

WHAT CAN WE LEARN ABOUT AUTOMATIC ENROLLMENT INTO PENSIONS FROM SMALL EMPLOYERS?

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Small employers employ significant fractions of the workforce, but their employees typically have very low pension plan participation rates and so are much more likely to be affected by government policies requiring automatic enrollment. We examine the first nationwide policy in the United Kingdom obliging small employers to enroll employees automatically into a pension. Exploiting pseudorandom variation in its introduction, we find automatic enrollment increased pension participation by 44 percentage points, reaching 70 percent — still substantially lower than the 90 percent rate among those working for the largest employers. We discuss evidence for the potential mechanisms that drive this lower participation rate.

Keywords: automatic enrollment, nonwage benefits, private pensions, small employers

JEL Codes: D14, J32, J38

I. INTRODUCTION

Automatic enrollment into private pensions is an increasingly common way of inducing workers to save more for their retirement. In 2012, the United Kingdom was the first country to introduce a nationwide policy that obliges employers to enroll their employees into a workplace pension. In the United States, increasing numbers of states — specifically California, Colorado, Connecticut, Illinois, Maryland, New Jersey, and Oregon (Georgetown University Center for Retirement Initiatives, 2020) — have enacted similar policies. Elsewhere, Germany, Ireland, Poland, and Turkey are either planning or actively considering introducing automatic enrollment.¹

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¹ In addition, in 2007, New Zealand introduced automatic enrollment into its “KiwiSaver” scheme. However, this could be put toward purchasing a first home instead of being used for retirement.

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Despite these policy developments, almost all the evidence on the effect of automatic enrollment comes from its application to large employers. This evidence comes from either the United States, where some employers chose to introduce automatic enrollment (Madrian and Shea, 2001; Choi et al., 2004; Beshears et al., 2010), or the United Kingdom, where the government by 2015 had obliged all large and medium-sized employers to introduce automatic enrollment (Cribb and Emmerson, 2020). In both cases, participation rates in workplace pension plans have been shown to be around (or above) 90 percent, with many employees sticking to the default contribution rates.

However, there is no evidence to date on the effect of automatic enrollment on pension saving when it is introduced by small employers, either voluntarily or because they have been obligated to do it. This is an important evidence gap for two reasons.

First, large fractions of employees work for small employers. According to the Organisation for Economic Co-operation and Development (OECD, 2019), 28 percent of employees in the United Kingdom (and 18 percent of employees in the United States) work for an employer with fewer than 50 employees, and 16 percent work for an employer with fewer than 10 employees (10 percent in the United States). The proportion working for small employers is also high in other developed countries.

Second, in the absence of automatic enrollment, pension participation is substantially lower among employees of smaller private-sector employers. For example, in the United Kingdom in 2012, only 17 percent of private-sector employees working for employers with fewer than 50 employees were enrolled in a workplace pension plan, compared with 40 percent of those working for employers with 500 or more employees. Pension participation rates in the United States are also substantially higher among the employees of larger employers compared to employees of smaller employers (Bureau of Labor Statistics, 2016). This means that any policy that obliges employers to enroll employees automatically will disproportionately affect small employers and their employees, and the reaction of these small employers and their employees may be different from those of larger employers and their employees. This paper is the first to provide evidence on the impact of small employers being obliged to introduce automatic enrollment and the potential mechanisms that are driving this impact.

The introduction of automatic enrollment in the United Kingdom meant that all employers had to provide access to a workplace pension plan and that their targeted employees had to be enrolled automatically into it. The employees could subsequently choose to leave the plan, but if they remained in the plan, employers were obliged to provide at least a minimal level of employer contribution.²

We exploit a feature of the introduction of automatic enrollment among small employers (those with between 2 and 29 employees) in the United Kingdom, in which the last two digits of an employer's assigned payroll tax code determined when the

² The fact that the employer has to provide at least a small contribution to the pension plan is a key difference between the introduction of automatic enrollment in the United Kingdom and the introduction of auto-IRAs by states in the United States, such as OregonSaves (see Zhong, 2020).

employer had to introduce automatic enrollment. Using employer-reported data on workplace pension participation from April 2016, and exploiting this pseudorandom feature of the rollout, we find that automatic enrollment substantially increased participation in workplace pensions among targeted employees of small private-sector employers by 44 percentage points to reach 70 percent. The 44 percentage point increase is very large and indeed is even greater than the sizeable increases seen among larger employers: Cribb and Emmerson (2020) find a 37 percentage point increase for medium and large employers.

However, at 70 percent, the resulting participation in workplace pensions is still well below the very high rates (around 90 percent) seen among the largest employers in the United Kingdom and the United States. As has been shown for larger employers (see Cribb and Emmerson, 2020), we also find that there are increases in the proportion of employees working for small employers who have contributions well in excess of the (low) mandatory minimums.

We present and discuss evidence for potential mechanisms driving lower pension participation under automatic enrollment among those working for smaller employers. Our analysis shows that observed differences between employees of small and large employers, such as age, earnings, job tenure, and industry, explain none of the difference. However, we cannot rule out that there are important differences between the employees of smaller and larger employers in unobserved factors that affect pension participation behavior.

One potential reason for higher pension participation among larger employers could be that on average, they offer more generous employer pension contributions, which could incentivize people to participate in their workplace pension plan. However, we find that the difference between average employer contributions in small and large employers is not dramatic. We also present evidence suggesting that among employees of larger employers, pension participation is not very responsive to employer contribution rates. The pension participation of employees of small employers would have to be vastly more responsive to offers of employer pension contributions for this to be an important mechanism driving the gap in pension plan participation seen between those working for smaller and larger employers.

The remainder of this paper proceeds as follows. Section II discusses the related literature, the mechanisms through which automatic enrollment boosts pension participation and why this might differ when applied to small employers. In Section III, we describe the policy background to this paper, including details of the nationwide rollout of automatic enrollment. In Section IV, we describe the data used and the empirical strategy employed. We present the results in Section V, and we conclude in Section VI.

II. LITERATURE

Previous research has found that automatic enrollment causes large increases in pension plan participation (Madrian and Shea, 2001; Cribb and Emmerson, 2020).

These increases are far higher than increases due to other features of pension or 401(k) plan design, such as “matching” (Choi, Laibson, and Madrian, 2004; Mitchell, Utkus, and Yang, 2007), or due to tax incentives to save (Cunningham and Engelhardt, 2002).

Automatic enrollment can increase participation in workplace pensions through a number of mechanisms that have been identified in previous research. First, it exploits inertia as people put off leaving a pension plan rather than putting off joining one (O’Donoghue and Rabin, 1999). Second, with default contributions and asset allocations, automatic enrollment reduces the complexity of the pension-saving decision. Beshears et al. (2013) have shown that having to make more complex decisions reduces pension participation. Third, there may be “endorsement effects,” which mean that participating is seen as implicit advice on the best course of action (Beshears et al., 2009). Fourth, some employees who are enrolled automatically would not have been offered an employer contribution to their pension previously. These employees may therefore choose to stay in their workplace pension to receive the (albeit potentially small) employer contribution they are now offered.

There are also several reasons why the effect of automatic enrollment on the employees of smaller employers might differ from those of larger employers where automatic enrollment has, to date, been introduced. First, the types of employees working for smaller employers may be systematically different from those working for larger employers in ways that affect how they respond to automatic enrollment. Employees of smaller firms have lower earnings than those working for larger firms (Bloom et al., 2018) and change employers more frequently (Topel and Ward, 1992), both of which will reduce the attractiveness of pension plan participation. Workers with lower discount rates or more self-control (Laibson et al., 1998) may choose disproportionately to work for larger employers that provide more generous pensions, potentially offered specifically to recruit and retain the types of employees attracted by this benefit (Lazear and Shaw, 2007).

Second, small employers that were much less likely than large employers to offer a workplace pension prior to automatic enrollment might therefore be particularly likely to respond to the new obligation by enrolling employees into an ungenerous pension arrangement with only minimum employer contributions.

Third, small employers may respond to the obligation to enroll their employees automatically into a pension plan in a way that reduces the probability of employees participating. This could arise if the (smaller) human resources functions of small employers are less effective at communicating the benefits of saving in a workplace pension than are larger employers with established plans or if smaller establishments make it easier to opt out. Alternatively, small employers could be more likely to undertake other actions that reduce the participation rate of their employees — for example, by implicitly (and illegally in the United Kingdom) offering slightly higher pay on the understanding that employees opt out of their pension plan, thereby reducing the cost of employer pension contributions. They might also be more likely than larger employers not to comply with the duty to enroll their employees automatically.

Fourth, peer effects could potentially be important (as shown in Duflo and Saez, 2002). Among large employers that already had established pension plans, previously enrolled employees could be important (or more effective) in explaining to their previously unenrolled colleagues how workplace pension plans work. This would not be possible among employers that were organizing a pension plan for the first time with the introduction of automatic enrollment, where levels of understanding or engagement with pensions may consequently be lower. Alternatively, the pension saving behavior of company directors or managers may affect employees' pension participation decisions differently in small and large employers. In small employers, managers or directors may be less likely to participate in a pension plan as they would prefer to invest their money in building their business. Employees may take their lead from their bosses and in turn be less likely to participate. In larger companies, where managers are more likely to be salaried employees, this lack of participation may be less likely to occur.

III. POLICY BACKGROUND

A. Pension Policy in the United Kingdom

We briefly describe the UK pension policy environment, focusing on the system in place in April 2016, which is the time when the data used in this paper were collected. UK employees accrue entitlement to a flat-rate state pension, which in April 2016 was worth up to £155.65 (\$202) per week, or just less than 30 percent of median full-time earnings. Individuals can receive the resulting state pension at age 65 for men and age 63 for women (the state pension age in April 2016), and, while taxable, it is not means-tested or subject to any earnings test.

Given the relatively low state pension replacement rate, private pensions play a significant role in providing retirement income. Contributions to private pensions are (up to a limit) made before income tax, and any returns from investments held in the pension are reinvested untaxed. On withdrawal, one-quarter is tax free while three-quarters is subject to income tax. The tax system treats employer contributions to private pensions particularly favorably, as neither the contributions nor the pension income they generate are subject to the payroll tax.

Prior to automatic enrollment, all employers with at least five employees had to provide access to a private pension provider. However, employers were not mandated by government to make any employer contributions and employees had to elect to join. In April 2012 (prior to automatic enrollment first being introduced), only 36 percent of private-sector employees were active participants in a workplace pension plan (Cribb and Emmerson, 2020).

Decreases in private pension participation in the late 1990s and early 2000s (from 48 percent in 1997 to 36 percent in 2012) led to concerns that not saving enough for retirement was widespread. In response, the UK government legislated to oblige employers to enroll their targeted employees automatically into a workplace pension.

This legislation was part of a package of reforms designed to boost the adequacy of retirement saving; also included was a move from price-to-earnings indexation of the state pension that was partially paid for by future increases in the state pension age (see Pensions Commission, 2005).

B. Details of Automatic Enrollment in the United Kingdom

From October 2012, the UK government started to oblige employers to implement automatic enrollment. Under this policy, employers must enroll all their targeted employees automatically into a pension plan. Employees are then able to choose to leave this plan at any point that they wish.

Certain conditions must be met for employees to be “targeted” for automatic enrollment: they must be at least age 22, they must be aged below the state pension age, they must have worked for their employer for at least three months, and they must earn more than £10,000 per year.

As long as employees do not choose to leave their pension plan, employers must make pension contributions to the plan that are at least as high as minimums set by the government. Initially, the minimum employer contribution was 1 percent of qualifying earnings and the minimum total contribution was 2 percent of qualifying earnings, where the “total” is the sum of employee and employer contributions. In 2016–2017, qualifying earnings were those between £5,824 (\$7,600) and £43,000 (\$55,900) per year.³

The requirement of employers to enroll employees automatically is the same for all employers, but the obligation was rolled out, starting with the largest employers and gradually extending to the smallest employers. The government gave employers a “staging date” from which they must automatically enroll targeted employees, although they can (but do not have to) postpone enrollment by up to three months. This means that any employers at least three months past their staging date must have introduced automatic enrollment or they will be in breach of their legal obligations. Employers that do not comply are issued fines that increase with the length of time that they are noncompliant and the number of employees affected. The minimum fine is a “fixed penalty notice” of £400. The Pensions Regulator can prosecute (and has prosecuted) more serious cases of noncompliance. Maximum penalties are two years in prison or an unlimited fine.⁴

An employer’s staging date is determined by information on its Pay-As-You-Earn (PAYE) tax scheme (the scheme by which income and payroll taxes are withheld

³ Minimum total contributions rose to 5 percent of qualifying earnings from April 2018 (with a minimum of 2 percent from the employer) and to 8 percent from April 2019 (with a minimum of 3 percent from the employer). Employers can choose to enroll their employees automatically into plans with higher (employee and/or employer) contributions, although they are prevented from setting the employee contribution rate so high as deliberately to encourage a large proportion of employees to opt out.

⁴ <https://www.ftadviser.com/pensions/2017/09/11/regulator-prosecutes-company-over-auto-enrolment/>.

from employees' earnings). For employers with at least 30 employees, the staging date was determined purely by the number of employees on the PAYE scheme in April 2012. Larger employers had earlier staging dates, starting with the very largest employers in October 2012. For employers with 29 or fewer employees in April 2012, staging dates were instead allocated gradually according to the last two digits of the employer's PAYE (payroll) tax code. This was done over the period from June 1, 2015 to April 1, 2017 (see Table A1 for the exact details). It is these small employers, with 29 or fewer employees in 2012, that we focus on in this paper.

IV. DATA AND EMPIRICAL METHODOLOGY

A. Data

The data used in this paper are from the Annual Survey of Hours and Earnings (ASHE). This is a panel survey collected by the United Kingdom's Office for National Statistics (2017). The survey includes employees if their National Insurance number ends in a specific pair of digits. The survey that began in 1997 is completed by employers in April of each year. The number of responses to this survey is around 180,000 in each year.

The ASHE data include detailed information on the pay and hours of work of each employee and the survey asks the employer whether the employee participated in a workplace pension plan ("run or facilitated by [the] organization"). Since 2005, the survey also asks how much the employer and the employee contributed to the pension.

The ASHE data contain some information on the employee, such as age, sex, occupation, and job tenure, and on the employer, such as industry and sector. Most importantly, the data contain the number of employees who worked for the employer in each year that the employer is included in the data, allowing us, for example, to identify which employees worked in April 2016 for employers that in April 2012 had fewer than 30 employees.⁵

Therefore, we can define the set of individuals who are "targeted" for automatic enrollment: those between age 22 and the state pension age, those earning more than the automatic enrollment earnings threshold, and those who have been working for their employer for at least three months. As public-sector workers are typically offered very different (defined benefit) pension plans and had much higher participation rates prior to automatic enrollment, we focus entirely on employees of private-sector organizations.

For one wave of ASHE data only (April 2016), the United Kingdom's Office for National Statistics (ONS) has kindly merged into the data the last two digits of the

⁵ For a small number of employers, we match information on their numbers of employees from the Annual Business Survey (Office for National Statistics, 2018) if data on employer size in 2012 are not available in the ASHE but are available in the Annual Business Survey.

employers' PAYE code — a variable not routinely in the data made available to researchers. This allows us to determine which small employers had introduced automatic enrollment in April 2016 and which had not, given the rules of the rollout set out in Section III.⁶

B. Empirical Methodology

PAYE (payroll) tax codes are created by the UK tax authority sequentially. The last two digits of the code are the same for 20 newly registered employers at a time (e.g., 20 new employers have a code ending in 34, followed by the next 20 new employers ending in 35, and so forth). Given the very high number of employers that are registered each year, the last two digits given to new employers change on average almost 60 times per day, and a given pair of last two digits occurs on average every other day.⁷ Thus, these digits are as good as random and unrelated to the employer or its employees. Because the rollout of automatic enrollment is based on these digits for small employers, this creates pseudorandom variation in whether employers (and their employees) have had automatic enrollment introduced at the point the ASHE observes them in April 2016.

This variation allows us to compare pension outcomes among employees of small employers who were subject to automatic enrollment (our treatment group) with those observed among employees of otherwise similar small employers who were not yet subject to automatic enrollment (our control group). Because treatment (i.e., being automatically enrolled) in April 2016 is assigned in a pseudorandom manner, we can use the control group as a counterfactual for the treatment group had automatic enrollment not been introduced.⁸

Therefore, we define our treatment group as targeted employees working for employers with between 2 and 29 employees (in 2012) whose staging date was between June 1, 2015, and November 1, 2015.⁹ All of these employees would have been

⁶ Employees working for an employer with only one employee are excluded, as those who are sole director of their own company and who employ themselves are not obliged to enroll themselves automatically into a workplace pension. These cases comprise a significant share of employers with just one employee.

⁷ According to the House of Commons Library (2020), there were 414,000 newly registered businesses in 2016.

⁸ In absence of this variation, the alternative identification strategy open to the researcher would be to compare pension participation before automatic enrollment affected small employers (in 2015) to after all small employers were affected (in 2018). Although a control group of larger employers could be used in a difference-in-differences strategy, we would need to assume that all the change in pension participation (or change relative to that seen among larger employers) was due to automatic enrollment. In our strategy, we do not have to make such an assumption, as we observe similar employers at exactly the same point in time, whose only difference is that they either did or did not have to introduce automatic enrollment because of the last two digits of their payroll tax number.

⁹ As our focus is on small employers, we exclude any employers that have seen unusually strong employment growth since 2012 and as a result had 100 or more employees in April 2016.

more than three months past their staging date by April 2016 and therefore subject to automatic enrollment. Our control group is defined as targeted employees working for employers with between 2 and 29 employees (in 2012) who passed their staging date on or after May 1, 2016. This is because none of these employers would have been past their staging date in April 2016 when the ASHE survey was undertaken.¹⁰

Having defined our treatment and control groups, Equation (1) sets out the specification that we use to estimate the impact of automatic enrollment on pension outcomes

$$y_i = \alpha + \beta \text{autoenrolled}_i + \delta X_i + \varepsilon_i. \quad (1)$$

We want to estimate the effect of automatic enrollment on an outcome (such as pension participation) y for an employee i . The variable autoenrolled_i is a dummy variable taking the value of one if automatic enrollment was in place (the treatment group) and zero if it was not in place (the control group). The variable β is our coefficient of interest. We run specifications with and without controls for a vector of characteristics of employees and the employers they work for, X . These controls are for sex, age (quadratic), gross weekly earnings (quadratic), job tenure (linearly and 3 dummies), weekly hours of work (4 dummies), current number of employees (i.e., in 2016), number of employees in 2012 (when staging dates were determined), 14 dummies for industry of the employer and 8 dummies for occupational category of the employee. The full list of covariates can be found in Table A2.

The primary outcomes of interest are the effects of automatic enrollment on the probability of participation in a workplace pension plan and on the level and distribution of contributions. Using ordinary least squares (OLS), we estimate the effect on the probability of participation in a workplace pension plan. For employer, employee, and total pension contributions, we look at the effect on the probability of contributing in particular bands of contribution (e.g., at the probability of having a contribution between 2 and 5 percent of earnings), as well as looking at the effect on the mean contribution (in both pounds per month and as a percentage of earnings).

There may be a correlation in the error ε_i between employees working for the same employer. We therefore cluster our standard errors at the employer level.

Our key identifying assumption is that, absent automatic enrollment being introduced, the pension outcomes of employees working for small employers would not vary by the last two digits of the employers' PAYE tax code. Therefore, a concern

¹⁰ There are two groups of targeted employees working for small employers that we do not include in either the treatment group or the control group. First, those with staging dates between February 1 and April 1, 2016, were not three months past their staging date when the ASHE survey was undertaken in April 2016, so we do not know if automatic enrollment had been introduced by then. Second, those who had a staging date of January 1, 2016, will have only just reached the point three months past the staging date in April 2016. Thus, these are excluded as any small delay of a few days in compliance with the obligations would bias our estimates of participation for those who are automatically enrolled.

could arise if these codes were allocated in some systematic way that is correlated with pension outcomes. Unfortunately, in the earlier years of data we do not observe the last two digits of the employers' PAYE code and therefore we cannot conduct placebo tests to see if pension outcomes were different between the two groups in earlier years before automatic enrollment was introduced.¹¹ However, in Table 1 we document the extent to which the characteristics observed in our data of the employees and employers in our treatment and control groups differ.

For almost all characteristics, we find no evidence of statistically significant differences in average characteristics between our treatment and control groups. More importantly, in no case is the difference observed in our sample economically large enough to drive a substantially different pension outcome. For example, the difference in mean weekly earnings between our treatment and control groups is just £6 per week and is not statistically different from zero. The only difference that is statistically significant is the average job tenure; employees working for the treated employers have slightly longer job tenure (1.3 years). Although there is a slight difference in this variable, when we control for these observed differences our findings are not materially affected. This leads us to conclude that there are not any important differences in the observed characteristics between treatment and control groups. This finding also helps justify our assumption that there are not any important differences in unobserved characteristics between the groups that would drive differences in workplace pension saving.

V. RESULTS

A. The Effect of Automatic Enrollment on Pension Participation

Table 2 presents our estimates of the effect of automatic enrollment on workplace pension participation among employees working for smaller employers. The first specification shows that, among targeted employees, the workplace pension participation rate was 70.1 percent in our treatment group compared with just 23.2 percent in our control group. This gives a raw difference of 46.9 percentage points. The inclusion of our control variables (sex, age, gross weekly earnings, hours of work, job tenure, employer size in 2012 and 2016, industry, and occupation) makes little difference to the estimated impact, as shown by specification 2 of Table 2, suggesting that automatic enrollment increased workplace pension participation by 44.0 percentage points. This is our preferred estimate of the impact of automatic enrollment

¹¹ We are, however, able to take employers with more than 100 employees and compare the pension plan membership of their employees in April 2016, split by whether the last two digits of the employers' PAYE code would have put them in our treatment or control group had they actually been a small employer. Controlling for the same background characteristics as used in Table 2, we estimate the coefficient on being in this placebo treatment group of +0.2 percentage points with a standard error of 2.4 percentage points. So reassuringly the estimated "effect" is both economically very small and not statistically different from zero.

Table 1
 Comparison of Average Characteristics of Employees Working
 for Private-Sector Employers with 2–29 Employees in
 April 2012, by Treatment and Control Group

	Treatment Group	Control Group	Difference
Employee characteristics			
Male	0.584	0.576	0.008
Gross earnings (£ per week)	487	480	6
Total paid hours per week	37.4	37.2	0.1
Job tenure (years with employer)	7.7	6.5	1.3**
Age	42.5	40.9	1.5
High occupational class	0.368	0.369	−0.001
Mid occupational class	0.402	0.41	−0.008
Employer characteristics			
Current number of employees (in 2016)	15.8	15.0	0.8
Number of employees in 2012	13.7	13.3	0.3
Industry: Manufacturing	0.151	0.116	0.035
Industry: Retail	0.192	0.199	−0.007
Industry: Administrative	0.103	0.066	0.037
Industry: Health/social care	0.131	0.106	0.025
Number of observations	291	13,942	N/A

Note: All averages are means. The p -values are adjusted for multiple hypotheses testing using the step-down procedure described in Romano and Wolf (2005, 2016), implemented using the STATA program `rwolf`. ** denotes the difference is statistically significant at the 5% level.

Source: Authors' calculations using the ASHE.

on pension participation. This very large effect is even larger than the sizeable effect of automatic enrollment (a 37 percentage point increase in participation) that Cribb and Emmerson (2020) found when looking at employees of medium and large employers in the United Kingdom.

One potential concern with our approach is that our control group could be contaminated by employers choosing to introduce automatic enrollment early. For example, some smaller employers with later staging dates could have decided to implement automatic enrollment a few months early to attract and retain employees who might otherwise work for similar employers that had already reached their staging date.

To allow for this, we compare targeted employees in our treatment group with those in a different control group. For this alternative control group, we take all targeted employees working for small employers in April 2015 (i.e., several months — and in many cases over a year — before any of them would reach their staging date). As shown in Figure A1, there is no evidence of any unusual change in workplace pension participation among this group at that point in time and, therefore, no need to use employees in 2014 or earlier as an alternative control group.

Table 2
Effect of Automatic Enrollment on Private-Sector Pension Participation
(for Employees of Employers with 2–29 Employees in April 2012)

Specification Number and Description	Effect of Automatic Enrollment	Standard Error	Number of Observations	Unadjusted Pension Participation (%)	
				Control Group (%)	Treatment Group (%)
Main specification (contemporaneous control group)					
(1) Without control variables	0.469***	(0.028)	14,233	23.2	70.1
(2) With control variables	0.440***	(0.027)	14,233		
Alternative specification (control group from previous year)					
(3) Without control variables	0.503***	(0.028)	17,633	19.8	70.1
(4) With control variables	0.476***	(0.027)	17,633		

Note: Standard errors are clustered at the employer level. Results are from estimating equation (1) by OLS. Full list of controls is given in Table A2. The main specification uses the control group of small employers in 2016 whose employer tax code meant that they did not have to introduce automatic enrollment. The alternative specification uses as a control group all small employers in 2015 (i.e., before automatic enrollment was introduced to any small employer). *** denotes the effect is statistically significant at the 1% level.

Source: Authors' calculations using the ASHE.

Workplace pension participation among this alternative control group is lower than in the contemporaneous control group. If anything, this suggests that automatic enrollment may have had a larger impact on pension participation than our main specification suggests. Without controls (specification 3) we find a 50.3 percentage point impact of automatic enrollment, while with controls (specification 4) this drops slightly to 47.6 percentage points. Overall, the use of this alternative control group would not change our conclusion that automatic enrollment boosted pension participation among this group by around 45 percentage points.

Overall, we find that around 70 percent of targeted employees working for small employers participate in workplace pensions once automatic enrollment is in place. This finding is corroborated by using ASHE data from April 2018 (which is the first point in these data that *all* small employers had to enroll their targeted employees automatically into a workplace pension). As shown in Figure A1, in April 2018, 72 percent of employees working for small employers were participating in a workplace pension, which is very similar to our finding of 70 percent among employees working for small employers that had implemented automatic enrollment in April 2016.

A pension participation rate of around 70 percent under automatic enrollment is much lower than has been seen elsewhere in the literature.¹² Cribb and Emmerson (2020) found participation of around 88 percent for targeted employees working for employers with 58 or more employees in the United Kingdom, which is similar to the participation rates seen among the large American companies studied in Madrian and Shea (2001), Choi et al. (2004), and Beshears et al. (2009). Our findings imply that, while the boost to pension participation is extremely large, after automatic enrollment the rate of pension participation remains considerably lower among the employees of small employers compared to employees of large employers.

We also find that the impact of automatic enrollment on pension participation varies by employee characteristics. The results, shown in Table 3, suggest a larger impact on subgroups with lower pension participation among our control group (men, lower earners, younger employees, and those with shorter job tenures), although the only statistically significant differences are for a larger effect on younger employees than older employees and on those with shorter job tenures than those with longer job tenures. Importantly, in none of the subgroups we examine does pension participation reach the very high overall rates (around 90 percent) seen among employees working for larger employers once automatic enrollment is in place. As Cribb and Emmerson (2020) found for medium and large employers, we also find that there are spillover effects onto the participation rate of nontargeted employees (i.e., those who are outside the target age group of 22 to state pension age, earn too little, or have been with the employer for less than three months), with 14 percentage point higher

¹² We restrict our attention to cases of automatic enrollment where employers were making at least some pension contribution. Zhong (2020) considers the case of OregonSaves (where there is not a compulsory employer contribution) and finds only 30 percent of employees contributing positive amounts.

Table 3
Effect of Automatic Enrollment on Pension Participation of Subgroups

	Effect of Automatic Enrollment	Standard Error	Number of Observations	Unadjusted Pension Participation Rates	
				Control Group (%)	Treatment Group (%)
All	0.440***	(0.027)	14,233	23.2	70.1
Sex					
Male	0.444***	(0.036)	8,201	21.2	68.2
Female	0.433***	(0.039)	6,032	25.9	72.7
Earnings					
<£350 per week	0.457***	(0.047)	4,988	15.8	65.0
£350–£500 per week	0.437***	(0.049)	4,285	20.8	67.4
£500+ per week	0.420***	(0.043)	4,960	32.6	77.8
Age group					
Age 22–39	0.543***	(0.039)†††	6,712	19.3	74.6
Age 40–state pension age	0.358***	(0.036)†††	7,521	26.6	66.7
Years with employer					
Fewer than four years	0.491***	(0.040)†††	6,903	18.6	68.4
Four years or more	0.396***	(0.036)†††	7,330	27.5	71.5
Not targeted for automatic enrollment					
All	0.139***	(0.029)	8,400	6.8	20.9

Note: Effects are from estimating Equation (1) by OLS with control variables as set out in Table A2. Standard errors are clustered at the employer level. Three daggers (†††) signify the effect of automatic enrollment on one subgroup is statistically different to the effect on the other group at the 1% level. *** denotes statistical significance of the effect at the 1% level.

Source: Authors' calculations using the ASHE.

pension participation rate seen among these employees of small employers that have introduced automatic enrollment than among the equivalent employees of small employers that have not.

B. The Effect of Automatic Enrollment on Pension Contributions

If all employees brought into workplace pensions have very low contributions, the effect on total workplace pension saving will be little compared to if they are brought in with much higher contributions. Therefore, we look at the effect of automatic enrollment on average employer and employee pension contributions, measured both as a share of earnings and in pounds per month. This is done by estimating Equation (1) with these measures as outcome variables, with those not saving in a workplace

pension included as having zero contributions. The results of this exercise are shown in Table 4. On both measures, the effect of automatic enrollment is to almost double pension contributions, albeit starting from a low base. Automatic enrollment increases the average monthly contribution by around £45 compared to the control group baseline of £50. Measured as a fraction of earnings, automatic enrollment increased the average contribution rate by 1.8 percent of earnings compared to a baseline of 2.0 percent.

We also examine the impact of automatic enrollment on the distribution of workplace pension contributions. To do this, we discretize the distribution of contributions into five bands (based on the fraction of salary contributed): 0 percent (i.e., not in a pension), >0 percent but <2 percent, ≥ 2 percent but <5 percent, ≥ 5 percent but <10 percent, and ≥ 10 percent. We estimate Equation (1) using linear probability models to estimate the effect of automatic enrollment on the probability of being in each band of contributions.

Table 5 shows that automatic enrollment massively reduced the proportion of employees with no contributions and that the majority of the increase was due to an increase in the proportion having very low positive contributions of less than 2 percent of earnings, consistent with receiving the minimum mandated by the government. From a baseline of just 3.6 percent, the proportion of employees with these low contributions increased by 28.2 percentage points. The results also show that automatic enrollment caused increases in the probability of employees having pension contributions well in excess of the minimum. Indeed, it led to the proportion with workplace pension contributions of 10 percent of earnings or more to double: there was a 6.2 percentage point increase from a baseline of 6.6 percent.

Tables A3 and A4 show that this effect is a result of employees having both higher employee contributions and higher employer contributions than the government's

Table 4
Effect of Automatic Enrollment on Mean
Total Workplace Pension Contributions

	Effect of Automatic Enrollment	Standard Error	Number of Observations	Control Group Average
Total contribution (£ per month)	45.30***	(9.45)	13,915	49.52
Total contribution (% of earnings)	1.82***	(0.32)	13,915	1.95

Note: Effects are from estimating Equation (1) by OLS with control variables as set out in Table A2. Standard errors are clustered at the employer level. A small number of observations have missing information on the level of pension contributions, and therefore the number of observations is slightly lower in this table to the analysis shown in Table 2. *** denotes the effect is statistically significant at the 1% level.

Source: Authors' calculations using the ASHE.

Table 5
Effect of Automatic Enrollment on the Distribution of Pension Contributions

Total Contributions (as % of Earnings)	Effect of Automatic Enrollment on Probability of Having Contributions in Each Band	Standard Error	Distribution of Contributions in Control Group (%)
0	-0.442***	(0.027)	78.6
>0 and <2	0.282***	(0.029)	3.6
≥2 and <5	0.058***	(0.019)	4.1
≥5 and <10	0.040**	(0.019)	7.1
≥10	0.062***	(0.019)	6.6
Number of observations	13,915		

Note: Each row is the result of estimating Equation (1) by OLS with control variables as set out in Table A2, where the outcome variable is a binary variable indicating if the individual has total pension contributions in that band. Standard errors are clustered at the employer level. A small number of observations have missing information on the level of pension contributions, and therefore the number of observations is slightly lower in this table to the analysis shown in Table 2. Asterisks denote statistical significance at the 1% (***) or 5% (**) levels.

Source: Authors' calculations using the ASHE.

minimum defaults. This finding is similar and, if anything, more apparent than the equivalent among medium-sized and large employers in the United Kingdom reported by Cribb and Emmerson (2020), who also found that automatic enrollment led to significant increases in the probability of having contributions in excess of the minimums.

C. Differences in Pension Participation by Employer Size under Automatic Enrollment

The results in Subection V.A show that with automatic enrollment in place employees of smaller employers are significantly less likely to participate in a pension plan than employees of larger employers. We therefore turn to what evidence there is for different potential mechanisms that could be driving this difference.

One possibility for the lower pension participation among small employers is that the types of workers that are employed by small employers are systematically different to those working for larger employers. For example, employees of smaller employers are paid less, on average (Bloom et al., 2018). To test this hypothesis, we take data from all private-sector employers in ASHE in 2016 where automatic enrollment has been introduced, look at how pension participation varies by employer size in 2016, and estimate how this variation differs once employee characteristics are controlled for. To do this, we estimate Equation (2) by OLS

$$y_i = \alpha + \sum \gamma_f \mathbf{1}(\text{employersize} = f) + \theta X_i + v_i, \quad (2)$$

where y_i is pension participation for an employee i and γ_f is a series of coefficients on indicators of the employee working for employers of different size groups (f), with the omitted (baseline) category being employers with 10,000 or more employees. The variable X_i is a vector of control variables (specifically sex, age, gross weekly earnings, hours of work, job tenure, industry, and occupation). We estimate Equation (2) both with and without control variables X_i to see what impact they have on the differences in pension participation by employer size (γ_f).

Table 6 shows the resulting estimated differences in pension participation by employer size in 2016 both unconditional (specification 1) and after controlling for the association that the control variables have with pension membership (specification 2). The results show that — once automatic enrollment is in place — remaining

Table 6
Differences in Pension Participation for Employees Targeted
for Automatic Enrollment Working for Private-Sector
Employers That Have Introduced It (April 2016)

	Specification 1		Specification 2		Pension Participation Rate (%)
	Coefficient	Standard Error	Coefficient	Standard Error	
Number of employees					
≥10,000	Baseline group		Baseline group		88.3
5,000–9,999	0.025	(0.031)	–0.003	(0.024)	90.8
1,000–4,999	–0.014	(0.030)	–0.033	(0.024)	86.9
500–999	–0.006	(0.030)	–0.024	(0.023)	87.8
250–499	–0.019	(0.029)	–0.034	(0.023)	86.5
100–249	–0.041	(0.029)	–0.052**	(0.023)	84.2
50–99	–0.117***	(0.029)	–0.122***	(0.024)	76.7
25–49	–0.217***	(0.030)	–0.218***	(0.025)	66.7
2–24	–0.257***	(0.038)	–0.248***	(0.034)	62.6
Control variables included	No		Yes		
Number of observations	76,419		76,419		
Number of clusters	21,708		21,708		

Note: The sample is all private-sector employees who are targeted for automatic enrollment and work for employers where automatic enrollment is in place in 2016. Employer size is measured in April 2016. Results are from regressions with pension participation as the dependent variable and eight dummies for employer size as the dependent variables, estimated by OLS. Specification 2 includes control variables for sex, age (quadratic), gross weekly earnings (quadratic), hours of work (4 dummy variables), job tenure (3 dummy variables and linearly), industry (14 dummy variables), and occupation (8 dummy variables). Standard errors are clustered at the employer level. Asterisks denote statistical significance at the 1% (***) or 5% (**) levels.

Source: Authors' calculations using the ASHE.

differences in the pension participation rates between employees of larger and smaller employers are not explained by controlling for this set of observed factors.

Of course, there could be characteristics that vary between the employees of smaller and larger employers that play a role in driving retirement savings and pension participation, such as different levels of self-control (Laibson et al., 1998) or locus of control (Cobb-Clark, Kassenboehmer, and Sinning, 2016), which are unobserved in these data. Unfortunately, we know of no data that contain these kinds of detailed variables alongside good measures of employer size and pension outcomes in the United Kingdom. However, given that differences in age, earnings, industry and occupation, job tenure, and so on, which all correlate strongly with pension participation (as shown in Table A2), play only a very minor role in explaining lower pension participation among smaller employers in an automatic enrollment environment, it would be surprising if unobserved employee characteristics were important in driving the substantial differences in the rates of pension participation, although we cannot rule this possibility out.

An alternative reason for lower participation in workplace pensions could be less generous offers of employer pension contributions from smaller employers than from larger employers.¹³ An offer of a higher *employer* pension contribution could incentivize pension plan participation because if employees do not participate, they are forgoing a larger part of their potential remuneration.

Table 7 shows the average pension contribution rates (from employer, employee, and combined) by employer size, for those employees enrolled in a workplace pension. Employer pension contributions are positively correlated with employer size, although not dramatically so (5.8 percent of earnings among larger employers compared to 3.5 percent among smaller employers). However, employees of larger employers also have higher average *employee* contributions. If this reflects employers mandating higher minimum *employee* contributions to receive the employer contribution (i.e., the employer will contribute 10 percent of the employee's salary to the pension, but the employee must also contribute 5 percent), then higher employee contribution could discourage pension plan participation compared to a situation in which the employer contribution was the same but the employee contribution was lower.

Could differences in the offer of employer pension contributions drive the difference in pension plan participation between smaller and larger employers? Because we do not observe the detailed pension offers (e.g., how much is offered irrespective of employee contribution, if any, and if there is any prospect of "matched" contributions) by either small or large employers, this is not a straightforward matter to test.

¹³ Zhong (2020) shows that it is the match rate on the first dollar of employee contribution — which in the UK context corresponds to the match rate on the minimum employee contribution — that is theoretically relevant for determining the pension participation decision. However, this does not take account of pension plans that provide an employer contribution irrespective of whether the employee contributes, such as those described in Benartzi and Thaler (2007).

Table 7
Mean Pension Contribution Rates for Employees
Participating in a Workplace Pension Plan, by Employer Size

Mean Contribution Rate (% of Earnings) from:	Number of Employees			
	2–49	50–499	500+	All
Employer (%)	3.5	4.2	5.8	5.2
Employee (%)	2.2	2.6	3.1	2.9
Total (%)	5.6	6.7	8.7	8.0

Note: The mean total contribution rate in each column may not be the sum of the mean employer and mean employee contribution rates due to rounding.

Source: Authors' calculations using the ASHE.

To shed light on whether different employer pension offers could drive the difference in pension participation between small and large employers, we need evidence on how responsive employees' participation decision may be to offers from employers.

One way to do this relies on the insight that, for large employers, a good proxy of the "offer" that employers make to their employees is the average contribution rates observed for the employer's employees who have joined the workplace pension. This is particularly the case because, under automatic enrollment, relatively few participating employees deviate from the default contributions set up by the employer (Madrian and Shea, 2001). Employer-level average contribution rates can only be observed relatively reliably in the ASHE data for large employers where we observe many of each employer's employees in the data. We can therefore use information on employer-level average employee and employer contributions among large employers in ASHE to individual pension participation decisions under automatic enrollment to estimate how responsive pension participation decisions are to employer pension offers.

Therefore, in Table 8, we take employees who work for 135 large private-sector employers that employ at least 5,000 employees (such that there at least 50 observations in our data) in 2016. We relate the average employer and employee contribution rates (measured among the other targeted employees of the same employer) to the individual's decision over whether to opt out of a workplace pension having been automatically enrolled. Specification 1 includes no other controls, and specification 2 controls for a set of employee and employer characteristics.

Specification 1 shows that higher average employer contributions are associated with higher pension participation by the employer's employees. Higher employee contributions are associated with lower levels of pension participation. The association between the (employer-level) average employer pension contributions and pension plan participation is much weaker once controlling for characteristics such as occupation, earnings, and job tenure.

This empirical analysis comes with a number of caveats. First, the measure of average employer contribution rates will be noisy as it is calculated on the sample

Table 8
 Relationship between Average Employer-Level Pension Contribution Rates and Pension Plan Participation, for Employees Working for Employers with 5,000+ Employees

Dependent Variable: Dummy for Pension Plan Participation	Specification 1		Specification 2	
	Coefficient	Standard Error	Coefficient	Standard Error
Mean employer contribution rate	0.011***	(0.003)	0.001	(0.006)
Mean employee contribution rate	-0.018**	(0.008)	-0.024**	(0.010)
Controlling for other characteristics	No		Yes	
Number of observations	18,875		18,875	
Number of clusters (employers)	135		135	

Note: The sample is private-sector employees who are targeted for automatic enrollment and work for employers where automatic enrollment has been introduced. Results are from regressions with pension participation as the dependent variable, and measures of average contribution rates of targeted employees who are employed by their employer (excluding the individual themselves in the calculation), estimated by OLS. Specification 2 additionally includes control variables for sex, age (quadratic), gross weekly earnings (quadratic), hours of work (4 dummy variables), job tenure (3 dummy variables and linearly), industry (14 dummy variables), and occupation (8 dummy variables). Standard errors are clustered at the employer level. Asterisks denote statistical significance at the 1% (***) or 5% (**) levels.

Source: Authors' calculations using the ASHE.

of employees that appears in ASHE. To some extent, the relationship will therefore be attenuated toward zero, although we have tried to address this by restricting attention to employers for whom we observe at least 50 employees. Second, we have to rule out the possibility of there being important omitted variables (we control for a fairly standard set of observed employee and employer characteristics). Third, we are relying on causality running from average contributions (a proxy for offers) to pension plan participation and not the other way around.

Notwithstanding these empirical caveats, if a similar relationship between this proxy for offers of pension contributions and pension plan participation were also to hold for those working for smaller employers, the different offers of pension contributions could not explain the very large gap in pension participation between large and small employers under automatic enrollment. Indeed, given there is only an average gap of 2.3 percent of earnings in employer pension contribution rates between large and small employers, the responsiveness of the participation of employees of small employers would need to be an order of magnitude larger to explain a significant fraction of the difference in participation between small and large employers. Therefore, as far as we can tell, the difference in offered employer pension contributions between small and larger employers appears unlikely to be a major driver of the difference in pension plan participation between them.

As identified in Section II, two other possible reasons that could explain the lower pension participation rate under automatic enrollment for small employers

are (1) peer effects and (2) differences in the administration of schemes by small and large employers, including potential differences in compliance to the regulations. We do not have any direct evidence on the importance of these channels. However, given there is also no clear evidence that differences in the characteristics of employees or in the offer of pension contributions drive the effect, a priority for future research is therefore to investigate the effect of employers' administration of their schemes and intra-employer peer effects on workplace pension saving in the context of automatic enrollment. These effects could be important in driving these differences in plan participation and, therefore, have important implications for the effectiveness of using automatic enrollment as a policy to boost the pension saving of many employees.

VI. CONCLUSION

With automatic enrollment increasingly being considered by governments internationally, including by state governments in the United States, to increase private retirement provision, it is important to understand its effects on those working for smaller employers. Smaller employers employ significant fractions of the workplace and typically have much lower rates of participation in workplace pension plans, and so are much more likely to be directly affected by automatic enrollment.

This is the first paper to assess the impact of obliging small employers to enroll their employees automatically into a workplace pension. By exploiting the pseudo-random timing based on the last two digits of the employer's payroll tax code of the obligation for small private-sector employers in the United Kingdom to enroll their employees automatically into a workplace pension plan, we find that automatic enrollment substantially boosts pension participation by 44 percentage points to reach around 70 percent participation among targeted employees. The increases in participation due to automatic enrollment are even larger than those seen in medium and large employers in the United Kingdom, as found by Cribb and Emmerson (2020).

We find that while most employees are automatically enrolled at low minimum default contributions, there are also significant increases in the proportion with pension contributions well in excess of the minimums. Although workplace pension savings make up a substantial share of private wealth (80 percent of mean nonhousing wealth of those in their late fifties/early sixties, according to Crawford, Innes, and O'Dea [2016]), it is possible that some of the increase in workplace pension savings is offset by reductions in other forms of saving, such as savings accounts. But to the extent that many savers are sufficiently "passive" in their saving decisions, as found by Chetty et al. (2014), the number of people who offset higher workplace pension savings by lowering other forms of saving would be limited.

Despite automatic enrollment increasing pension participation among those working for small employers to 70 percent, this remains well below the 90 percent levels seen among medium-sized and larger employers both in the United Kingdom and the United States. We have discussed the evidence for various reasons for this

difference in pension plan participation. It cannot be rationalized by differences in a rich set of observed individual and employer characteristics, including age, occupation, job tenure, hours of work, and earnings, though we cannot rule out that there are important differences in other unobserved employee characteristics. Furthermore, while employer pension contributions are somewhat less generous among smaller employers, this difference does not seem large enough to explain the gradient in pension participation by employer size. Two other potential mechanisms that could drive the gap are differences in the way that small employers administer their pension arrangements (including differences in compliance) and the role of peer effects from other employees in the workplace.

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In addition to employment of both authors at the Institute for Fiscal Studies, Carl Emmerson is a member of the Social Security Advisory Committee and of the advisory panel of the Office for Budget Responsibility.

The working paper on which this article is based was circulated to the Laura and John Arnold Foundation for comments prior to wider circulation. However, no changes to the paper were made as a result of this submission and ultimate editorial control was retained by the authors.

APPENDIX

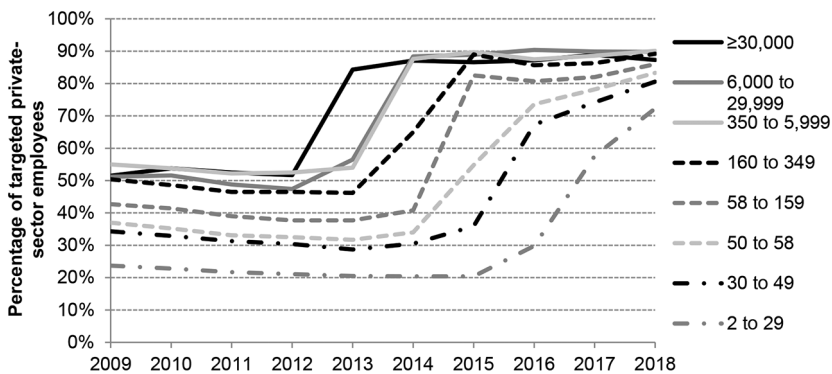


Figure A1. Workplace pension participation rates among private-sector employees targeted for automatic enrollment, by employer size in 2012. Calculations are authors', using data from the ASHE.

Table A1
Staging Dates for Employers with 2–29
Employees as of April 2012

Final Two Digits of Employers' PAYE Reference Number	Staging Date
92, A1–A9, B1–B9, AA–AZ, BA–BW, M1–M9, MA–MZ, Z1–Z9, ZA–ZZ, 0A–0Z, 1A–1Z, or 2A–2Z	June 1, 2015
BX	July 1, 2015
BY	September 1, 2015
BZ	November 1, 2015
02–04, C1–C9, D1–D9, CA–CZ, or DA–DZ	January 1, 2016
00 05–07, E1–E9, or EA–EZ	February 1, 2016
01, 08–11, F1–F9, G1–G9, FA–FZ, or GA–GZ	March 1, 2016
12–16, 3A–3Z, H1–H9, or HA–HZ	April 1, 2016
I1–I9 or IA–IZ	May 1, 2016
17–22, 4A–4Z, J1–J9, or JA–JZ	June 1, 2016

Table A1 (Continued) Staging Dates for Employers with 2–29 Employees as of April 2012

Final Two Digits of Employers' PAYE Reference Number	Staging Date
23–29, 5A–5Z, K1–K9, or KA–KZ	July 1, 2016
30–37, 6A–6Z, L1–L9, or LA–LZ	August 1, 2016
N1–N9 or NA–NZ	September 1, 2016
38–46, 7A–7Z, O1–O9, or OA–OZ	October 1, 2016
47–57, 8A–8Z, Q1–Q9, R1–R9, S1–S9, T1–T9, QA–QZ, RA–RZ, SA–SZ, or TA–TZ	November 1, 2016
58–69, 9A–9Z, U1–U9, V1–V9, W1–W9, UA–UZ, VA–VZ, or WA–WZ	January 1, 2017
70–83, X1–X9, Y1–Y9, XA–XZ, or YA–YZ	February 1, 2017
P1–P9 or PA–PZ	March 1, 2017
84–91, 93–99	April 1, 2017

Table A2

Effect of Automatic Enrollment on Workplace Pension Participation Among Targeted Employees of Small Employers: OLS Regression Results

Dependent Variable: Pension Participation	Coefficient	Standard Error
Automatic enrollment introduced by employer	0.440***	(0.027)
Male	-0.001	(0.009)
Gross earnings (£ per week)	0.001***	(0.000)
Gross earnings squared	0.000***	(0.000)
Hour worked: 16–29	0.059***	(0.014)
Hours worked: 30–39	0.031***	(0.011)
Hours worked: 40–49	-0.050***	(0.011)
Hours worked: 50+	-0.114***	(0.017)
Years with current employer	0.008***	(0.001)
Less than one year with current employer	-0.010	(0.010)
One to two years with current employer	0.004	(0.010)
No information on job tenure	-0.035*	(0.018)
Employer size in 2012	0.004***	(0.001)
Employer size in 2016	0.005***	(0.001)
Age	0.007***	(0.002)
Age squared	0.000***	(0.000)
Industry: Agriculture	-0.050*	(0.026)
Industry: Manufacturing	-0.060***	(0.019)
Industry: Construction	-0.123***	(0.019)
Industry: Retail and Wholesale	-0.072***	(0.018)

Table A2 (Continued) Effect of Automatic Enrollment on Workplace Pension Participation Among Targeted Employees of Small Employers: OLS Regression Results

Dependent Variable: Pension Participation	Coefficient	Standard Error
Industry: Transport and Storage	-0.087***	(0.024)
Industry: Accommodation and Food Services	-0.095***	(0.020)
Industry: Information and Communications	-0.083***	(0.023)
Industry: Finance or Insurance	0.075**	(0.033)
Industry: Real Estate	-0.083***	(0.028)
Industry: Scientific or Tech professions	-0.067***	(0.019)
Industry: Administration or support	-0.046**	(0.020)
Industry: Education	-0.002	(0.028)
Industry: Health/social care	0.135***	(0.019)
Industry: Arts and Recreation	-0.011	(0.032)
Occupation: Professional	0.041***	(0.016)
Occupation: Associate Professional	0.043***	(0.015)
Occupation: Admin/Secretarial	0.071***	(0.014)
Occupation: Skilled Trades	-0.031**	(0.013)
Occupation: Caring	-0.140***	(0.018)
Occupation: Sales/Customer Service	-0.017	(0.017)
Occupation: Plant and Processing	-0.038**	(0.016)
Occupation: Elementary occupations	-0.011	(0.015)
Constant	-0.257***	(0.049)

Note: Standard errors are clustered at the employer level. Results are from estimating Equation (1) by OLS. Number of observations: 14,233. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

Source: Authors' calculations using the ASHE.

Table A3
Effect of Automatic Enrollment on the Distribution of Employee Pension Contributions

Employee Contributions (% of Earnings)	Effect of Automatic Enrollment on Probability of Having Contributions in Each Band	Standard Error	Distribution of Contributions in Control Group (%)
0	-0.425***	(0.029)	79.2
>0 and <2	0.328***	(0.030)	5.1
≥2 and <5	0.064***	(0.020)	7.0
≥5 and <10	0.028**	(0.014)	4.5
≥10	0.006	(0.007)	4.2

Table A3 (Continued) Effect of Automatic Enrollment on the Distribution of Employee Pension Contributions

Employee Contributions (% of Earnings)	Effect of Automatic Enrollment on Probability of Having Contributions in Each Band	Standard Error	Distribution of Contributions in Control Group (%)
Number of observations	13,915		

Note: Each row is the result of estimating Equation (1) by OLS with control variables as set out in Table A2, where the outcome variable is a binary variable indicating if the individual has employee pension contributions in that band. Standard errors are clustered at the employer level. Asterisks denote significance at the 1% (***) and 5% (**) levels.

Source: Authors' calculations using the ASHE.

Table A4
Effect of Automatic Enrollment on the Distribution
of Employer Pension Contributions

Employer Contributions (% of Earnings)	Effect of Automatic Enrollment on Probability of Having Contributions in Each Band	Standard Error	Distribution of Contributions in Control Group (%)
0	-0.443***	(0.027)	82.5
>0 and <2	0.316***	(0.029)	5.5
≥2 and <5	0.080***	(0.021)	7.1
≥5 and <10	0.014	(0.016)	4.2
≥10	0.033**	(0.015)	0.7
Number of observations	13,915		

Note: Each row is the result of estimating Equation (1) by OLS with control variables as set out in Table A2, where the outcome variable is a binary variable indicating if the individual has employer pension contributions in that band. Standard errors are clustered at the employer level. Asterisks denote significance at the 1% (***) and 5% (**) levels.

Source: Authors' calculations using the ASHE.

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