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Employee savings and employer contribution rules in defined contribution plans: evidence from age-based policies

Abstract

Retirement savings adequacy remains a challenge in the United States, notably with defined contribution plans in which participants are responsible for funding adequacy. In some retirement savings plans, employers increase contributions for employees after reaching a certain age. The effectiveness on whether this change increases total retirement saving depends on whether employees offset these increases by reducing their own contributions at these designated age thresholds. Analyzing individual-level administrative data and varied age-based employer contribution rules, we find that these age-based contribution increases do not crowd-out employees' own contributions, and total retirement savings increase. Our research highlights the potential positive impact of employer-initiated interventions on improving retirement readiness.

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1. Introduction

The employer-sponsored retirement plan landscape in the U.S. has shifted from traditional defined benefit pension plans to defined contribution (DC) plans, placing a significant responsibility and risk on individuals to save and invest for their retirement (Mitchell and Moore, 1998). Following decades of savings in DC plans and Individual Retirement Accounts (IRAs), tax-advantaged retirement savings accounts represent the largest source of wealth outside of housing (Board of Governors of the Federal Reserve System, 2024). Combined with workplace benefits composing 31% of total compensation (U.S. Bureau of Labor Statistics, 2022), employers play a pivotal role in shaping Americans' retirement readiness. These employer benefit structures are key inputs for the self-insurance path that their employees take to finance retirement via savings.

Retirement planning is intrinsically related to risk and insurance topics as it requires individuals to manage financial risks associated with longevity, healthcare costs, and market fluctuations, often necessitating strategies like annuities, long-term care insurance, and diversified investment portfolios to achieve financial security in later life. Such planning has been shown to be heavily impacted by financial literacy (Bateman et al. 2016, Lusardi and Mitchell 2011) and improved understanding of retirement products (e.g., Munnel et al. 2020). Employers can enhance employee retirement readiness by offering competitive retirement benefits and contribution dollars to a DC retirement savings plan. The contribution dollar benefit is typically a percentage of an employees' base salary. Additional plan options designed to benefit participants include auto enrollment, in which employees are enrolled in plans by default (Beshears et al., 2010, Madrian and Shea, 2001); auto escalation, in which employees save an increasing share of salary, for example, over time by default (VanDerhei and Lucas, 2010); having Qualified Default Investment Alternatives—QDIAs —(McDonald et al., 2021; Butt et al., 2018); a distribution menu for retirement income (Brown et al., 2023); and in-plan advice. This paper examines the effectiveness of employer increases to retirement contributions occurring after an employee has achieved a certain age or years of service.

Some DC plans' features involving increased contributions from the employer as a function of employee age. We examine four employers using administrative data from TIAA. The plan details vary by employer, but all feature an increase in the employer contribution at an age-based juncture. We use this discontinuity to explore how employee and total retirement savings are impacted by employer-sponsored DC plan changes. We use the age-based variation of retirement plan participants from cross-sectional data and the plan-level discontinuity with a regression discontinuity design. In addition, we measure the marginal impact, using the age-based discontinuity to instrument for employee and total contributions to the plan. We document that employees do not change their contributions when experiencing an increase in employer contributions at these junctures. Under the assumption that these increased savings make it to retirement-age with continued employment, we find that the employer rules meaningfully improve retirement readiness.

Our work builds on several strands in the existing literature. The first body of research explores the crowd-out effect in savings behavior. The question of whether tax-advantaged retirement savings plans increase total household savings instead of households substituting savings in brokerage and savings accounts for retirement accounts has been a debated topic in household finance among economists. Poterba et al. (1995, 1996) and Gelber (2011) find that retirement savings programs support a "crowd-in" hypothesis. That is, retirement savings programs result in an increase in total household savings do not crowd out other personal savings. Engen et al. (1996) conclude there is no rise in total household savings. Alternatively, households could take on debt to finance an increase in retirement savings. Exploiting changes in automatic enrollment in the Thrift Savings Plan (TSP), Beshears et al. (2022) find no changes to non-mortgage debt or credit scores when employees are enrolled to automatically save in the TSP. While changes to total household savings is an important topic, this paper, we only explore the change to retirement savings based on the discontinuity in the generosity of employer retirement contributions.

More directly related to our study, Chetty et al. (2014) finds that a substantial share of individuals are passive savers who accumulate increased retirement savings when they become eligible for mandatory contributions. Using administrative tax data in the U.S., Goodman (2020) further documents that passive savers do not decrease even non-retirement savings when they become eligible for an exogenous increase in retirement contribution limits.[1] Card and Ransom (2011) finds that employees have a passive response to employer contribution rates but are sensitive in their own voluntary contributions when the plan mandates contribution as part of the employee's responsibility.[2]

1 There is a more historical literature on crowd-out from total household savings from retirement savings accounts. See Poterba et al. (1994, 1995, 1996); Engen et al. (1996); Venti and Wise (1992, 1996).

2 A policy of mandatory contributions for employees is common for plans in higher education and the public sector. These are usually a condition of employment or plan participation. None of the plans we examine have mandatory employee contributions.

The age rules we investigate differ from the waiting period prior to being fully vested, a feature common in many firms. Gelber (2011) studies these vesting rules and finds that eligibility not only raises 401(k) balances, but also increases IRA assets, consistent with a "crowd-in" hypothesis (Bernheim, 2002) for saving. The rules we study involve an increase in employer contribution, effectively raising total employee compensation. Following Card and Ransom (2011), we define our outcome variables as a fraction of total compensation. These rules augment the share of total compensation to deferred retirement saving. This contrasts with automatic escalation policies, which increase the share of cash compensation going to retirement while maintaining total compensation constant (Benartzi and Thaler, 2013; Zhong, 2021; Beshears et al., 2018). Examining the increase in total compensation at the treated age-junctures is particularly interesting, as no prior work to our knowledge, has studied employee savings behavior at these age-related thresholds.

The effectiveness of whether these policies raise total retirement savings within the plan depends on if employees alter their own contributions at the age-based juncture. Employees could reduce their own contributions in response to an increased contribution amount by their employer. Our results reveal employee passivity, indicating that the employer contribution increases drive increased retirement savings in aggregate.

This paper proceeds as follows. In section 2, we detail the institutional variation we use along with a summary of the individual-level data. Section 3 overviews the empirical strategy. In section 4, we provide the estimated effects of employer contribution changes on retirement savings. Section 5 concludes and offers potential avenues of future research.

2. Setting and data

We use data from employers offering DC plans, selected for a discontinuous change in the employer contribution rate at either an employee age or job tenure juncture. Our dataset comprises information from retirement accounts of employees who make contributions to their primary accounts throughout the year—using 2021 administrative data from TIAA and incorporated salary data. We also focus on employers for whom TIAA is the sole recordkeeper, allowing us to identify all contributions. Table 1 details the contribution rules for each employer. The first row shows that Employer 1 increases the employer contribution by 5 percentage points of employee salary for every year after the employee turns age 40. This is implemented as an increase from 5% to 10% for employees with salary less than $141,000, and an increase from 10% to 15% for employees with salary equal to or above $141,000.

TABLE 1. CONTRIBUTION RULES ACROSS EMPLOYER SAMPLE

Employer	Rule type	Employer contribution (%)	Matching	Notes
E1	Age	Age<40: 5 Age 40+: 10	No	If income <SS max
	Age	Age<40: 10 Age 40+: 15	No	If income >=SS max
E2	Age	Age<30: 1.5 Age 30-39: 3 Age 40+: 4	Matches 1:1 up to 5%	
E3	Age	Age<50: 10 Age 50+: 11.5	No	Hired before 2006
E4	Years of service	YOS 2-4: 5.0 YOS 5-9: 7.5 YOS >=10: 10.0	No	2-year wait for employer contributions

Notes: Social Security (SS) max is $141,000 for 2021, the year of data studied. E1-4 denote unique employers; YOS is years of service.

TABLE 2. SUMMARY STATISTICS

Variable	Mean	St. Dev.
Contributions - Total ($)	12,528	11,326
Employer ($)	7,040	6,076
Employee ($)	5,488	6,677
Contribution Rates - Total (%)	13.5	8.2
Employer (%)	7.6	2.7
Employee (%)	5.9	7
Salary ($)	85,961	56,833
Age (years)	40.5	8.3
Tenure (years)	8.4	6.9
Balance ($)	186,741	278,311

n = 18,193. Data are pooled across employers.

Employer 2 offers smaller contributions as a share of salary both overall and at the age discontinuities, but it offers a one-to-one match for employee contributions up to 5%. Without any match, the employer provides a 1.5% contribution for those under age 30, a 3% contribution for those aged 30 to 39, and a 5% contribution for those aged 40 and above. Employer 3 has a simple rule of increasing the contribution by 1.5 percentage points (moving from 10% to 11.5%) for employees aged 50 and above. There is an additional restriction for this employer in that the contribution increase only applies to employees hired before 2006, a constraint accommodated in the empirical analysis. Employer 4 employs a rule based on years of service (YOS)—which, while not based on year of birth, is a function of age—with the additional rule that the employee must have two years of service before being eligible for employer contributions. We only include participants who meet this two-year service requirement.

Table 2 describes the universe of employees across the four employers we examine. The data include 18,193 individuals during a snapshot from 2021. We apply the following two sample restrictions: we omit (1) individuals above the 2021 DC retirement plan deduction annual compensation limit of $290,000, and (2) individuals who are beyond nine years before or after any age or YOS contribution rule. We impute salary based on employer contribution rules using administrative age and YOS data. We remove individuals we estimate earned less than $5,000. We observe that the mean retirement account contribution is $12,528, of which about 56% comes from employer contributions and the remaining 44% comes from employee contributions. Moving from contribution dollars to contribution rates, the mean is 13.6%, with the mean employer contribution rate being 7.6% and the mean employee contribution rate being 5.9%. The average age of employees in our sample is 40.5 and average job tenure is 8.4 years. The average retirement account balance held with TIAA among our sample is $186,741.

A natural question is, how common are these types of age-based pension rules? In defined benefit plans that usually vary benefits as a function of age, years of service, and salary, such age-based features are near-universal by construction. For DC plans, however, there is no aggregate reporting on the prevalence of such age-based features. Thus, we examined 1,440 institutions at TIAA who had at least 100 participants with employer contributions. Of this group, 99 (6.9%) of institutions had plans where employer contributions varied based on age or years of service. A majority use YOS rules (65%) compared to age rules (28%), with a few using an age plus years of service formula (7%). YOS discontinuities range from 1 to 25 years, with a median and mode of 5 and mean of 7.9. Age discontinuities range from 21 to 62, with a median and mode of 40 and mean of 40.1. Institutions using both had discontinuities range from 21 to 55 with a median of 35, mode of 21, and mean of 35.5. Taken together, we believe that the age-based rules are sufficiently prevalent that they merit the attention in this study.

3. Hypotheses

Since the employer contribution is considered a component of total compensation, we follow the methodology outlined by Card and Ransom (2011), We examine separately the effects on the total effective contribution rate and the employee effective contribution rate. The first outcome, the total effective contribution rate, is defined as the following:

$$\text{Total Effective Contribution Rate} = \frac{\text{Total Contribution}}{\text{Total Compensation}} = \frac{\text{ER+EE}}{\text{ER+Salary}} \quad (1)$$

where ER is the employer contribution dollar amount, EE is the employee contribution dollar amount, and Salary is the employee's salary. Thus, the fraction is the total retirement savings divided by the employee's total compensation. The employee effective contribution rate is defined using a subset of the numerator:

$$\text{Employee Effective Contribution Rate} = \frac{\text{Employee Contribution}}{\text{Total Compensation}} = \frac{\text{EE}}{\text{ER+Salary}} \quad (2)$$

Finally, the employer effective contribution rate is defined analogously:

$$\text{Employer Effective Contribution Rate} = \frac{\text{Employer Contribution}}{\text{Total Compensation}} = \frac{\text{ER}}{\text{ER+Salary}} \quad (3)$$

As shown in Table 3, a substantial portion of compensation is deferred towards retirement savings. Consequently, constructing nominal contribution rates can be misleading. To illustrate this, let us examine columns (1) and (2) in Table 3. In the first column, the employer designates 5% of the cash compensation as deferred retirement compensation for employees at the age of 39. In the second column, the employer allocates 8% for employees at the age of 39. The effective employer contribution rate for column (1) is 4.76% and 7.41% for column (2). When employees reach age 40, both employers increase their contribution rate by 3 percentage points. Consequently, the effective employer contribution rate at age 40 is 7.41% in column (1) and 9.91% in column (2). Although the difference in employer nominal contribution rate is the same in both columns, which is a 3% increase, the employer effective contribution is higher in column (1), which is 2.65%, compared to 2.5% in column (2). This suggests that, although the nominal increase for both employers is the same, effectively employees at the age of 40 receive a larger portion of compensation (salary and employer contributions combined) in column (1) compared to those in column (2).

TABLE 3. NOMINAL VS. EFFECTIVE CONTRIBUTION RATES

	(1)	(2)
Salary	$100,000	$100,000
Employer contribution % at age 39 (nominal rate)	5.00%	8%
Total compensation	$105,000	$108,000
Effective employer contribution rate	4.76%	7.41%
Employer increase	3%	3%
Employer contribution % at age 40	8%	11%
Effective employer contribution rate	7.41%	9.91%
Difference		
Employer nominal contribution rate	3%	3%
Employer effective contribution rate	2.65%	2.5%

The employee effective contribution rate is relevant because it can shed light on whether employees are active or passive in response to the employer contribution changes. Passivity is difficult to infer, however, because it includes the case in which an employee takes the employer contribution as a guideline and thus does not alter saving behavior even if the changes are salient. Our goal is to assess the impact of the contribution rules on the total effective contribution rate; the reason we will also look at the employee effective contribution rate is to assess whether there is any employee response to the compensation change.

If we normalize salary to 1 and suppose the current employer contribution is a proportion α of the salary. Then, the current employer (ER) effective rare is $\frac{\alpha}{\alpha+1}$. Now, suppose the employer increases this rate by β. Then the new ER effective rate is $\frac{\alpha+\beta}{\alpha+\beta+1}$. Figure 1 plots two objects of interest. The x-axis in both Panels is β, indicating the changes in the level of employer contributions. We first set the baseline employer contributions at $\alpha\ equal\ to$ 0.054. This is because, in our data, the mean baseline employer contribution is 5.4%.

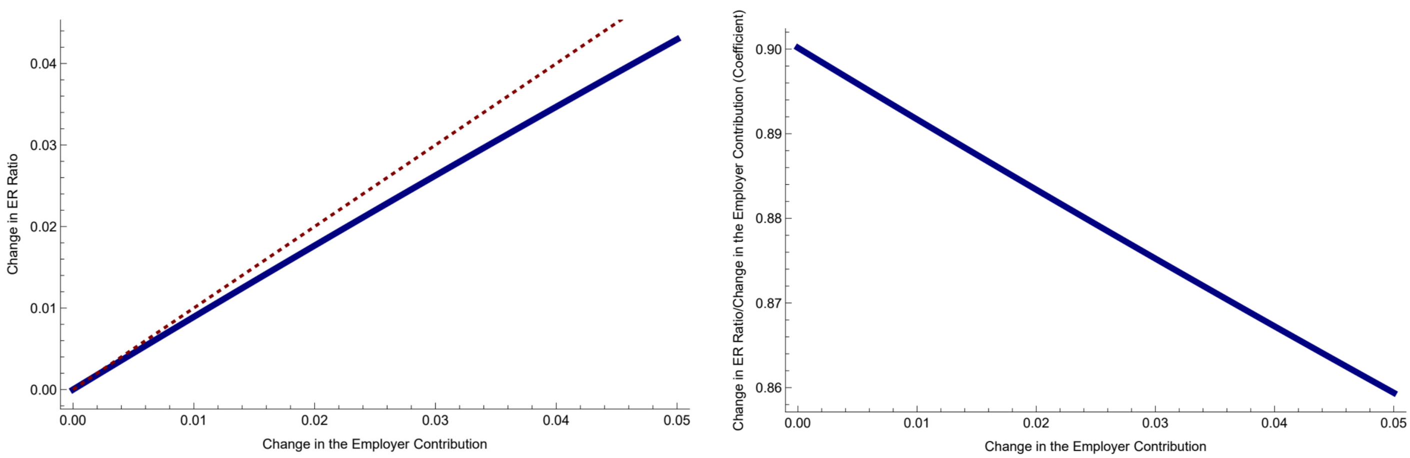
In Figure 1a, the y-axis indicates the change in the effective ER ratio after the employer contribution rate increases from α to α+β: $\Delta = \frac{\alpha+\beta}{\alpha+\beta+1} - \frac{\alpha}{\alpha+1}$. The dotted line is the identify line, i.e. $y = x$. As shown in Figure 1a, the change in the ER effective rate is smaller than changes in the level of the employer contribution rate (i.e., $\Delta \leq \beta$). For example, when the employer contribution rate increases by 1%, where $\alpha = 0.054$ and $\beta = 0.01$, and $\Delta = 0.009$. This means that when the employer contribution rate increases by 1 percentage point, the ER effective rate increases by 0.9 percentage point.

In Figure 2b, the y-axis presents the change in the effective ER ratio: $\frac{\alpha+\beta}{\alpha+\beta+1} - \frac{\alpha}{\alpha+1}$ and the x-axis shows the change in ER contribution rate levels β $\delta = \frac{\frac{\alpha+\beta}{\alpha+\beta+1} - \frac{\alpha}{\alpha+1}}{\beta}$. The slope of the line in Figure 2b, δ, indicates the mechanical increase in the effective ER ratio for every unit of increase in the ER contribution rate. This δ value is close to the expected coefficient in the regression analysis as it is the marginal impact of β on the effective ER rate. If saving is a normal good, then we should expect δ to increase (in levels) as compensation rises. The extent of increase might depend on underlying preferences and beliefs about risks, longevity, and other factors. We observe that for β values around 0.024 (the mean rate increase of our sample), the expected coefficient is 0.88.

FIGURE 1. ANALYSIS OF THE EMPLOYER EFFECTIVE RATIO

Panel A. Change in the employer effective ratio

Panel B. Expected coefficient



4. Empirical strategy

We pool the individual-level data from the employers in our sample and estimate regressions where the dependent variable is a function of the contribution rate, and the key independent variable is the change in the employer contribution rate. We estimate the following regressions at the individual-level i:

$$Y_i = a_i + b * Age + c * \boldsymbol{X}_i + \gamma * Treatment_i + e_i \qquad (4)$$

where Age is continuous and measured in years; the covariate vector $\boldsymbol{X}$ contains the individual's salary (in $000), age squared, job tenure (in years), and job tenure squared (in years); and e is the employer fixed effect. The main variable of interest, $Treatment$, is continuous and contains the ER increase for the individual depending on their age, job tenure, and employer compared to the baseline. For example, if the rule is an increase of x percentage points in employer contribution at age y (only one rule break), then the treatment is implemented as follows:

- Age y-2: treatment is 0
- Age y-1: treatment is 0
- Age y: treatment is x
- Age y+1: treatment is x

If there are two rules, in which the first discontinuity is at age y (at which point the employer contribution increases by x percentage points) and the second is at age $y+2$ (at which point the employer contribution increases by another z percentage points):

- Age y-2: treatment is 0
- Age y-1: treatment is 0
- Age y: treatment is x
- Age y+1: treatment is x
- Age y+2: treatment is $x+z$
- Age y+3: treatment is $x+z$

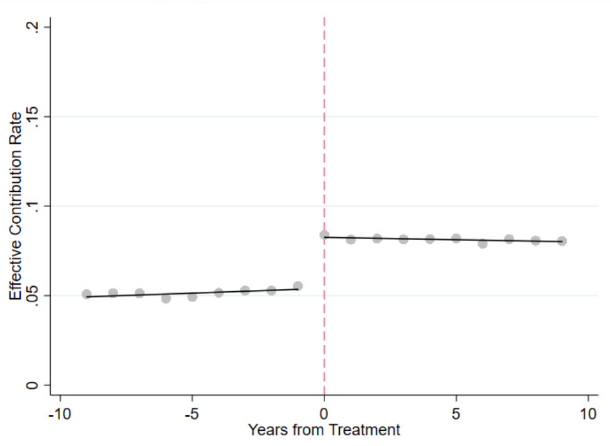
Our focus will be on interpreting the gammas γ from Equation 4, which we can estimate because we have variation in job tenure conditional on age, and on age conditional on job tenure.

4.1 Graphical evidence

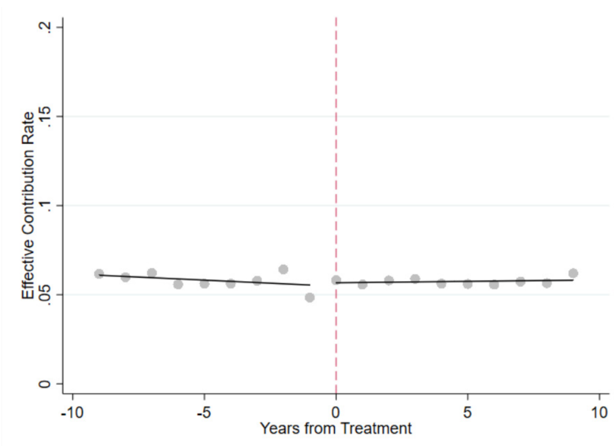
We begin by showing the plots of the employer, employee, and total effective contribution rates on the y-axis in three separate plots. The horizontal axis is the years in age or job tenure from the treated age or job tenure. We observe that, as expected, there is a rise in the employer effective contribution rate (Figure 1a) at the treated age or job tenure junctures; the jump is approximately from 0.05 to 0.08, representing an average rise of 3 percentage point (pp) in the employer effective contribution rate across all sources of variation. The employee effective contribution rate plotted in Figure 1b does not appear to show any change, however; the slight decline likely stems from the numerator staying the same while the denominator, total compensation, rises because of the increase in employer contributions. In Figure 1c, we observe an increase in the total effective contribution rate from (roughly) 0.11 to 0.14, reflecting the increase in employer contributions. Taken together, these plots show us that the employer contribution rules appear to go into effect as expected, with little aggregate response from employees.

FIGURE 2. EFFECTIVE CONTRIBUTION RATES BY YEARS FROM TREATMENT

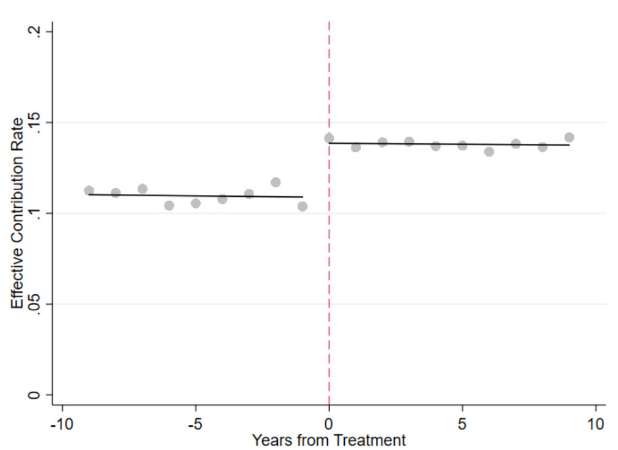
Panel. A. Employer effective contribution rate



Panel B. Employee effective contribution rate



Panel C. Total effective contribution rate



Notes: For employers 2 and 4 we include only employees above the first discontinuity. The full sample is included for analysis in Table 4.

5. Regression results

Table 4 presents the main results using linear regressions. We include employer fixed effects in each specification. We cluster the standard errors at the level of "treatment" variation, which is at the employer contribution policy (there are 12). In Panel a, we observe that the total effective contribution rate rose by 0.76 percentage points (pp) for every 1-pp increase in the treatment. As we have mentioned, this coefficient is not equal to 1 as the denominator is total compensation and thus also rises when the treatment is implemented. In Panel b, we observe that the employee effective contribution rate appears flat with respect to the treatment, indicating no savings "response"; the negative coefficients (despite being not statistically significant) stem from the increase in the denominator of total compensation.

We note that in Panel B the point estimate is not significantly different from zero. However, the confidence interval (CI) on the estimate that contains zero is between -0.076 and 0.099 and thus does not entirely rule out the possibility of (reverse) crowd-out.

In Panel c, we observe that the employer effective contribution rate is almost identical to the results in Panel a, indicating that all the effect is coming from the employer contribution increases at treatment. Column 1 shows our baseline regression with age and tenure controls only. Then in column 2, add age squared in column 3, and add tenure squared in column 4—and the coefficients are stable across these specifications, indicating little contribution from these covariates.

TABLE 4. REGRESSION ESTIMATES OF EFFECTIVE CONTRIBUTION RATES

	(1)	(2)	(3)	(4)
Panel A. Total effective contribution rate				
Treatment	0.762***	0.757***	0.752***	0.752***
	(0.064)	(0.054)	(0.046)	(0.045)
Panel B. Employee effective contribution rate				
Treatment	0.011	0.010	0.012	0.012
	(0.040)	(0.043)	(0.045)	(0.045)
Panel C. Employer effective contribution rate				
	0.750***	0.747***	0.740***	0.740***
	(0.062)	(0.044)	(0.036)	(0.036)
Salary ($000)		X	X	X
Age squared			X	X
Tenure squared				X

Notes: Dependent variable in Panels a, b, and c are defined in equations (1), (2), and (3) respectively; it is in percentage points and the domain of this variable is 0 to 5. Linear regressions and includes all employers. All specifications include employer fixed effects. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. The 95% CI on the treatment for Panel b column (1) is -0.076, 0.099 and for column (2) is -0.087, 0.111.

TABLE 5. DIFFERENCES BY SALARY, EMPLOYEE EFFECTIVE CONTRIBUTION RATE

	Estimate	Standard error	95% CI
Panel A. below \$70,000 salary (n = 8,705)			
Treatment	-0.015	0.054	(-0.137, 0.106)
Panel B. above \$70,000 salary (N = 9,488)			
Treatment	0.070*	0.038	(-0.013, 0.154)

Notes: Median salary is \$72,306; individuals with salaries equal to this amount are placed in the below median salary group. Dependent variable is the employee effective contribution rate as defined in equation (2); it is in percentage points and the domain of this variable is 0 to 5. Linear regressions and includes all employers. Specification includes employer fixed effects with errors clustered at the treatment. *, **, and *** indicate significance at the 10%, 5%, and 1% levels. Controls are the same as column (5) from table 4.

Table 5 presents the regression estimates on one dimension of heterogeneity: whether the employee salary is above or below \$70,000, close to the sample median of \$72,306. We report the estimate on our main variable, standard error, and 95% CI on the estimate, using the controls from column (5) of Table 4. The outcome we focus on here is the employee effective contribution rate, as it is possible that employees facing greater liquidity constraints may adjust their saving in response to an employee-initiated increase. For employees under \$70,000 salary, we do not find any significant relationship in Panel A. In Panel B, there are directional evidence changes in the employee effective contribution rate for above-median salary employees. But with a p-value of 0.091, we do not view this as a significantly significant finding. Furthermore, zero is contained in the confidence interval, further suggesting passivity among employees.

We estimate the elasticity of employee effective contribution rates with respect to effective employer contribution rates via IV regression in similar fashion to Leive (2021). For E2 and E4 we only examine employees above the first discontinuity. We use the employer contribution discontinuity to instrument for effective employee contributions. For the dependent variable we model the employee effective contribution rate in reduced form.

$$\text{Effective employer rate}_{if} = \beta_0 + \beta_1 M_{if} + \beta_2 \text{treatment\_time}_{if} + \beta_3 M_{if} \text{ x } \text{treatment\_time}_{if_{if}} + \varepsilon_{if}, \qquad (5)$$

$$\text{Effective employee rate}_{if} = \pi_0 + \pi_1 M_{if} + \pi_2 \text{treatment\_time}_{if_{if}} + \pi_3 M_{if} \text{ x } \text{treatment\_time}_{if} + \varepsilon_{if}, \qquad (6)$$

where $time_{if}$ is the age or tenure of employee i at employer f and M_{if} is an indicator for employees above the age-based treatment discontinuity. $treatment\_time_{if}$ is how many years employee i at employer f is above or below the employer contribution discontinuity. Table 6 presents estimating equations (5) and (6) via IV regression, showing the estimate for the marginal ratio π_1 / β_1. An estimate of zero provides evidence for a passive response by employees, whereas values greater (less) than zero would provide evidence for an active response by employees adjusting their contributions upward (downward). Additionally, Table 6 shows estimates of the impact to the total effective contribution rate using the full set of controls as in Table 4 and displaying the 95% CI as well. We find strong support that there is no impact to employee contributions, following Table 4. However, the range of the CI does not preclude the possibility of one. With respect to total contributions, once adding controls we find strong evidence of a one-to-one relationship between changes in employer contributions and total contributions. The CI on the estimate is also well above zero. Next, we examine the practical impact of these policies.

TABLE 6. DIFFERENCES BY SALARY, EMPLOYEE EFFECTIVE CONTRIBUTION RATE

	Estimate	Standard error	95% CI	Controls
Effective employee contribution rate				
	-0.730	1.141	(-2.969, 1.508)	No
	0.102	0.167	(-0.226, 0.430)	Yes
Total effective employee contribution rate				
	0.270	1.142	(-1.969, 2.508)	No
	1.102***	0.167	(0.774, 1.430)	Yes

Note. Estimates from 2SLS from equations (5) and (6), using the same controls in the second stage as in table 4, column (5). *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

6. Impact on retirement readiness

In this section, we estimate how age-based increases in employer contributions can affect retirement readiness in practice. Following Leibowitz et al. (2002) and Hammond and Richardson (2009), we use the ratio of final simulated accumulated assets relative to salary at retirement to measure retirement readiness—the asset/salary ratio—from an asset accumulation perspective. We assume individuals receive a annual salary increase of 4%,investment return of 6%, and that employees do not reduce their own contributions. The simulation results are presented in Table 7, which outlines the effect by employee age when the rule is applied and the magnitude of the rule change. Column (1) shows a 1pp increase in the employer contribution rate at age 40 (or age 50), for an individual working until 67 and then retiring. At retirement, this results in an additional accumulation of 0.37 (or 0.23) of final preretirement salary (or an additional accumulation of $25,900 for someone earning $70,000), increasing the asset-salary ratio at retirement. This is equivalent to an extra 4.4 (or 2.8) months of labor income at age 67. These back-of-the-envelope estimates are similar to Bronshtein et al. (2019).

TABLE 7. INCREASE IN FINAL ASSET/SALARY RATIO AT RETIREMENT

	Amount of increase in the age-based rule (in percentage points)				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Age	1.00	2.00	3.00	4.00	5.00
40	0.37	0.73	1.10	1.47	1.83
45	0.29	0.61	0.91	1.21	1.51
50	0.22	0.46	0.69	0.92	1.15
55	0.15	0.33	0.49	0.65	0.81

Assumptions: 4% annual salary growth, 6% investment returns, no change in employee contributions, and retirement at age 67.

From a retirement income perspective, the $25,900 translates into approximately $168 of monthly income using approximate current single-life annuity payout rates of 7.8%. This accounts for an additional retirement income replacement rate of 2.9pp for someone earning $70,000 at retirement. A 5pp increase at age 40 accounts for an increased replacement rate of 14.4pp (or an additional $841 of monthly income from a life annuity). We use example only as an illustration of the potential impact of these contribution policies on retirement income.

7. Discussion

Employer benefits have a large impact on employee retirement readiness, underscoring the importance of carefully crafting employer retirement plan designs. Recent research indicates that employees value employer retirement contributions at much more than the tax-adjusted dollar (Cole and Tasks, 2023). Our study reveals that employers introducing age-based increases in contributions improve their employees' retirement readiness, as these retirement savings are not "crowded-out" by a decrease in employee contributions. This is applicable to earners across the salary distribution, specifically both below- and above- the median.

Our study is the first to examine these types of employer rules. Like any research, ours has imitations. First, we do not observe individuals over time, and we rely on a cross-section analysis using a limited set of employers. Potentially employees would change their voluntary contributions in later years, exhibiting crowd-out that is not captured in our analysis. We view that possibility as unlikely, however, based on prior work demonstrating employee passivity (Chetty et al., 2014). Second, we do not observe total household savings data, focusing solely on employer-sponsored retirement plans. Individuals could adjust savings beyond workplace retirement plans, such as to savings accounts or IRAs. Yet, prior research—albeit debated—suggests limited potential for such behavior (Goodman, 2020). Households could also debt-finance retirement savings increases, but research (Beshears et al., 2022) does not provide strong supportive evidence for this.

Another possibility is that if these contribution rules are anticipated by employees, they could be taking a lifecycle savings approach and therefore adjust their contributions in a way that doesn't match the timeline we study. We view this as unlikely for three main reasons. First, most research has rejected that people smooth consumption according to a standard permanent income hypothesis (i.e. Mankiw, 1981; Hubbard et al. 1994) without additional assumptions (i.e. Hall, 1978, Gourinchas and Parket, 2002). Second, such adjustment would require sophisticated planning and a high level of retirement plan rule salience, both of which are likely to be challenging to support across the distribution of people we study. In addition, Card and Ransom (2012) finds that salience is likely much the lower for employer-funded portion of retirement pension plans than the employee-funded portion. Third, recent work has shown that people generally have low literacy on retirement topics (Yakoboski et al. 2024). In light of these findings, we view such sophisticated planning as unlikely, although we acknowledge that the interpretation of our results leaves open this possibility. Our study offers insights into one common component of defined contribution pension design and indicates the potential positive impact of age-based rules on improving retirement preparedness.

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Appendix (tables with coefficients displayed)

TABLE A1. REGRESSION ESTIMATES OF THE TOTAL EFFECTIVE CONTRIBUTION RATE

	(1)	(2)	(3)	(4)
Treatment	0.762***	0.757***	0.752***	0.752***
	(0.064)	(0.054)	(0.046)	(0.045)
Age	0.119***	0.098***	0.256***	0.213***
	(0.029)	(0.024)	(0.114)	(0.098)
Tenure	0.033***	0.034***	0.032***	0.098***
	(0.011)	(0.009)	(0.008)	(0.021)
Salary ($000)		0.009***	0.009***	0.009***
		(0.003)	(0.003)	(0.003)
Age squared			-0.002***	-0.001*
			(0.001)	(0.001)
Tenure squared				-0.003***
				(0.001)
Constant	6.762***	6.698***	3.564	4.226*
	(1.003)	(0.903)	(2.322)	(2.275)

Notes: n = 18,193. Dependent variable is the total effective contribution rate as defined in equation (1); it is in percentage points and the domain of this variable is 0 to 5. Age and tenure are in years. Linear regressions include all employers. All specifications include employer fixed effects. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

TABLE A2. REGRESSION ESTIMATES OF THE EMPLOYEE EFFECTIVE CONTRIBUTION RATE

	(1)	(2)	(3)	(4)
Treatment	-0.011	-0.010	-0.012	0.012
	(0.040)	(0.043)	(0.045)	(0.045)
Age	0.054***	0.049***	-0.007	-0.023
	(0.010)	(0.010)	(0.085)	(0.087)
Tenure	0.012	0.012	0.012	0.058
	(0.013)	(0.013)	(0.013)	(0.036)
Salary ($000)		0.002	0.002	0.002
		(0.003)	(0.003)	(0.003)
Age squared			0.001	0.001*
			(0.001)	(0.001)
Tenure squared				-0.002
				(0.001)
Constant	4.309***	4.295***	5.143***	5.596***
	(0.367)	(0.361)	(1.546)	(1.561)

Notes: n = 18,193. Dependent variable is the employee effective contribution rate as defined in equation (2); it is in percentage points and the domain of this variable is 0 to 5. Age and tenure are in years. Linear regressions include all employers. All specifications include employer fixed effects. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

TABLE A3. REGRESSION ESTIMATES OF THE EMPLOYER EFFECTIVE CONTRIBUTION RATE

	(1)	(2)	(3)	(4)
Treatment	0.750***	0.747***	0.740***	0.740***
	(0.062)	(0.044)	(0.036)	(0.036)
Age	0.065***	0.048***	0.249***	0.235***
	(0.023)	(0.019)	(0.064)	(0.040)
Tenure	0.021*	0.022*	0.019	0.040*
	(0.011)	(0.012)	(0.011)	(0.031)
Salary ($000)		0.007***	0.007***	0.007***
		(0.001)	(0.001)	(0.001)
Age squared			-0.002***	-0.002***
			(0.001)	(0.001)
Tenure squared				-0.001***
				(0.000)
Constant	2.453***	2.403***	-1.579	-1.370
	(0.846)	(0.762)	(1.439)	(1.418)

Notes: n = 18,193. Dependent variable is the employer effective contribution rate as defined in equation (3); it is in percentage points and the domain of this variable is 0 to 5. Age and tenure are in years. Linear regressions include all employers. All specifications include employer fixed effects. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

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