523910	36	9.0%
Finance and Insurance	Investment advice	523930	15	3.7%
Finance and Insurance	Mortgage and nonmortgage loan brokers	522310	13	3.2%
Food Services	Full-service restaurants	722511	22405	40.1%
Food Services	Limited-service restaurants	722513	17913	32.0%
Food Services	Hotels and motels, except casino hotels	721110	6357	11.4%
Food Services	Snack and nonalcoholic beverage bars	722515	4397	7.9%
Food Services	Drinking places, alcoholic beverages	722410	3075	5.5%
Health Care	Assisted living facilities for the elderly	623312	3199	18.9%
Health Care	Services for the elderly and disabled	624120	2906	17.2%
Health Care	Home health care services	621610	1897	11.2%
Health Care	Child day care services	624410	1842	10.9%
Health Care	Residential disability facilities	623210	1274	7.5%

Information	Motion picture theaters, except drive-ins	512131	278	27.6%
Information	Newspaper publishers	511110	134	13.3%
Information	Software publishers	511210	115	11.4%
Information	Internet publishing and web search portals	519130	97	9.6%
Information	Wired telecommunications carrier	517311	77	7.7%
Management	Managing offices	551114	275	92.3%
Management	Offices of other holding companies	551112	23	7.7%
Manufacturing	Wineries	312130	725	6.4%
Manufacturing	Wood kitchen cabinet and countertop mfg.	337110	686	6.0%
Manufacturing	Commercial bakeries	311812	503	4.4%
Manufacturing	Breweries	312120	484	4.3%
Manufacturing	Perishable prepared food manufacturing	311991	452	4.0%
Mining/Oil/Gas	Other crushed and broken stone mining	212319	57	50.9%
Mining/Oil/Gas	Construction sand and gravel mining	212321	28	25.0%
Mining/Oil/Gas	Clay, ceramic, and refractory minerals mining	212325	21	18.8%
Mining/Oil/Gas	Dimension stone mining and quarrying	212311	6	5.4%
Other Services	Religious organizations	813110	2338	25.1%
Other Services	Beauty salons	812112	1109	11.9%
Other Services	Automotive body and interior repair	811121	660	7.1%
Other Services	General automotive repair	811111	613	6.6%
Other Services	Pet care, except veterinary, services	812910	479	5.1%
Professional/Scientific	Veterinary services	541940	635	15.2%
Professional/Scientific	Process and logistics consulting services	541614	578	13.8%
Professional/Scientific	Offices of lawyers	541110	289	6.9%
Professional/Scientific	Other technical consulting services	541690	268	6.4%
Professional/Scientific	Engineering services	541330	239	5.7%
Real Estate	Residential property managers	531311	1249	35.7%
Real Estate	Lessors of residential buildings	531110	767	21.9%
Real Estate	Offices of real estate agents and brokers	531210	528	15.1%
Real Estate	Lessors of other real estate property	531190	225	6.4%
Real Estate	Miniwarehouse and self-storage unit operators	531130	124	3.5%
Retail Trade	Supermarkets and other grocery stores	445110	1973	11.1%
Retail Trade	Gasoline stations with convenience stores	447110	1491	8.4%
Retail Trade	Convenience stores	445120	1177	6.6%
Retail Trade	Store retailers not specified elsewhere	453998	1159	6.5%
Retail Trade	Used merchandise stores	453310	1105	6.2%
Transportation/Storage	Other airport operations	488119	1257	23.7%
Transportation/Storage	Local messengers and local delivery	492210	727	13.7%
Transportation/Storage	Special needs transportation	485991	417	7.9%
Transportation/Storage	Other support activities for road transport.	488490	410	7.7%
Transportation/Storage	General freight trucking, long-distance TL	484121	392	7.4%
Wholesale Trade	Fruit and vegetable merchant wholesalers	424480	548	17.1%
Wholesale Trade	Wholesale trade agents and brokers	425120	288	9.0%
Wholesale Trade	Other grocery product merchant wholesalers	424490	245	7.6%
Wholesale Trade	Recyclable material merchant wholesalers	423930	214	6.7%
Wholesale Trade	Farm supplies merchant wholesalers	424910	182	5.7%

#### Appendix Table 4. OregonSaves Employees, by Industry.

In this table, we provide employee-level summary statistics by industry, for employees covered by OregonSaves. Columns (1) and (2) report the number of employees and employers enrolled with OregonSaves by the end of April 2020. For each employee, we define month 1 as the first month in which she will be eligible to contribute to OregonSaves if her identify is verified and she remains employed. The remainder of the table is restricted to employees who were not classified as ineligible in month 12 and who work for an employer that has submitted contributions to OregonSaves by month 12. Columns (3) and (4) report the number of employees and employers, respectively, in our “month 12” sample. (Industries are sorted by the number of employees in column (3).) Column (5) reports the average (approximate) age in month 12, where age is defined as the current calendar year minus the year of birth. Monthly earnings are estimated at the employee-month level as total monthly contributions divided by current savings rate (e.g., \$100 / 5% = \$2000). Monthly earnings can only be estimated for the subset of contributors. We further limit the sample to individuals with a single active employee-employer relationship. In columns (6) through (8), we report the mean and median imputed monthly earnings within each industry, and the interquartile range. In column (9), we report the average monthly earnings based on lagged quarterly earnings and hours worked data from the Oregon Employment Department (OED), which is provided at the NAICS6-county level. These data cover all employees at both OregonSaves-participating and non-OregonSaves-participating employers. We observe matched NAICS6-county earnings from OED for 72.3% of the employee observations in column (6). The correlation between the matched industry-level average monthly earnings in columns (6) and (9) is 0.79.

Industry	All	All	Employees	Employers	Average	All Contributors, Months < 12			OED Mean
	Employees	Employers	Month 12	Month 12	Age	Imputed Before-Tax			Before-Tax
	April 2020	April 2020	Sample	Sample	Month 12	Monthly Earnings			Monthly
	(1)	(2)	(3)	(4)	(5)	Mean	Median	IQR	Earnings
						(6)	(7)	(8)	(9)
Food Services	91,342	2,523	43,158	711	32.9	1,874	1,540	1,520	1,877
Business Support	32,930	571	15,275	128	39.0	2,000	1,660	1,740	2,609
Health Care	26,893	837	14,302	207	39.1	2,159	1,800	1,700	2,543
Retail Trade	25,509	1,322	9,419	219	37.9	2,250	1,800	1,690	2,517
Manufacturing	16,510	708	7,229	166	40.7	2,886	2,480	2,080	3,604
Agriculture	21,593	687	6,289	126	41.6	3,103	2,667	2,340	2,805
Other Services	12,375	909	3,796	117	38.0	2,340	1,960	1,880	2,785
Arts/Entertainment	8,770	324	3,262	69	36.4	1,586	1,060	1,760	1,919
Construction	13,344	1,066	3,001	129	41.0	3,945	3,460	2,580	4,268
Education	4,704	236	2,157	67	40.4	1,905	1,340	2,160	2,740
Professional/Scientific	5,376	459	2,007	56	39.2	3,796	2,860	3,120	6,133
Wholesale Trade	4,403	265	1,629	35	42.5	3,755	3,040	2,380	4,731
Transportation/Storage	6,472	250	1,494	39	44.4	2,998	2,640	2,240	4,007
Real Estate	4,255	330	1,233	48	42.2	3,077	2,700	2,368	3,776
Information	1,249	94	343	19	39.0	3,001	2,450	2,820	4,580
Management	576	18	242	3	27.9	2,612	1,933	1,970	6,024
Finance and Insurance	417	75	14	3	47.9	4,103	2,880	1,460	6,195
Mining/Oil/Gas	144	12				3,746	3,940	1,520	4,690
Missing	12,795	402	4,015	77	34.6	2,242	1,808	1,730	5,839
All Employees	289,657	11,088	114,850	2,142	36.9	2,266	1,820	1,920	2,529
Exclude Missing Industry	276,862	10,686	110,835	2,065					

**Appendix Table 5.**  
**Distribution of OregonSaves Contribution Rates.**

In this table, we describe the distribution of OregonSaves contribution rates. We focus on the same "month 12" sample of employees as in Table 2, with one observation per employee. Column (2) excludes employees who set their contribution rate to 0%. Column (3) is limited to the "Not out in month 12" sample from Table 2; these employees have not opted out of OregonSaves by month 12 and are still classified as being actively employed. In the last row, we report the average month 12 contribution rate for each sample of employees.

Current Rate	Employee 12 months after initial eligibility date					
	12 Month Sample		Rate > 0%		Active with rate > 0%	
	(1)		(2)		(3)	
0%	59,148	49.76%	0	0.00%	0	0.00%
1%	760	0.64%	760	1.27%	600	1.64%
2%	750	0.63%	750	1.26%	605	1.65%
3%	705	0.59%	705	1.18%	565	1.54%
4%	211	0.18%	211	0.35%	189	0.52%
5%	46,024	38.72%	46,024	77.07%	24,657	67.36%
6%	10,403	8.75%	10,403	17.42%	9,263	25.30%
7%	105	0.09%	105	0.18%	90	0.25%
8%	99	0.08%	99	0.17%	89	0.24%
9%	23	0.02%	23	0.04%	22	0.06%
10%	498	0.42%	498	0.83%	409	1.12%
11% - 15%	71	0.06%	71	0.12%	59	0.16%
16% - 20%	26	0.02%	26	0.04%	21	0.06%
21% - 30%	18	0.02%	18	0.03%	16	0.04%
31% - 40%	2	0.00%	2	0.00%	2	0.01%
41% - 50%	13	0.01%	13	0.02%	12	0.03%
51% - 99%	1	0.00%	1	0.00%	1	0.00%
100%	7	0.01%	7	0.01%	6	0.02%
All	118,865		59,717		36,607	
0% or 5% or 6%	115,575	97.23%	56,427	94.49%	33,920	92.66%
Mean rate	2.59%		5.16%		5.24%	



**Appendix Table 6.**  
**Summary statistics for Employee-level Regressions.**

In this table, we summarize the dependent and independent variables used in Table 2. We focus on the subset of the “month 12” sample with account addresses in Oregon or Washington. Imputed monthly earnings are averaged across all non-missing values in our sample between months 1 and 12; all other variables are limited to one observation per employee-employer pair, where month  $t$  equals month 12 for employee  $i$ . For dependent variables, we report the fraction of employees who have formally opted out by month 12; informally opted out by month 12; and formally or informally opted out by month 12. We also report the fraction of employees with a positive account balance in month 12. To capture potential peer effects (arising from the actions of coworkers or employers), we report the fraction of coworkers who have opted out through month  $t$ , and the fraction of coworkers with a positive account balance through month  $t$ . Our set of demographic variables captures age, whether the employee lives in rural Oregon, whether the employee lives outside of Oregon, the lagged average unemployment rate within the employee’s home county, whether the employee was hired three or more months after the employer joined OregonSaves, whether the employee encountered OregonSaves at a previous employer, and whether the employer was terminated by month 12. Employer characteristics include the natural logarithm of the number of employees when the employer joined OregonSaves, whether the employer was part of the initial pilot program, whether the employer registered for OregonSaves after the deadline for a firm of its size, and whether the employer has processed payroll for at least one employee by month  $t$ . In addition to reporting the average imputed monthly earnings in months 1 through 12, we report the median imputed monthly earnings within the same industry (NAICS6) and county for the same quarter. Finally, we use data from the Oregon Employment Department to calculate average monthly earnings within industry-county cells. Missing values arise from the fact that we do not observe OED data when industry-county cells contain too few employers.

Variable	N	Mean	Std Dev
Formally opt out within 12 months of eligibility? (t)	102,275	42.9%	49.5%
Informally opt out within 12 months of eligibility? (t)	102,275	7.0%	25.5%
Opt out within 12 months of eligibility? (t)	102,275	49.9%	50.0%
Positive account balance within 12 months of eligibility? (t)	102,275	36.9%	48.2%
Age < 26? (t)	102,275	25.1%	43.3%
Age 26-35? (t)	102,275	29.4%	45.6%
Age 36-45? (t)	102,275	18.8%	39.1%
Age 46-55? (t)	102,275	13.6%	34.3%
Age 56-65? (t)	102,275	9.5%	29.3%
Age 66-75? (t)	102,275	3.1%	17.4%
Age > 75? (t)	102,275	0.4%	6.6%
Account holder in rural Oregon? (t)	102,275	29.6%	45.7%
Account holder lives outside Oregon? (t)	102,275	4.3%	20.3%
Average county unemployment rate (t-14 to t-12)	102,275	4.2%	0.8%
Hired 3+ months after employer joins OregonSaves? (t)	102,275	21.8%	41.3%
OregonSaves job number 2+? (t)	102,275	13.1%	33.7%
Employee terminated? (t)	102,275	36.9%	48.2%
Ln (number of employees at enrollment)	102,275	4.4	1.2
Pilot employer? (t)	102,275	4.7%	21.1%
Employer registered late? (t)	102,275	13.4%	34.0%
Employer processed payroll? (t)	102,275	100.0%	0.0%
Imputed monthly income (t)	337,701	2,266.3	2,277.9
Median imputed monthly income industry-county (q)	102,275	2,026.1	1,258.6
Average OED industry-county income (q-1)	81,903	2,430.3	1,078.9
Average OED industry-county income (q-5)	81,314	2,320.3	1,040.5

**Appendix Table 7.**  
**Probability of Contributing Declines Over Time.**

In this table, the unit of observation is account  $i$  in month  $t$ . We limit the sample to the 23,593 accounts for which the first contribution is made between August 2018 and May 2019. This filter allows us to track each account over its first twelve months. The fraction of participants classified by (one or more of their employers) as active at the end of month  $t$  falls from 96.8% to 69.9%. In the first column, we report the fraction of participants who make a contribution into OregonSaves during months 1 through 12. In the next six columns, we partition participants into three categories (active with a positive contribution rate, active with a contribution rate of 0%, and inactive) and further partition them based on whether they contribute into OregonSaves during the month (Yes or No). For example, the 38.0%, 1.1%, and 2.2% in columns 2, 4, and 6 in month 12 sum to the 41.3% with a positive contribution in column 1. The fact that 18.2% of the participants are classified as active with a positive contribution rate but do not make any contribution in month 12 suggests that the job status variable and/or saving rate variable is not being updated by employers. The last two columns report the fraction of participants with an outflow during months 1 through 12, and the fraction of participants with a positive account balance through the end of each month.

Months	Overall % with inflow during month (1)	Participant Status and Likelihood of Inflow						Overall % with outflow during month (8)	Overall % with positive balance (9)
		Active & rate > 0%		Active & rate = 0%		Inactive			
		Yes (2)	No (3)	Yes (4)	No (5)	Yes (6)	No (7)		
1	100.0%	<b>91.9%</b>	0.0%	<b>5.1%</b>	0.0%	<b>3.0%</b>	0.0%	0.5%	99.8%
2	83.4%	<b>77.0%</b>	9.4%	<b>3.3%</b>	4.4%	<b>3.1%</b>	2.8%	2.6%	98.3%
3	75.6%	<b>70.5%</b>	11.6%	<b>2.2%</b>	6.6%	<b>2.9%</b>	6.2%	2.3%	97.1%
4	67.9%	<b>63.6%</b>	14.4%	<b>1.7%</b>	8.1%	<b>2.6%</b>	9.6%	2.5%	96.1%
5	62.1%	<b>58.3%</b>	16.1%	<b>1.6%</b>	8.8%	<b>2.3%</b>	13.0%	2.2%	95.2%
6	58.0%	<b>54.4%</b>	16.8%	<b>1.5%</b>	9.5%	<b>2.1%</b>	15.7%	2.5%	94.4%
7	54.1%	<b>50.9%</b>	17.9%	<b>1.2%</b>	10.2%	<b>2.0%</b>	17.8%	2.4%	93.5%
8	51.1%	<b>48.0%</b>	18.4%	<b>1.0%</b>	10.6%	<b>2.0%</b>	19.9%	2.4%	92.9%
9	48.4%	<b>45.2%</b>	18.9%	<b>1.0%</b>	11.0%	<b>2.1%</b>	21.7%	2.4%	92.1%
10	45.5%	<b>42.3%</b>	18.9%	<b>1.1%</b>	12.1%	<b>2.2%</b>	23.4%	2.7%	91.5%
11	42.9%	<b>39.7%</b>	19.2%	<b>1.1%</b>	12.4%	<b>2.1%</b>	25.6%	2.9%	90.7%
12	41.3%	<b>38.0%</b>	18.2%	<b>1.1%</b>	12.6%	<b>2.2%</b>	27.9%	2.9%	90.0%

**Appendix Table 8.  
Growth of OregonSaves, August 2018 to December 2023.**

In this table, we report the total number of dollars invested in OregonSaves at the end of each month, as well as the total net flows (inflows minus outflows), inflows, and outflows during the month. Percent net flow is the net flow during month t scaled by total assets in month t-1. Percent inflow and outflow are defined similarly. Statistics for August 2018 through April 2020 are calculated from our administrative data; statistics for August 2020 through December 2023 are taken from public reports available at <https://www.oregon.gov/treasury/financial-empowerment/Pages/Oregon-Retirement-Savings-Board.aspx#meetings>; there are no public reports for May 2020 through July 2020. We are able to determine the total contributions and total withdrawals over the life of OregonSaves from the latest public report, which we report in the last row.

Date	Total assets (1)	Total net flow (2)	Total inflow (3)	Total outflow (4)	Percent net flow (5)	Percent inflow (6)	Percent outflow (7)
Aug 2018	6,679,928	1,074,570	1,287,967	-213,397	19.3%	23.1%	-3.8%
Sep 2018	7,730,532	1,034,423	1,231,143	-196,720	15.5%	18.4%	-2.9%
Oct 2018	8,814,097	1,151,576	1,447,061	-295,485	14.9%	18.7%	-3.8%
Nov 2018	9,910,995	1,052,093	1,348,217	-296,124	11.9%	15.3%	-3.4%
Dec 2018	10,948,439	1,131,755	1,427,083	-295,328	11.4%	14.4%	-3.0%
Jan 2019	12,531,133	1,372,018	1,753,164	-381,146	12.5%	16.0%	-3.5%
Feb 2019	14,164,566	1,538,361	1,872,047	-333,686	12.3%	14.9%	-2.7%
Mar 2019	16,211,620	1,949,131	2,294,651	-345,520	13.8%	16.2%	-2.4%
Apr 2019	18,420,364	2,055,547	2,520,999	-465,452	12.7%	15.6%	-2.9%
May 2019	20,380,644	2,168,732	2,677,598	-508,866	11.8%	14.5%	-2.8%
Jun 2019	22,780,423	2,039,662	2,601,049	-561,387	10.0%	12.8%	-2.8%
Jul 2019	25,487,492	2,638,161	3,328,270	-690,109	11.6%	14.6%	-3.0%
Aug 2019	28,541,770	3,067,188	3,918,247	-851,059	12.0%	15.4%	-3.3%
Sep 2019	31,326,977	2,634,966	3,297,416	-662,450	9.2%	11.6%	-2.3%
Oct 2019	34,559,000	2,973,977	3,808,450	-834,473	9.5%	12.2%	-2.7%
Nov 2019	37,572,465	2,713,452	3,463,042	-749,590	7.9%	10.0%	-2.2%
Dec 2019	40,955,951	3,014,223	3,930,297	-916,074	8.0%	10.5%	-2.4%
Jan 2020	43,800,314	2,852,497	4,065,011	-1,212,514	7.0%	9.9%	-3.0%
Feb 2020	45,924,890	3,201,617	4,862,348	-1,660,731	7.3%	11.1%	-3.8%
Mar 2020	46,711,651	3,188,054	4,567,289	-1,379,235	6.9%	9.9%	-3.0%
Apr 2020	51,054,705	2,485,249	3,202,234	-716,985	5.3%	6.9%	-1.5%
May 2020							
Jun 2020							
Jul 2020							
Aug 2020	66,846,469	2,972,867	3,864,015	-891,148			
Sep 2020	69,167,837	3,147,522	4,054,036	-906,514	4.7%	6.1%	-1.4%
Oct 2020	71,325,749	2,630,940	3,735,119	-1,104,179	3.8%	5.4%	-1.6%
Nov 2020	79,106,584	3,947,290	5,032,998	-1,085,708	5.5%	7.1%	-1.5%
Dec 2020	84,741,739	3,793,004	5,052,385	-1,259,381	4.8%	6.4%	-1.6%
Jan 2021	87,886,663	3,418,852	4,856,028	-1,437,176	4.0%	5.7%	-1.7%
Feb 2021	92,275,410	3,632,750	4,858,733	-1,225,983	4.1%	5.5%	-1.4%
Mar 2021	99,147,494	5,933,215	7,127,454	-1,194,239	6.4%	7.7%	-1.3%
Apr 2021	107,217,323	6,087,937	7,318,970	-1,231,033	6.1%	7.4%	-1.2%

May 2021	113,149,423	5,250,447	6,613,461	-1,363,014	4.9%	6.2%	-1.3%
Jun 2021	118,898,674	4,939,225	6,594,160	-1,654,935	4.4%	5.8%	-1.5%
Jul 2021	125,013,352	5,568,824	6,955,408	-1,386,584	4.7%	5.8%	-1.2%
Aug 2021	131,548,621	5,207,896	6,747,971	-1,540,075	4.2%	5.4%	-1.2%
Sep 2021	133,535,002	4,830,690	6,790,233	-1,959,543	3.7%	5.2%	-1.5%
Oct 2021	140,695,842	3,796,568	5,832,967	-2,036,399	2.8%	4.4%	-1.5%
Nov 2021	140,697,792	1,266,459	2,770,796	-1,504,337	0.9%	2.0%	-1.1%
Dec 2021	150,010,539	5,071,394	6,765,391	-1,693,997	3.6%	4.8%	-1.2%
Jan 2022	147,278,855	4,113,674	6,119,649	-2,005,975	2.7%	4.1%	-1.3%
Feb 2022	148,076,981	3,913,840	6,735,388	-2,821,548	2.7%	4.6%	-1.9%
Mar 2022	153,896,905	4,741,584	7,333,035	-2,591,451	3.2%	5.0%	-1.8%
Apr 2022	147,788,686	4,803,287	6,902,522	-2,099,235	3.1%	4.5%	-1.4%
May 2022	151,300,357	3,231,197	5,934,165	-2,702,968	2.2%	4.0%	-1.8%
Jun 2022	146,004,291	4,564,167	7,448,671	-2,884,504	3.0%	4.9%	-1.9%
Jul 2022	158,032,364	3,917,304	5,910,647	-1,993,343	2.7%	4.0%	-1.4%
Aug 2022	156,901,495	3,922,956	7,374,401	-3,451,445	2.5%	4.7%	-2.2%
Sep 2022	148,185,293	3,550,836	6,276,623	-2,725,787	2.3%	4.0%	-1.7%
Oct 2022	156,888,309	3,429,463	5,873,326	-2,443,863	2.3%	4.0%	-1.6%
Nov 2022	170,449,511	3,569,702	6,847,289	-3,277,587	2.3%	4.4%	-2.1%
Dec 2022	168,705,846	3,761,535	6,251,808	-2,490,273	2.2%	3.7%	-1.5%
Jan 2023	182,053,048	3,218,608	6,417,475	-3,198,867	1.9%	3.8%	-1.9%
Feb 2023	180,914,234	3,627,862	6,692,825	-3,064,963	2.0%	3.7%	-1.7%
Mar 2023	189,647,528	4,830,695	7,788,777	-2,958,082	2.7%	4.3%	-1.6%
Apr 2023	194,526,372	3,651,955	6,849,073	-3,197,118	1.9%	3.6%	-1.7%
May 2023	195,790,104	3,649,880	7,400,436	-3,750,556	1.9%	3.8%	-1.9%
Jun 2023	208,222,978	4,089,161	7,434,936	-3,345,775	2.1%	3.8%	-1.7%
Jul 2023	217,060,589	3,520,911	7,154,174	-3,633,263	1.7%	3.4%	-1.7%
Aug 2023	215,524,438	3,747,014	7,662,067	-3,915,053	1.7%	3.5%	-1.8%
Sep 2023	211,520,601	4,070,424	7,183,604	-3,113,180	1.9%	3.3%	-1.4%
Oct 2023	209,026,488	4,292,015	8,107,885	-3,815,870	2.0%	3.8%	-1.8%
Nov 2023	228,849,547	3,766,421	7,282,515	-3,516,094	1.8%	3.5%	-1.7%
Dec 2023	243,643,288	3,035,166	6,203,744	-3,168,578	1.3%	2.7%	-1.4%
Total	243,643,288		337,034,163	-111,265,135			

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**Appendix Table 9.  
Predicting Monthly Inflows and Outflows.**

In this table, we estimate linear probability models to predict any monthly inflows and outflows. The unit of observation is the account of employee  $i$  in month  $t$ . We limit the sample to accounts for which the first contribution is August 2018 or later, and follow each account for up to 18 months or until April 2020, whichever comes first. As in Table 4, there are 23,593 contributors for whom we observe 12 months of data. The dependent variable in column (1) equals 100 if there is any inflow into the account in month  $t$ , and zero otherwise. Similarly, the dependent variable in column (2) equals 100 if there is any outflow from the account in month  $t$ , and zero otherwise. We include dummy variables to capture whether the employee is listed as being actively employed, whether they were terminated during month  $t$ , whether they were terminated during month  $t-1$ , whether they set the saving rate to 0% during month  $t$  (which reflect either a formal opt-out decision or a direct change to the saving rate), and whether the saving rate is still equal to 0%. We include age category fixed effects (omitted category is ages 18-25); months since the initial contribution fixed effects; date fixed effects; and NAICS6 industry fixed effects (not reported). Standard errors cluster on broad industry (NAICS2). Statistical significance at the 1-percent, 5-percent, and 10-percent levels is indicated by \*\*\*, \*\*, and \*, respectively.

	Any inflow in month $t$ ?			Any outflow in month $t$ ?		
	(1)			(2)		
Active? (t)	56.22	(2.20)	***	1.69	(0.11)	***
Terminated this month? (t)	27.58	(1.59)	***	2.68	(0.16)	***
Terminated last month? (t)	-2.46	(0.97)	**	1.29	(0.16)	***
Set saving rate to 0% this month? (t)	-6.60	(1.60)	***	42.87	(2.06)	***
Saving rate still equal to 0%? (t)	-53.84	(2.25)	***	0.64	(0.14)	***
Age 26-35? (t)	3.61	(0.48)	***	0.46	(0.09)	***
Age 36-45? (t)	5.64	(0.59)	***	0.53	(0.07)	***
Age 46-55? (t)	7.32	(0.77)	***	0.17	(0.12)	
Age 56-65? (t)	8.82	(0.95)	***	0.09	(0.13)	
Age 66-75? (t)	7.02	(1.73)	***	-0.04	(0.16)	
Age > 75? (t)	5.39	(1.89)	**	-0.05	(0.32)	
Months 3-6? (t)	-9.64	(1.10)	***	0.60	(0.06)	***
Months 7-12? (t)	-17.27	(1.91)	***	1.16	(0.13)	***
Months 13-18? (t)	-18.44	(2.06)	***	1.52	(0.16)	***
Oct 2018	-1.96	(4.16)		-0.54	(1.28)	
Nov 2018	-0.22	(1.81)		-0.61	(1.12)	
Dec 2018	-2.40	(2.95)		-0.71	(1.15)	
Jan 2019	-4.58	(4.00)		-0.03	(1.19)	
Feb 2019	-4.39	(2.70)		-0.74	(1.04)	
Mar 2019	-0.16	(2.85)		-0.69	(1.05)	
Apr 2019	-2.44	(3.50)		-0.81	(1.02)	
May 2019	-1.97	(2.71)		-0.82	(1.09)	
Jun 2019	-4.57	(2.36)	*	-0.90	(1.11)	
Jul 2019	-4.45	(2.74)		-0.59	(1.07)	
Aug 2019	-4.75	(2.43)	*	-0.82	(1.19)	
Sep 2019	-5.66	(2.67)	**	-1.04	(1.06)	
Oct 2019	-5.04	(2.69)	*	-0.44	(1.09)	
Nov 2019	-7.38	(2.59)	**	-0.92	(1.14)	
Dec 2019	-5.78	(2.60)	**	-0.52	(1.13)	

Jan 2020	-6.54	(2.88)	**	-0.36	(0.99)
Feb 2020	-6.14	(2.75)	**	1.01	(0.99)
Mar 2020	-5.51	(3.09)	*	-0.27	(1.31)
Apr 2020	-17.26	(5.89)	***	-1.31	(1.16)
N	508,175			508,175	
R2	0.4280			0.1080	
Mean dependent	55.40			2.56	

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