Automating Short-Term Payroll Savings:
Evidence from Two Large U.K. Experiments[*]

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Abstract. Automatic enrollment is often used to increase retirement plan savings. Can it also be used to increase savings for short-term needs? We evaluate data from two large U.K. experiments. The first randomly assigned opt-in, opt-out, or active choice enrollment into short-term savings accounts at two employers. Nine months later, scheme participation was 46 percentage points higher under automatic enrollment than opt-in enrollment, and average balances were £105 higher. Active choice enrollment yields results similar to those under opt-in enrollment. In the second experiment, after years of offering opt-in short-term savings accounts funded by payroll deduction to its employees, an employer changed enrollment in these accounts to opt-out for new hires only. In tenure month 18, scheme participation was 43 percentage points higher under automatic enrollment, and average balances were £162 higher. Automatic enrollment did not decrease usage of wage advances.

I. Introduction

Automatic enrollment has been studied extensively in the retirement savings context. Previous research has shown that automatic enrollment into 401(k) plans increases participation and balance accumulation, and that many plan participants remain at the default contribution rate when automatically enrolled (Madrian and Shea 2001; Choi et al. 2003, 2004; Beshears et al. 2009, 2022). The U.S. has encouraged employers to implement automatic enrollment in 401(k) and similar plans.[1] Thus, in 2019, 40% of U.S. private industry workers and 28% of U.S. state and local government workers participating in a savings and thrift plan did so in one with automatic enrollment (Zook, 2023). Multiple other countries, including the U.K., require employers to automatically enroll eligible employees into a workplace pension scheme.[2]

Can automatic enrollment also be used to encourage short-term savings? Many households in the U.S. and other countries lack funds to weather short-term negative financial shocks. Thirty-two percent of American adults say that they would not be able to cover an unanticipated $400 expense using cash, savings, or a credit card paid off at the next statement (Board of Governors 2022). Many of these individuals turn to costly solutions, such as payday loans, overdrafts, or revolving credit card debt; others will simply be unable to cover the expense at all. Similarly, roughly 44% of U.K. adults would struggle to pay an unexpected £300 bill and about 25% could not pay it with their own money (Berk et al. forthcoming, Phillips et al. 2021). Employer-sponsored payroll savings programs could potentially help individuals build meaningful balances in

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[1] The Pension Protection Act of 2006 encouraged employers to use automatic enrollment in defined contribution savings plans. Starting in 2025, the SECURE 2.0 Act of 2022 requires most 401(k) and 403(b) plans established on or after year-end 2022 to automatically enroll new employees at a default contribution rate between 3% and 10% of income, and to subsequently auto-escalate their contribution rate by 1% of income per year up to at least 10% and no more than 15% of income.

[2] For the relevant U.K. legislation, see the Pensions Act 2008. Cribb and Emmerson (2020, 2021) study the effects of U.K. automatic enrollment on pension participation and contributions, and Beshears et al. (2023) study how it affected borrowing and creditworthiness.

precautionary savings accounts, but take-up is very low when employees must opt in (Berk et al. forthcoming).

In this paper, we provide evidence that automatic enrollment can successfully increase participation and balance accumulation in short-term savings accounts funded by payroll deduction. We document and evaluate two large experiments. Section II describes and analyzes the first experiment, conducted by a large U.K. fintech company in conjunction with two client employers. In this experiment, new members to the fintech company were randomly assigned to one of three arms: a control arm, in which payroll savings is available on an opt-in basis; an active choice arm, in which new members are prompted to explicitly choose whether or not to save in the short-term account; and an automatic enrollment arm. Section III describes and analyzes the second experiment, conducted by a large U.K. employer and a credit union, in which employees hired from a certain date onward were automatically enrolled into a payroll savings scheme. Section IV concludes.

II. Experiment 1: Randomized controlled trial of automatic enrollment and active choice

A. Experiment description

We study a randomized controlled trial (RCT) implemented by Wagestream, a U.K. fintech company that is in the business of providing employee benefits, in conjunction with two of its client employers. The fintech company works with client employers to offer a mobile app to employees. This app allows employees to track their shifts and earnings, divert pay to a Wagestream savings account ("savings pot"), and receive earned wage access (i.e., salary

advances).[3] Savers may also elect a savings goal for the savings pot, up to £1,000.[4] Wagestream additionally offers financial coaching, micro-savings,[5] and monthly incentives to encourage financial wellbeing. Savings pots are fully liquid; their balances can be transferred to another bank account at any time with no penalties, fees, or delays. Savings pots have maximum balances of £1,000. Contributions cease when the pot balance reaches £1,000 or the saver's goal (whichever is lower) and resume when the balance drops below this threshold.

On October 24, 2022, Wagestream began randomly assigning newly registering users ("members") from Bupa Care Services to one of three arms. Bupa Care Services, a division of Bupa UK, employs approximately 10,500 workers in the aged care home sector. The Co-operative Group Ltd. ("the Co-op") began participating in the RCT, assigning new members to the same three arms, on November 21, 2022.[6] The Co-op employs 58,000 workers in the food retail, funeral, insurance, and legal services sectors.

In the control arm, new members experienced the business-as-usual opt-in joining process for the savings pot. They could learn about the savings pot by navigating to the relevant portion of the Wagestream app or by reviewing standard electronic marketing materials, and they could sign up directly in the app. In the active choice arm, new members were prompted during their sign-up

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[3] Member employees can access up to 50% of their wages in advance of their payday for a fixed £1.75 fee per advance, with no impact on the employer's payroll processes. The employers studied in this paper have set the wage advance limit at 40% of the next paycheck.

[4] Savers elect a per-paycheck contribution amount to the savings pot. They may also choose to contribute a set amount from each wage advance to the savings pot. Contributions must be between £5 and £100. They can also choose to enter a savings goal and date to achieve it, and the app will calculate the implied contribution amount (e.g., a goal of £1,000 with an achievement date one year in the future will yield a monthly contribution amount of £83.33). If the user does not select a date to achieve their goal but does enter a contribution amount, the app will calculate an achievement date based on their chosen savings goal and contribution election. After viewing information about their chosen savings goal, contribution amounts, and achievement date, the user may make edits to these fields. Changes to one or more field will cause the app to recalculate the other fields.

[5] This feature allows members to round the pay for each shift they work down to the nearest pound and divert the remainder to the savings pot.

[6] A soft launch, which involved enrolling 95 Co-op employees into the study, ran from November 21 to November 25, 2022. The full launch at the Co-op began on December 23, 2022.

journey to choose whether or not to contribute to the savings pot from each paycheck. Users could not proceed without making a selection; users who closed the app without making a choice would see the same prompt when they returned to the app. The active choice intervention allowed users who chose to save to select a contribution amount by moving a slider whose initial level was £15 per paycheck. In the automatic enrollment arm, new members were by default enrolled to contribute £40 to the savings pot from each monthly paycheck, which is approximately 1.9% of the average Bupa participant's monthly salary, assuming 2,080 hours of work per year (see Table 1). Members could easily opt out within the app,[7] and received multiple communications ahead of their first affected payroll to ensure they were fully aware of the deduction and able to adjust their deduction amount away from the £40 default.

Members in all arms receive pre-payday summary emails with information about their savings settings and options to view, cancel, or change their elections. Members are free to adjust their savings settings at any time, including to cease contributing to the savings pot altogether. Wagestream is not a depository institution and does not hold funds. It partners with e-money providers[8] to facilitate saving for its members.

Four items should be noted regarding the experiment. First, this experiment ran during a period of unusual macroeconomic instability. Second, the fintech company changed the name for its savings product. At the beginning of the trial, the product was called "Save." In response to a request from one of its e-money provider partners, the company renamed the product to "Build." This change was implemented on January 4, 2023, but some users may have first seen the change

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[7] Upon account creation, the savings pot appeared as "pending." In this period, which lasted for up to one week depending on how far before their next payday the user registered, no edits were possible and no payroll contributions were made. Users were informed via email and app when they were able to opt out or make other edits to their savings pot. Users also received a push notification 2-3 days before their first payroll deduction.
[8] https://www.fca.org.uk/firms/electronic-money-payment-institutions

in later weeks depending on when they updated the app on their device. Third, the company restructured its app so that information about the savings product ("Build") was moved from the main navigation bar to a hub page. This change was implemented on February 6, 2023, but, again, some users may have first seen the change weeks later.

Finally, the company temporarily introduced Know Your Customer (KYC) checks for new members during the research trial following a change in the e-money provider for the savings pot. This KYC check process required new members who proactively signed up for savings pots from February 27 to March 21, 2023, to supply extra personal details (date of birth, home address) and personal identification documents. We exclude from our analyses participants who were randomized during this period due to concerns that the opt-out participants were not subject to KYC while opt-in and active choice participants were. Additionally, members already in our study at the time of the KYC introduction were prompted within the app to complete a KYC check; 796 members saw this prompt and only four completed the check.

B. Data description

We use a dataset provided by Wagestream on members who were randomized between October 24, 2022, and August 31, 2023.[9] For each individual, we receive data on their employer, current Wagestream membership status, treatment assignment, randomization date, employment start date, employment termination date (if applicable), paycheck amounts and dates, savings amounts and dates, savings deduction elections and election dates, savings goal elections and election dates, micro-savings settings and settings dates, and (for Bupa only) shifts worked. We

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[9] We have received data collected through October 16, 2023. In these analyses, we exclude data collected beginning on September 19, 2023, because Wagestream implemented a new KYC process on this date. (Future analyses will incorporate this data.) We further exclude data collected between September 1 and September 18, 2023, because most employees did not experience a wage payment in this period.

drop 779 members who were assigned to an experimental arm during the period February 27 – March 21, 2023, when the KYC check was in effect for new members proactively signing up for a savings pot.

C. Comparison of experiment arms

To estimate the impact of automatic enrollment and active choice, we compare behavior across the three RCT arms. In total, we have 2,419 individuals in the opt-in (control) arm, 2,490 individuals in the active choice arm, and 2,495 individuals in the automatic enrollment arm. We define month 0 as the month the individual joined Wagestream and was randomized into a study arm.[10]

Table 1 compares the characteristics of the three arms. There is no statistically significant difference in the share of individuals from Co-op across experimental conditions. The differences in the average first observed hourly wage are jointly statistically significant, but economically small; the statistical significance is driven by the active choice arm having an average hourly wage that is £0.37 – £0.41 higher than the other arms. Sample sizes decline with membership tenure both because of employee attrition and because our data end in August 2023, which means that more recently joining members are observed for a shorter period of time. Note that Bupa—but not the Co-op—allows employees to view their shift information in the app. Additionally, Co-op employees receive a 5% "boost" to their savings (similar to interest earnings). Thus, individuals from the Co-op may be more likely than Bupa employees to join Wagestream with the intention to save.

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[10] Employees may join Wagestream at any time in their tenure. The decision to join the company and download the app is most salient at hire, and over 60% of individuals in our study joined within the first 30 days of their employment. However, 12% of individuals joined more than three years into their employment.

D. Short-term savings participation

Figure 1 shows the savings pot participation rate in each of the three study arms from the time of randomization onward. We define participation in a given month as having a non-zero account balance or a non-zero contribution amount in that month. The denominator for all participation rates is the number of individuals randomized to the respective experimental arm who are Wagestream members in that month. Wagestream is only available to active employees; employees lose access to the app when they separate from their employer or give notice, and any accrued savings are paid out. Figure 1 also shows the fraction of members who made a contribution to the savings pot each month.

In month 1, 67.8% of the opt-out (automatic enrollment) arm is participating, compared to 13.5% of the active choice arm and 10.4% of the opt-in (control) arm. These differences in participation remain relatively consistent across the entire study period. In month 9—currently the last month with per-arm sample sizes that exceed 100 individuals—64.8% of the opt-out arm is participating, compared to 15.6% of the active choice arm and 19.3% of the opt-in arm. Not all participants continue to make payroll contributions to their savings pots, but the majority do so. In the opt-out arm, 66.2% of members contribute in month 1, and 62.4% contribute in month 9. In the active choice arm, 13.2% of members contribute in month 1 and 15.6% contribute in month 9. In the opt-in arm, 10.1% contribute in month 1 and 16.7% contribute in month 9. Differences in both participation rates and the fraction contributing between the opt-out and control arms are statistically significant in all months (see Table 2, columns 1 and 2). Differences in participation rates between the active choice and control arms are statistically significant in months 0-1, weakly significant in months 2-3, and insignificant thereafter; differences in the fraction contributing are

statistically significant in months 0, 1, and 3, weakly significant in months 2 and 7, and otherwise insignificant (see Table 3, columns 1 and 2).

Figures 2 and 3 show participation rates and the fraction contributing to their savings pot separately by employer and—for Bupa only—by initial hourly wage. The differences across study arms are similar across employers and wage terciles. Participation rates are slightly higher in the opt-in and active choice arms at the Co-op than at Bupa, and trending upwards over the study period, whereas participation is flat or trending downward at Bupa. These variations are perhaps driven by differences in the employee characteristics and incentives across the two companies (see Section II.C).

Across all arms, participation is relatively stable for the first year after joining Wagestream. However, individuals in the opt-in and active choice arms in this study are greater than 20 times more likely to participate than those at other U.K. companies whose opt-in short-term payroll savings account we studied in Berk et al. (forthcoming). We believe these differences are largely driven by differences in the study populations. In this RCT, our study population includes only employees who join Wagestream, who may be more engaged with their finances than their peers who do not join Wagestream. Indeed, in experiment 2 in this paper, our study population includes all employees hired after November 1, 2020, and we find opt-in participation rates that are more consistent with those in Berk et al. (forthcoming). It may also be the case that the Wagestream app makes it easier or more appealing for users to opt into saving.

A more surprising result is that the active choice arm does not meaningfully outperform the control arm. This result suggests that lighter-touch interventions may be insufficient to increase short-term savings rates in a novel type of account. However, it may be that the design of the active choice intervention could be further optimized to generate higher participation.

E. Balance accumulation

Figure 4 shows mean balances by month for individuals who are Wagestream members in that month. In month 4, the mean balance in the opt-out arm is £71, compared to £16 in the active choice and opt-in arms. These differences grow over the entire study period. By month 9, the mean balance in the opt-out arm is £132, compared to £19 in the active choice and £27 in the opt-in arm. The effect of automatic enrollment on mean balances is statistically significant in all months; the effect of active choice on mean balances is significant in month 0, and insignificant thereafter (see Tables 2 and 3, column 3).

In Figure 5, we restrict our analysis to individuals with a positive savings balance in each given month. In month 4, the conditional mean balance in the opt-out arm is £101; the 10th, 25th, 50th, 75th, and 90th percentile balances in the opt-out arm are £4, £19, £120, £160, and £173, respectively. For the active choice arm, the conditional mean balance is £98 in month 4; the 10th, 25th, 50th, 75th, and 90th percentiles are £4, £17, £49, £147, and £278, respectively. For the control arm, the conditional mean balance is £102 in month 4; the 10th, 25th, 50th, 75th, and 90th percentiles are £4, £13, £49, £157, and £321, respectively. The differences between the study arms expand over time. By month 9, the mean balance in the opt-out arm is £214, compared to £128 in the active choice arm and £139 in the opt-in arm. The 10th percentile balance in the opt-out arm is £10, compared to £13 in the active choice arm and £10 in the opt-in arm. The 25th percentile balance in the opt-out arm is £52, compared to £24 in the active choice arm and £21 in the opt-in arm. The median balance in the opt-out arm is £209, compared to £46 in the active choice arm and £50 in the opt-in arm. The 75th percentile balance in the opt-out arm is £354, compared to £96 in the active choice arm and £156 in the opt-in arm. The 90th percentile is £377 in the opt-out arm,

compared to £407 in the active choice arm and £393 in the opt-in arm. The differences at the 90th percentile peak in month 7, when the 90th percentile is £295 in the opt-out arm, compared to £615 in the active choice arm and £568 in the opt-in arm. The effect of automatic enrollment on conditional mean balances is marginally significant and negative in month 2 and marginally significant and positive in month 9 (see Table 2, column 4); the effect of active choice is always insignificant (see Table 3, column 4).

The combination of Figures 4 and 5 illustrate the role that participating at all plays in balance accumulation. When we do not condition on participating, the difference in accumulated balances is stark and grows consistently over time. The large number of non-participants with £0 balances drives down the average balance across all arms, and the effect is therefore most pronounced in the active choice and opt-in arms, where participation is roughly 50 percentage points lower than in the opt-out arm. However, when we condition on participating, we see that average balances accumulate at similar paces for at least the first 6 months of Wagestream membership. Although conditional mean balances across arms do diverge thereafter, we note that sample sizes shrink considerably as membership month increases.

F. Contributions and withdrawals

We turn next to an analysis of flows into and out of the short-term savings accounts. Figure 6 shows median and mean non-zero contribution amounts by month. In the opt-out cohort, the median contribution amount is consistently equal to the £40 default; the mean contribution amount is consistently slightly higher. There is significantly more variation in the active choice and opt-in arms. The £15 preset in the active choice arm does not appear particularly sticky; compared to the opt-in arm, where at least half of savers consistently contribute the default £40, a minority of active

choice savers retain the £15 preset. We emphasize that the number of savers is significantly smaller in the active choice and opt-in arms, and that across all arms, sample sizes diminish as membership length increases.

The £40 default is equivalent to about 1.9% of pay for the average member on whom we have wage data. At this contribution level, a saver would accumulate enough to cover an unexpected £300 bill in eight months. This result is informative when considering scaling up payroll-based short-term savings, which will likely require a default contribution that is specified as a percentage of income rather than an absolute amount in order to accommodate populations with a wide range of income levels.

Figure 7 displays the share of savers in each arm taking a withdrawal in each month. Multiple withdrawals taken in a single month are aggregated as a single withdrawal. Withdrawal rates in the opt-in and active choice arms are generally between 5% and 9%; withdrawal rates in the opt-out arm are generally between 22% and 26%. The share of savers taking a withdrawal increases over months 0-2 and remains relatively flat thereafter for all arms. The difference between the opt-out and control arms is statistically significant in all months, but the difference between the active choice and control arms is always insignificant (see Table 4, columns 1 and 4).

Figure 8 displays information about the size of the average positive withdrawal taken by each arm. In all trial arms, the average withdrawal amount rises with membership length. In the opt-out arm, the average withdrawal is £41 in month 0 and £141 in month 9. In the active choice arm, the average withdrawal is £85 in month 0 and £147 in month 9. In the opt-in arm, the average withdrawal is £64 in month 0 and £130 in month 9. However, the average withdrawal as a share of the available account balance falls slightly as membership length increases. Across all arms, the average withdrawal represents between 84% and 89% of the available balance in month 0 and

between 70% and 76% in month 9. Compared to their peers in the opt-in and active choice arms, automatically enrolled savers tend to take withdrawals that are slightly smaller in absolute terms, but similar as a share of the available balance. Automatic enrollment has a statistically significant negative effect on average withdrawal amounts in months 0-2 and 5, but usually has no significant effect on withdrawals as a share of balance. Active choice generally has no significant effect on withdrawal amounts in absolute or proportional terms. (See Table 4, columns 2-3 and 5-6).

Figure 9 shows the relationship between withdrawals, available balances, and recent contributions. The left panel plots the percent of withdrawals approximately equal to (between 95 and 100% of) the available account balance. The number falls steadily over months 0-9, suggesting that savers become less constrained by their available balance as their balances grow. The right panel plots the percent of withdrawals approximately equal to the previous contribution and smaller than the available balance. This share is highest in months 0-1, when only 0 or 1 contributions have been made. Over months 3-8, the range of withdrawals in this category is 9%-30% in the opt-out arm, 13%-29% in the active choice arm, and 2%-20% in the opt-in arm. As liquidity shocks are unlikely to exactly equal the previous contribution amount, the right panel may represent instances where a member was influenced by the psychologically focal amount of the prior contribution.

G. Wage advance utilization

An important feature of Wagestream membership is access to wage advances. Trial participants can access up to 40% of their wages in advance of their payday for a fee. Evidence from Wagestream suggests that wage advances are a substitute for other forms of credit, such as credit cards, payday loans, overdraft, and borrowing from friends and family (Wagestream 2021).

Figure 10 compares the usage rate of Wagestream's wage advance benefit across the three study arms. The share of members taking a wage advance is similar across the study arms in all observed months. There is a slight peak in month 1, suggesting that some new Wagestream members may have joined specifically for access to this benefit, and thereafter around one-third of members use the benefit in each month. Automatic enrollment has a weakly statistically significant positive effect on wage advance utilization in months 1 and 3, but otherwise is insignificant; active choice has no significant effect on utilization (see Table 5, columns 1 and 4).

Figure 11 displays the average size of the advances taken in GBP and as a share of the next paycheck, respectively, conditional on taking an advance. Multiple advances taken in a single month are aggregated before computing these averages. The average size of the advances is similar across all study arms in all observed months. Automatic enrollment and active choice generally have no significant effects on wage advance amounts, with the exception of active choice in months 2 and 3 (see table 5, columns 2-3 and 5-6).

Figure 12 shows the percentage of wage advances that are larger than the member's available savings pot balance. In the active choice and opt-in arms, the percentage is nearly 100% in all months, with a slight downward trend over time. In the opt-out arm, the percentage falls steadily over time but is still 85% by month 9. Opt-out payroll savings, despite helping employees build up a liquidity buffer, does not change use of wage drawdown. Figure 12 suggests that much of this is because savings pot balances are generally not large enough to replace the typical wage advance. Since the fee for a wage advance does not vary by the size of the wage advance, there is no incentive to split the financing of an expenditure between a wage advance and a savings pot withdrawal.

III. Experiment 2: Introduction of automatic enrollment for new hires

A. Experiment description

The second experiment was created by a large multinational employer's decision to begin automatically enrolling its new U.K. hires into a payroll savings scheme. This employer, SUEZ recycling and recovery UK, operates in the recycling and waste management sector and has over 5,000 employees across the U.K. working in both field and office positions. On November 1, 2021, SUEZ implemented a form of automatic enrollment for newly hired benefits-eligible employees who were onboarded using an online journey. Before this change, employees had to opt into the payroll savings plan to make contributions. After the change, new hires were automatically enrolled into the scheme at an employee contribution rate of £40 per month if they did not opt out. This is 1.9% of the mean affected worker's monthly pay (see Table 6). Workers hired before November 1, 2021, were never subject to automatic enrollment.

For administrative reasons, contributions began with a new hire's second or third pay cycle. The initial contribution was set to £40 per month; in subsequent pay cycles, automatically enrolled workers were able to change their contribution amount.[11] The payroll savings accounts are housed at TransaveUK, a large U.K. credit union, and are fully liquid (available without penalties or fees within 1-2 business days from the withdrawal request). Savers initiate withdrawals (transfers to other bank accounts) and perform other account-related tasks by using the TransaveUK website or mobile app or by contacting customer service. Participation in the scheme gives the saver other benefits from the credit union. These include an annual dividend paid to members, a modest

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[11] Due to variation in hire and enrollment dates, some savers were enrolled early enough to adjust their initial contribution amount. In our current data, only eight automatically enrolled individuals adjusted their initial payroll deduction in this way. All others made an initial contribution of £40. Savers must contribute at least £5 per month.

bereavement benefit, and access to unsecured personal loans up to £20,000.[12] The credit union also offers other savings vehicles, including a prize-linked savings account and a goal-based savings pot. The former has a £200 maximum balance. However, these savings vehicles cannot be funded via payroll deduction.

Due to the regulatory landscape, automatic enrollment was implemented with some guardrails and differed from traditional models seen in the U.S. and U.K. retirement savings domains.[13] The most significant difference was the need for the employer to gather consent from new hires to automatically enroll them into the payroll savings scheme. During the online onboarding journey, new hires were asked to read the employer's Payroll Auto-Saving Policy and agree to its terms; consent to saving £40 per pay period; read and agree to the credit union's Account Terms and Conditions; acknowledge that savings held with the credit union are insured (up to £85,000) by the Financial Services Compensation Scheme; and agree to data sharing between the employer and the credit union. This consent step was not compulsory; any new hires who did not complete it were not automatically enrolled but retained the usual opt-in access. However, the employer tells us that the majority of new hires completed the consent step during their onboarding journey, making automatic enrollment near-universal for the target population.[14] All new hires who completed the consent step were automatically enrolled unless they subsequently opted out.

In addition, new hires received multiple communications from their employer about their automatic enrollment status before their first payroll deduction. Three reminders were sent in the

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[12] Small loans up to £3,000 are available instantly to all credit union members. Larger personal loans up to £20,000 are available to members who regularly save at least £5 per month or £1 per week.

[13] For an overview of the U.K. regulatory environment, see Cooper et al. (2021).

[14] In February 2022, the employer modified the consent step to ensure that new hires were fully aware that they could choose to withhold their consent. We are missing consent data, but detect no decline in participation after the modification of the consent step. 48.5% of employees hired between November 1, 2021 and January 31, 2022 are participating in tenure month 4, compared to 53.2% of employees hired between March 1, 2022 and May 31, 2022.

weeks immediately after the employee started work. During this period, new hires wishing to opt out could do so by contacting the SUEZ compensation and reward team via email. Savings accounts were not created for employees who opted out in this period. Additional reminders were sent after the account was created but before the first payroll deduction. After the account was created, employees wishing to opt out did so by contacting the credit union. Employees also received a member information packet from the credit union, which could have prompted them to opt out or adjust their contribution amount because the packet reminded them of the account.

There were no other changes to the payroll savings scheme in the year preceding or following the implementation of automatic enrollment. However, three situations are potentially relevant. First, a planned acquisition of the employer by a competitor was announced in 2020 and remains in progress. To date, the acquisition has not affected benefit offerings at the employer. Second, the entire experiment took place during the Covid-19 pandemic, which created employment, consumption, and income shocks to individuals and their households, as well as general macroeconomic turmoil in the U.K. economy. However, all employees in our analysis were hired during the pandemic (in November 2020 or later). Although we do not have complete data on furloughs, we note that furloughed employees continued to receive 100% of their compensation;[15] continued to be eligible for voluntary payroll deductions, including savings; and eventually returned to work. Finally, the employer began partnering with Wagestream (the fintech company in Experiment 1) in Fall 2022. Although this partnership did not originally include access to Wagestream savings pots for SUEZ employee, access to the Wagestream pots has been available on an opt-in basis since Summer 2023. No SUEZ employees have been automatically enrolled into saving at Wagestream.

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[15] While on furlough, 80% of wages were paid by the U.K. government as part of the Coronavirus Job Retention Scheme. The employer voluntarily paid the remaining 20%.

B. Data description

We use a merged dataset containing data collected by three sources: the employer, the credit union, and Nest Insight.

The employer provided monthly snapshots of individual-level administrative data on employees hired between November 1, 2020, and August 31, 2023.[16] These data include gender, age, contracted hours of work per period, hire date, employment termination date (where applicable), current employment status, the date the current employment status became effective, gross pay amount, pay frequency, job category, pension membership, and pension contribution amount/percentage. About 10% (421 employees) of our current sample disappears from the employer-provided data after a certain date but have no employment termination date. Based on guidance from the employer, we treat these employees as having separated in the last month in which they appear in the employer data.

The credit union provided administrative data collected between December 1, 2021, and July 31, 2023. We observe individual-level payroll savings scheme choices for all employees hired on or after November 1, 2020. These data include joining date, current membership status, and the date the current membership status became effective. We also observe details about the member's utilization of the payroll savings scheme, including monthly contribution elections, monthly payroll savings scheme balances, transaction-level withdrawals (date- and time-stamped) from the payroll savings scheme, and additional (i.e., not via payroll deduction) deposits to the payroll savings scheme. The credit union makes personal loans available to members, and we receive

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[16] The employer operates an anti-recidivism scheme that allows them to hire imprisoned individuals on release of temporary license (ROTL). Fewer than 10 imprisoned individuals were hired during the study period, all on or after November 1, 2021. Except for one individual who was automatically enrolled in the savings scheme, the ROTL employees have been excluded from our research data.

monthly data on loan principal, repayment history, and balances. The contribution elections variable contains the individual's selected payroll deduction amount; this variable tracks relatively closely but not perfectly with positive changes in balances. An individual who stops saving may continue to have a positive election recorded in the credit union data.

The employer and credit union transferred the relevant administrative data to Nest Insight for merging. A merged research dataset stripped of identifiers was then transferred to us for analysis.[17]

We take several steps to clean the data. First, we drop individuals who did not go through the online onboarding journey, and therefore did not view the trial-related consent step described in Section III.A. We drop 143 individuals from a U.K. region that does not participate in the online journey, and another 17 individuals hired under the Transfer of Undertakings (Protection of Employment) regulations (TUPE).[18] We also drop 28 individuals who were rehired one or more times during the study period and two individuals who were already members of the credit union at the time of hire.

C. Comparison of pre- and post-automatic enrollment hire cohorts

To estimate the impact of automatic enrollment, we compare the behavior of two hire cohorts. The pre-automatic enrollment ("pre-AE") cohort consists of SUEZ employees hired in the year preceding the introduction of automatic enrollment—from November 1, 2020, through October 31, 2021. The post-automatic enrollment ("post-AE") cohort consists of SUEZ employees hired from November 1, 2021 (when automatic enrollment was introduced), to August 31, 2023

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[17] Nest Insight collected, and will continue to collect, survey data on SUEZ employees' financial well-being and attitudes. Where possible, these survey data have been merged with the administrative data from SUEZ and TransaveUK.
[18] https://www.gov.uk/transfers-takeovers

(the last date for which we currently have data). In our analyses, we drop individuals who leave the firm from the sample after their separation month.

There are 1,164 individuals in the pre-AE cohort and 2,441 individuals in the post-AE cohort. The number of individuals we observe in the post-AE cohort drops off sharply as tenure at the company increases, which is a result of the current lack of credit union date after July 2023 and employer data after August 2023. For example, the only post-AE individuals who can be observed at tenure month 18 are those who were hired before February 2022. By contrast, since credit union administrative data were only collected after December 2021, the number of observations in the pre-AE cohort first increases with tenure and then begins to decrease.

Table 6 compares the characteristics of the two cohorts. Workers in the two cohorts have similar gender and age compositions. Workers in the pre-AE cohort are slightly more likely to work in a manual position, have lower annualized starting pay, and have lower annualized pay in the automatic enrollment period (November 1, 2021 through August 31, 2023); these differences are statistically significant. When we adjust starting salaries for inflation using the Consumer Prices Index including owner occupiers' housing costs (CPIH), the difference in starting pay is no longer statistically significant.

D. Short-term savings participation

Figure 13 shows participation rates in the payroll savings scheme by tenure month for the pre- and post-AE cohorts. We define participation in a given month as having a non-zero account balance or a non-zero elected contribution amount at any time in that month. In tenure month 3, 1.8% of the pre-AE cohort is participating, compared to 46.8% of the post-AE cohort. These levels of participation are consistent through month 18, when 1.3% of the pre-AE cohort is participating

and 44.5% of the post-AE cohort is participating. The difference in participation between the two cohorts is statistically significant across the study period (see Table 7, column 1). These estimates likely overstate the difference in actual contributions flowing into the account, since positive elections sometimes are not accompanied by inflows. We plan to address contributions to the savings accounts in a future draft.

Figures 14-17 show participation by tenure month for subgroups of the post-AE cohort. In the first year of tenure, it appears that gender, age, job role, and starting pay do not significantly affect short-term savings participation. In later months, there is some evidence that workers who are female, aged 31-50, in graded roles (more likely to be office-based and salaried), or in the highest tercile of starting pay participate at lower rates. However, these patterns occur in the tenure regions with smaller sample sizes.

The low opt-in participation rate observed in this study is consistent with our prior work on payroll schemes for short-term savings, which saw opt-in participation rates below 1% at five U.K. employers (Berk et al. forthcoming). Overall participation rates are stable for at least 18 months following hire, indicating that initial decisions regarding saving are persistent.

E. Balance accumulation

Figure 18 shows mean and median balances by tenure month for the pre- and post-AE cohorts. In tenure month 3, the mean balance in the pre-AE cohort is less than £1, compared to over £42 in the post-AE cohort. Mean balances continue to diverge over time, never exceeding £3 for the pre-AE cohort but peaking at £183 for the post-AE cohort in month 16. Automatic enrollment has a statistically significant effect on average balances (see Table 7, column 2). For both cohorts, the median balance is always £0. Although participation in the post-AE cohort briefly

surpasses 50%, the occasional lag between positive contribution elections and their corresponding positive balance changes causes the median balance to be persistently £0.

In Figure 19, we plot mean balances by tenure month conditional on having a positive balance. In tenure month 3, the conditional mean balance among pre-AE cohort members is £21; the 10th, 25th, 50th, 75th, and 90th percentiles are £1, £6, £16, £36, and £50, respectively. The conditional mean balance among post-AE cohort members is £91; the 10th, 25th, 50th, 75th, and 90th percentiles are £40, £80, £80, £120, and £120, respectively. The differences between the cohorts grow over time. In tenure month 18, the conditional mean balance among pre-AE cohort members is £55; the 10th, 25th, 50th, 75th, and 90th percentiles are £1, £2, £44, £72, and £200, respectively. The conditional mean balance among post-AE cohort members is £379; the 10th, 25th, 50th, 75th, and 90th percentiles are £1, £51, £351, £681, and £721, respectively. The difference in conditional mean balances is statistically significant across the study period (see Table 7, column 3).

The combination of Figures 18 and 19 shows that to a much larger extent than in Experiment 1, differences in balance accumulation are driven by more than divergent levels of participation. Even when we restrict our analysis to employees with positive balances, mean balances in the post-AE cohort are often four or more times larger than in the pre-AE cohort. Employees who opt into saving behave differently from those who are defaulted into saving.

F. Contributions and withdrawals

We turn next to an analysis of flows into and out of the short-term savings accounts. Figure 20 shows median and mean contribution amounts by tenure month for employees in the pre- and post-AE cohorts who made a positive contribution in that month. In the post-AE cohort, the median

contribution rate is consistently equal to the £40 default; the mean contribution rate is consistently slightly higher. There is significant variation in the pre-AE cohort. This is consistent with the contribution rate behavior we observe in experiment 1.

Figures 21 and 22 document information about withdrawals. Figure 21 displays the share of savers in each cohort taking any withdrawal in each tenure month. The share of post-AE cohort savers taking withdrawals rises steadily with tenure, peaking at 35% in month 17. The share of pre-AE cohort savers taking withdrawals fluctuates; however, it is higher than in the post-AE cohort in all but three months. The differences in withdrawal rates are not statistically significant (see Table 8, column 1).

Figure 22 displays information about the magnitude of the average positive withdrawal taken by savers in each cohort.[19] The mean withdrawal amount in the post-AE cohort trends upwards with tenure, from £75 in month 3 to £150 in month 18. However, as a share of the available balance, the average post-AE cohort withdrawal does not appear to grow in magnitude; they are between 70 and 90% of the available balance in almost every tenure month. The amount a saver chooses to withdraw is constrained by the amount she has saved to date. Withdrawal amounts in the pre-AE cohort are highly variable due to small sample sizes.[20] Table 8 (columns 2 and 3) shows that differences between the cohorts are not statistically significant.

Figure 23 shows the relationship between withdrawals, available balances, and recent contributions. The left panel plots the percent of withdrawals approximately equal to the available account balance. The percent of post-AE cohort withdrawals in this category is highest in month

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[19] The number of savers in the pre-AE cohort is very low, making it difficult to interpret differences in the magnitude of withdrawals.

[20] Due to accounting delays, roughly 4% of observed withdrawals appear to be greater than 100% of the available balance. In such cases, we divide the withdrawal by the available balance plus the withdrawal to calculate the share of balance withdrawn.

1, and in the range of 24%-41% over months 2-18. The right panel plots the percent of withdrawals approximately equal to the previous contribution and smaller than the available balance. The percent of post-AE cohort withdrawals in this category is consistently in the range 15%-35% over months 2-18. Small sample sizes make it difficult to interpret trends in the pre-AE cohort.

G. Interaction with pension savings

The U.K. began rolling out mandatory automatic enrollment into pensions in 2008, and all employers have automatically enrolled their eligible employees since 2018.[21] For our entire study period, minimum pension contribution rates have totaled 8% of salary, including a 3% employer contribution. A natural question is whether an increase in short-term savings generated by automatic enrollment crowds out long-term savings. Figure 24 suggests that this is not the case in our experiment. In the pre-AE cohort, pension participation is 79% in month 3 and between 76% and 84% through month 18. In the post-AE cohort, pension participation is 82% in month 3 and between 77% and 87% through month 18. Table 8 (column 4) shows that the differences in pension participation between the two cohorts are not statistically significant.

Figure 25 additionally plots the sum of short-term and pension savings as a share of salary for each cohort, for employees with annualized salaries at or below £50,270. For the pre-AE cohort, the mean total savings rate is 6.8% in tenure month 3 and between 6.5% and 7.0% in each of months 0-18. For the post-AE cohort, the mean total savings rate is 8.0% in tenure month 3 and between 7.4% and 8.2% in each of months 0-18. Thus, for the first 18 months of tenure, automatic enrollment into short-term savings appears to increase total savings as a share of pay by nearly 1

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[21]   https://www.gov.uk/government/publications/workplace-pensions-and-automatic-enrolment-employers-perspectives-2022/summary-workplace-pensions-and-automatic-enrolment-employers-perspectives-2022

percentage point. Table 8 (column 5) shows that these differences are statistically significant across the study period.

H. Personal loan utilization

We turn next to an evaluation of the relationship between automatic enrollment into short-term savings and credit utilization. As previously mentioned, credit union members gain access to a personal loan product. Small loans up to £3,000 are available instantly to all credit union members. Larger personal loans up to £20,000 are available to members who regularly save at least £5 per month or £1 per week.

Figure 26 displays the information about loan utilization in each cohort. The left-hand panel shows average amount borrowed from the credit union over tenure months 0-20, inclusive of individuals who borrow nothing; the right-hand panel shows the average amount borrowed over this period, conditional on borrowing. 3.8% of the post-AE cohort and 0.6% of the pre-AE cohort members observed at any point during this period take out a loan in this tenure range. The average post-AE cohort member borrows £77 more from the credit union than their pre-AE cohort peer, roughly one-half of the amount saved due to automatic enrollment by month 16. Conditional on taking out a loan, the average post-AE cohort member borrows £2,234—far more than what is accumulated in the payroll savings account. This is £953 more than the average pre-AE cohort member; however, only 5 pre-AE cohort members borrow in our window, making it difficult to draw meaningful conclusions about the size of the typical personal loan. It may be the case that automatic enrollment into short-term savings increases loan utilization because it increases engagement with the credit union and awareness of the credit union's offering.

IV. Conclusion

Automatic enrollment can be used to increase participation and balances in short-term payroll savings schemes. We first study a randomized controlled trial implemented by a fintech company in conjunction with two of its client employers. One month after randomization, we find that participation is 57 percentage points higher and mean balances £13 higher under automatic enrollment than under opt-in enrollment. Differences in participation and mean balances are persistent. Nine months after randomization, participation is 46 percentage points higher and mean balances £105 higher under automatic enrollment than under opt-in enrollment. Withdrawals are more common under automatic enrollment, but similar in magnitude conditional on withdrawing. Automatic enrollment does not appear to meaningfully change use of the fintech company's wage advance benefit, suggesting that the liquid savings created by automatic enrollment is not financing needs that were otherwise being covered by wage advances. The lack of reduced wage advance usage may be due to the fact that the wage advance amount is almost always much larger than the balances accumulated in the short-term savings scheme. Because the fintech charges a flat fee for wage advances regardless of the amount advanced, there is no incentive to split the financing of a purchase between the short-term savings account and the wage advance.

We additionally study an experiment created by a large employer's decision to automatically enroll its new hires into a payroll savings scheme. At tenure month 3, we find that participation is 45 percentage points higher and mean balances £42 higher in the automatic enrollment regime than in the opt-in regime. Again, differences in participation and mean balances are persistent. Eighteen months after hire, participation is 43 percentage points higher and mean balances £162 higher under automatic enrollment. Automatic enrollment into short-term savings does not appear to reduce pension savings; total short-term and pension savings as a share of salary

are roughly 1 percentage point higher in an opt-in regime. But automatic enrollment modestly increases utilization of loans offered by the credit union housing the payroll savings accounts, perhaps because access to these loans required saving in the payroll savings scheme.

Finally, the default contribution amount under automatic enrollment is £40 per monthly paycheck in both experiments. For the average employee at the participating employers, this is approximately 1.9% of gross pay. In both experiments, the median contribution amount is persistently £40 and the mean is always higher. This evidence suggests a contribution amount close to 2% of pay is suitable for a significant share of workers.

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Table 1. Summary Statistics, Experiment 1

This table presents summary statistics for the Wagestream members who are included in our analyses. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership. Standard errors are shown in parentheses. We are currently missing shift and wage data for many employees, including all Co-op employees. Some employees have multiple wages reported on their first observed day. These are likely to be situations where the employee worked overtime or took a shift that pays a higher wage. In such cases, we use the average wage on the first observed day.

	Opt-in (Control)	Active Choice	Opt-out	F-test of joint equality (p-value)
Mean first-observed hourly rate (Bupa only)	£12.29 (0.112)	£12.70 (0.137)	£12.33 (0.115)	0.035
Co-op employees	64.6% (1.0)	65.9% (1.0)	66.6% (0.9)	0.322
Sample size				
Month 0	2,419	2,490	2,495	
Month 1	2,127	2,151	2,197	
Month 2	1,753	1,780	1,794	
Month 3	1,348	1,398	1,434	
Month 4	1,091	1,117	1,131	
Month 5	789	796	794	
Month 6	645	669	637	
Month 7	430	469	453	
Month 8	206	242	218	
Month 9	114	141	125	
Month 10	21	22	21	
Month 11	4	1	1	

**Table 2. Effect of Automatic Enrollment on Participation Rates,
Fraction Contributing, and Mean Balances, Experiment 1**

This table presents how much higher the opt-out arm is relative to the opt-in arm in the variable shown in the column header, by month since joining Wagestream. Standard errors are shown in parentheses. Participation rate is the fraction of Wagestream members with a positive balance in or contribution to their savings pot. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership. Sample sizes vary by month; the last two rows report the largest and smallest sample size observed in the column, along with the month in which those sample sizes were observed. Column (4) limits the sample to members with a positive balance in the month. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Month	Participation Rate (1)	Fraction Contributing (2)	Mean Balance (3)	Mean Balance, Conditional on Positive Balance (4)
0	0.189***	0.189***	1.65***	0.08
	(0.009)	(0.009)	(0.10)	(0.87)
1	0.574***	0.561***	12.59***	-2.67*
	(0.012)	(0.012)	(0.51)	(1.61)
2	0.575***	0.526***	28.97***	-2.36
	(0.014)	(0.014)	(1.13)	(2.88)
3	0.558***	0.500***	42.56***	-5.47
	(0.016)	(0.016)	(2.07)	(5.18)
4	0.556***	0.492***	55.38***	-1.27
	(0.017)	(0.018)	(3.11)	(7.81)
5	0.518***	0.473***	63.99***	-4.11
	(0.021)	(0.021)	(4.64)	(11.71)
6	0.523***	0.479***	77.66***	3.56
	(0.023)	(0.024)	(6.33)	(16.04)
7	0.512***	0.498***	85.28***	21.06
	(0.029)	(0.029)	(8.69)	(21.76)
8	0.506***	0.484***	99.76***	38.28
	(0.041)	(0.041)	(12.79)	(34.99)
9	0.455***	0.457***	104.96***	75.24*
	(0.057)	(0.056)	(18.49)	(43.49)
Max *N*	4,914	4,914	4,914	1,677
(Month)	(Month 0)	(Month 0)	(Month 0)	(Month 1)
Min *N*	239	239	239	99
(Month)	(Month 9)	(Month 9)	(Month 9)	(Month 9)

Table 3. Effect of Active Choice on Participation Rates,
Fraction Contributing, and Mean Balances, Experiment 1

This table presents how much higher the active choice arm is relative to the opt-in arm in the variable shown in the column header, by month since joining Wagestream. Standard errors are shown in parentheses. Participation rate is the fraction of Wagestream members with a positive balance in or contribution to their savings pot. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership. Sample sizes vary by month; the last two rows report the largest and smallest sample size observed in the column, along with the month in which those sample sizes were observed. Column (4) limits the sample to members with a positive balance in the month. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Month	Participation Rate (1)	Fraction Contributing (2)	Mean Balance (3)	Mean Balance, Conditional on Positive Balance (4)
0	0.018***	0.019***	0.12**	-1.01
	(0.005)	(0.005)	(0.06)	(1.43)
1	0.031***	0.031***	0.65	-1.13
	(0.010)	(0.010)	(0.40)	(2.73)
2	0.022*	0.021*	0.96	-1.76
	(0.012)	(0.012)	(0.96)	(5.01)
3	0.024*	0.027**	0.37	-9.06
	(0.014)	(0.014)	(1.72)	(8.47)
4	0.008	0.014	0.16	-3.59
	(0.016)	(0.015)	(2.55)	(12.94)
5	0.010	0.013	0.83	-3.73
	(0.019)	(0.018)	(3.88)	(19.13)
6	0.020	0.029	3.36	2.82
	(0.021)	(0.020)	(5.20)	(24.78)
7	0.020	0.043*	8.94	37.66
	(0.026)	(0.025)	(7.42)	(33.99)
8	0.004	0.009	-4.62	-32.59
	(0.033)	(0.033)	(8.03)	(47.56)
9	-0.037	-0.011	-7.61	-10.10
	(0.048)	(0.046)	(12.66)	(66.04)
Max N	4,909	4,909	4,909	519
(Month)	(Month 0)	(Month 0)	(Month 0)	(Month 2)
Min N	255	255	255	43
(Month)	(Month 9)	(Month 9)	(Month 9)	(Month 9)

Table 4. Effect of Automatic Enrollment and Active Choice on Withdrawal Rates and Amounts, Experiment 1

This table presents how much higher the opt-out arm is relative to the opt-in arm, or the active choice arm relative to the opt-in arm, in the variable shown in the column header, by month since joining Wagestream. Standard errors are shown in parentheses. The withdrawal rate is the number of members taking one or more withdrawals in a given month divided by the number of members with a positive balance in or payroll contribution to their short-term savings account in that month. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership. Sample sizes vary by month; the last two rows report the largest and smallest sample size observed in the column, along with the month in which those sample sizes were observed. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

	Opt-Out			Active Choice		
	Withdrawal Rate	Mean Positive Withdrawal Amount	Mean Positive Withdrawal Share of Balance	Withdrawal Rate	Mean Positive Withdrawal Amount	Mean Positive Withdrawal Share of Balance
Month	(1)	(2)	(3)	(4)	(5)	(6)
0	0.020***	-23.21***	0.046	-0.000	21.38	-0.029
	(0.003)	(7.16)	(0.069)	(0.002)	(16.69)	(0.101)
1	0.138***	-15.68***	0.054	0.008	-4.98	0.044
	(0.009)	(5.14)	(0.037)	(0.005)	(7.66)	(0.044)
2	0.172***	-13.18***	0.053	-0.000	7.86	0.024
	(0.011)	(5.07)	(0.033)	(0.007)	(8.93)	(0.037)
3	0.181***	-9.03	0.007	0.013	1.99	0.034
	(0.013)	(7.79)	(0.032)	(0.009)	(11.28)	(0.060)
4	0.203***	-16.45	0.069*	-0.004	-1.08	0.067
	(0.015)	(10.16)	(0.036)	(0.010)	(17.97)	(0.048)
5	0.167***	-33.38**	-0.019	-0.009	-13.17	-0.060
	(0.017)	(12.87)	(0.040)	(0.012)	(19.55)	(0.049)
6	0.195***	-34.66	0.017	0.007	-27.45	0.035
	(0.020)	(21.03)	(0.046)	(0.014)	(33.11)	(0.058)
7	0.170***	-37.79*	-0.077*	-0.016	-44.90	-0.150***
	(0.025)	(22.50)	(0.045)	(0.018)	(33.79)	(0.056)
8	0.181***	-18.87	0.021	0.026	14.12	0.113
	(0.0323)	(32.46)	(0.087)	(0.023)	(51.86)	(0.099)
9	0.136***	10.66	0.048	-0.024	17.03	0.055
	(0.047)	(64.54)	(0.101)	(0.033)	(58.20)	(0.105)
Max N	4,919	485	485	4,909	176	176
(Month)	(Month 0)	(Month 2)	(Month 2)	(Month 0)	(Month 2)	(Month 2)
Min N	239	37	37	255	18	18
(Month)	(Month 9)	(Month 9)	(Month 9)	(Month 9)	(Month 9)	(Month 9)

Table 5. Effect of Automatic Enrollment and Active Choice on Wage Advance Rates and Amounts, Experiment 1

This table presents how much higher the opt-out arm is relative to the opt-in arm, or the active choice arm relative to the opt-in arm, in the variable shown in the column header, by month since joining Wagestream. Standard errors are shown in parentheses. The wage advance rate is the fraction of members taking one or more wage advances in a given month. Sample sizes for wage advance amounts and wage advance shares differ slightly because wage advances may appear in a different month than the corresponding paycheck. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership. Sample sizes vary by month; the last two rows report the largest and smallest sample size observed in the column, along with the month in which those sample sizes were observed. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

	Opt-Out			Active Choice		
	Wage Advance Usage Rate	Mean Positive Wage Advance Amount	Mean Positive Advance Share of Next Paycheck	Wage Advance Usage Rate	Mean Positive Wage Advance Amount	Mean Positive Advance Share of Next Paycheck
Month	(1)	(2)	(3)	(4)	(5)	(6)
0	0.012	1.62	-0.009	0.015	9.88	-0.006
	(0.012)	(8.95)	(0.007)	(0.012)	(9.65)	(0.008)
1	0.030**	-10.28	-0.005	0.011	0.12	0.004
	(0.015)	(10.58)	(0.006)	(0.015)	(10.71)	(0.006)
2	0.024	0.92	-0.001	0.004	27.55**	0.016**
	(0.016)	(13.17)	(0.007)	(0.016)	(13.96)	(0.007)
3	0.032*	-8.53	-0.003	0.006	4.109	0.013*
	(0.018)	(13.82)	(0.007)	(0.018)	(14.42)	(0.008)
4	0.020	2.411	0.000	-0.001	18.26	0.012
	(0.021)	(17.91)	(0.009)	(0.021)	(17.49)	(0.009)
5	0.000	13.63	-0.007	-0.012	23.22	-0.005
	(0.024)	(21.62)	(0.011)	(0.024)	(23.67)	(0.011)
6	0.003	12.04	-0.004	-0.002	25.87	-0.003
	(0.027)	(26.51)	(0.013)	(0.026)	(25.72)	(0.0123)
7	-0.007	19.03	0.003	-0.012	48.06	0.018
	(0.032)	(30.84)	(0.017)	(0.032)	(34.10)	(0.017)
8	-0.001	51.52	0.010	-0.025	41.28	0.002
	(0.044)	(61.74)	(0.028)	(0.042)	(63.80)	(0.028)
9	-0.052	-11.17	0.005	-0.025	-31.58	-0.030
	(0.059)	(75.83)	(0.039)	(0.058)	(87.60)	(0.039)
Max N	4,914	1,799	1,854	4,909	1,739	1,812
(Month)	(Month 0)	(Month 1)	(Month 1)	(Month 9)	(Month 1)	(Month 1)
Min N	239	69	69	255	77	75
(Month)	(Month 9)	(Month 9)	(Month 9)	(Month 9)	(Month 9)	(Month 9)

Table 6. Summary Statistics, Experiment 2

This table presents summary statistics for the 3,605 SUEZ employees who are included in our analyses. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.

	Pre-AE (Nov 2020 – Oct 2021 hires)	Post-AE (Nov 2021 – Aug 2023 hires)	Difference	*p*-value of difference
Mean nominal starting pay (annualized)[1,2]	£23,992	£26,313	£2,321	0.000
Mean inflation-adjusted starting pay (annualized)[3]	£23,603	£23,441	-£162	0.501
Mean pay, Nov 2021 – Aug 2023 (annualized)	£25,829	£26,970	£1,141	0.000
Female	13.8%	13.7%	-0.1%	0.934
Age[4]				
30 or under	34.0%	33.8%	-0.3%	0.882
31-50	33.6%	34.6%	1.0%	0.555
51 +	32.4%	31.6%	-0.7%	0.652
Manual position[5]	82.4%	79.1%	-3.3%	0.020
Total employees[6]	1,164	2,441		
Employees observed in				
Tenure month 0	1,164	2,441		
Tenure month 1	1,158	2,311		
Tenure month 2	1,083	2,055		
Tenure month 3	1,002	1,803		
Tenure month 4	956	1,585		
Tenure month 5	910	1,422		
Tenure month 6	875	1,261		
Tenure month 7	819	1,127		
Tenure month 8	786	978		
Tenure month 9	764	886		
Tenure month 10	726	783		
Tenure month 11	702	687		
Tenure month 12	674	596		

Tenure month 13	654	523
Tenure month 14	636	445
Tenure month 15	608	391
Tenure month 16	587	313
Tenure month 17	573	258
Tenure month 18	561	200
Tenure month 19	551	138
Tenure month 20	539	86
Tenure month 21	524	50
Tenure month 22	516	0
Tenure month 23	467	0
Tenure month 24	380	0
Tenure month 25	326	0
Tenure month 26	274	0
Tenure month 27	220	0
Tenure month 28	175	0
Tenure month 29	144	0
Tenure month 30	113	0
Tenure month 31	80	0
Tenure month 32	53	0
Tenure month 33	36	0

[1] We observe annual pay for some workers and hourly pay for others. We also observe scheduled hours per week for most workers. We calculate annualized pay for hourly workers with observed schedules by computing their hourly rate × scheduled hours per week × 52. When calculating annualized pay, we drop hourly workers with zero or unobserved scheduled hours per week. [2] Our pay data are right-censored; employees with observed pay at or above £50,271 are binned together by Nest Insight. Employees with calculated annualized pay at or above this threshold are grouped into the same bin. As a result, the means reported here (which are computed assigning £50,271 to right-censored employees) are lower than the true means. [3] Values are adjusted to January 2021 GBP using the CPIH. [4] We receive age as a categorical variable, so we cannot calculate a mean. [5] A small number of individuals appear to change between manual and non-manual positions. We drop these individuals when calculating the share in manual positions. [6] We include counts of employees in each cohort for each tenure month. We have more months of data from the employer than from the credit union, and as a result we use only a subset of the available data for some analyses.

Table 7. Effect of Automatic Enrollment on Participation Rates and Savings Accumulation, Experiment 2

This table presents how much higher the post-AE cohort is relative to the pre-AE cohort in the variable shown in the column header at selected months after hire. Standard errors are shown in parentheses. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings, from November 1, 2020, to October 31, 2021. The Post-AE cohort contains employees hired between November 1, 2021, and August 31, 2023. The participation rate is the fraction of employees with a positive balance in or positive elected contribution to their payroll savings scheme. Tenure month 0 is the month of hire. Employee are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. Sample sizes vary by month; the last two rows report the largest and smallest sample size observed in the column, along with the month in which those sample sizes were observed. Column (3) limits the sample to those with a positive balance in the month. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Month	Participation Rate (1)	Mean Balance (2)	Mean Balance, Conditional on Positive Balance (3)
3	0.450***	41.58***	70.15*
	(0.033)	(4.41)	(35.83)
6	0.478***	85.93***	158.32***
	(0.023)	(5.63)	(44.77)
9	0.461***	106.72***	172.62***
	(0.021)	(6.65)	(54.24)
12	0.490***	142.40***	256.55***
	(0.021)	(8.71)	(81.33)
15	0.481***	177.60***	287.40**
	(0.021)	(11.55)	(110.76)
18	0.433***	162.44***	324.19***
	(0.023)	(11.68)	(118.36)
Max N (Month)	1,924 (Month 3)	1,924 (Month 3)	787 (Month 3)
Min N (Month)	698 (Month 18)	698 (Month 18)	66 (Month 18)

Table 8. Effect of Automatic Enrollment on Withdrawal Rates, Withdrawal Amounts, and Total Savings Rate, Experiment 2

This table presents how much higher the post-AE cohort is relative to the pre-AE cohort in the variable shown in the column header at selected months after hire. Standard errors are shown in parentheses. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings, from November 1, 2020, to October 31, 2021. The Post-AE cohort contains employees hired between November 1, 2021, and August 31, 2023. The withdrawal rate is the fraction of employees with a positive balance in or contribution to their savings pot who took one or more withdrawals in a given month. Approximately 4% of withdrawals observed in our data appear to exceed the available balance due to accounting delays. In such cases, we divide the withdrawal by the available balance plus the withdrawal to calculate the share of balance withdrawn. The pension participation rate is the fraction of employees contributing to their pension. The total savings rate represents the combined short-term and pension savings rate as a share of salary, for employees with observed annual salaries below £50,271. Tenure month 0 is the month of hire. Employee are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. Sample sizes vary by month; the last two rows report the largest and smallest sample size observed in the column, along with the month in which those sample sizes were observed. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level. Standard errors are shown in parentheses.

Month	Withdrawal Rate (1)	Mean Positive Withdrawal Amount (2)	Mean Positive Withdrawal Share of Balance (%) (3)	Pension Participation Rate (4)	Total Savings Share of Salary (%) (5)
3	-0.113	25.18	-18.669	0.011	1.265***
	(0.173)	(95.92)	(24.853)	(0.016)	(0.136)
6	-0.115	-2.27	-11.545	0.029	0.908***
	(0.144)	(146.89)	(18.627)	(0.018)	(0.165)
9	-0.105	26.23	-7.314	-0.013	0.807***
	(0.142)	(133.12)	(13.056)	(0.020)	(0.185)
12	-0.131	8.68	12.204	-0.020	1.090***
	(0.155)	(79.88)	(14.419)	(0.023)	(0.211)
15	-0.164	147.69	-11.192	-0.030	0.871***
	(0.150)	(132.58)	(13.929)	(0.026)	(0.235)
18	0.009	90.28	16.065	0.040	1.166***
	(0.185)	(127.42)	(22.622)	(0.031)	(0.267)
Max N	798	110	110	2,805	2,510
(Month)	(Month 3)	(Month 3)	(Month 3)	(Month 3)	(Month 3)
Min N	68	20	20	761	699
(Month)	(Month 18)	(Month 18)	(Month 18)	(Month 18)	(Month 18)

**Figure 1. Participation Rate in and Fraction Contributing to Savings Pot, Experiment 1**
Within each trial arm and membership month, we display the participation rate (the fraction of Wagestream members with a positive balance in or contribution to their savings pot) and the fraction of Wagestream members who made a contribution to the savings pot. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
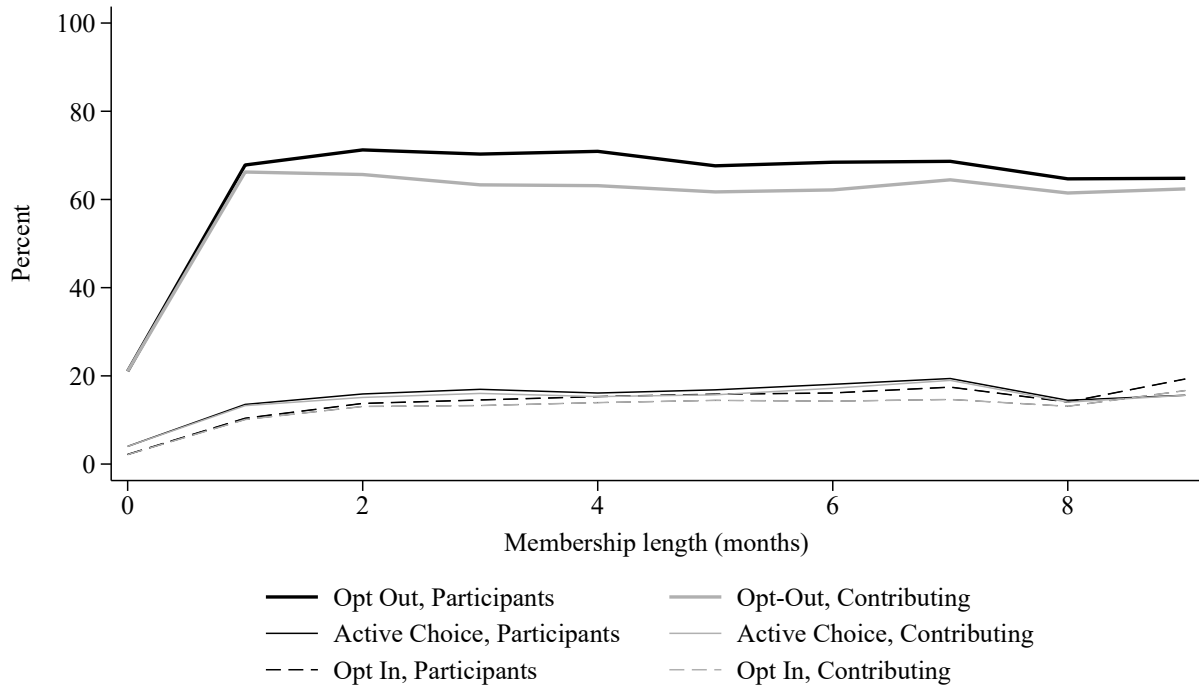
Figure 2. Participation Rate in and Fraction Contributing to Savings Pot by Employer, Experiment 1

Within each trial arm, membership month, and employer, we display the participation rate (the fraction of Wagestream members with a positive balance in or contribution to their savings pot) and the fraction of Wagestream members who made a contribution to the savings pot. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
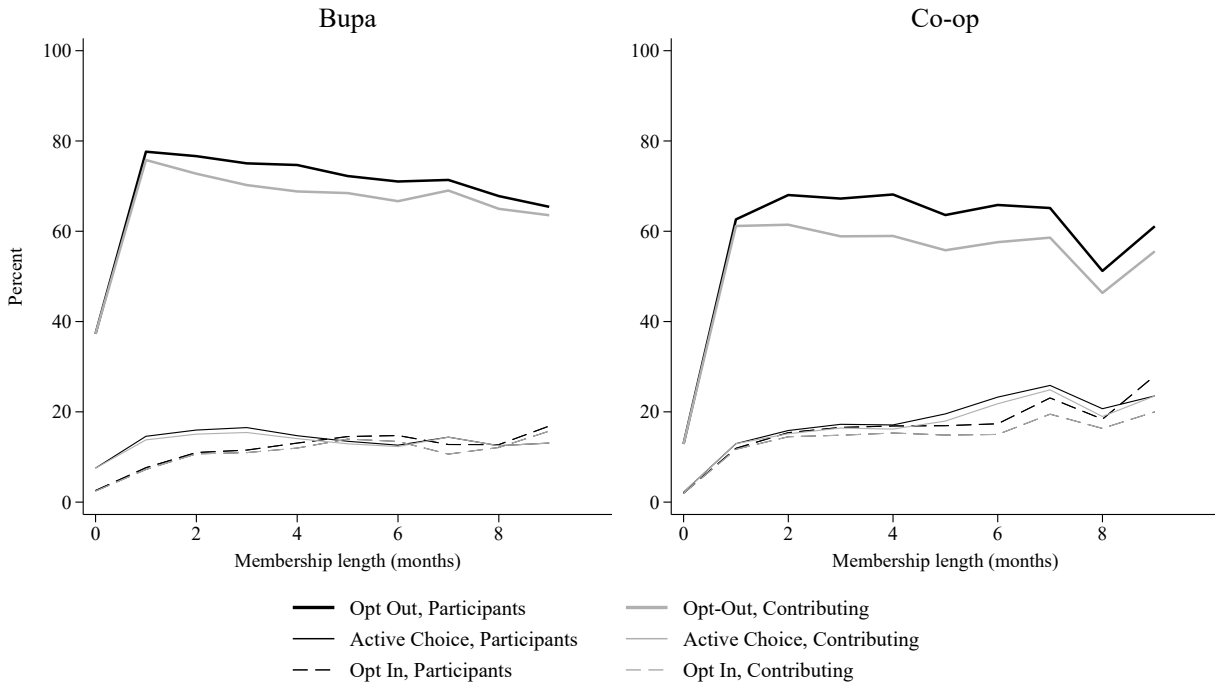
Figure 3. Participation Rate in and Fraction Contributing to Savings Pot by Hourly Wage Tercile, Experiment 1

For each trial arm, membership month, and hourly wage tercile, we display the participation rate (the fraction of Wagestream members with a positive balance in or contribution to their savings pot) and the fraction of Wagestream members who made a contribution to the savings pot. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or other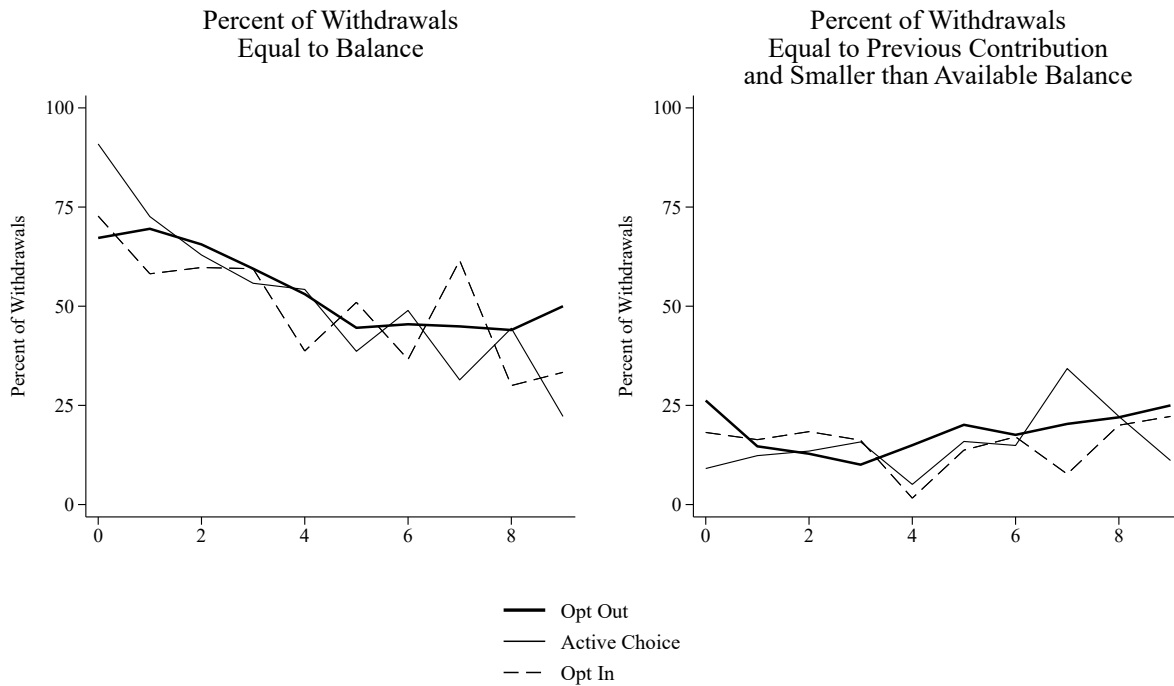wise ended their Wagestream membership. Hourly wage data are only available for Bupa, so we exclude Co-op members from this analysis.
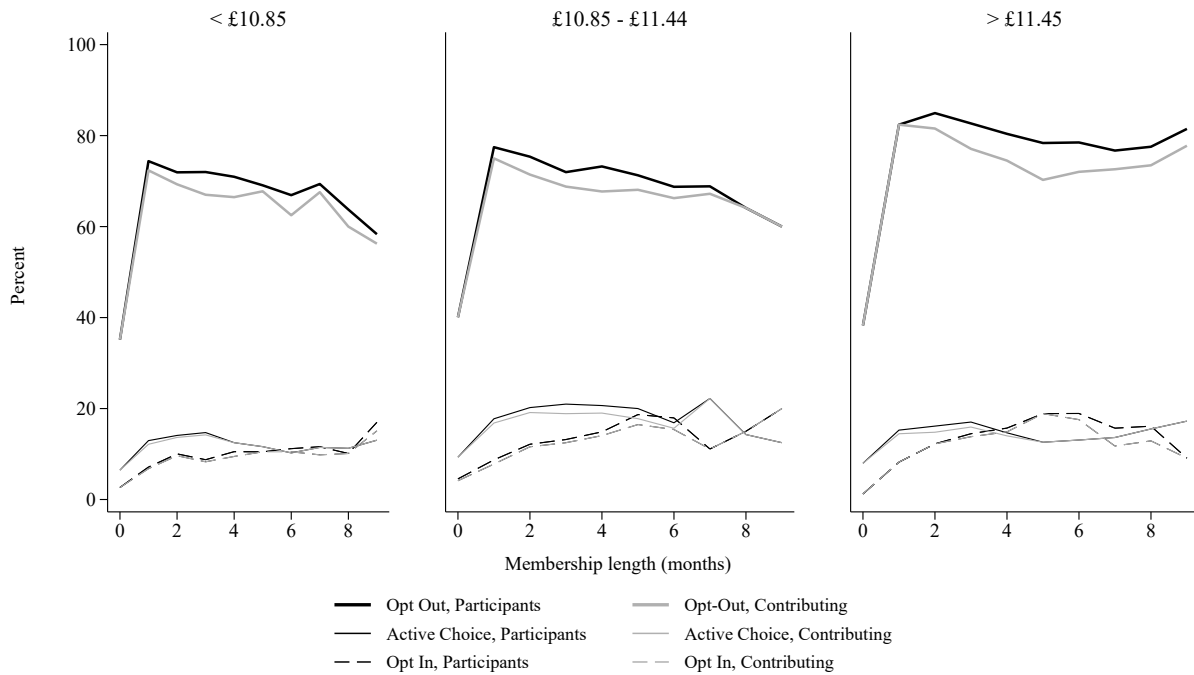
Figure 4. Savings Balances, Experiment 1

For each trial arm and month of membership, we report mean savings pot balances for all members (including those who are not saving, whom we assign a balance of £0). Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
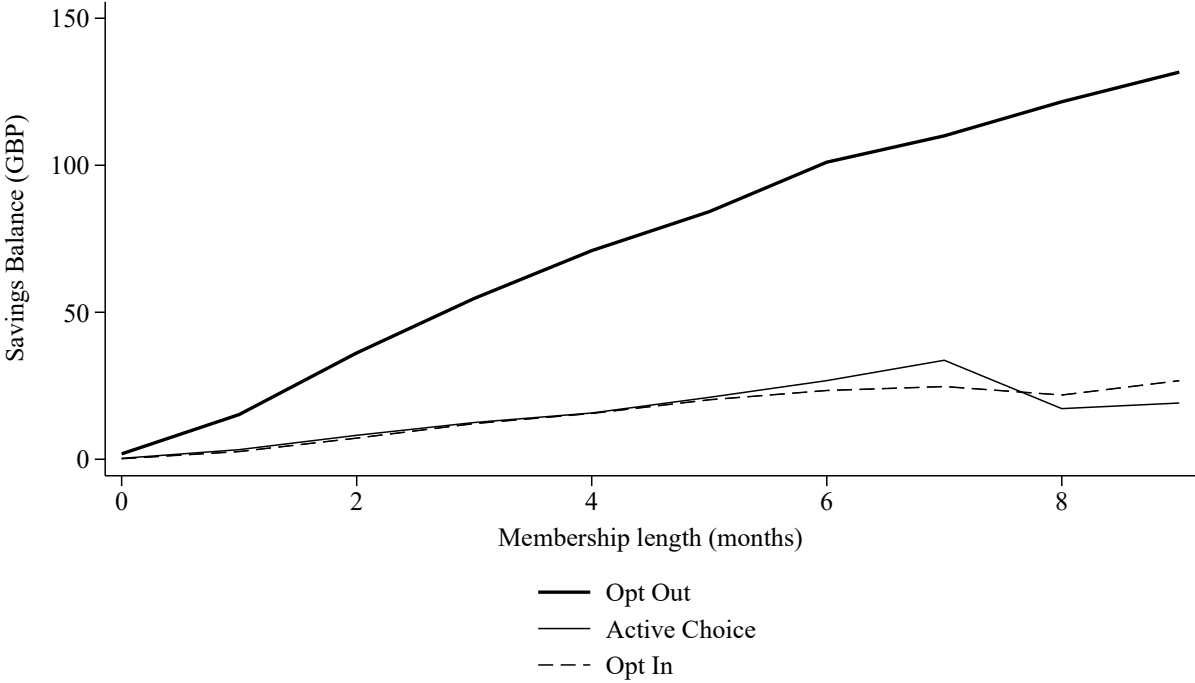
Figure 5. Savings Balances Conditional on Saving, Experiment 1
For each trial arm and month of membership, we report the mean, 10th percentile, 25th percentile, median, 75th percentile, and 90th percentile of short-term savings balances for all members with a positive balance at a given month. Membership month 0 is the month the individual joined Wagestream. An individual is included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
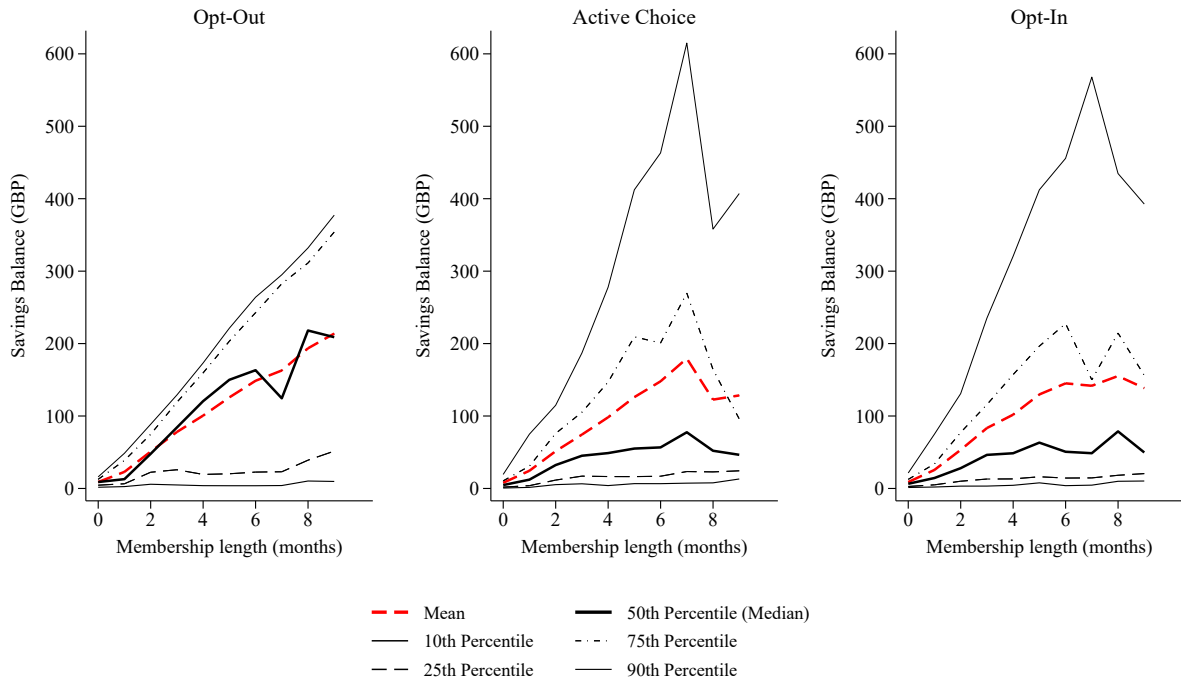
Figure 6. Contribution Amounts, Experiment 1

For each trial arm and month of membership, we report mean and median short-term savings contribution amounts, conditional on having a positive contribution. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
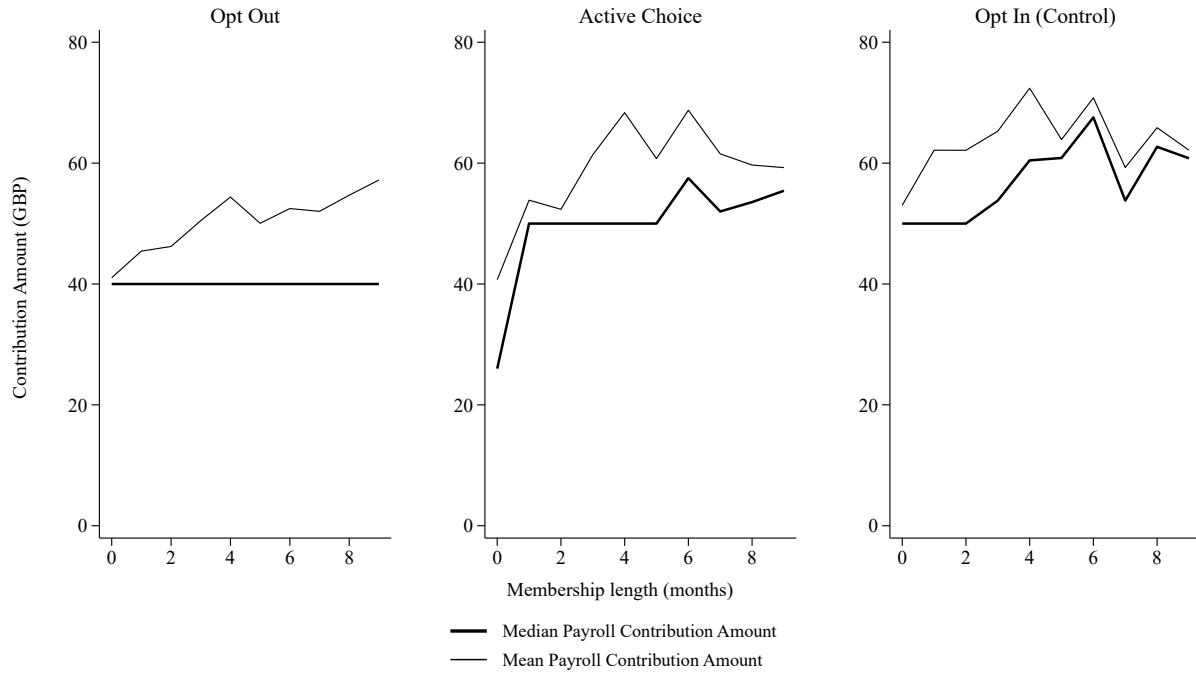
Figure 7. Withdrawal Rates, Experiment 1
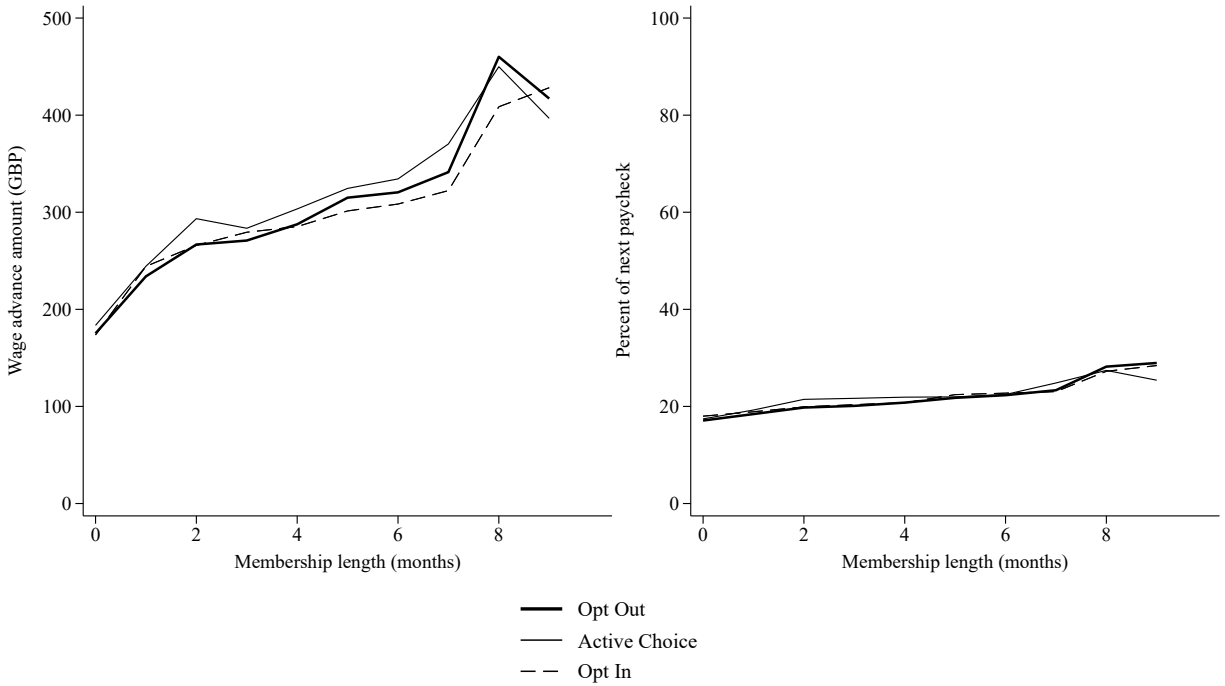For each trial arm and month of membership, we divide the number of members taking one or
more withdrawals in a given month by the number of members with a positive balance in and/or
payroll contribution to their short-term savings account. Membership month 0 is the month the
individual joined Wagestream. Individuals are included at a given membership month if they
joined early enough to be observed at that horizon and had not separated from employment or
otherwise ended their Wagestream membership.
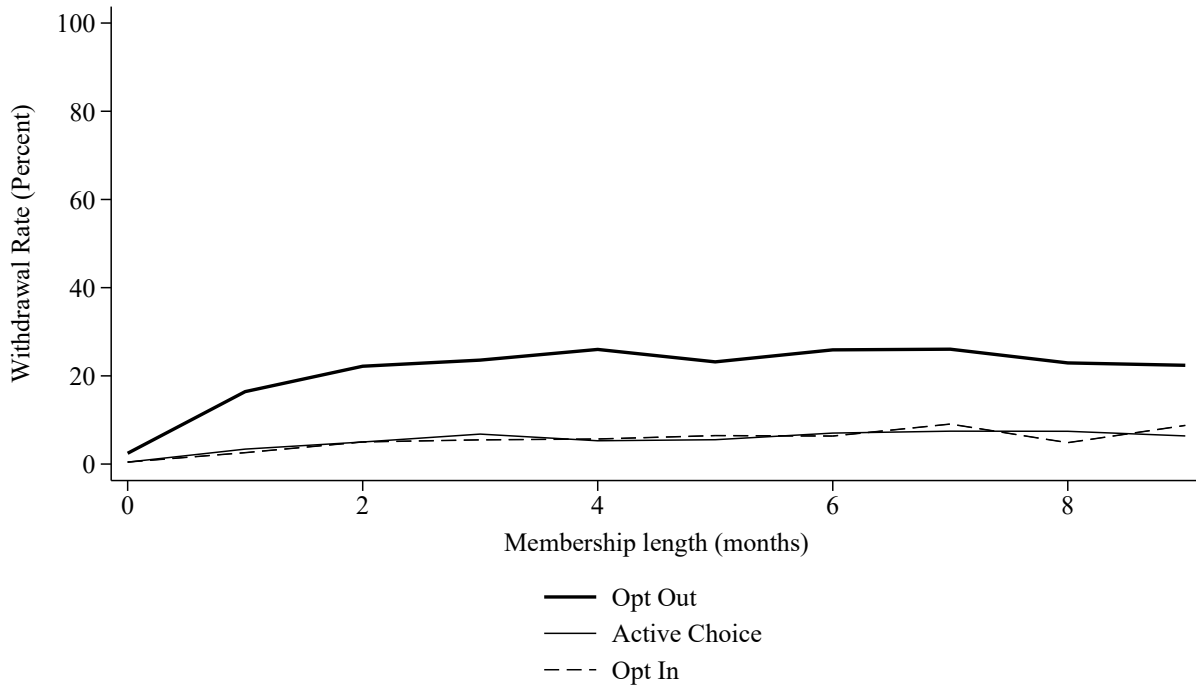
Figure 8. Withdrawal Amount, Experiment 1

For each trial arm and membership month, we report the mean withdrawal size in GBP and as a share of the account's balance, conditional on taking a withdrawal. Multiple withdrawals made by an individual in a single month are combined. When determining the account's balance in a month, we add all contributions made during the month to the starting balance. Membership month 0 is the month the individual joined Wagestream.
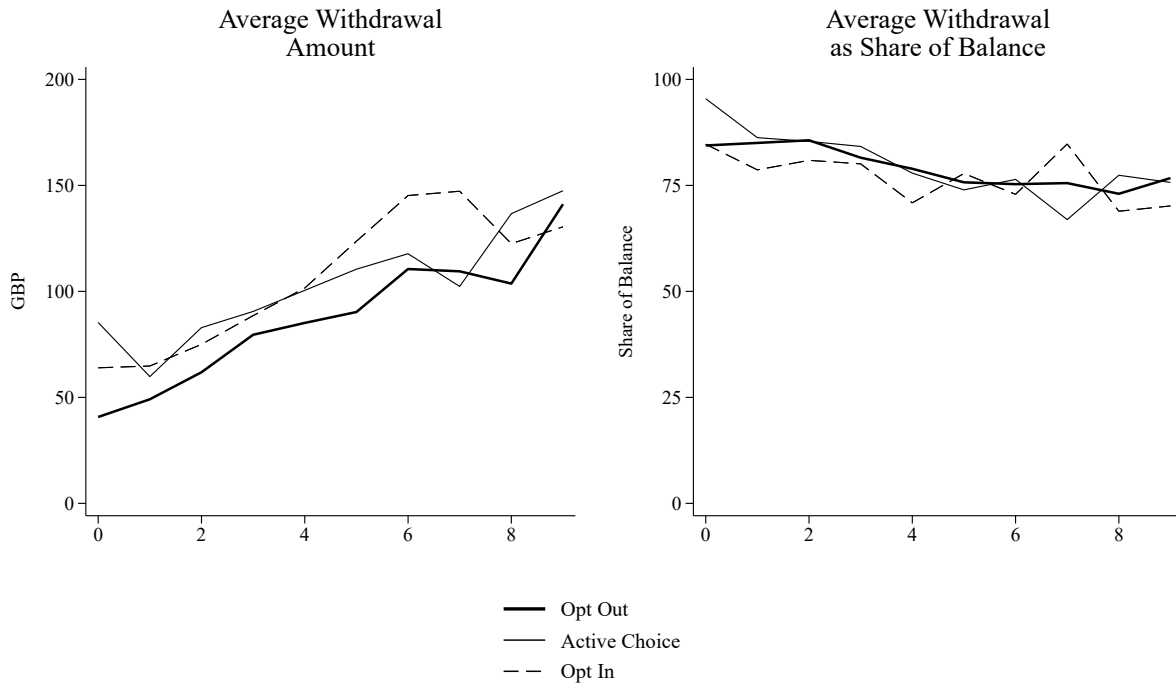
Figure 9. Withdrawals Equal to Balance and/or Previous Contribution, Experiment 1

For each trial arm and membership month, we show the percentage of withdrawals that are approximately equal to (between 95% and 100% of) the account balance and the percentage of withdrawals that are approximately equal to (between 95% and 100% of) the previous contribution and less than 95% of the available balance. Multiple withdrawals made by an individual in a single month are combined. When determining the account's balance, we add the starting balance to all contributions made during the month. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.


Percent of Withdrawals Equal to Balance

Percent of Withdrawals Equal to Previous Contribution and Smaller than Available Balance

Opt Out
Active Choice
Opt In

Figure 10. Wage Advance Utilization Rate, Experiment 1
For each trial arm and month of membership, we divide the number of members using the wage advance product in a given month by the number of members. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
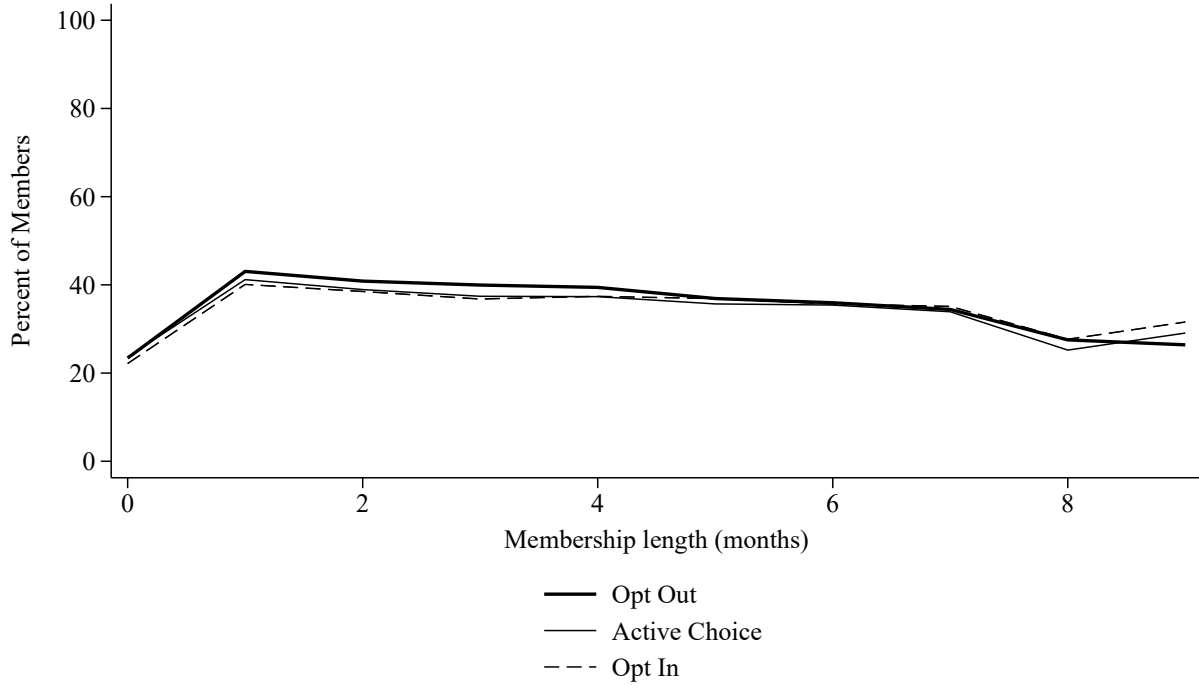
Figure 11. Wage Advance Behavior Conditional on Using, Experiment 1
For each trial arm and month of membership, we report the average wage advance amount and the average share of the next paycheck taken in advance, conditional on taking a wage advance. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.

Figure 12. Percentage of Wage Advances Exceeding Savings Pot Balance, Experiment 1
For each trial arm and month of membership, we report the percent of wages advances that are larger than the member's available savings pot balance. Multiple advances taken in a single month are aggregated. Membership month 0 is the month the individual joined Wagestream. Individuals are included at a given membership month if they joined early enough to be observed at that horizon and had not separated from employment or otherwise ended their Wagestream membership.
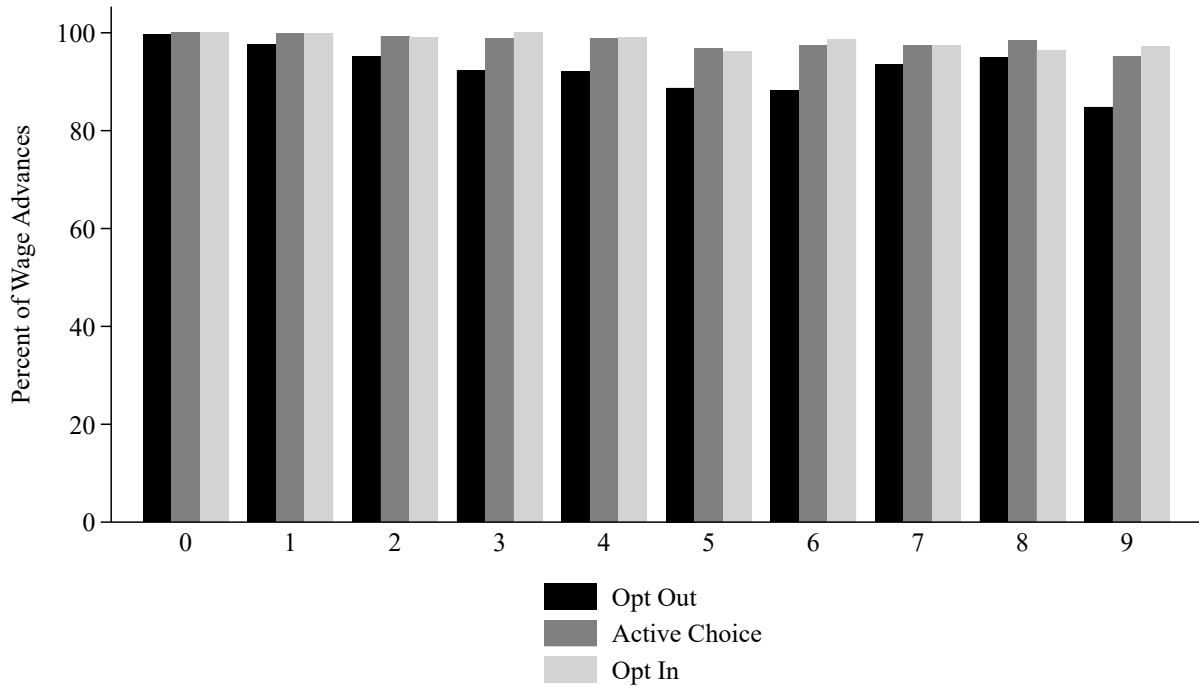
Figure 13. Short-Term Savings Participation Rates, Experiment 2

For each hire cohort and tenure month, we divide the number of employees with a positive balance in or a positive elected payroll contribution to their short-term savings account by the number of eligible employees. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings, from November 1, 2020, to October 31, 2021. The Post-AE cohort contains employees hired between November 1, 2021, and August 31, 2023. Tenure month 0 is the month of hire. Employee are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.
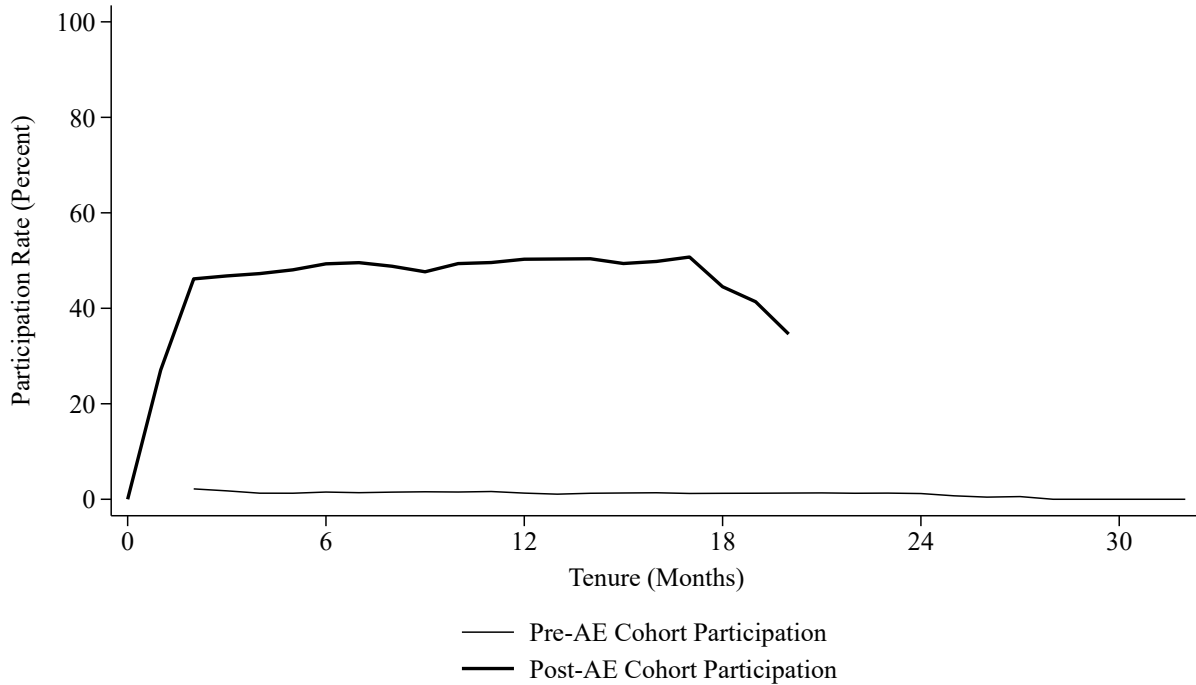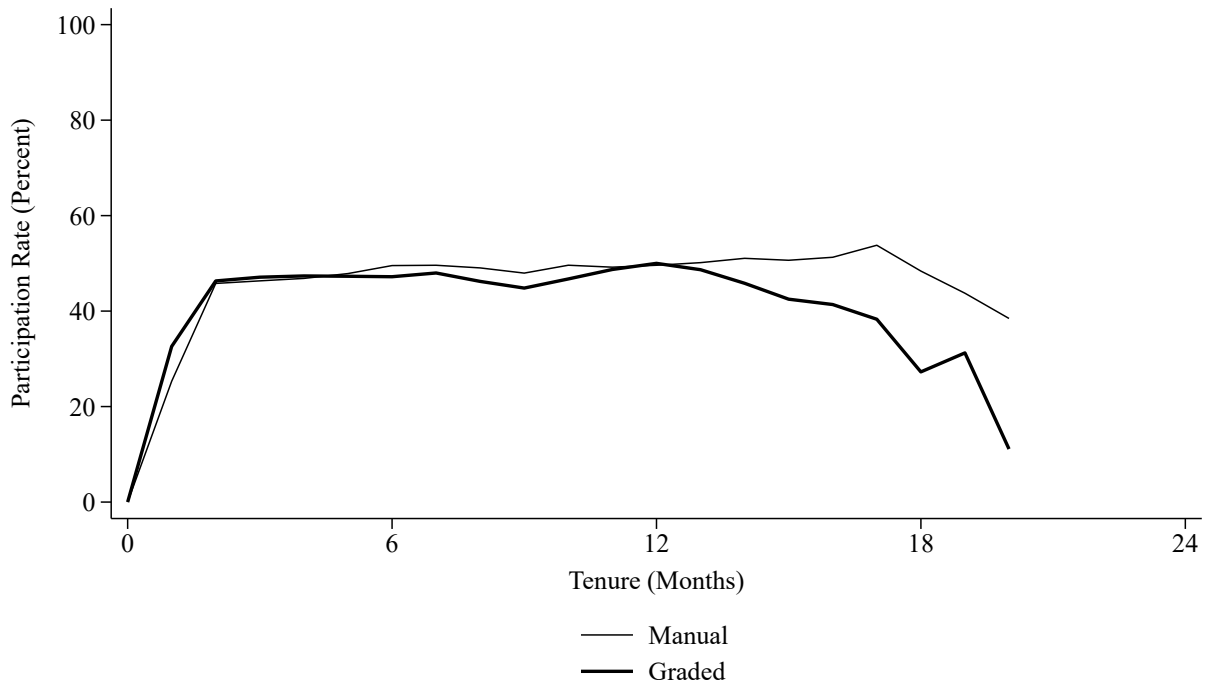
Figure 14. Short-Term Savings Participation Rates by Gender, Post-AE Cohort, Experiment 2

For employees hired between November 1, 2021, and August 31, 2023, and for each gender and tenure month, we divide the number of employees with a positive balance in or payroll contribution to their short-term savings account by the number of eligible employees. Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. We exclude individuals with missing gender data or with a reported gender other than male or female.
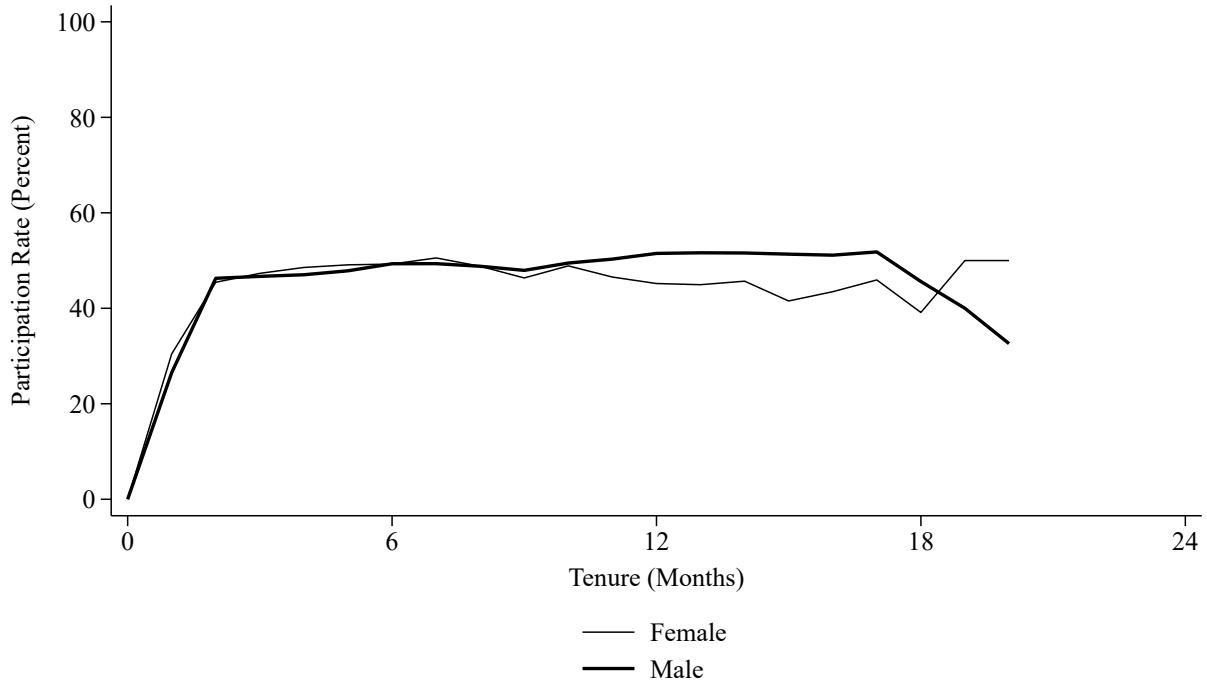
Figure 15. Short-Term Savings Participation Rates by Age, Post-AE Cohort, Experiment 2
For employees hired between November 1, 2021, and August 31, 2023, and for each age band and tenure month, we divide the number of employees with a positive balance in or payroll contribution to their short-term savings account by the number of eligible employees. Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. We exclude individuals with missing age data. We sort based on the first non-missing age value for each employee.
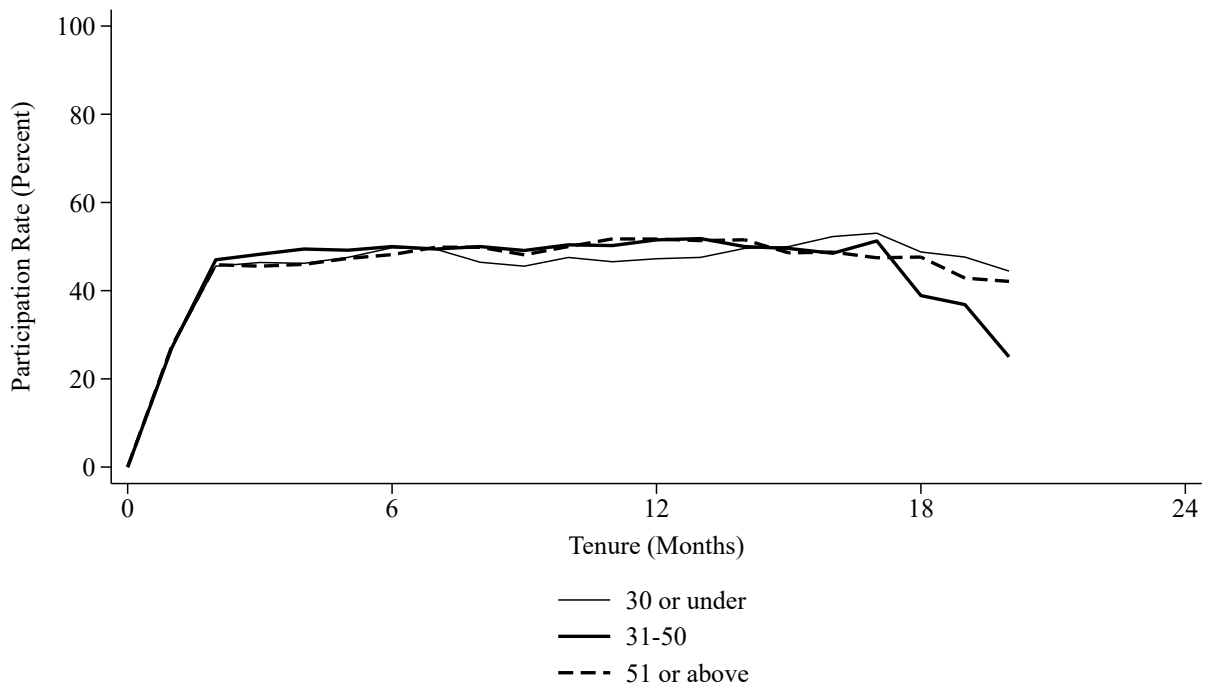
Figure 16. Short-Term Savings Participation Rates by Role, Post-AE Cohort, Experiment 2
For employees hired between November 1, 2021, and August 31, 2023, and for each role type and tenure month, we divide the number of employees with a positive balance in or payroll contribution to their short-term savings account by the number of eligible employees. Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. In general, manual roles are more likely to be field-based and hourly; graded roles are more likely to be office-based and salaried. We exclude individuals with missing role data, as well as the few individuals who alternate between manual and graded roles.

Figure 17. Short-Term Savings Participation Rates by Annualized Starting Pay, Post-AE Cohort, Experiment 2

For employees hired between November 1, 2021, and August 31, 2023, and for each tercile of annualized starting pay and tenure month, we divide the number of employees with a positive balance in or payroll contribution to their short-term savings account by the number of eligible employees. Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. We observe annual pay for some workers and hourly pay for others. We also observe scheduled hours per week for most workers. We calculate annualized pay for hourly workers with observed schedules by computing their hourly rate × scheduled hours per week × 52. We drop hourly workers with zero or unobserved scheduled hours per week.
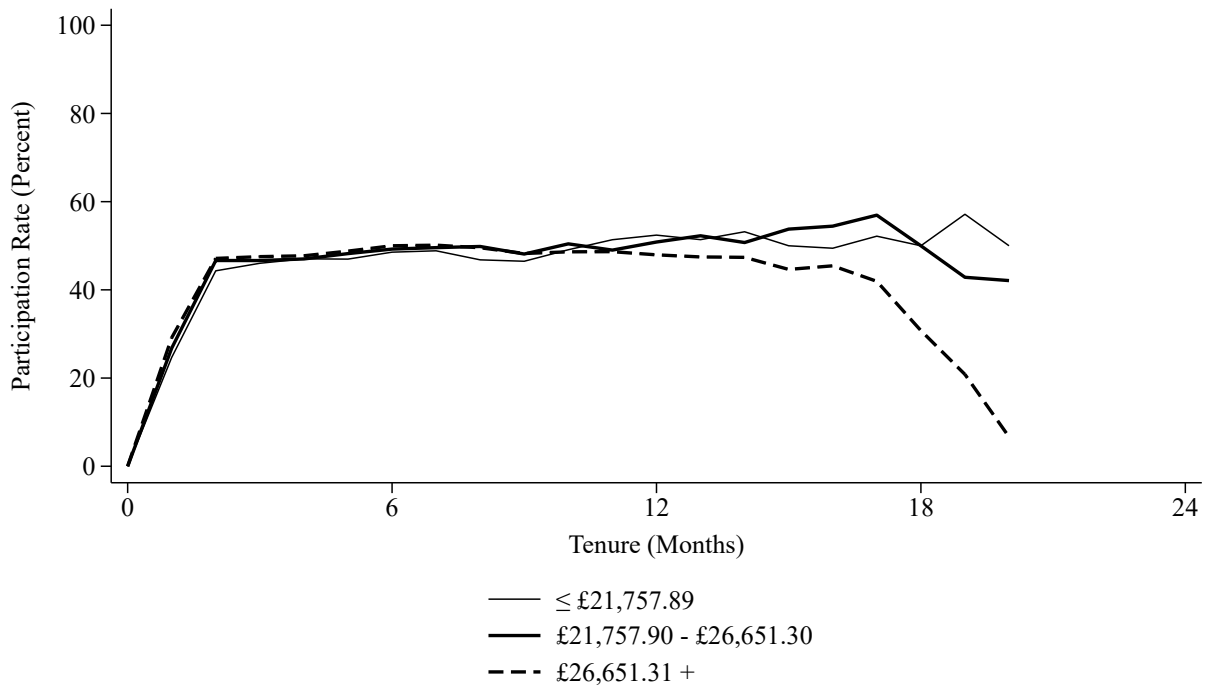
**Figure 18. Savings Balances, Experiment 2**

For each hire cohort and tenure month, we show mean and median short-term savings balances across all employees (including those who are not saving). The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.
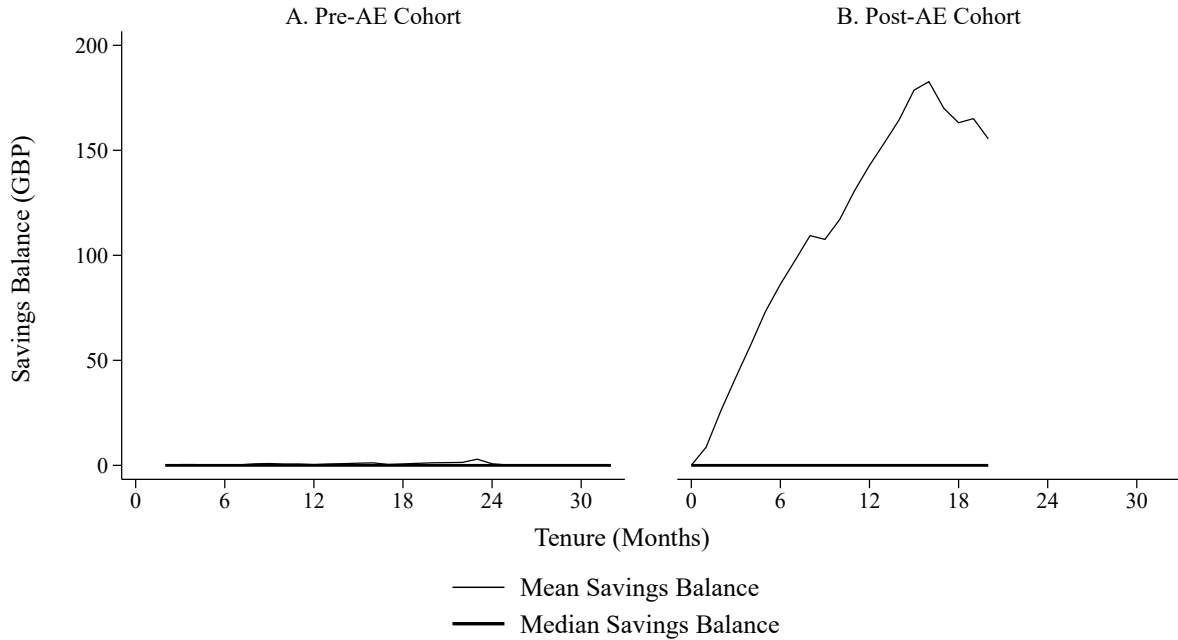
Figure 19. Savings Balances Conditional on Saving, Experiment 2

For each hire cohort and tenure month, we report the mean, 10th percentile, 25th percentile, median, 75th percentile, and 90th percentile of short-term savings balances for all employees with a positive balance in the month. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.
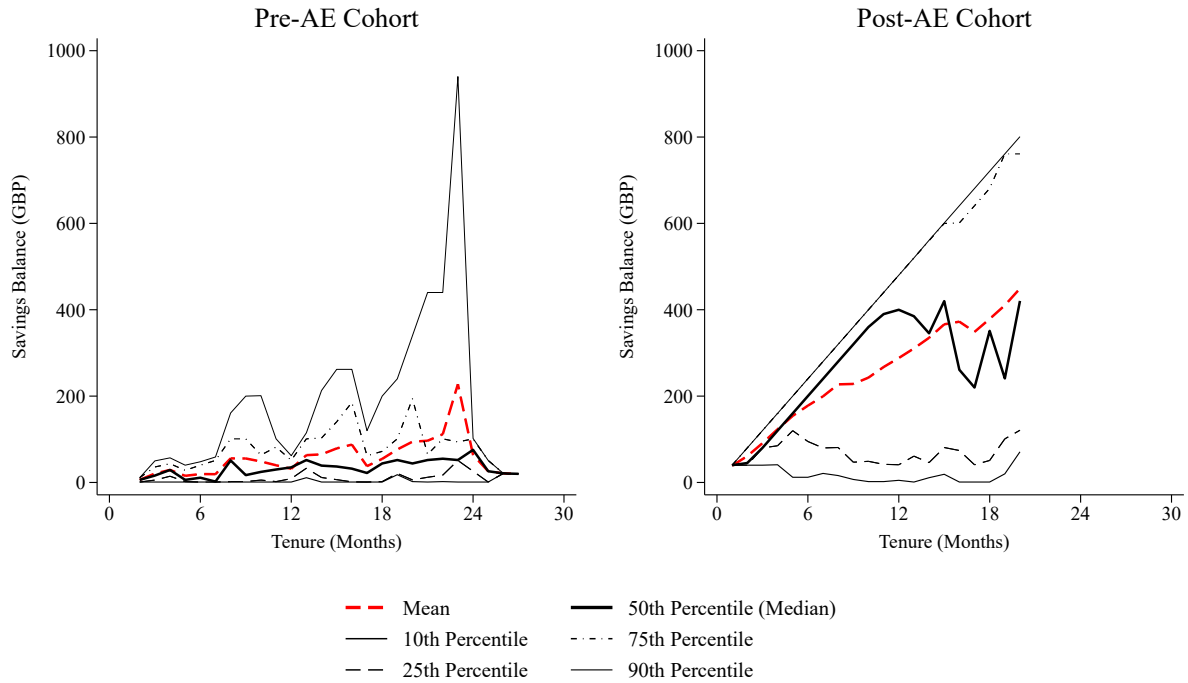
Figure 20. Elected Contribution Amounts, Experiment 2

For each hire cohort and tenure month, we show mean and median elected short-term savings contribution amounts, conditional on having a positive contribution. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.
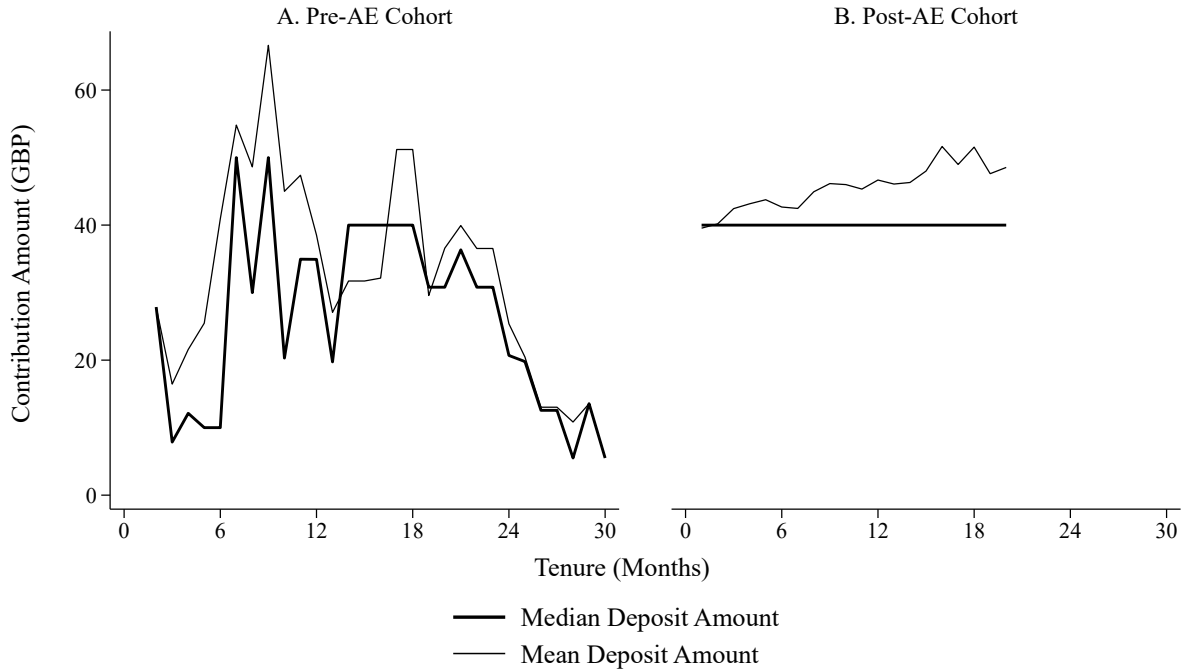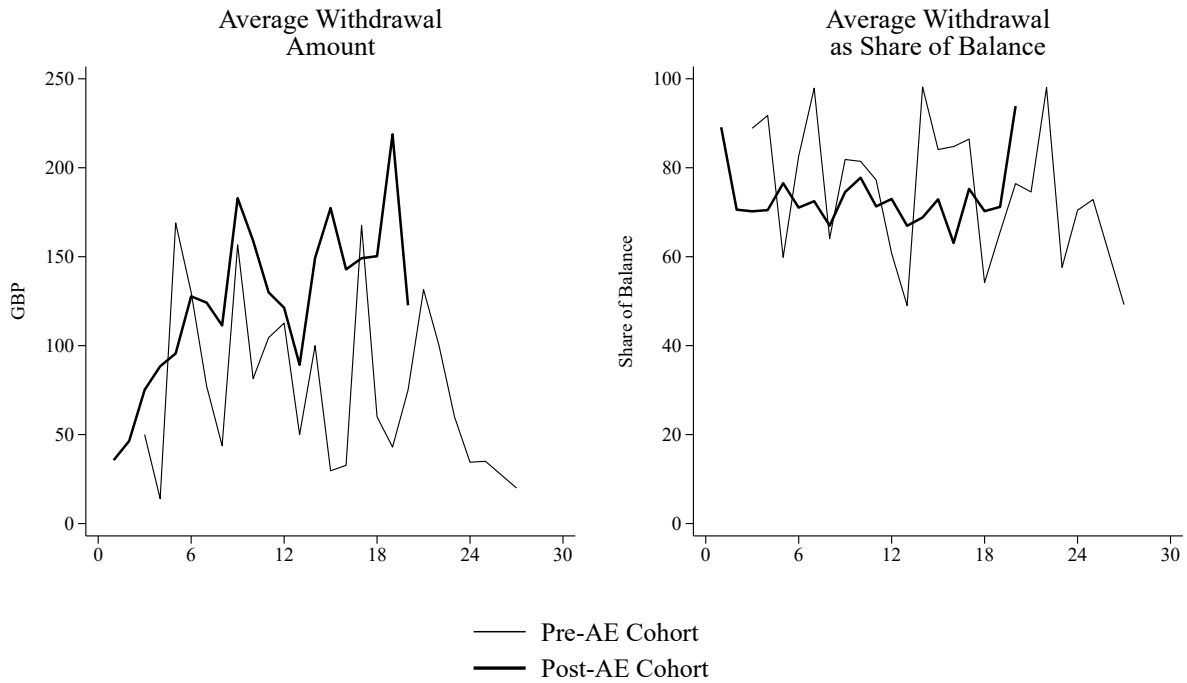
Figure 21. Withdrawal Rates, Experiment 2

For each hire cohort and tenure month, we divide the number of employees taking one or more withdrawals in a given month by the number of employees with a positive balance in or payroll contribution to their short-term savings account in that month. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.
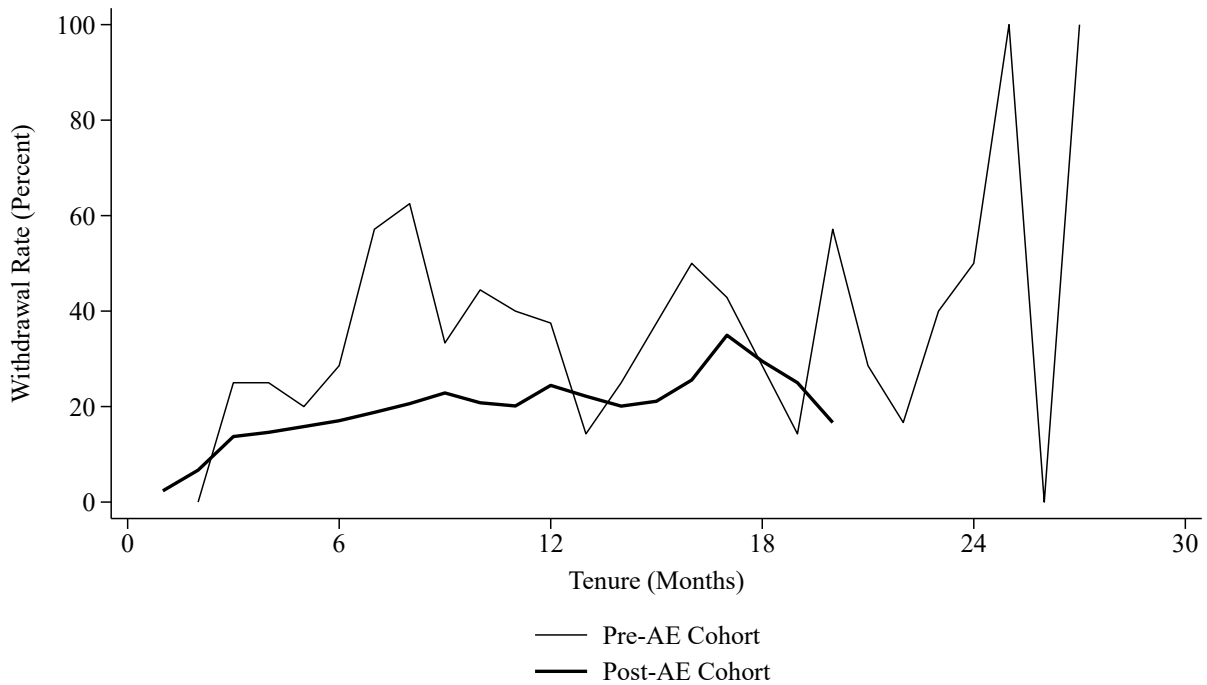
Figure 22. Withdrawal Amount, Experiment 2
For each hire cohort and tenure month, we report the mean positive withdrawal size in GBP and as a share of the account's balance. Multiple withdrawals made in a single month are aggregated. When determining the account's balance, we add to the starting balance all contributions made during the month. Approximately 4% of withdrawals observed in our data appear to exceed the available balance due to accounting delays. In such cases, we divide the withdrawal by the available balance plus the withdrawal to calculate the share of balance withdrawn. Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.

Figure 23. Withdrawals Equal to Balance and/or Previous Contribution, Experiment 2
For each hire cohort and tenure month, we show the percentage of withdrawals that are approximately equal to the account balance (between 95% and 100% of the available balance) and the percentage of withdrawals that are approximately equal to the previous contribution (between 95% and 100% of the previous contribution) and less than 95% of the available balance. Multiple withdrawals made in a single month are aggregated. When determining the account's balance, we add to the starting balance all contributions made during the month. Approximately 4% of withdrawals observed in our data appear to exceed the available balance due to accounting delays. In such cases, we divide the withdrawal by the available balance plus the withdrawal to calculate the share of balance withdrawn. Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.
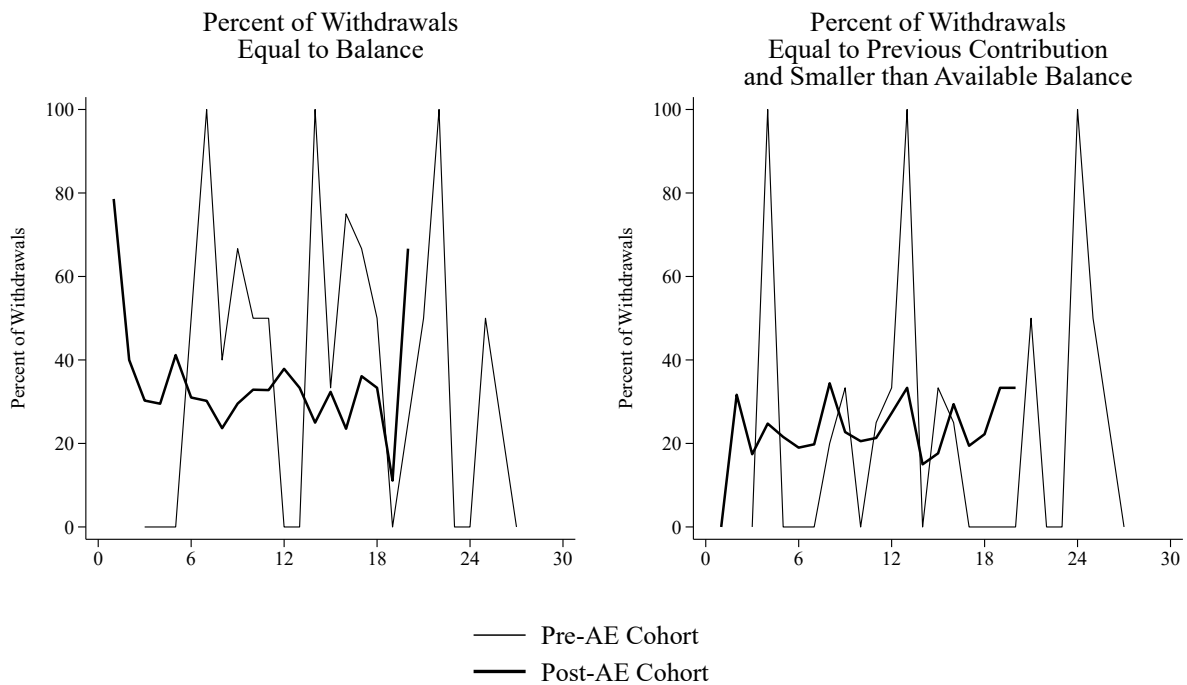
Figure 24. Pension Participation Rates, Experiment 2

For each hire cohort and tenure month, we divide the number of employees with a positive pension contribution by the number of employees. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. July 2022 data are dropped due to data quality concerns.
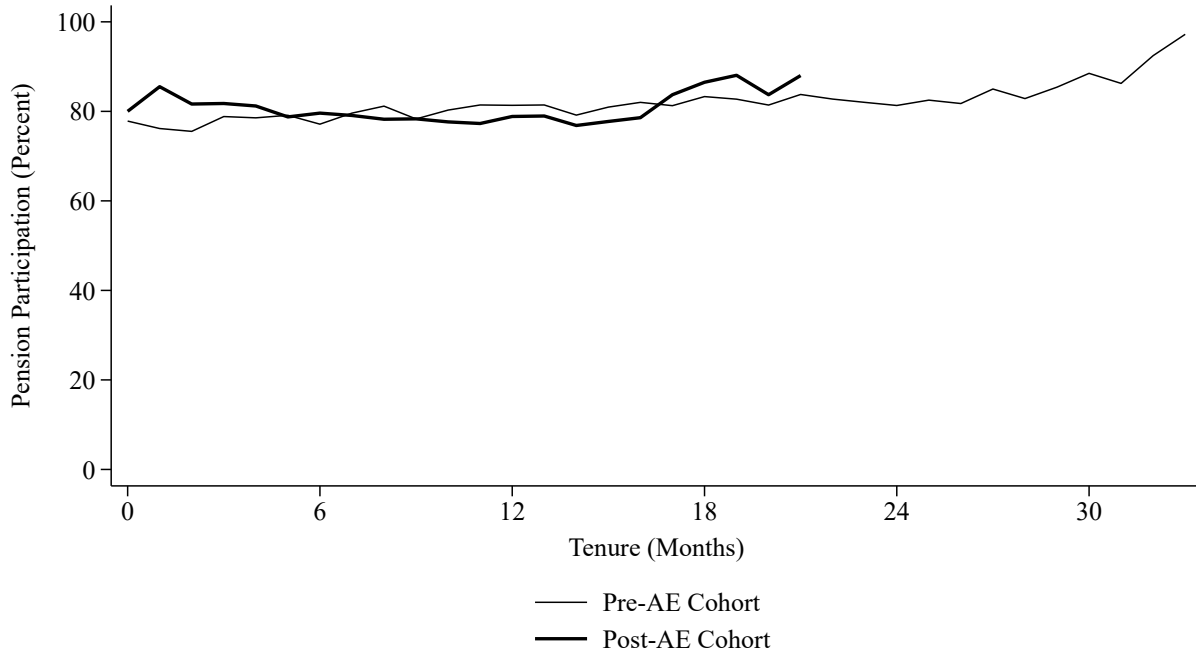
Figure 25. Combined Short-Term and Pension Savings Rates, Experiment 2

For each hire cohort and tenure month, we calculate the average combined short-term and pension savings as a share of salary. We omit employees with right-censored pay (those with annualized pay above £50,270). Our calculation of short-term savings is annualized elected contribution amounts divided by annualized salary. Our calculation of pension savings includes the employer match. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired afterwards (November 1, 2021 – August 31, 2023). Tenure month 0 is the month of hire. Employees are included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated. July 2022 data are dropped due to data quality concerns.
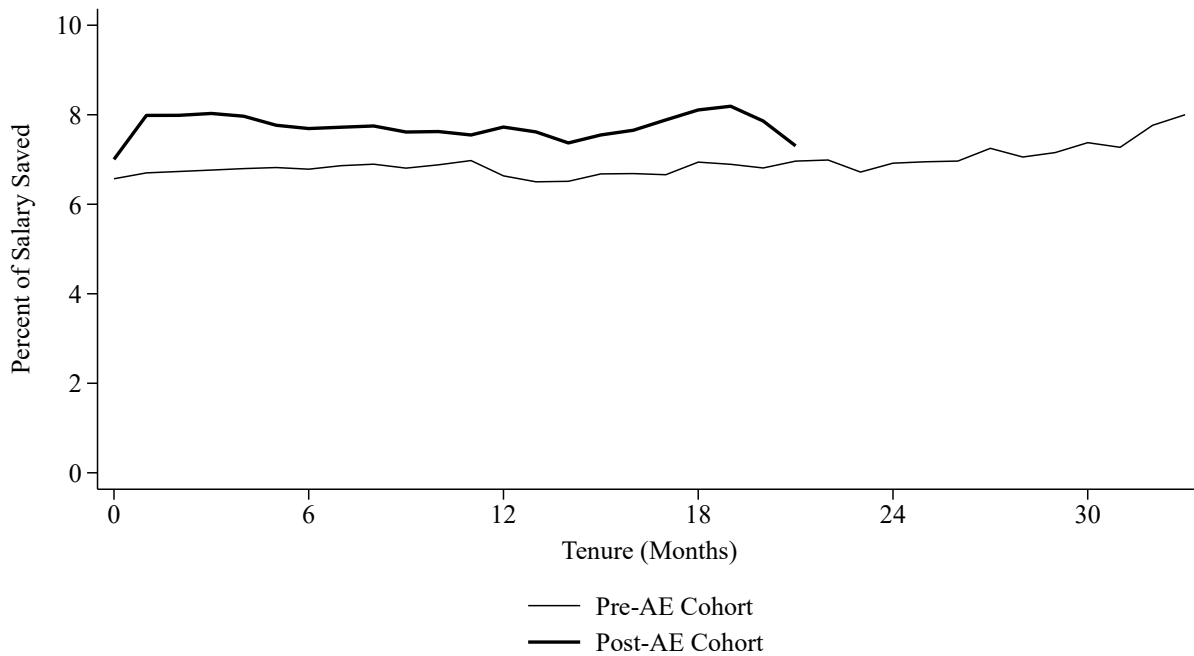
Figure 26. Loan Utilization, Experiment 2

For each hire cohort, we calculate the average amount borrowed from the credit union (left panel) and the average amount borrowed from the credit union, conditional on borrowing (right panel). We restrict our analyses to loans taken in month 0-20. We receive data on the total amount an individual has borrowed, their repayments, and the date and time that the total amount borrowed changed. To calculate the amount borrowed by each individual, we calculate the change in their total amount borrowed by month, then add together the positive changes. The Pre-AE cohort contains employees hired in the 12 months before the introduction of automatic enrollment into short-term savings (November 1, 2020 – October 31, 2021). The Post-AE cohort contains employees hired between November 1, 2021 and August 31, 2023. Tenure month 0 is the month of hire. An employee is included at a given tenure if they were hired early enough to be observed at that horizon and had not yet separated.

Average Amount Borrowed · Average Amount Borrowed Conditional on Borrowing