

Contribution location decisions and inertia in retirement plans: Evidence from the nonprofit sector

Abstract

Employers offering defined contribution (DC) plans have the option to provide traditional tax-deferred accounts, Roth accounts, or both. Traditional accounts provide deferral of contributions and asset earnings, with distributions fully taxable. By comparison, Roth contributions are not deducted from current taxable income, and withdrawals (including asset earnings) are tax-free. In this study, we analyze the characteristics of workers who are Roth contributors within a TIAA record kept plan. Among actively contributing participants, 42% had a Roth account option in their retirement plan. We find 12% of participants use a Roth option. Utilization of a Roth option depends on age, default status, plan contribution requirements, and whether a Roth option was available when joining the plan. We find evidence of contribution inertia, with participants who did not have a Roth option when joining the plan being less likely to have Roth contributions. Participants who are younger, not plan investment defaulters, and in a DC plan with mandatory employee contributions are significantly more likely to locate contributions to a Roth account. Half of Roth contributors use Roth accounts exclusively. Roth-contributing participants save more on a tax-equivalent basis except when they have mandatory contributions. Our results provide insight into how plan design impacts household tax location decisions and provides insights into how retirement policy changes may affect household retirement security.

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1. Introduction

For decades, workers contributed on a pre-tax basis when participating in an individual retirement account (IRA) or defined contribution (DC) retirement plan. These accounts provided tax deferral of contributions and asset earnings, with account distributions fully taxed at ordinary income tax rates. Roth treatment of retirement accounts was introduced as part of the Taxpayer Relief Act of 1997 for IRAs and for DC plans as part of the Pension Protection Act (PPA) in 2006. By comparison to traditional tax treatment, Roth contributions are fully taxable, but asset earnings and distributions are tax-free. This latter policy change introduced a tax location choice for workers' DC retirement savings. Assuming households have the same income tax schedules at the time of contribution and withdrawal, the only difference between Roth and pretax accounts is the timing of the tax payment.

Households expecting higher (lower) tax rates in retirement can reduce expected lifetime tax liability by locating relatively more (less) contributions to Roth accounts. However, most households face substantial uncertainty about future tax rates. Brown, Cederburg, and O'Doherty (2017) find that households may be able to reduce their expected lifetime tax liability by mixing their contributions across both Roth and pre-tax accounts. While paying taxes at the time of contribution insures against future income tax increases, pre-tax contributions best manage current tax liability and insure against low account performance via the progressive income tax schedule. Their analysis finds that many households should split contributions between traditional and Roth accounts, and that the percent allocated to tax deferral increases as tax uncertainty diminishes (as a household nears retirement age). While ICI (2024) finds 57% of households with IRAs have a Roth IRA either alone or with a traditional IRA, Roth accounts make up a small percentage of IRA assets, despite the benefits of incorporating Roth contributions into an overall tax location strategy. Statistics from ICI (2024) show these accounting for only 10% of IRA assets in 2023. This may be due to the relatively recent adoption of Roth provisions or may be due to behavioral considerations.

In this paper, we analyze the tax location choice of employee contributions in DC plans using administrative data from plans record-kept by TIAA. We document the characteristics of Roth contributors and how they split their contribution dollars across traditional pre-tax and Roth accounts. Following our descriptive findings, we compare tax location decisions to the Brown et al. (2017) location benchmark. Finally, we use an event study to examine inertia in location decisions by exploiting when a Roth account became available in the plan and when a participant joined the plan.

Our work adds several important aspects to the literature on retirement savings decisions and household finance. More broadly, our study connects various aspects of retirement plus design, including Choukhmane (2025), Dobrescu et al. (2018), and Choi et al. (2003) research on optimal default saving rates, behavioral conferences examined in Mitchell and Utkus (2004), and plan design and equilibrium theory by Bubb and Warren (2020). More specific to our study, we extend limited empirical asset location decision research by Beshears et al. (2014, 2017) and Burman et al. (2001). There is more research on this by Poterba et al. (2004), Bergstresser and Poterba (2004), and Dammon et al. (2005), but it examined the location choice between pretax accounts and taxable brokerage accounts, excluding Roth accounts. Our study complements and extends Beshears et al. (2014) with more recent data, which is important as individuals become more accustomed to Roth saving availability, using a larger sample in a different sector of the workforce.

On the extensive margin, we find that 12.0% of Roth-eligible participants contribute to a Roth account—complementing findings from the for-profit sector.¹ This percentage is higher for younger participants, males, and those who make active investment decisions. Because auto-enrollment defaults participants in a pre-tax savings account, our finding comports with research that passive investors are more likely to fully accept default provisions.² Another tax margin is the ability to exceed the qualified deferral limit. Because the contribution limit is the same for both Traditional and Roth accounts, workers can effectively contribute more to a Roth account because it includes the tax payment.³ We find participants contributing the maximum amount were significantly less likely to use Roth accounts compared to participants contributing below the qualified limit, suggesting the intertemporal tax effect is more important than total amount of tax-sheltered assets. On the intensive margin, we find little evidence that few workers mix location contribution locations.⁴ Half of Roth contributors in our sample use Roth accounts exclusively and 10% use a simple 50/50 location heuristic to split contributions between Roth and traditional pre-tax accounts.

1 See, for example, Beshears et al. (2014), PSCA (2018), and ICI (2024).

2 See the auto-enrollment literature from Madrian and Shea (2001), Choi et al. (2004), and investment research in the context of retirement savings from Agnew and Szykman (2005) and Choi et al. (2004) among others.

3 For example, in 2022 the maximum deferral was \$22,000. A Roth deferral was effectively $\$22K \times (1 + \text{MRT})$.

4 This is related to Brown et al. (2017) discussion of optimal location decisions for retirement savings.

A common plan design feature among plans in the public and not-for-profit sectors is mandatory employee contributions to a primary retirement plan as a condition of employment. By contrast, employee contributions to a supplemental retirement plan may be either Roth or tax-deferred. Mandatory contributions are always located in a pre-tax account, and only those participants with voluntary contributions above the mandatory minimum have a location choice. We find that participants with both mandatory and voluntary contributions are 7% more likely to be Roth participants and use Roth accounts with greater intensity, compared with those with only voluntary contributions. This result adds to the studies examining the impact that plan design features have important effects on participants. Friedberg et al. (2024) and Card and Ransom (2011) have examined how mandatory contributions impact supplemental voluntary saving amounts.

Conducting an event study, we examine location decisions by delineating between participants who join their plan before or after the introduction of a Roth option. Participants who joined plans before a Roth option was introduced were significantly less likely to use the Roth accounts, by a nearly 10-percentage-point difference. This suggests that there is substantial inertia in participants' contribution location decisions. This finding follows inertia in other household finance and retirement decisions from Agnew et al. (2003), Ameriks and Zeldes (2004), and Mitchell et al. (2004), among others.

The remainder of the paper is structured as follows. The tradeoff between traditional and Roth contributions is discussed in Section 2. Section 3 describes our sample. Section 4 examines characteristics of Roth contributors. Section 5 overviews our event study. Section 7 offers concluding thoughts.

2. The pre-tax versus Roth decision

Employees⁵ are only eligible to put their own voluntary contributions in a Roth account if a Roth account is offered by the plan. If offered, employees then have a location choice to allocate their contribution dollars to a Roth or pre-tax account, or both. By comparison, employer contributions can only be made to a pre-tax account. Assuming an individual's marginal tax rate is the same at the time of contribution and retirement, then both locations provide equivalent tax liability and retirement consumption, and the only difference is the timing of the tax. However, there is considerable uncertainty around future marginal tax rates—in particular for younger workers. Tax rates in retirement can differ if either taxable income or income-tax schedules change. If the tax rate in retirement is higher (lower), then the employee can lower lifetime tax liability and increase retirement consumption by using the Roth (pre-tax) account. By committing to paying (deferring) taxes at the time of contribution, the participant can “insure” against future tax rate increases (decreases).

When employee contributions are matched by an employer, the attractiveness of a pre-tax account is greater for liquidity-constrained individuals compared to a Roth account. This is because d dollars of employee pre-tax contributions are matched with d employer dollars, but only $(1 - \tau_0)d$ Roth contributions are matched with d dollars, where $0 < \tau_0 < 1$ is the participant's current marginal tax rate. Assume a participant is liquidity constrained and only able to contribute a dollars, and $a < (1 + \tau_0)d$. This participant would not be able to receive the full employer match as that would require Roth contribution dollars of $d_R = (1 + \tau_0)d$. If they switch to a pre-tax account, then a contributions are matched with a dollars, which provides a better outcome under reasonable future tax assumptions, since $d > d_R$.⁶

⁵ We use the term employee and participant synonymously throughout the paper.

⁶ Beshears et al. (2014) provide further discussion on this point.

Many non-profit employers provide a primary employee non-contributory plan or a flat contribution to an employee contributory retirement plan.⁷ If the employer provides a flat contribution without requiring any employee contributions, then the attractiveness of a worker contributing to a supplemental Roth account increases compared to the employer-matching case. Some employers require employee pre-tax contributions as a condition of participation in a primary plan.⁸ In this case, Roth contributions may be attractive to participants with a desire to contribute beyond the mandatory minimum contribution amount. Provided a participant desires to make contributions beyond the mandatory amount, the attractiveness of a Roth contribution increases compared with an employee who has no mandatory contribution requirement. This is because the individual already has a pre-tax deferral on the pre-tax mandatory contribution amount.

DC plan participants have substantial flexibility in determining what percent of their salary to contribute to a workplace retirement plan. Intuitively, saving rates (what can I afford?) may be a more salient feature for participants than the tax-equivalent amount (what are my tax savings?) when considering how much to save. This could lead Roth investors to purchase more retirement consumption compared to pre-tax only savers. Beshears et al. (2017) find some evidence for this because saving $x \in [0,1]$ fraction of salary in a Roth account where taxes are paid upfront is equivalent to a $x(1 + \tau)$ savings in a pre-tax account, where $\tau \in [0,1]$ is the current marginal tax rate as taxes in a pre-tax account are paid upon withdrawal. We also find evidence for this in our setting, but notably only for participants without mandatory contributions, showing how plan design aspects can impact participant savings behavior.

Mixing contribution locations could be advantageous. Brown et al. (2017) discuss optimal retirement saving decisions, finding that many savers should mix contributions between Roth and pre-tax accounts. However, we find nearly all savers use only pre-tax or Roth accounts. Our results provide empirical evidence on where retirement contributors locate their savings.

3. Data description

We examine contribution location decisions for participants with access to a Roth account in their workplace retirement plan. We use a cross-section of administrative data from plans where TIAA is the sole record keeper.⁹ In 2018, TIAA served approximately 4.3 million individuals with approximately 1.5 million participants who were actively contributing to a workplace retirement plan. We then limit the sample to the 912,901 participants who contributed throughout the year and are in plans that are sole-record-kept by TIAA. Finally, we include only participants who have a Roth account option (42.0%), leaving us with a sample of 385,315 participants in 2018.¹⁰

Table 1 provides summary statistics for our sample of contributing participants. The average participant is 47 years old, has a balance of \$199,425, and has been in a TIAA record kept plan for 10.2 years. A majority (60%) of contributors are women. The average total contribution is \$13,004, of which 54% is funded by the employer and 48% by the employee. About 10% of participants have mandatory employee contributions. More than one-third (36%) of participants defaulted into the plan's default investment option and remained fully that investment. Based on age and income, we estimate 7.5% of participants contributed to the qualified maximum deferral limit. We have salary information for 62% of the sample, which is almost \$87,000 on average. Average total contribution rates were 14.8%.

Many plan participants in the non-profit sector have access to a supplemental savings account in addition to their primary savings account.¹¹ More than half (55%) made contributions to only a primary DC account, while 36% also contributed to a supplemental plan, and 9% contributed only to a supplemental plan. Only contributing to a supplemental plan may indicate that their primary plan is a defined benefit plan, but we can only confirm this in our data.

7 Card and Ransom, (2011).

8 These contributions are generally IRC Section 414(h) and are not counted for purposes of employee qualified elective deferrals.

9 Retirement plans can have a sole record keeper (SRK) or multiple record keepers. We limit to SRK plans so we can identify all contributions. With multiple record keepers, participants can often allocate contributions across record keepers.

10 If a participant did not make any voluntary contributions, they are classified as not having Roth access because none of their contributions could be located in a Roth account.

11 For further research on this topic see Clark et al. (2018) and Clark and Pelletier (2022).

TABLE 1. SUMMARY STATISTICS

Variable	Mean	St. Dev.	Median
Age	46.6	12.8	47
Female (%)	60.1		
TIAA Tenure (yrs)	10.2	9.8	7
Asset Balance	199,425	371,942	62,987
Defaulter (%)	36.1		
Max Contributor (%)	7.5		
% with Employer Contributions	87.1		
% with Mandatory Contributions	10.2		
% with Roth Contributions	12.0		
Total Contributions (\$)	13,004	12,325	8,806
Employee Contributions (\$)	7,043	7,475	3,902
Vol Pre-tax Contributions (\$)	6,144	6,993	3,236
Vol Roth Contributions (\$)	461	2,106	0
Mandatory Contributions (\$)	438	1,809	0
Employer Contributions (\$)	5,960	6,256	4,300
Salary (\$)	86,881	61,078	70,031
Total Employee Contribution Rate (%) (\$)	14.8	9.4	13.5
Employee Contribution Rate (%)	8	7.2	5.9
Employer Contribution Rate (%)	6.7	4.3	7.1
Primary only (%)	55.3		
Primary and supplemental (%)	35.8		
Supplemental only (%)	8.9		

Note: We include salary data if salary is known and between \$5,000 and \$500,000. The number of observations is 385,315 except for salary, which is 240,271.

Source: Authors' analysis of administrative records.

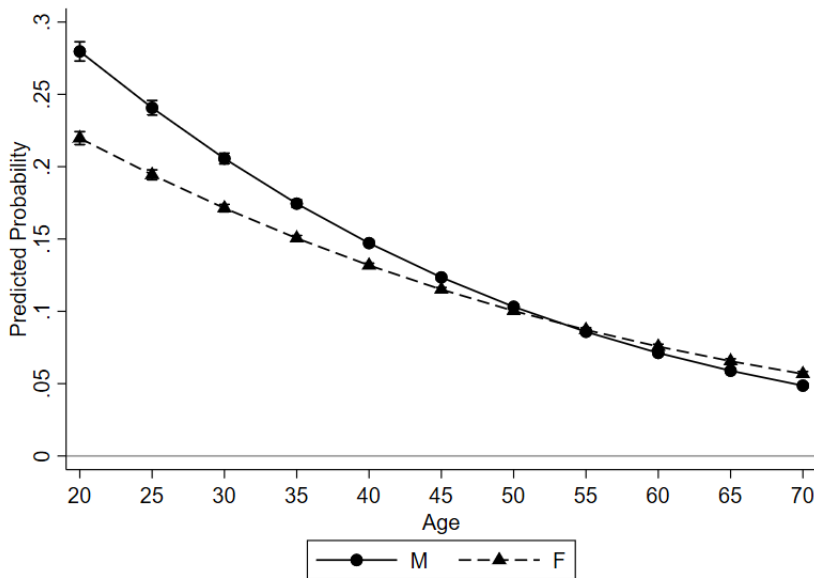
4. Characteristics of Roth contributors

4.1 The extensive margin: Who makes a Roth contribution

In 2018, 12.0% of participants in our sample contributed to a Roth account. Figure 1 shows the predicted probability of making a Roth contribution by age and sex using results from a logit regression model. Overall, 20% of participants under 30 contributed to a Roth account, which monotonically and significantly decreases to 7.9% for participants over 50 years old. The pattern is similar for males and females, but younger males have a significantly higher propensity to use Roth accounts. After age 50, women are slightly more likely to use a Roth account. This age gradient is similar to use of Roth accounts by IRA account holders described in ICI (2024).

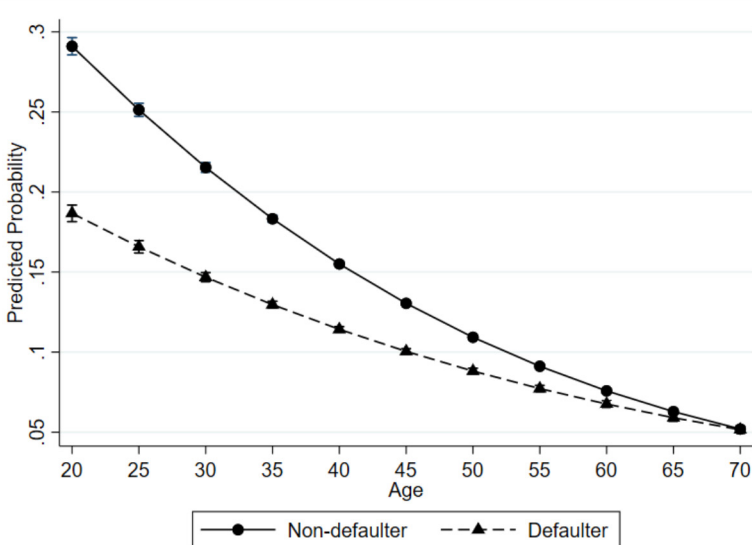
These empirical findings match lifecycle expectations. Roth accounts may be more attractive to younger workers who expect greater income growth as they advance through their career and thus expect higher income in retirement than they have currently. Likewise, the immediate pre-tax deduction is not as impactful for younger workers as they have, on average, lower salaries and face a lower marginal income tax than older workers with higher salaries. And younger workers have a longer time horizon and more uncertainty around income tax rates in retirement compared to older workers. This may be especially important as Brown, Poterba, and Richardson (2025) find TIAA participants have been retiring at older ages, so younger workers may have a longer working life before they know tax schedules at retirement.

FIGURE 1. LIKELIHOOD OF MAKING A ROTH CONTRIBUTION BY AGE AND SEX



Source: Authors' analysis of administrative records.
 Notes: Figure plots predicted probabilities from Logit estimates interacting sex and age. Sex and age are the only control. Whiskers denote 95% confidence intervals with robust standard errors.

FIGURE 2. LIKELIHOOD OF MAKING A ROTH CONTRIBUTION BY AGE AND PLAN DEFAULTER STATUS



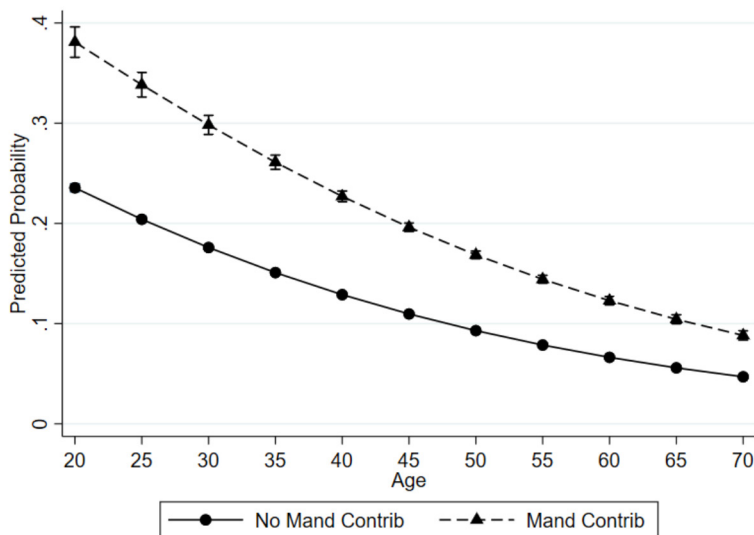
Source: Authors' analysis of administrative records.
 Notes: Figure plots predicted probabilities from Logit estimates interacting plan defaulter status and age. Plan defaulter status and age are the only control. Whiskers denote 95% confidence intervals with robust standard errors.

Earlier research shows many retirement savers are passive, and therefore, default rules have a powerful effect on their savings and investing behavior.¹² Because locating contributions to Roth accounts requires an active choice, we expect that passive savers using default investment allocations would be more likely to save in default pre-tax accounts.¹³

We identify participants who are in a plan default's investment. Figure 2 examines the likelihood of making a Roth contribution by default status and age. In our data, 36% of participants were plan investment defaulters. This percentage declines monotonically by age, from 48% of participants under age 30 to 27% of participants age 50 and older. Figure 2 displays the predicted probability of making a Roth contribution by plan investment default status and age group. The empirical evidence supports our hypothesis that non-defaulters are more likely to utilize a Roth account. For participants under age 60, defaulters were significantly less likely to make Roth contributions, which decreases by age. For example at age 25, 25.1% of non-defaulters were predicted to make a Roth contribution compared with 16.6% of defaulters. This gap decreases by age, at age 50, 10.9% of non-defaulters were predicted to make a Roth contribution compared to 8.8% of defaulters.

The propensity to use a Roth account may also depend on whether a participant has mandatory contributions. This is because participants with mandatory contributions must make additional voluntary contributions if they want to contribute to a Roth account. As discussed, the presence of mandatory contributions increases the attractiveness of a Roth account for participants' next available contribution dollar. Overall, 17.6% of participants with mandatory and voluntary contributions use a Roth account, significantly higher than 11.3% of participants without mandatory contributions. Figure 3 displays the predicted probability of a Roth contribution by whether a participant has mandatory contributions or not. At each age, participants with mandatory contributions who make additional voluntary contributions are over 50% more likely to make a Roth contribution compared to participants without mandatory contributions, supporting the economic intuition. This is because participants with mandatory pre-tax contributions already get pre-tax savings on that mandatory amount, with increases the marginal attractiveness of a Roth contribution compared to participants without mandatory contributions. We examine how the level of mandatory contributions impacts the tax location decision in our full set of regressions later in this section.

FIGURE 3. LIKELIHOOD OF MAKING A ROTH CONTRIBUTION BY AGE AND HAVING MANDATORY CONTRIBUTIONS



Source: Authors' analysis of administrative records.

Notes: Figure plots predicted probabilities from Logit estimates interacting mandatory contributor status and age. Mandatory contributor status and age are the only control. Whiskers denote 95% confidence intervals with robust standard errors.

12 There is a large literature on this topic. For research on default investments see Choi et al. (2002), and McDonald et al. (2019, 2021). Madrian and Shea (2001) is the seminal paper on autoenrollment. For additional research on this topic see, Choukhmane (2025), Beshears et al. (2025), and Beshears et al. (2022).

13 The exceptions to this are state-run auto-IRA plans, which are beyond the scope of our study.

In Table 2, we use logit regressions to estimate the likelihood of making a Roth contribution, showing marginal effects and robust standard errors in parentheses. In our base model (1), we control for age, gender, tenure (years) in a TIAA record kept plan, whether the participant had mandatory contributions (mand), employee contribution amounts, and plan investment defaulters (defaulter). Model (2) has a dummy variable for maximum contributors. Model (3) includes the subset with salary, and Model (4) has contribution rates. Model (5) limits the sample to participants with mandatory contributions.

Following Figures 1–3, age, sex, default status, and having mandatory contributions are all significantly related to making Roth contributions. For each additional age, a participant is predicted to use a Roth account by 0.4 percent points (pp) less. Defaulters are 4.0pp less likely to use Roth accounts. While this may seem small overall, it is a 33% decrease compared to the mean ($=-0.04/0.12$). Salary has a significantly negative relation—a 1% increase in salary is related to a 1pp to 3pp decrease in making a Roth contribution. This is intuitive because, all else equal, higher salary contributors are more likely to have a higher marginal tax rate, decreasing the appeal of a Roth contribution. Mandatory contributors were 6pp significantly more likely to use Roth accounts, which is a 50% ($=.06/.12$) increase compared to the mean.

One objection to Roth accounts is high household income maximum contributors may be more likely to make Roth contributions if their objective is to effectively contribute more than the qualified limit by using Roth contributions.

Overall, we estimate 7.2% of participants in our sample meet the contribution limit—while maximum contributors were less likely to make a Roth contribution (9.5%) than investors below the contribution limit (12.2%) in the sample overall. However, in Table 2, when adding individual characteristics, the effect is quite small: Maximum contributors are only 0.4pp less likely to make a Roth contribution.

Contribution rates and dollar amounts have limited explanatory power. We find that having both mandatory and voluntary contributions is the strongest predictor of making a Roth contribution. Participants with mandatory contributions are around 6pp more likely to use a Roth account. Model 5 includes mandatory contributions as a control. For each 1% increase in mandatory contributions, we find a significant increase of 2.1pp in the likelihood of making a Roth contribution.¹⁴ Compared to primary-only contributors, savers using a supplemental account as well are significantly more likely to make a Roth contribution. This group could be more active savers, especially as Clark et al. (2025) find there is limited automatic enrollment in supplemental plans, and savings in a supplemental plan would require an active choice.

14 The subsample without mandatory contributions includes participants at and above the default savings rate, while the subsample without mandatory contributions included participants above the default savings rate. To control for this, we estimated Models 3 and 4 for individuals saving above common auto-enrollment rates (3%, 5%, and 6%) in subsequent regression not shown. Results are similar to coefficients reported in Table 2.

TABLE 2. MAKING A ROTH CONTRIBUTION, LOGIT ESTIMATES

	(1)	(2)	(3)	(4)	(5)
Age	-0.004***	-0.003***	-0.002***	-0.003***	-0.00***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Age^2	0.000	0.000	-0.000***	-0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Woman	-0.007***	-0.008***	-0.010***	-0.011***	-0.005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)
TIAA Tenure	-0.002***	-0.002***	-0.001***	-0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Defaulter	-0.040***	-0.041***	-0.040***	-0.039***	-0.04***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)
Mand	0.066***	0.068***	0.060***	0.058***	
	(0.002)	(0.002)	(0.002)	(0.002)	
Prim + Supp	0.028***	0.030***	0.025***	0.024***	0.075***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.005)
Supp only	0.005**	0.005***	0.001	0.000	
	(0.002)	(0.002)	(0.002)	(0.002)	
Max		-0.004**			-0.133
		(0.002)			(0.096)
EE Contrib (\$)	0.000***		0.000***		
	(0.000)		(0.000)		
Log(Salary)			-0.026***	-0.017***	-0.042***
			(0.001)	(0.001)	(0.005)
EE Rate (%)				0.175***	
				(0.009)	
ER Rate (%)				0.001	-0.624***
				(0.018)	(0.103)
Mand EE Rate (%)					0.021***
					(0.101)
N	385,315	385,315	240,271	240,271	22,109
Dep. Var Mean	0.12	0.12	0.11	0.11	0.17

Logit estimates with marginal coefficients shown. Standard errors clustered at the individual level are provided in parentheses. *, **, *** represents significance at the 10%, 5%, and 1% levels.

4.2 The intensive margin: Relative Roth contributions

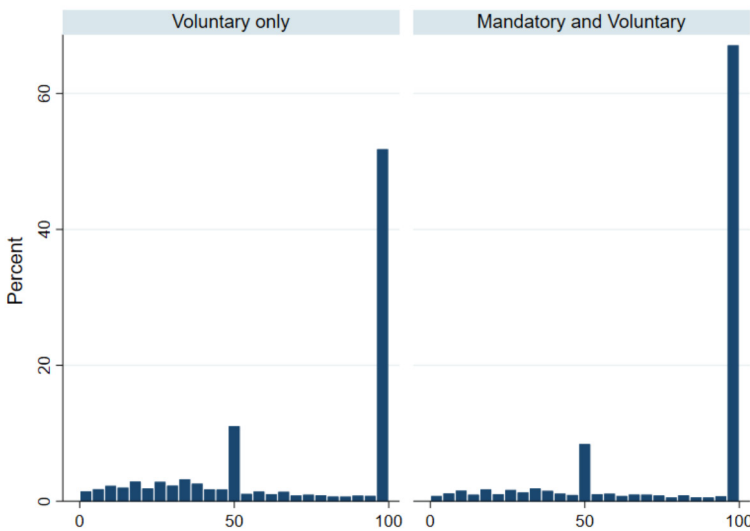
In this section, we examine the fraction of Roth contributions located in Roth accounts among Roth contributors. Overall, 53.4% of Roth contributors use Roth accounts exclusively for their voluntary contributions, and about 10% used a 50/50 allocation rule.¹⁵ While the prior result suggests intertemporal tax optimization, the latter strategy may be a behavioral effect. Prior to retirement saving investment defaults, a naïve 1/n investment strategy was not an uncommon choice and sparked earlier research on this behavioral strategy by Benartzi and Thaler (2001) and DeMiguel et al. (2009) among others. With two location options, a participant implementing a naïve 1/n investment strategy across tax locations would choose half of their contributions to Roth and half to pre-tax accounts.

Figure 4 shows the fraction of voluntary contributions located to Roth accounts among Roth contributors, faceted by whether participants have mandatory contributions. Again, there’s a significant difference between participants with and without mandatory contributions—51.1% of participants without mandatory contributions used Roth accounts exclusively, significantly fewer than 66.6% of participants with mandatory contributions. There is a higher likelihood of making relative Roth contributions between below 50/50 than above but no other notable allocation splits.

Are maximum contributors who make a Roth investment more likely to further relax the contribution constraint by locating more relative contributions to Roth accounts than Roth investors who are not at the maximum contribution constraint? We find maximum contributors use Roth accounts less on the intensive margin. Conditional mean relative contributions to Roth accounts were 62.1% among maximum contributors, significantly less than 73.6% among non-maximum contributors.

Due to the dichotomous distribution of relative Roth contributions, in Table 3 we provide Logit estimates on the likelihood of locating all voluntary contributions to Roth accounts among Roth investors. Marginal effects with robust standard errors in parentheses are shown with specifications akin to Table 2. We find females, older participants, participants with higher salaries, and maximum contributors were less likely to use Roth accounts exclusively when contributing at least one dollar to a Roth account. Participants with mandatory contributions are significantly more likely to locate all voluntary contributions in Roth accounts. Higher mandatory contribution rates were significantly related to greater likelihood of locating all voluntary contributions in Roth accounts with a high elasticity. For a 1% increase in the mandatory amount, Roth investors increase the percent of voluntary contributions to Roth accounts by 2.4pp.

FIGURE 4. HISTOGRAMS OF RELATIVE ROTH CONTRIBUTION AMOUNTS BY CONTRIBUTOR TYPE



Notes: 100 represents all voluntary contributions located in a Roth account, while 30 represents 30% of voluntary contribution are located in a Roth account, and similarly throughout.

15 We define a 50/50 split as someone who locates more than 48% but less than 52% of voluntary contributions in a Roth account.

TABLE 3. ESTIMATES FOR LOCATING ALL VOLUNTARY CONTRIBUTIONS TO ROTH ACCOUNTS AMONG ROTH INVESTORS

	(1)	(2)	(3)	(4)
Age	-0.018*** (0.001)	-0.021*** (0.001)	-0.017*** (0.002)	-0.020*** (0.005)
Age^2	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Woman	-0.033*** (0.005)	-0.018*** (0.005)	-0.038*** (0.006)	-0.012 (0.016)
TIAA Tenure	-0.002*** (0.000)	-0.004*** (0.000)	-0.003*** (0.000)	0.002** (0.001)
Defaulter	-0.079*** (0.005)	-0.069*** (0.005)	-0.076*** (0.006)	-0.067*** (0.017)
Mand	0.267*** (0.007)	0.221*** (0.007)	0.253*** (0.010)	
Prim + Supp	-0.090*** (0.005)	-0.111*** (0.005)	-0.051*** (0.007)	0.092*** (0.020)
Supp only	-0.005 (0.008)	-0.002 (0.008)	0.011 (0.012)	
Max		-0.055*** (0.010)		
EE Contrib (\$)	-0.000*** (0.000)		0.000*** (0.000)	
Log(Salary)			-0.079*** (0.006)	-0.110*** (0.017)
EE Rate			-1.508*** (0.059)	
ER Rate			0.961*** (0.096)	-1.086*** (0.362)
Mand EE Rate				0.028*** (0.004)
N	46,247	46,247	26,802	3,726
Dep. Var Mean	0.53	0.53	0.53	0.66

Logit estimates with marginal coefficients shown. Standard errors clustered at the individual level are provided in parentheses. *, **, *** represents significance at the 10%, 5%, and 1% levels.

4.3. The intensive margin: Contribution rates

We next examine how the location decision varies by employee contribution savings rates. Beshears et al (2017) found that Roth contributors may focus on the amount of salary deferred to savings and not the tax-equivalent amount of pre-purchased retirement consumption. They conclude if the savings rate is the salient feature of savings, Roth contributors would relatively save more.

We provide linear estimates of contribution rates in Table 4, controlling for participants who make Roth contributions. A positive coefficient indicates greater tax-equivalent savings. A negative coefficient indicates equivalent or lower relative savings compared to pre-tax-only participants, depending on their current and expected tax liability. Columns (1) and (2) estimate employee contribution rates as a percent of salary, while columns (3) and (4) estimate the total employee plus employer rate as a percent of salary. Columns (2) and (4) include only participants with mandatory contributions.

Table 4 documents two main findings. First, we find Roth contributors are significantly more likely to have relatively larger contribution rates, as evidenced by the significantly positive coefficient.¹⁶ Even a zero coefficient, found by Beshears et al. (2017), would represent greater retirement savings because these contributions are subject to income taxes at the time of the contribution. This result holds both for own employee deferral rate as a percent of salary (column 1) and the overall employee plus employer savings rate (column 3). Roth contributors defer one percent more of their salary at the margin, with total savings also being 0.8 percent greater than pre-tax only savers. At a minimum, this non-negative result indicates Roth contributors save more for retirement on a tax-equivalent basis. However, because we do not know marginal tax rates, we cannot determine the level of the additional retirement consumption purchased.

Our second finding is the above result is true only for participants without mandatory contributions. Examining employee contribution rates for participants with mandatory contributions in column 2, we find that Roth contributors defer 0.5% less than Roth contributors without mandatory contribution amounts. Extending this effect to total savings rates, the total effect is 0.8% less. We do not focus on the size of these effects, but on the direction and that the estimated coefficients are significantly negative for both models. The difference in these two findings highlights how retirement plan design and the incentive of where to locate one's next marginal dollar saved impacts retirement plan participants' decisions. Workers may be making rational decisions based on total household retirement savings, although recent research by Choukhmane et al. (2025) documents frictions in optimizing retirement household savings. Or some participants may view the mandatory contribution as an employer endorsement that this level is the "right amount" to save—in essence, a behavioral nudge.¹⁷ Numerous studies¹⁸ have found the workers tend to contribute up to the employer default and stop, resulting in the addition of auto-escalate provisions.

16 Not tax inclusive because we do not know household income or marginal tax rates.

17 For recent research on behavioral nudges in the context of retirement savings see Clark et al. (2019) and Bajtelsmit and Coats (2023).

18 For example, see the large auto-enrollment research of Chetty et al. (2014) examining passive versus active savers, and Engelhardt and Kumar (2007) who examine how employer matching amounts are a focal point of contribution levels.

TABLE 4. ESTIMATES OF CONTRIBUTION SAVING RATES

	(1)	(2)	(3)	(4)
Roth?	0.008*** (0.000)	-0.005*** (0.001)	0.009*** (0.001)	-0.008*** (0.002)
Age	0.001*** (0.000)	0.002*** (0.000)	0.004*** (0.000)	0.003*** (0.000)
Age^2	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Woman	0.004*** (0.000)	0.005*** (0.001)	-0.001 (0.000)	0.004*** (0.001)
TIAA Tenure	0.000*** (0.000)	0.000 (0.000)	0.001*** (0.000)	0.000*** (0.000)
Defaulter	-0.010*** (0.000)	-0.011*** (0.001)	-0.014*** (0.000)	-0.014*** (0.001)
Mand	0.046*** (0.001)		0.053*** (0.001)	
Prim + Supp	0.010*** (0.000)	0.017*** (0.001)	0.020*** (0.000)	0.023*** (0.001)
Supp only	0.008*** (0.001)		-0.053*** (0.001)	
Max	0.091*** (0.001)	0.170*** (0.009)	0.103*** (0.001)	0.191*** (0.011)
Log(Salary)	-0.011*** (0.000)	-0.008*** (0.001)	-0.012*** (0.000)	-0.014*** (0.001)
Mand EE Rate		0.013*** (0.000)		0.020*** (0.000)
Constant	0.125*** (0.003)	0.061*** (0.012)	0.121*** (0.005)	0.140*** (0.016)
N	240,271	22,109	240,271	22,109
Dep. Var Mean	0.08	0.12	0.15	0.21

OLS estimates with marginal coefficients shown. Standard errors clustered at the individual level are provided in parentheses. *, **, *** represents significance at the 10%, 5%, and 1% levels.

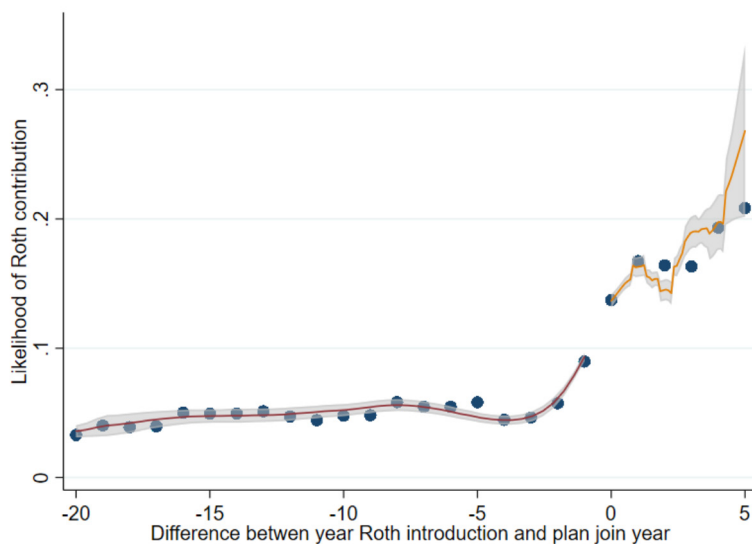
5. Inertia in contributions location decisions

Individuals often display inertia in contributions and asset allocation decisions (Agnew et al., 2003; Ameriks and Zeldes, 2004; Samuelson and Zeckhauser, 1988). A natural extension is that individuals exhibit similar behavior with their asset location decisions. We hypothesize that if participants have a Roth option when they first join the plan (post-Roth), then they will be more likely to make Roth contributions compared with participants who join prior to a Roth option becoming available (pre-Roth). This is because the latter individual would need to make a subsequent active and different location decision after the introduction of the Roth account option.

To examine this hypothesis, we construct a subsample of our main dataset examining contribution location decisions in 2018 for 120,129 participants in plans that implemented Roth accounts between December 2012 and December 2017. This allows us to exploit the variation between when a participant joined their plan and when the Roth options became available. In our overall subsample, 9.2% of participants made a Roth contribution in 2018. But 15.1% of participants who immediately had a Roth option available made Roth contributions in 2018, significantly greater than the 6.3% of participants making Roth contributions and who joined their plans prior to the introduction of the Roth account.

Figure 5 displays a scatterplot of the mean fraction of participants who made a Roth contribution in 2018, conditional on in which year they enrolled relative to that plan's Roth account introduction. The scatterplot is fitted with a local polynomial smoothing with a sharp regression discontinuity design. On the horizontal axis, a value of 0 indicates a participant joined the plan within the same month of the Roth introduction up to one-year after the plan's Roth introduction. A value of 1 (-1) indicates joining the plan at least one year after (before) the plan's Roth introduction but less than two years, and so on. We document a large jump in the fraction of participants making a Roth contribution among those enrolling in a plan after the Roth option was available, from 5.0% of the pre-Roth cohort joining at least one year before a Roth option was available to 9.3% for those joining one year prior to the Roth introduction. Participants who more recently joined their plan may be more likely to "reset" their contribution decision. The percentage increased further to 13.7% for participants joining in the same year of the Roth introduction and to over 15.1% for those joining after the Roth option was available.

FIGURE 5. LIKELIHOOD OF ROTH CONTRIBUTIONS BY RELATIVE PLAN JOIN YEAR

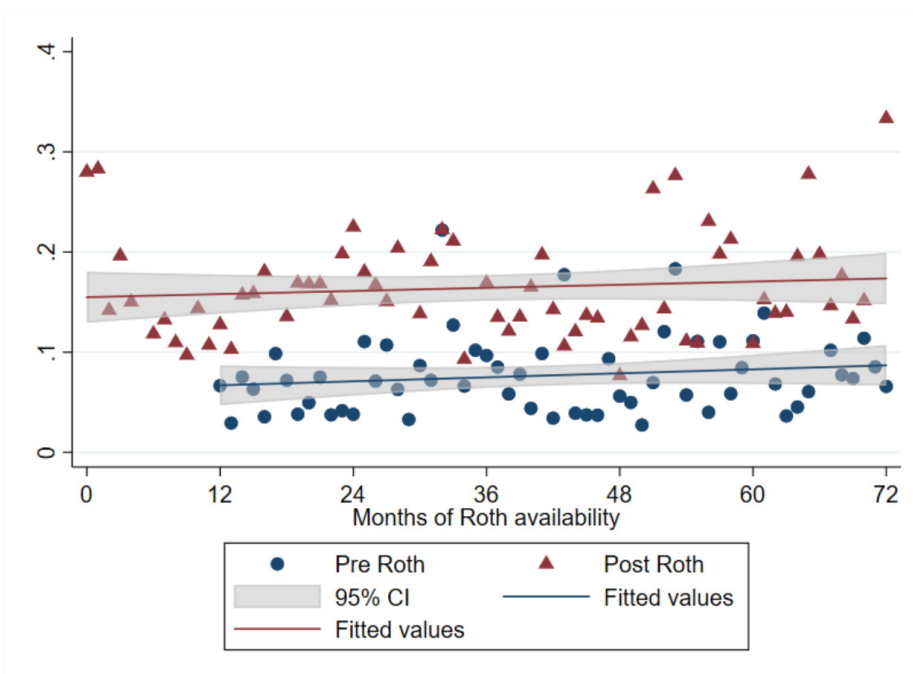


Notes: Scatterplots show at each year the mean fraction of participants with a Roth contribution by the year they joined the plan relative to the year a Roth account was introduced. Lines show local polynomial fits with degree two and 95th confidence intervals. A value of 0 indicates a participant joined the plan within the same month of the Roth introduction up to one year after the plan's Roth introduction. A value of 1 (-1) indicates joining the plan at least one year after (before) the plan's Roth introduction but less than two years, and so on.

We next examine whether Roth take-up increases the longer the option has been available. Figure 6 displays the mean proportion of participants with Roth contributions in 2018 for each month following the availability of a Roth option for the “pre” and “post” cohorts, overlaid with linear regressions. We find no economically meaningful time trend the longer a Roth option has been available, for both the pre-Roth and post-Roth cohorts. Individuals are unlikely to update contribution locations after their initial

decision, extending the finding from Beshears et al. (2014) and consistent with earlier studies by Ameriks and Zeldes (2004) and Tang et al. (2012) that DC participants make limited savings and investment changes. We confirm these results with regressions on Table 5. Compared with the mean, post-Roth participants are 6.3% more likely to make a Roth contribution—a 66% ($=0.06/0.09$) increase compared with the mean. The marginal effect (11.5%) is nearly twice as large for participants with mandatory contributions.

FIGURE 6. FRACTION OF PARTICIPANTS WITH ROTH CONTRIBUTIONS FOR PRE AND POST COHORTS BY LENGTH OF ROTH AVAILABILITY



Note: We define one (two) month(s) as having had a Roth option for at least one (two) month(s) but less than two (three) months; this applies throughout the figure. Linear fitted values with 95% confidence interval are shown. The post-Roth outlier at 0.42 only represents 7 observations. We examine plans introducing Roth accounts between 2012 and 2017 and participant contributions in through the 2018 year—a participant joining a plan prior to a Roth introduction will therefore have at least 12 months of Roth availability.

TABLE 5. REGRESSION ESTIMATES OF ROTH CONTRIBUTION, PRE- AND POST-ROTH COHORTS

	(1)	(2)	(3)	(4)
Post Roth	0.064***	0.069***	0.085***	0.114***
	(0.002)	(0.004)	(0.005)	(0.015)
Months since	0.001***	0.001***	0.001***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Months since*Post Roth		-0.000*	-0.001***	-0.002***
		(0.000)	(0.000)	(0.000)
Demographic Controls	Y	Y	Y	Y
Salary Control	N	N	Y	Y
Mand Only	N	N	N	Y
Dep. Var Mean	0.09	0.09	0.08	0.11
N	120,129	120,129	81,135	7,943

Notes: Table 5 displays logit estimates of making a Roth contribution in 2018 at plans that introduced a Roth option between late 2012 and 2017, displaying marginal effects with individual controls. Post Roth is a dummy variable equal to 1 for participants joining a plan after a Roth introduction and 0 if before. We control for how long the Roth option had been available with *Months since*. *Months since*Post-Roth* is the interaction of *Post-Roth* and *Months since*. We control for characteristics as in Table 2. Estimates on the control coefficients are similar to Table 2.

6. Conclusion

We examine Roth account access and contribution location behavior in the non-profit sector. Overall, 12.0% of participants used Roth accounts. Roth account usage significantly increases for younger participants and those who do not use the plan's default investment option, indicating that participants who rely on plan defaults are more likely to be passive in both the investment and tax location choice. Most Roth investors use Roth accounts for all voluntary contributions. We found that plans with mandatory employee contributions significantly impact the Roth decision, while employer contributions have a small impact on the likelihood of making a Roth contribution.

On a broader scale, the result that Roth investors contribute more as a percent of salary has important policy implications, as many states have launched "auto-IRA" policies. Unlike auto-enrollment in workplace plans that defaults participants in a pre-tax amount at a specified deferral rate, the state-run IRAs (such as OregonSaves or CalSavers) default participants into a Roth account.¹⁹

Our future research will expand this analysis to examine if asset location decisions are driven by income expectations, tax expectations, and understanding of the tax location options. Beshears et al. (2017) find that there is substantial lack of literacy on tax location options. Our research also speaks to the role for incorporating the asset location decision calculus into financial planning. Greater financial education, planning tools, and advice in this domain could improve financial decision-making and Americans' retirement security.

We are aware of the limitations of our study. We do not know an employee's entire household balance sheet. Participants could use Roth IRAs or save through their spouse's plan. Participants may have different beliefs about future tax rates or the tax properties. Because retirement plan structures differ substantially between the non-profit and for-profit sectors, our results may not be generalizable to the entire DC participant population.

But in a broader sense, our research informs how Roth provisions might affect retirement savers, extending theoretical work by Horneff et al. (2023). The retirement savings federal tax expenditure is a frequent target in policy discussions whenever there is a need to raise revenue and reduce deficits. A common proposal is the "Rothification" of all retirement accounts, which would increase tax revenue within a 10-year budget window but generally lose tax revenue in the longer-run. Given the relatively higher coverage rate and preference to use pre-tax accounts, our results are suggestive of the disruptive impact this type of policy change could have on retirement plan coverage, retirement savings, and ultimately retirement security.

The recent SECURE 2.0 legislation provides an example of the issues that can arise from Rothification policies. One statute from this Act mandates that employee "catch-up" contributions for retirement plan participants age 50 and older must be made to a Roth account if the participants earn more than \$145,000 (in inflation adjusted wages). As we documented, many plan sponsors only allowed pre-tax contributions, and higher earning employees tended to have a strong preference for making pre-tax contributions. Implementation of this provision was delayed by the IRS to provide plan sponsors the ability to add Roth accounts to their retirement plans.²⁰ The delayed implementation highlights how additional uncertainty over retirement saving tax treatment can increase both regulatory-compliance costs for plan sponsors and financial planning complexity for retirement savers.

19 These recent retirement policy developments have sparked recent research by Chalmers et al. (2022), Dao (2024), and Bloomfield (2025).

20 <https://www.irs.gov/newsroom/irs-announces-administrative-transition-period-for-new-roth-catch-up-requirement-catch-up-contributions-still-permitted-after-2023>

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