# Generous to a Fault? The Effect of Generosity of Employers' Retirement Plan Contributions on Leakage from Cashing Out at Job Separation

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**Abstract:** The US government imposes a 10% tax penalty to discourage pre-retirement leakage -- cash withdrawal from 401(k) retirement savings. We investigate the impact of employer matching contributions on leakage at job termination. In our unique data set with 597,980 employees covered by 29 retirement plans, 38% of employees leaked by cashing out 401(k) savings at job termination. Increasing the generosity of the employer / employee match rate increases retirement balances, reducing leakage. It also increases the proportion of one's balance contributed by the employer, increasing leakage. We interpret the latter effect as showing that employees are more likely to frame their retirement accounts as a rainy-day fund rather than a lock box of untouchable retirement savings when their employer contributed a greater proportion of the balance. We estimate that a 50% increase in employer / employee match rate would increase leakage probability by 14.5% at job termination. However, there could be an 11.2% *reduction* in leakage probability if employees ignore the extra incentive generated by the framing effect. Approximately 20% of accumulated assets from a 50% increase in match rate would leak out of the system due to framing bias attributable to the percent of assets contributed by employer.

**Keywords**: Retirement Leakage, 401(k), Match Rate, Defined Contribution

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## 1. Introduction

The United States has the most "liquid" retirement savings system among developed countries. Beshears et al. (2015a) compare the employer-based defined contribution (DC) plans' flexibility across six nations in permitting employees access to retirement savings prior to retirement age. The United States is characterized by its relatively low penalty on early withdrawals and the resulting high "leakage" rate. The issue of retirement plan leakage has received significant attention in industry and media reports. Aon Hewitt's report (2011) suggests that the most significant form of retirement leakage is cashing out behaviors for employees at job termination. In the present research, we show surprising evidence of how employers' choices in the design of defined contribution retirement plans affect the tendency to cash out at job separation.

Scholars in marketing are increasingly interested in consumer financial decision making (Lynch 2011), including how consumers trade off retirement savings over current consumption (Hadar, Sood, and Fox 2013; Hirshfield et al. 2011; MacKenzie and Liersch 2011; Nenkov, Inman, and Hulland 2007; Shah et al. 2019). We focus on how consumers make this tradeoff at the point of job separation. Prior work on marketing's role in consumer financial decision making has focused on how the actions and offerings of financial services firms affect behavior of customers (e.g., Atlas, Johnson, and Payne 2017; Liu, Montgomery, and Srinivasan 2018; Peterson, Kushwaha, and Kumar 2015; Shu, Zeithammer, and Payne 106; Soman and Cheema 2002; Ulkumen and Cheema 2011; Liu, Montgomery and Srinivasan 2018; Bao and Ni 2017). Less work in marketing has considered how firms intentionally or unintentionally influence the consumption behavior of their own employees via the design of retirement plans (but see Goldstein, Hirschfield, and Benartzi 2016; Morrin et al. 2012; Liu, Kalra and Zhang 2019).

Employees are increasingly offered employer-sponsored defined contribution plans rather than defined benefit pension plans. According to the 2018 National Compensation and Benefits Survey, approximately two-thirds of US full-time employees are offered employer-sponsored defined contribution plans where employees assume full responsibility for participation, contribution, and withdrawal decisions in their retirement accounts. The data from the Current Population Survey and the matched Survey of Employee Benefits supplement show that participation in 401(k) and other defined contribution plans has steadily increased from 57 percent in 1988 to 69 percent in 2016. Despite steady increases in participation, balances have remained

flat over recent history and discouragingly low: a mean of $92,148 and a median of $22,217 in 2018 Vanguard data (Munnell 2019).

We investigate one reason why growing participation may not be translating into growing retirement preparedness: an intriguing phenomenon of pre-retirement leakage. Pre-retirement leakage is defined as any form of withdrawal from 401(k) balances before the age of 59.5. It is difficult for an employer or social planner to say whether leakage by a given individual is an appropriate consumption-smoothing response to a financial shock or a regrettable lapse (Amromin and Smith 2003; Beshears et al., 2017). That said, financial planning professionals view that much leakage at job separation is a mistake (Mercado 2019; Moore 2019; VanDerhei 2019).To discourage early withdrawal, the Internal Revenue Service (IRS) in the United States imposes a 10% tax penalty on pre-retirement leakage. A small amount of leakage can have an immediate cost due to tax penalties but also can cause a long-term loss due to foregone compounding of returns. Pre-retirement leakage threatens to reduce the wealth in US retirement accounts by about 25% when the lost annual savings are compounded over 30 years (WSJ 2017).

There are three sources of pre-retirement leakage, including default on loans from one's retirement account, hardship and non-hardship withdrawals during active employment, and cash distribution upon job termination. Almost all retirement plans have loan provisions and in-service withdrawal features. If one pays those loans back on time, one is essentially borrowing from oneself, which may be cheaper than other sources of liquidity. But if a loan is not repaid on time for a certain period (e.g., 2 months), it becomes permanent leakage (Lu et al. 2015). Leakage through hardship and non-hardship withdrawals is expected to smooth out certain economic shocks. According to Aon Hewitt's 2011 report, 27% of active employees borrow against retirement plans, but only 3% of those taking out loans default. Only 7% of individuals take a hardship withdrawal during employment.

The bulk of retirement plan leakage comes at job termination. Among workers who terminated in 2010, more than 40% took a cash-out distribution. This happened despite strong encouragement to either roll over assets to a qualified plan (i.e., new employer plan or IRA) or to keep balances in the current plan when quitting a job. Evidence shows that in the United States, for every $1 contributed to the defined contribution plans, $0.40 flows out of the defined contribution system before the employee reaching age 55 (Beshears et al. 2015a; Argento et al.

2015). Thus, it is critical to understand what plan and individual features possibly trigger leakage behavior at job termination.

We investigate the impact of employer matching contributions on leakage at job termination. A vast majority of employer-sponsored retirement plans take the structure of a match rate of employer dollars to employee contributions, and a match threshold of the maximum percent of employee income subject to that match rate. A typical one-tier matching contribution, for example, specifies that up to 5% of employee salary contributed towards retirement account is matched 50 percent by an employer. The 5% is a *matching threshold*, while the 50 percent is a *matching rate*. A typical account statement separates the overall balance into two parts, with one contributed by an employee and the other sponsored by the employer. Both parts of contributions grow at the same rate that depends on one's 401(k) investment choices.

Adding a matching contribution or increasing the generosity of a match is aimed to create an incentive for participation and induce higher contribution rates by employees (Madrian 2012). If an employee does not contribute a percentage of income up to the match threshold, he or she is "leaving money on the table" by not taking free dollars from one's employer. A generous matching plan grows the retirement asset by the multiplied match rate. Industry reports suggest that larger balance is more likely to activate future planning and deters cashing out withdrawals at job termination (Retirement ClearingHouse 2019).

We test the hypothesis that retirement plan leakage will increase with the generosity of the employer match, holding constant one's 401(k) balance and a set of controls. Specifically, we see more leakage with a higher matching rate – e.g., with an employer contributing $0.75 rather than $0.50 per $1 contributed by employee – or, more specifically, with a greater fraction of one's 401(k) balance contributed by one's employer. We consider economic and psychological reasons why that might be true in section 2.3, and our empirical tests assess qualitative patterns in the data implied by alternative mechanisms.

To investigate the effect of a matching contribution on leakage behavior at job separation, we obtained a unique data set with 597,980 employee contribution records from 28 employers and 29 retirement plans that provide variation in match rates. This affords rich variation in matching plan generosity. We observe how employees treat retirement savings at job separation. Do they distribute their savings by requesting a check, keep the money in the old account, or request a

direct rollover to another account? In cases where a cash distribution or rollover is requested, we also observe the amount and the date that the transaction is completed. We also observe their employee tenure years, income, age, company industry, and job locations. We do not observe the cause of job termination.

We find that of those voluntarily or involuntarily leaving their employer, 38 percent withdrew retirement savings. Conditional on leakage, 90 percent terminating employees drained their retirement accounts completely. Approximately 71 percent took a one-time total cash-out, while another 19 percent depleted their 401(k) balances in 2 or 3 withdrawals within six months. The data present a strong positive relationship between the incidence of cashout leakage and the proportion of employer contribution. Given that contribution and leakage decisions are subject to unobserved common factors, we use a terminating employee's actively employed cohorts' contribution as an instrumental variable. The rationale is that the actively employed colleagues who were hired in the same year as the terminating employee would affect his/her contribution decision, but they should not influence his/her leakage decision, as cashing out withdrawal is not available for active employees. We build a two-stage econometric model and leverage both across-plan and within-plan variation to investigate the changes of leakage probability when terminating employees are faced with different proportions of own versus employer contribution. We also control for demographics, as well as the influence of a plan's generosity on employee's elective contributions and tenure years.

We show that retirement plans with higher match *thresholds* provide strong economic incentives to promote employees' elective contributions. Holding other plan features constant, if an employee's contribution falls short of that upper threshold for matching, that is "leaving money on the table." The effect of a more generous match rate on employee contributions is positive but weaker than the effect of the matching threshold, perhaps because the latter serves as some implicit recommendation for how much to save (cf. MacKenzie, Liersch, and Finkelstein 2006).

More importantly, we find that a higher proportion of contribution by the employer is positively and significantly associated with a higher probability of leakage when job separation occurs. We replicate these effects exploiting both between plan variation in matching structure and within-plan variation. Our simulation study shows that a 50% increase in match rate would increase leakage from cashing out by 14.5% at job separation. However, were it not from the

greater tendency to leak when employer contributions form a more substantial fraction of the balance, a 50% match rate increase would have the potential to reduce leakage probability by 11.2%, as employees are less likely to withdraw from an account with a larger balance.

We further evaluate the impact of plan generosity (a 50% match rate increase) on the cashout amount and the resulting accumulation of total retirement assets. We estimate that an average 401(k) account balance will increase by $36,398 over an average of 6 tenure years, following a 50% increase in employer match rate. However, if we were able to remove the composition effect, the cashout amount would decline, and the effect of the more generous match on employees' average balance would have been substantially larger, $46,273. In other words, $9,875 is leaked out of an average 401(k) account as a result of the documented effect of the proportion of assets contributed by employer, equivalent to 15 to 20% of the accrued 401(k) account balance. Job separators with short tenure years are most subject to the account composition effect. We model the effect of a 50% match rate increase on accumulated assets: for an employee terminating within five years, one-third of the increase in accumulated assets would leak out at job separation. We interpret these results as reflecting a framing of one's 401(k) balance as "emergency reserves" or a fungible "rainy day fund" rather than untouchable retirement savings when the employer contributed more of the balance.

The rest of the paper is organized as follows. Section 2 provides a brief literature and background review that highlights issues related to retirement savings participation, contribution, and leakage, and possible psychological and economic routes by which more generous retirement plans might promote greater leakage. These routes differ in terms of their implications for the timing of the withdrawals, whether leakage is partial or complete, in one withdrawal or several, and how vesting in a retirement plan affects leakage. We then describe the data and present several simple analyses that highlight key behaviors in Section 3 and 4. Section 5 details the model and estimation procedure. Section 6 presents the estimation results. Section 7 concludes the paper with a discussion of opportunities for further research, limitations of the current research, and implications of our findings for modifying retirement plan design to reduce leakage at job separation.

## 2. Background

### 2.1. Defaults and choice architecture affect 401(k) plan participation and saving

We know from prior research that retirement plan choice architecture affects participation and savings accumulation. One of the most important forms of choice architecture is to automatically enroll employees in 401(k) plans at a default savings rate. Madrian and Shea (2001) leverage a natural experiment where a company implemented a default enrollment option unless employees actively opted out. They find a dramatic increase in the participation rates of retirement savings. They also find that employees become "passive" savers by contributing exactly at the default rates. Defaults have been shown in past research to have strong influences on a variety of behaviors (Johnson and Goldstein 2003; Levav et al. 2010; McKenzie et al. 2006).

If one auto-enrolls employees, what should be the default level of contribution? Beshears et al. (2008, 2016) document that default effects vary across individuals, specifically across different income groups. Employers tend to set low defaults to encourage take-up. Those defaults tend to match the preferences of low-income employees. Those employees are nonetheless slow to opt out from higher defaults to lower their contribution burden. This might argue for improving long-run savings by setting higher defaults. Dobrescu et al. (2014) find that among participants in a large pension fund in Australia, the speed of wealth accumulation is highly sensitive to default settings when auto-enrollment is established.

Choice architecture can also nudge employees to higher savings by starting at a low default rate but escalating employee contribution rates over time. Thaler and Benartzi (2004) report a set of natural experiments aimed at increasing retirement savings via Save for More Tomorrow programs that allow people to make a reversible pre-commitment to save a higher percentage of future salary than one is presently saving. Their results suggest a dramatic increase in savings rates (from 3.5% to 13.6% over 40 months). These findings demonstrate the importance of nudging employees to save more than the default option to accelerate the retirement asset accumulations.

### 2.2. Employer match affects plan participation and saving

Our focus in the present research is on the effects of the employer matching scheme, where there is a small literature. Bassett et al. (1998) analyze employee savings behaviors at two companies following changes in the 401(k) matching structure. Bassett et al. find that the introduction of an

employer match, regardless of its generosity, increased employees' incentives to participate, but increasing the existing matching threshold does not significantly affect the plan participation rate. Madrian's review (2012) focuses on the contribution rate conditional on plan participation and shows that raising the matching threshold has a much more dramatic effect on promoting individual contributions than increasing the matching ratio, possibly because the former provides a more direct reference point for how much employees should save.

## 2.3. Why might employer match rate and matching threshold affect retirement plan leakage?

In this research, we examine how these same plan features of match rate and matching threshold affect retirement plan leakage. Only a handful of academic papers have focused on the problem of retirement savings leakage. Beshears et al. (2015b) study commitment contracts that restrict spending via penalties on withdrawals. Beshears et al. (2015a) and Argento et al. (2015) infer that in the United States, for every $1 contributed to the defined contribution plans, $0.40 flows out of the defined contribution system by the age of 55 due to cashing out of account balances at job separation.

We investigate how the generosity of employer matching contributions affects cashing out at job termination. We predict and find that employees are more likely to leak retirement savings at job separation the greater the proportion of their 401(k) balance contributed by their employer rather than themselves. We consider two reasons why this might be so.

### 2.3.1. Opportunistic planned leakage

First, employees might be opportunistic and may plan to leak. One may plan to capitalize on "free money" that can be tapped in a partial cash-out at job separation even after paying the penalties and taxes on the partial leakage. Assume that an employee would save $X for retirement without an employer match, but might save $X + $Y with a match. One might plan to generate a pool of employer "free" money (match rate * ($X+$Y)) for use at job separation even after paying taxes and penalties. If the 10% penalty is lower than other borrowing costs for the terminated employee, one may strategically "over-save" as part of a plan to later leak. A key implication of this account is that if the employee anticipates leaking at the time of job separation, that leakage should be partial and that the amount leaked should be greater the higher the proportion of accumulated assets contributed by the employer. In that account, leaked dollars should also rise with the

matching threshold, because $Y will increase with that threshold. We will show that the data do not conform to that account.

### 2.3.2. Framing of 401(k) as "rainy day" savings vs. untouchable retirement "lockbox"

Tversky and Kahneman (1981, 1986) introduced the notion that different framing of the same decision problem may cause significant shifts of individual preferences and subsequently lead to distinctive choices. Framing effects have been widely applied in marketing, behavioral finance, and public policy (e.g.,Khan and Dhar 2010; Tully and Sharma 2018). Important framing effects have been demonstrated in prior work on consumer financial decision making. Behaghel and Blau (2012) provide empirical evidence that different framings of a social security reform may lead to different benefit claiming behaviors for retirement. Brown et al. (2008) show that annuities are seen as much more attractive when framed as consumption insurance than when framed as investments. Agnew et al. (2008) also highlight framing effects in the appeal of annuities. Sharif and Shu (2017) note how labeling a pool of money as "emergency reserves" increases the perceived cost of using up the resource and makes it less likely that one gives up after failing to achieve a goal.

Framing is closely related to "mental accounting", introduced by Thaler (1985). Consumers create different labeled buckets for their fungible financial assets and treat each one as non-substitutable for the other. See Henderson and Peterson (1992) and Thaler (1999) for reviews. Zelizer (1994) provides a sociological analysis of how monies from various sources are placed in separate mental accounts, each with a different social meaning "earmarked" for a particular purpose, and with restrictions on how the money should be spent. Work in marketing shows how mental labels for fungible pools of money lead people to treat funds in those different accounts as non-fungible, explaining how people have different willingness to spend assets of equal monetary value from one account than another differently labeled account (Heath and Soll 1996., Reinholtz, Bartels, and Parker 2015; Stourm, Bradlow, and Fader 2015; Viswanathan et al. 2018). Cheema and Soman (2006) have shown that people apply mental account labels flexibly to justify their spending decisions.

We postulate that holding constant 401(k) balance, increasing the percentage of assets coming from the employer may change how employees frame their 401(k) balances. When they contributed most of their own 401(k) balance, employees may frame their account as a lock box

of untouchable retirement savings. Prior work shows that labeling savings for a sacred purpose leads people to be unwilling to tap savings even in emergencies (Soman and Cheema 2011; Sussman and O'Brien 2016). Other labels cause people to spend "windfall" money or "house money" more freely (Levav and McGraw 2009; Thaler and Johnson 1990). We posit that for the same dollar value of employee 401(k) balance, those employees with accounts tilted toward contributions of their employers may frame the accumulated balance as a fungible rainy-day fund that is legitimate to spend in unusual circumstances.

Normatively, one's decision about whether to raid one's retirement account at job separation should depend on the balance and one's financial position, independent of whether that balance came predominantly from employee versus employer contributions. However, framing and mental accounting may lead consumers to engage in different actions for accounts with different labels.

## 3. Data

Our unique data set comes from one of the largest "recordkeepers" in the United States that covers 15% of the US workforce. Recordkeepers administer retirement plans for employers and keep track of employee account activities such as contribution, investment, loan, and withdrawal. We are able to obtain detailed plan tracking information of 29 plans hosted by 28 companies in banking and finance, retail, electronics, manufacturing, insurance, telecommunications, and health care industries between 2014 and 2016.

### 3.1. Descriptive Statistics

We select individuals who meet the following four criteria: (i) ever employed between 2014 and 2016, (ii) between 18 and 59 years at the original hire date and not exceeding 60 years if separating from job, (iii) with non-missing annual income of an average between $5,000 and $300,000, (iv) enrolled in a retirement plan with a one-tier matching scheme. The selection criteria resulted in a sample of 597,980 employees with an average working experience of 8.9 years. Table 1 shows that the average employee in our sample is 31.7 years old when hired with an annual gross income of approximately $67,000 dollars. There are 14.1% of employees in the "high compensation"

category with annual income above $120,000 in 2016 or $115,000 in 2015 and 2014.[2] Females comprise 52% of the sample.

Table 1 also reports key retirement contribution variables, including employee's plan participation, monthly contribution rate, loan borrowing, retirement account balance, and individual demographics in the data. The plan enrollment rate is 85.6%, with an average monthly contribution rate of 6.2%. Conditional on retirement plan enrollment, the average monthly contribution rate is 6.7%. This translates to an average of $387 employee elective contribution per month, an average employer match of $212 per month, yielding a combined contribution of $599 from both employees and the employer to the retirement accounts. All the plans offer a loan feature. We find that 27.8% of employees have ever carried a loan. This number is very close to 27% in the Aon Hewitt report (2011). Approximately 23.1% of terminated employees have outstanding loans at the time of job separation. The average account balance at the end of our observation window or by the snapshot of the termination month is $79,584, with a wide range from $0 to $852,973. This considerable variation is an outcome of service years, income, employee elective contribution rate, and employer match rate.

It is reported that over 3 million employees quit their jobs each month (Bureau of Labor Statistics, 2017). We focus on a subset of the 597,980 employees in our sample: the 113,439 (19%) who terminated their jobs in the 3-year observation period. Web Appendix A1 shows that, quitting patterns depict seasonal variations. Turnover is higher in summer than winter months.

We take a closer look at the potential demographic and contribution differences between active and terminated employees in Table 2. Terminating employees tend to have a slightly lower income. Despite similar hire age, they have lower years of tenure and consequently lower account balances, and slightly lower monthly contribution rates. They are *less* likely to have ever carried a loan or to hold one at the time of job separation than the active employees in the sample.

Table 3 reports the key retirement plan features related to a plan's generosity. The default contribution rate is one of the most critical plan features. 88% of employees (24 out of the 29 plans) in our sample are offered an auto-enrollment plan with 1% to 6% default contribution rates.

[2] Internal Revenue Service (IRS) defines high compensation workers as those who "owned greater than 5% of the interest in the business at any time during the year or the preceding year" or "for the preceding year, receive compensation from the business of more than $120,000 (for 2016) and $115,000 (for 2014 and 2015), and, if the employer so chooses, was in the top 20% of employees when ranked by compensation."

Other important features are the match rate and match threshold. The sample includes companies that offer a match rate ranging from 30 percent up to 100 percent. Employees are eligible for company matching for their elective contributions under the match threshold varying from 4 to 15 percent in the data.[3] Table 4 presents the distribution of match rates and match thresholds in the sample. The variation in match rate across plans provides a rich source of variation in the retirement account balance composition between employee and employer.

Another 401(k) feature is the vesting schedule. Vesting offers employers an employee-retention tool. Figure 1 shows that 27.6% plans (8 out of 29 plans) provide an immediate vesting schedule, while 72.4% offer either a cliff or a graded vesting schedule. Immediate vesting refers to the fact that employees acquire immediate full ownership of the employer-matched contribution regardless of service years. 55.2% plans (16 out of 29 plans) offer a cliff vesting schedule, where individuals do not hold ownership of the employer-matched contribution until they meet the minimum service years. 17.2% plans (5 out of 29) provide a graded vesting schedule where employees acquire ownership gradually over time in proportion to their service years. The vesting schedule provides a within-company source of variation in the retirement account balance composition between employee and employer.

### 3.2. Cashing Out at Job Separation

When observing a job separation, we look at the account activities (outflow), specifically, cash distribution paid to a plan participant to identify cashout leakage. We define cashout leakage as either a lump-sum or partial cash withdrawal following a job separation. In the data set, we also observe all the tax transactions associated with cashout distributions.

We examine whether people leak at all, whether cashout is total or partial, and whether it occurs in one transaction versus in multiple withdrawals over time after job separation. We view that partial cashout is more consistent with opportunistic leakage and that total cashout is more consistent with our framing interpretation. Planned, opportunistic leakage should occur in one transaction rather than multiple (and therefore more time consuming) transactions, and likely would involve partial leakage unless the employee truly had no interest in retirement savings apart

[3] Highly compensated employees (HCE) who make $120K or more share the same matching thresholds with non-HCE workers enrolling in the same plan, though HCE workers are sometimes subject to a lower contribution limit as a proportion of their income.

from the desire to capture the employer's contributions. Multiple leakage events suggest once employees start framing their 401(k) balance as a rainy-day fund, it becomes easier to go back to withdraw again, but perhaps not predictable to the employee at first (cf. Sussman and Alter 2012).

Table 5 shows that 38% of employees took at least some cash out of their retirement savings, 33.4% kept all their money in the old plan, and another 28.6% completed direct rollover to a new employer (i.e., trustee-to-trustee transfer) or IRAs out of the total 113,439 terminated employees. Table 5 further shows that among terminated employees, those who take cash distributions tend to have much smaller account balances compared to those who did not. This is consistent with industry reports that larger balance is more likely to activate future planning and deters cashing out withdrawals at job termination (Retirement ClearingHouse 2019). The pattern holds if we exclude terminating employees with small balance less than 1K.

Table 6 examines the percent of employees leaking some, all, or none of their 401(k) savings at job separation. Approximately 4% of balance flows out in the form of a partial cash-out, 34% in total cash-out, and another 62% stays within the retirement system (see Web Appendix A2). The evidence that those who cash out almost all do so entirely suggests that it is not that people are treating the two parts of their retirement balances separately, even though most statements show both own and employer contributions. Indeed, only 589 of the 113,439 separating employees in our sample cash out the employer's contributions but not their own.

Figure 2 and Table 6 together show that both total and partial cash out are more likely for those who have borrowed loans from their 401(k) compared to those who do not. Of those with no loans, 67.7% engaged in no leakage, keeping all assets in the plan or directly rolling over to a new account or IRA; 29.4% cashed out all assets, and only 2.9% engaged in "partial" cash out. However, for those with an outstanding loan at job separation, the corresponding percentages were 44.0%, 47.2%, and 8.8%, respectively. We observe consistent patterns for those who had borrowed but fully paid back a 401(k) loan prior to job termination: 34.9% exhibit no leakage, 60.4 cashed out all assets, and 4.7% cashed out partially. It is relevant that total-cash out is significantly higher among those who have already paid back their loans than among those with loans outstanding at job termination. We speculate that employees who have ever requested 401(k) loans were more likely to consider retirement assets as fungible "rainy day" assets rather than a lockbox. As a result, there is a much higher probability of leakage from cashing out at job termination.

Figure 3a shows a distribution of the number of months elapsed after job separation until the first withdrawal. Technically, withdrawal could occur any time after a job separation. Figure 3a shows that the first withdrawal usually occurs immediately following a job termination with an average of 2.5 months after the separation.

Interestingly, Figure 3b shows that conditional on leakage, 20.7% terminated employees had multiple cash outs from their retirement accounts after job separation. Given that there are transaction costs associated with each withdrawal, this suggests that this set of employees did not expect to withdraw more than once, analogous to the case when payday loan borrowers do not expect to renew a loan but do. Figure 3c shows that those with multiple withdrawals took an average of 6 months to deplete their accounts. Table 7 provides more evidence on repeated cashout withdrawals. Conditional on leakage, approximately 71 percent of employees took a one-time total cash-out after job termination. Among the remaining 29 percent who requested a partial cash-out initially, about two-thirds eventually withdrew every penny in their retirement account.

We ran a logistic regression with the following specification $Leak_{it} = \beta_{0i} + Year_t\beta_1 + \beta_{2i}TQuit_{it} + \beta_{3i}TLastLeak_{it} + \beta_{4i}FreqLeak_{it} + \beta_5 OutstandingLoan_i + \varepsilon_{it}$ among the terminated employees. The binary $Leak_{it}$ dependent variable indicates whether employee $i$ withdraws cash in month $t$ after job termination. Each terminated employee $i$ contributes an observation in period t until either the balance is drained or we reach the end of the three-year observation period. $\beta_{0i}$ controls for individual random effects, $Year_t$ controls for year fixed effects, $TQuit_{it}$ controls for the number of months since job separation, $TLastLeak_{it}$ is the number of months since the last cash withdrawal, $FreqLeak_{it}$ is the total frequency of cash withdrawal up to month $t$, and $OutstandingLoan_i$ is an indicator whether the terminated employee carried a loan at job termination. This analysis leverages within-individual over-time variation among the 29% of employees with multiple cash withdrawal decisions.

Table 8 shows the panel logistic regression results. The first notable observation is that an outstanding loan at the time of job separation increases the leakage probability. Second, all the variables indicating past leakage history have a positive and significant impact on future leakage probability. Those who leak once but not completely are more likely to leak in the next period. Terminated employees who started to tap into their retirement accounts increasingly treat their retirement accounts as rainy day "piggy" bank and keep going back to withdraw cash.

The preceding analyses lead us to conclude that it is of critical importance to investigate whether a terminating employee would ever engage in cash-out, whether that cashout was partial or total, and whether it occurred in a single withdrawal or multiple withdrawals upon job separation. These phenomena have not been studied in prior work. Next, we highlight the model-free evidence on the relationships between the decision to leak (at all) and a plan's generosity via its influence on the proportion of contribution from the employer.

## 4. Model-Free Evidence

Our focus is on how the composition of 401(k) balances affects plan leakage. The composition of balances depends heavily on a plan's match rate. In this section, we report several data patterns that provide insight into the relationship between the cashing out withdrawal decision[4] and a plan's generosity as reflected by the proportion of employer contribution in one's balance. This material motivates the econometric analysis and discussion for endogeneity in the next section.

Figure 4 illustrates how leakage probability changes with the generosity of employer contributions to the 401K. It shows a scatter plot of the likelihood of cashout withdrawal among terminated employees and fifty bin levels[5] of their employer contribution proportion in the retirement accounts. Here we adjust for employee's ownership of employer-matched contribution by his/her service years and the plan's vesting schedule. Figure 4 reveals a positive correlation between employer contribution proportion and the percentage of employees cashing out at job separation. We interpret this to suggest that as the employer contribution proportion goes up, the effect of framing the whole retirement balance as a "fungible rainy-day account" is more pronounced, and as a result, the leakage probability at job separation increases. We show in Web Appendix A3-A4 that the bivariate patterns are nearly identical if one excludes small balance accounts or even do not control for the vesting schedule.

In Figure 5, we plot the same bivariate relationship between cash-out leakage probability and the adjusted employer contribution proportion at different levels of account balance (upper left), income (upper right), age (lower left), and gender (lower right). Leakage is higher for those

[4] We use the word "leakage", "withdrawal" and "cashing out" interchangeably throughout the document.
[5] We have tried other levels for robustness checks. The patterns remain the same.

with lower versus higher balance, and lower versus higher income. Perhaps terminating employees with lower income are more subject to framing their 401(k) as a "fungible rainy day" account rather than an untouchable "lock box" for retirement savings. There are no effects of age or gender on leakage. Critically, in all four panels and for all levels of account balance, income, age, and gender we observe that leakage probability is systematically higher when the employer's proportion of the overall 401(k) balance is higher.

The variation in the proportion of own versus employer contribution comes from variation across plans and within plans. The match rate plays a key role in determining the employer contribution percentage across plans, while the match threshold and vesting schedule enrich variations in employer contribution proportion within a plan across employees in the same plan. Individuals who elect to contribute above the match threshold may end up with a lower employer contribution proportion as compared to those who contribute at or below the match threshold. We also exploit within-plan variation in proportion of own versus employer contribution from cliff or graded vested plans, where the employees do not have ownership of the employer-matched contribution until after the required number of service years. Table 9 looks at the source of variation in the vesting-adjusted employer contribution proportion at the time of job separation. The ANOVA results suggest that across-plan variation accounts for a large amount of variation in the employer contribution proportion. However, the largest source of variation is within-plan variation due to vesting status in a plan's cliff or graded vesting scheme[6].

Next, we leverage the within-plan employer match variation out of the vesting feature. All the plans in our data have the employer match. The cliff-vesting schedule offers us a zero-match scenario from the employer for employees terminating prior to vesting. We take a natural experiment analysis and focus on the terminating employees who quit before or after the vesting day in a three-year cliff plan with a balance more than 3K. We conduct propensity score matching to ensure that terminating employees who quit before or after the vesting day have similar account balance, annual income, and the probability of carrying an outstanding loan. We then fit logistic regression of the cash-out leakage decision using quadratic time trends separately before and after the vesting day. There is a significant and positive coefficient associated with the indicator of full

[6] We would like to emphasize that the ANOVA results do not imply that the across-plan variation is less important than the within-plan variation, as cliff vesting schedules would produce zero percentage contribution from employer, create large deviation from the mean, and contribute to more variation in the ANOVA analysis.

vesting (0.321 see details in Web Appendix A6). Figure 6 shows terminating employees who quit in the short time before qualifying for employer matched dollars in a three-year cliff plan had 37.84% (exp(0.321)-1) less odds to cash out their retirement assets as compared to those who quit after fulfilling the vesting requirement that shifted the balance to employer matched dollars.

The preceding model-free evidence suggests a positive relationship between the individual employee's probability of cashing out at job termination and employer contribution proportion of 401(k) balance.

## 5. Model

In this section, we develop an econometric model of retirement balance leakage decision. At the core of our model is the relationship between an individual's leakage probability from cashing out and employer contribution proportion in the retirement account. Figure 7 shows that increasing the generosity of the employer / employee match rate affects retirement plan leakage by two different channels. First, higher match rates increase retirement balances from employer and own contributions, and higher balances decrease retirement plan leakage. Second, holding constant one's balance, a higher match rate increases the proportion of one's balance contributed by one's employer, and a higher proportion increases the probability of leakage. The net effect of increasing employer match rates reflects the balance of these two forces.

### 5.1. Leakage Decision

We start by modeling the underlying utility of terminating employee $i$'s leakage decision at job separation:

$$(1)\ u_i^L = \beta_{ind} + \beta_1 EmployerPt_i + \beta_2 \log(1 + Balance_i) + \beta_3 Loan_i + \beta_4 HireAge_i + \beta_5 \log Income_i + \beta_6 Female_i + \beta_7 ThresholdDefault_i + \beta_8 Rate_i + \beta_9 YrCliff_i + \beta_{10} YrGrade_i + \beta_{11} ImmVest_i + \varepsilon_i^L$$

where $\beta_{ind}$ is a vector of fixed effects absorbing the differences in the underlying utility of cashing out for employees in various working industries. The term $EmployerPt_i$is the key variable in Equation (1). It indicates the employer contribution proportion in the retirement account at job

quitting. A generous plan will have the employer match at a higher rate and thus a larger value of $EmployerPt_i$. The coefficient $\beta_1$ speaks directly to the effect of generosity of employer's retirement plan on the tendency to cash out. A positive sign of $\beta_1$ suggests that, controlling for everything else, as employer's contribution accounts for a larger percentage of the 401(k) balance, employees will have a higher probability of leaking by cashing out at job termination. A positive $\beta_1$ is consistent with our framing conjecture.

The term $\log(1 + Balance_i)$ denotes the impact of the accrued 401(k) balance on the underlying utility of leakage. Lower balances may be more likely framed as a rainy-day fund rather than one's hard-earned and untouchable retirement lock-box. Arguably, a larger balance discourages cashing out because cumulative loss would be more consequential given the compound investment rates of a large balance over time. Large amounts engender thoughts of comparisons and opportunity costs of similarly large amounts, discouraging use; the comparisons for smaller amounts are "peanuts", encouraging use (cf. Gourville 1998).

The term $Loan_i$ indicates whether the terminating employee ever carried a 401(k) loan or not. The model free evidence shows that employees who requested a 401(k) loan were more likely to consider retirement assets as fungible rainy-day assets rather than a lockbox. We expect that those with loans have a much higher probability of leakage from cashing out at job termination.

We also include observed demographics $HireAge_i$, $\log Income_i$, and $Female_i$ to indicate the differences in the underlying utility of leakage across age, income, and gender, respectively. To eliminate the concern that employees enrolled in different plans with varying benefit packages may face different utilities, we include a set of plan features including the match threshold above the default rate $ThresholdDefault_i$, match rate $Rate_i$, the number of years $YrCliff_i$ and $YrGrade_i$ in the cliff and graded vesting schedules, and indicator for immediate vesting $ImmVest_i$. Error term $\varepsilon_i^L$ captures the unobserved individual heterogeneity in the underlying utility of leakage beyond the observed variables. It follows the standard Type-I extreme value distribution, such that we can write the probability of leakage from cashing out as:

$$\text{Prob}(d_i^L = 1) = \frac{exp(v_i^L)}{1+\exp(v_i^L)} \quad (2)$$

where $v_i^L$ denotes for the deterministic component of leakage utility in Equation (1).

## 5.2. Instrumental Variables

It is important to correct for the endogeneity of employer contribution proportion and account balance in predicting the probability of cashing out at job separation. Unobserved factors such as financial literacy, retirement planning, or unobserved nonretirement wealth may affect cashing out withdrawal, employee elective contribution, and termination decision. Figure 9 shows that there is indeed a negative relationship between leakage probability and individual elective contribution rate. This would lead to a spurious correlation between cashing out leakage probability and employer contribution percentage in the 401(k) accounts in the observed data.

Suppose that individuals have unobserved differences in factors like financial illiteracy or chronic financial stress (need for liquidity, cf. Netemeyer et al. 2018) that would reduce employee elective contribution during employment. Employees who contribute to 401(k) at a lower rate would have a larger proportion of employer contribution as compared to those who elect to contribute at a higher rate. This is because the part of the elective contribution above the match threshold is not eligible for a match. We can also expect that financial illiteracy and financial stress would encourage cashout leakage at job termination. Without controlling for endogeneity, the variable $EmployerPt_i$ could be spuriously positively correlated with leakage. This creates an upward bias in the coefficient of $EmployerPt_i$. Alternatively, it is possible that employees with low financial illiteracy are not aware of the vesting plan features and may quit the job before the employer match is fully vested. In that case, financial literacy would be negatively correlated with cashing out leakage but positively correlated with the employer contribution proportion at the time of job termination. This may otherwise create a downward bias in the coefficient of $EmployerPt_i$.

The bias direction of the account balance coefficient is more straightforward. Financial stress (need for liquidity) or financial illiteracy would both lead to a lower elective contribution rate to 401(k), which translates to a smaller account balance. Therefore, without controlling for endogeneity, the negative coefficient of account balance would be biased upwards (too negative), as part of this negative relationship should be attributed to the unobserved factors such as high need for liquidity or low financial literacy rather than balance account.

Our empirical strategies involve instrumental variables that shift employee elective contribution rates (and thus employer contribution proportion) but do not affect the leakage decision at job separation. Both the employer contribution proportion and the balance amount can

be calculated given employees' elective contribution rate and service years. We directly model each employee's elective contribution rate and his/her job quitting decision as a function of key plan features. The linkage allows us to assess the impact of a more generous plan (a higher match rate) on account balance accumulation and account composition change.

For instrumental variables, we take advantage of the unique feature that cashing out the retirement balance is only available at job termination but not during employment[7]. We use the elective contribution rates of the actively employed same cohort as the exclusion variable to the terminating employee's leakage decision. Social influence could be at work when it comes to retirement plan contributions during employment (Duflo and Saez 2003; Brown and Laschever 2012; Beshears et al. 2015c[8]). However, the actively employed colleagues in a focal individual's cohort do not face a retirement plan withdrawal decision, unlike the focal terminating employee. Thus, the actively employed cohort's contribution decision is related to the terminating employee's contribution decision but not his/her leakage decision. We operationalize the measure of cohort as the actively employed employees who were hired in the same year (past 12 months) as the focal individual in the same company in the same state. When it comes to the instrumental variable of tenure years, we use all the actively employed employees in the same company located in the same state as the cohort and calculate the length of employment from their hire date to the focal individual's job termination date.

### 5.3. Elective Contribution and Tenure Years Decisions

We now provide details on modeling the individual elective contribution rate. A plan's default rate is a strong reference point for how much to save. In our sample, 87.8% of employees covered by 24 plans were offered a default contribute rate ranging from 1% to 6%. For plans without an auto-enrollment feature, the default rate would be zero, indicating that newly recruited employees would contribute zero percent of their income if they make no explicit election. In Figure 9, we show the distribution of the elective contribution deviation from the default. We model individual elective contribution deviation from the default rate as:

[7] Hardship and non-hardship withdrawal are only allowed after hardship withdrawal application and for limited purposes such as funerals and emergency medical expenditures.
[8] Unlike the other two papers, Beshears el al. (2015c) find that providing peer information would affect individual contribution rates negatively. The authors suggest that upward social comparisons may discourage individuals and lower their willingness to contribute.

(3) $$CD_i = \alpha_{ind} + \alpha_1 ThresholdDefault_i + \alpha_2 Rate_i + \alpha_3 HireAge_i + \alpha_4 \log Income_i + \alpha_5 Female_i + \alpha_6 Loan_i + \alpha_7 PeerCD_i + \alpha_8 \log(1 + PeerTenure_i) + \alpha_9 YrCliff_i + \alpha_{10} YrGrade_i + \alpha_{11} ImmVest_i + \varepsilon_{1i}^C$$

The term $\alpha_{ind}$ captures the difference in the tendency of deviating from the plan default rates across industries. The term $ThresholdDefault_i$ indicates the difference between match threshold and default rate. In our data, 77.4% of our terminated employees have a match threshold different from the default rate. Both default rates and matching thresholds could serve as reference points for the individual elective contribution rates. We suggest that a match threshold above the default rate may pull individual's elective contribute rate above the default contribution rate. Therefore, we expect a positive sign for the coefficient $\alpha_1$.

We also include the match rate $Rate_i$ and other observed individual demographics $HireAge_i$, $\log Income_i$, $Female_i$, and $Loan_i$ in the model. The term $PeerCD_i$ is the average deviation from the default rate among the actively employed cohorts of the focal individual over our three-year observation window. As discussed before, peer cohort is operationalized as the cohort of currently employed employees who were hired in the same year with the focal individual in the same company in the same state. We expect a significant positive peer influence on the individual elective contribution ( $\alpha_7$ >0). We include the peer tenure years denoted by $\log(1 + PeerTenure_i)$, as this variable would appear as an instrument in the model of tenure years. Wooldridge (2010) suggests that all the instruments and exogeneous control variables should be included in each equation. For similar reasons, we incorporate the plans' vesting schedules. The error $\varepsilon_{1i}^C$ follows a normal distribution. It denotes the unobserved individual factor in retirement contribution decision.

Next, we examine how a plan's vesting schedule affects the number of service years. Vesting schedules are designed to retain employees. 72.4% of plans in the data set do not grant 100 percent immediate vesting. Instead, they offer cliff or graded vesting options. It is an interesting empirical question of whether the vesting schedule would work as an effective incentive to retain employees or a less desirable plan feature to mobilize employees. We model individual i's service years using a parametric Weibull distributed survival function $S(t) = \exp(-(\lambda t)^p)$

and accommodate the right censoring of tenure years for the still active employees at the end of our observation window. We parameterize $\lambda_i$ as:

$$(4)\ \log(\lambda_i) = \tau_{ind} + \tau_1 YrCliff_i + \tau_2 YrGrade_i + \tau_3 ImmVest_i + \tau_4 HireAge_i + \tau_5 \log Income_i + \tau_6 Female_i + \tau_7 \log(1 + PeerTenure_i) + \tau_8 ThresholdDefault_i + \tau_9 MatchRate_i + \tau_{10} PeerCD_i + \tau_{11} Loan_i$$

where $\tau_{ind}$ is a vector of fixed effects that control for the differences in employee service years across industries. The coefficients of the vesting variables $\tau_1$, $\tau_2$ and $\tau_3$ could be either negative or positive depending on whether the vesting specification works as an effective incentive to retain employees or a less favorable plan feature to mobilize employees. The next three variables are observed individual demographics $HireAge_i$, $\log Income_i$, and $Female_i$. We include the average service years of all the actively employed employees in the same company in the state, $PeerTenure_i$, as an instrument variable for the focal individual's tenure years. We add control variables $ThresholdDefault_i$, $Rate_i$, $PeerCD_i$, and $Loan_i$ that appear in equations (1) and (3).

Given employee's elective contribution rate, service years, income, and plan features, we can calculate the individual i's retirement account balance at job termination. The term $T_i$ is individual $i$'s years of tenure. In cases where terminating employees fulfill their required service years $T_i \geq T_R$, their retirement accounts would have two components, one contributed by themselves, $Income_i \cdot Contribution_i \cdot T_i$, and the other component contributed by their employer, $Income_i \cdot \min(Contribution_i, Threshold_i) \cdot Rate_i \cdot T_i$. When the plan is not fully vested, the balance amount depends on whether it is a cliff or graded vesting scheme. In case of a cliff plan, for those not fully vested, the 401(k) balance amount would include only the employee's own contribution. In the case of a graded plan, for those not fully vested, the balance amount has two components, one contributed by employees themselves, and the other vested part of employer's matched contribution. A factor smaller than one, $\frac{floor(\min(T_i, T_R))}{T_R}$, is applied to indicate the vesting rate in the graded vesting plan.

We can calculate our key variable of interest, employer contribution proportion, as the proportion of 401(k) balance coming out of the employer's matched dollars at the time of job termination. Match rates, along with match thresholds, vesting schedules, and individual's own

elective contribution rates, jointly determine the relative contribution proportions of employer and employee.

**In summary,** equations (1) – (4) allow us to directly test whether the account composition (percentage of amount contributed by the employer) would be associated with leakage probability at job termination. If so, what is the link between plan features (i.e., match rate and threshold) and the leakage probability? We allow for both positive and negative impacts of a generous employer match plan on the leakage probability. On one hand, a generous employer match could incentivize employee elective contribution and staying with the company to contribute to a larger 401(k) account balance. We expected that a larger retirement account balance would reduce the leakage probability at job termination. On the other hand, a generous employer match may shift the composition of the retirement plan towards a higher proportion of contribution by the employer. The change in the retirement balance composition could activate a framing that induces individuals to view the 401(k) balance as "fungible rainy-day fund" to tap rather than a lock box of "untouchable" savings for retirement and increase leakage probability at job termination. Our goal is to understand and quantify the net impact of the two counteracting mechanisms. We separate the two mechanisms and assess the extent to which the unintended consequence of balance composition mitigates the positive impact of providing a generous employer match.

## 6. Results

We estimate Equations (1) – (4) using a two-stage estimation with instrument variables (IV). The stages follow specific decision streams reflected in Figure 7, starting with individual elective contribution rate and service years, to the account balance accrued by job termination and the account balance composition between employer and employee contribution, and ultimately to the cashout leakage decision at the job termination. The variables of interest, employer contribution proportion and account balance are endogenous. In the first stage, we model the individual elective contribution rate, and service years both as a function of plan features as well as peer colleagues' elective contribution rate and service years. The actively employed peer colleagues' elective contribution rates serve as an instrumental variable to shift the focal individual's contribution but not his/her leakage decision. Peer colleagues' tenure year serves as an instrumental variable to the

terminating employee's service year. The two instrumental variables appear in each other's equations (Wooldridge 2010).

Given the first stage estimation, we can obtain the predicted employer contribution proportion and account balance. We insert the predicted employer contribution proportion, as well as the predicted account balance in the second-stage leakage decision equation. Note that when estimating each of the equations, we include all the exogeneous variables that ever appear in the two estimation stages. We use a bootstrap to correct for the standard error of the predicted account composition and balance. We also cluster standard errors at the company level in each of the bootstrap iteration.

### 6.1. Elective Contribution and Service Years Results

We start with the first-stage estimation results in Equations (3) - (4) on individual elective contribution and tenure years. Table 10 shows the estimation results of Equation 3 for employees' elective contribution deviation from the default contribution rate. We find that a 1 percentage-point difference between match threshold and default rate (e.g., match threshold 4% and default rate 3%) would incentivize employees to contribute above the default rate by an average of 1.12 percentage points ($\alpha_1$= 1.12). It suggests that the match threshold serves as a strong reference point along with the default contribution rate. When that match threshold is above the default rate, employees have incentives to contribute above the default to max out the matching from the company. The match rate has a relatively smaller impact on an individual's elective contribution ($\alpha_2$=0.034). For example, a 10-percentage point increase in match rate (from 50% to 60% match rate) would increase the contribution above the default by 0.34 percentage point. This result is consistent with prior findings that match threshold and default rate have a nudging role in retirement account contribution, while the economic incentive of the match rate has a minimal role (Madrian 2012).

Employees who were older at the time of hiring contribute more as compared to those who were younger when hired. Employees with a loan contribute less to the 401(k) than those who do not, presumably due to need for liquidity. Income and gender do not significantly affect the employee contribution decisions after accounting for industry fixed effects, plan features, and other individual demographics.

Table 10 shows that our instrumental variable of the peer cohort's average deviation from the default is a strong instrument (Stock, Wright, and Yogo 2002), a significant and positive driver of the focal individual's deviation. This suggests that peer influence plays a role in an individual's retirement contribution and that the peer cohort's contribution decision is a valid instrument for employees' elective contribution decisions.

In Table 11, we present the estimation results of service years in the Weibull parametric survival model. As expected, the instrument of peer tenure years has a significant and negative coefficient and is a strong instrument. If the average peer tenure years increase by 1 unit, the termination rate of the focal individual would reduce by 14.3% (1-exp(-0.154)). We find the coefficients of the number of years associated with all three vesting schemes are insignificantly positive. This suggests that employees with an immediate vesting timeline have shorter tenure years as compared to those with a cliff or a graded vesting schedule. However, for the cliff and graded vesting plans, a longer required service year seems to work to mobilize employees rather than serving as a retention tool. Young employees and female employees have a quick turnover and shorter tenure years. Employees in need of financial liquidity (loans) work more years. Interestingly, we find that a high match rate has no significant impact on job turnover.

Higher match rates lead to higher pre-termination account balances. A generous plan can build up a large account balance and deter leakage from cashing out at job separation. However, the match rate also has an impact on the percentage of account balance contributed by the employer. Holding constant account balance, we will show that a higher percent contributed by the employer predicts more leakage. The predicted and vesting-adjusted balance amount and balance composition are carried over to the leakage decision equation in the second stage estimation.

### 6.2. Leakage Decision Results

Now we turn to our empirical results of the leakage decision in Table 12. We begin by using the observed employer contribution proportion and observed account balance, thereby estimating a model without controlling for endogeneity issues in the two key variables. The results in Table 12 column (1) show that the observed employer contribution proportion has a significantly positive partial effect on leakage probability ($\beta_1$ =1.436) and the observed balance amount has a significantly negative partial effect on leakage probability ($\beta_2$=-0.946).

Next, we use the two-step estimation and replace the observed employer contribution proportion and balance amount with the predicted values from Equations (3) – (4) (the coefficients are in column (2) of Table 12). According to our discussion in Section 5.2, the coefficient of account balance would be biased upwards. The uncorrected coefficient of employer contribution proportion could be biased either way due to two counteracting mechanisms shown in Figure 7. On the one hand, unobserved financial literacy may increase employee contribution and reduce the employer contribution proportion. However, employees with high financial literacy may also be motivated to wait to terminate until fully vested, thus increasing the proportion of employer match out of the account balance. Given our prediction of a positive coefficient associated with the employer contribution proportion, the question is whether the same coefficient would remain significantly positive after we control for endogeneity. Column (2) shows that we still find a significantly positive impact of employer contribution proportion ($\beta_1$=1.233) and a negative impact of balance amount on leakage probability ($\beta_2$=-0.615). Both the coefficients are reduced in absolute size after we control for endogeneity (1.436 to 1.233; -0.946 to -0.615). This is consistent with our expectations. Both columns of Table 12 reflect partial effects: employees with smaller account balance and with larger proportion of contribution from the employer would be more likely to cash out at job termination.

We also find that high income employees are less likely to withdraw retirement savings at job separation ($\beta_5$=-0.439). Income is correlated with individual financial literacy and education, which are both found to serve as important predictors of financial decision making (Beshears et al. 2008). Employees who had ever taken a loan are more likely to cash out ($\beta_3$=1.555). The positive correlation between loan-taking behavior and leakage probability highlights the importance of money management skills in all financial decision-making processes. It is interesting that terminating employees who were hired at an older age are slightly more prone to cash-out leakage when we control for other demographics and retirement account balance ($\beta_4$=0.016). Perhaps this reflects their lower likelihood of quickly locating another job and a greater need for a steady income flow to support their families. We find no systematic difference in the leakage probability between males and females.

After controlling for retirement account composition (employer contribution proportion), account balance, and individual demographics, the key plan features match rate, match threshold

and vesting scheme do not have direct significant impact on terminating employees' leakage decision. This supports our framework suggesting that these plan features affect leakage via the decisions of elective contribution rate and tenure years.

### 6.3. Robustness Checks of Leakage Decision Results

We conduct robustness checks for the estimation of the leakage decision (equation 1) in Web Appendix A7. In column (1), we exclude the employees with a small account balance of less than $1,000 at job termination since some plans may automatically initiate a total cash distribution when the accrued asset is too small. In column (2), we add an additional control variable of the cohort turnover rate that might be related to one's job termination decision. In column (3), we include state fixed effects along with industry fixed effects to account for the difference in leakage likelihood across states and industries.[9] Across all the three specifications, we find minimal changes to our results, and all coefficients remain significant.

Self-selection may occur at job termination. Whether individuals terminate voluntarily or involuntarily would affect their intention to withdraw the 401(k) assets. For example, a laid-off employee may withdraw his/her retirement fund in need of liquidity. Unfortunately, our data do not record the job termination reason. To alleviate the concern, we apply a Heckman selection model in the second stage to allow for the correction between job termination and retirement account leakage. We estimate the likelihood of job termination as a Probit function of plan features, employee demographics, and two exclusion variables, namely the employee income rank within the working industry and the cohort turnover rate. Conditional on job termination, we specify the leakage probability using a Probit model with the same set of variables in equation (1).

Web Appendix A8 displays the estimation results. For both the full sample observations and a subsample excluding individuals with a small balance of less than $1,000, we find a similar significant positive partial effect of employer contribution proportion on leakage probability (0.673 and 0.671). Besides, individuals with a larger retirement balance are estimated to have a smaller likelihood of leakage conditional on job termination in the two samples (-0.341 and -0.238). Other estimates remain consistent with those reported in Table 12. In the Heckman selection model, the correlation coefficient $\rho$ measures the magnitude of the association between

[9] We also include state fixed effects in the first stage contribution equation (Equation (2)) in this specification to account for the difference in contribution incentives across states.

errors in the two equations. We estimate that this correlation is insignificantly negative in both samples (-0.098 and -0.204). The weak relationship between job termination and leakage decisions suggests that the self-selection of job termination does not pose a threat to our estimation of the leakage decision.

A legitimate concern remains whether plan features such as match rate are determined by unobserved company characteristics that affect the leakage decision at job termination. We show in the ANOVA analysis in Table 9 that a substantial source of variation in our key variable – employer contribution proportion – comes from the difference in plan features. The rich cross-sectional variance poses a challenge to include plan-specific fixed effects, as they would absorb most between-plan variation and leave the identification to the remaining within-plan variation among employees within a plan. We strike a balance by including fixed effects of all the combinations of key plan features of match rate and match threshold in our estimation equations. Web Appendix A9 presents the results. As can be seen, when we include plan feature fixed effects, the coefficient of the predicted employer contribution proportion is still significantly positive. The magnitude is even larger as compared to when endogeneity is not controlled (1.667 vs. 1.233). This makes sense, as the plan feature fixed effects likely absorb the variation among plans in the vesting scheme and limit the downward bias on the coefficient of employer contribution proportion. The coefficient of the predicted log balance remains statistically negative. The magnitude is very close to the estimates in Table 12 without the plan feature fixed effects (-0.663 vs. -0.615). All the robustness checks with different specifications support our key conclusion of a positive coefficient estimate of employer contribution proportion on leakage.

### 6.4. Simulations

We now focus on the effect of retirement plan generosity on employees' inventive of cashing out at job termination. Match rates affect leakage decisions by two routes: shifting the proportion of employer contributed money as well as the 401(k) balance. We therefore ask how leakage would change if the current plans modify their match rates while holding other features constant. We explore this question empirically using simulations based on the coefficients obtained in Table 12. We consider individuals' behavioral responses to a 50% increase in the current level of match rate (i.e., 50 to 75% or 60% to 90%).

In Figures 10a-10d, we plot the distributions of simulated employee's elective contribution rate, account balance, the proportion of balance contributed by the employer, and leakage probability before and after the policy change. When current plans increase their match rates by 50 percent, individuals are incentivized to increase their elective contribution rates to take full advantage of the benefit that their employer provides. An average employee would increase his or her elective contribution rate from 6.2% to 7.7%. The more generous match rates also marginally retain employees, increasing their average years of tenure from 13.4 to 14.2 years. Following these changes, we see an employee's account balance at job separation increases by $50,855, and the proportion contributed by the employer increases (5.6 percentage points higher).

We predict that a larger account balance would reduce leakage probability, while a higher employer contribution proportion would increase leaking by inducing employees to frame 401(k) savings as "fungible rainy day" money. It is an open question as to whether a generous increase in the employer match may produce an inflow of retirement assets that dominates this unintended consequence of inducing cashout leakage. Figure 11d shows that the framing effect dominates the balance effect. A 50% match rate increase will lead to a 14.5% (4.9 percentage points) net increase in leakage probability. However, the same estimates imply that if one could shut down the account framing effect of the proportion of assets contributed by employer (let $\beta_1 = 0$) and the only effect of a more generous match is via increasing the employee's balance, there could be an 11.2% (3.8 percentage points) reduction in leakage probability.

One should not conclude from these findings that that a more generous match rate fails to make employees better off. The question is whether they are less prepared for retirement than they "should" be if one could eliminate the tendency for higher employer percent of assets to encourage leakage with resulting harm to retirement readiness.

Table 13 shows a counterfactual evaluation of the impact of an impact plan generosity (a 50% match rate increase) on the cashout amount and the resulting accumulation of total retirement assets. With a 50% increase in match rates, an average terminating employee's retirement balance would increase by $50,855 by the time of job termination compared to the case with no such increase in match rates. At the same time, the cashout amount would increase by $14,457 when we multiply the accumulated balance before job termination by the continuous measure of leakage probability. Subtracting the cashout amount from the retirement account balance, we estimate that

the average 401(k) account balance will increase by $36,398 (=$50,855-$14,457) following a 50% increase in employer match rate. However, if we were able to shut down the account framing effect, the cashout amount would go up by only $4,582, and the build-up asset of an average account could have reached $46,273 (=$50,855-$4,582). In other words, a 50% increase in match rate would cause an additional $9,875 to leak out of an average 401(k) account as a result of the documented effect of employer percent of 401(k) contributions. We interpret that effect as a tendency to think of their retirement account as "fungible rainy-day funds" when there is a larger proportion of balance contributed by their employers. The leaked dollar amount is approximately equivalent to 19.42% of the effect of a 50% increase in employer match on post termination balances for an average 401(k) account ($9,875/$50,855).

An alternative way of conducting the simulation is to consider leakage as a binary dependent variable. We have shown that almost all the employees who had ever withdrawn money from a retirement account after job termination eventually drain the entire balance. Thus, we predict a total cashout for an employee if his or her predicted leakage probability is above a cutoff point (50%) and no leakage otherwise. The second column of Table 13 shows that the discrete version simulation has consistent patterns as the continuous version. The only difference is that the magnitude of the cashout amount is smaller in the discrete setting as compared to the continuous setting. Specifically, approximately 14.8% of the pre-termination balance ($7,526/$50,855) was estimated to have leaked out of an average account balance as a result of the framing effect. This slightly lower effect of framing in the balance accumulation in the discrete leakage version is because terminating employees with smaller balance amount were more prone to cashout leakage.

Web Appendix A10 presents a similar set of simulation results but only for employees who were predicted to terminate within our observation window by the end of 2016 from the survival equation (4). The average pre-termination retirement balance would rise by $14,391. When we consider leakage as a continuous probability (versus a discrete event in parentheses), we find that 32% (vs. 21%) of the average account balance would be cashed out at job termination and the rest 68% (vs. 79%) would be either kept in the old plan or transferred to another qualified plan. However, 87% (vs. 97%) of the balance could have been kept in the 401(k) system if the account framing were shut down. Thus, approximately 19.27% (vs. 17.69%) of the retirement assets per account ($2,772 vs. $2,544) were wiped out due to the intended account framing effect.

We further investigate the simulation results by the predicted years of tenure, as individuals who terminate with a short employment period would have a smaller balance and therefore be more likely to engage in cash withdrawals. Table 14 organizes the simulation results around five brackets of tenure year ranges with a discrete measure of leakage incidence. As expected, the accumulated pre-termination balance increases with tenure years. Under a 50% match rate increase, there is a net increase of leakage incidence across all levels of predicted tenure years. It shows that the account framing effect outweighs the increased account balance effect at all levels of predicted tenure years, thus producing a lift on leakage incidence.

In terms of the cashout dollar amount, an average terminating employee would leak from 4.38% to 31.3% of the additionally accrued account balance, with the highest leakage percentage (31.3%) for job separators with less than five years of service. However, if we were able to only increase the account balance through a more generous match rate (50% increase) while removing the account framing effect in the leakage decision, we could have reduced the cashout amount per retirement savings account by $2,253 (in the shortest tenure year group of fewer than five years) to $15,653 (in the 20-30 years tenure group).

In other words, job separators with a quick job turnover rate are most subject to the account framing effect. Under our simulation of 50% match rate increase, they are most likely to treat their 401(k) funds as "fungible rainy day accounts" rather than "sacred" funds in a retirement lockbox, as they have a small termination balance that is inadequate to offset the effect of a large proportion of employer contribution due to more generous matching. This finding is noteworthy, as it implies a lack of security and planning of retirement funds for employees without long-term secure jobs.

Figure 11a provides a visual plot of the percentage of cashout dollar amounts relative to the additionally built-up retirement assets across different levels of tenure years in the scenario of a 50% match rate increase. Figure 11b shows the potential to keep the accrued retirement asset in the 401(k) system if we were able to introduce a generous retirement contribution plan without inducing or further activating the account framing effect. It suggests that mental labels on different sources of assets play a diminishing role in shifting the leakage incentives when the employee's tenure years goes up.

## 7. Discussion and Limitations

There is by now a large literature on retirement plan decisions, but there is very little rigorous academic research that documents the behaviors of retirement plan leakage at job termination. It is common to cash out retirement plan assets, pay taxes and penalties, and lose all progress one has made over years of 401(k) savings. Our work makes a unique contribution in documenting the patterns of how this occurs and in investigating how the generosity of employer matching contributions contributes to cashing out at job termination.

Using a unique data set with 597,980 employees covered by 29 retirement plans, we find that 38% of employees engaged in leakage at job termination. A 50% increase in matching rate would be associated with 14.5% (4.9 percentage points) increase in leakage probability at job termination. We use instrumental variables to support a causal interpretation of this result. Conditional on our controls, it should not matter to decisions whether the dollars in one's 401(k) came from one's employer or from one's own contributions, but it does.

Our work has three primary limitations: First, we do not observe the termination reason, be it voluntary or involuntary. Record keepers do not record such data, but we suspect that this would be another key factor in the 401(k) leakage that is worthwhile to study in future research, perhaps by matching survey data to the administrative data like that record-keepers observe.

Second, a majority of variation in our key variable comes from cross sectional variation either due to differences among plans or differences in employees with differential plan vesting and voluntary contributions. It would be ideal to track an individual over multiple job separation processes and control for unobserved individual heterogeneity (i.e. need for liquidity) beyond the commonly observed demographics such as income and age in a payroll system.

Third, we document a societally important phenomenon – greater leakage with greater proportion of assets contributed by the employer – but we can provide only suggestive data on why this occurs. We consider economic and psychological mechanisms that might predict greater leakage when more 401(k) assets were contributed by the employer. An economic motive might be opportunistic planned leakage, wherein one contributes more than one would without the match to one's 401(k) to capture "free money" from one's employer, planning to withdraw a portion and still be ahead after paying taxes and penalties. That account is not supported in our data. We find

little effect of the employer match rate on employee contributions. Moreover, a planned, opportunistic leakage account implies that we should observe partial leakage. However, overwhelmingly, those who leak drain the whole balance. We only observe approximately 4% of employees would engage in partial cashing-out at job termination. An even smaller percentage of 0.05% terminating employees (589 out 113,439) in our sample cash out the employer's contributions but not their own.

We find our data to be more consistent with an interpretation that employees frame their retirement assets based on the proportions of employer match versus their own contribution. Accounts with larger proportions of employer-sponsored dollars are more likely trigger leakage. Our interpretation is employees whose balances are dominated by employer contributions are more likely to think of their 401(k) as "fungible rainy-day fund." In contrast, employees with balances with the majority of savings coming from employee's elective contributions are more likely to be preserved at the time of job separation, despite identical balances, incomes, years of service, and other demographic features at the time of job separation. We conjecture that employees regard the account as more of a windfall rainy day fund for current use than a hard-earned long-term retirement savings vehicle when more of the balance comes from the employer. As a result, a 401(k) account dominated by employee contributions is more prone to early withdrawals when a job termination occurs, whereas balances in a real retirement savings account are likely to be viewed as sacred assets profane to raid.

We further evaluate the impact of plan generosity (a 50% match rate increase) on the cashout amount and the resulting accumulation of total retirement assets. Our simulations imply that a 50% increase in match rates would increase an average employee's pre-termination balance by $50,855. However, we also see that the same 50% increase leads to an increase of $14,457 in the cashout amount at job termination. Subtracting the cashout amount from the retirement account balance, we estimate that the average 401(k) account balance will increase by $36,398, following a 50% increase in employer match rate.

What would happen if the account framing effect could be neutralized? In that case, the same 50% increase in employer match rate would lead to an increase in 401(k) cashout amount of only $4,582, so that the increased employer match leaves the average terminating employee with $46,273 more than without the increased match. In other words, $9,875 leaked out of an average

401(k) account as a result of the documented framing effect, equivalent to 20% of the additionally accrued 401(k) account balance. If instead of modeling leakage dollars we model a binary measure of leakage incidence, we get very consistent results: approximately 15% of the additionally accrued account balance would leak out of the 401(k) systems.

We further evaluate the simulation effect against the predicted tenure years. Job separators with short tenure years are most subject to the account framing effect. For those who terminated within five years, one-third of the build-up would leak out at job separation as a result of the account framing effect.

What might reduce this leakage that we document? Perhaps terminating employees would be less likely to treat their 401(k) funds as a rainy-day account if they had other savings explicitly labeled as such. The Aspen Institute has advocated "side-car" savings accounts (Mitchell and Lynne 2017, p. 4):

> "Workers would fund a short term savings account that could be used for emergencies, and once a sufficient savings buffer was built up, additional contributions would automatically be diverted to a traditional, less liquid retirement account. To ensure a constant savings buffer, the short-term account would be automatically replenished as necessary. The hope is that by formalizing the dual role the retirement system currently plays, savers would be in a better position to distinguish between what is available now and what is locked away for retirement. This would allow them to meet short- and long-term financial goals more easily."

We hypothesize that such a plan structure would discourage any tendency to frame one's retirement balance as a "rainy day fund", because another account had that label. The same would be true of recent innovations where employers match employee dollars in an emergency fund that is distinct from the 401(k) fund. One could extend those ideas by plan designs that allow loans from an emergency fund but not from the labeled 401(k) retirement fund.

Another policy approach drawing significant interest is "auto-portability" that allows employers to automatically roll small balance accounts of a terminated employee into the new employer's plan (Barney 2019, Miller 2019). New guidance from the US Department of Labor reduced the consent requirements from the terminated employee to achieve those transfers.

Both side-car accounts and auto-portability seem to have the potential to reduce the pernicious tendency to be more likely to leak from an account of a given size if a larger fraction of the assets came from employers that create a frustrating tendency for plans with higher match rates to be "generous to a fault."

All of these topics above are promising lines for future research. We hope that these findings inspire further marketing scholarship about these issues of broad relevance to firms, employees, and society.

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**Tables**

Table 1: Employees' Demographics and Contributions

| | Mean | SD | Min | Max |
|---|---|---|---|---|
| Age at hire date | 31.7 | 9.4 | 18.0 | 59.8 |
| Years of tenure | 8.9 | 8.2 | 0.1 | 42 |
| Annual income ($) | 66,998 | 50,076 | 5,000 | 300,000 |
| High compensation employees % | 14.1 | - | - | - |
| Female % | 52.0 | - | - | - |
| | | | | |
| Monthly plan participation rate % | 85.6 | - | - | - |
| Unconditional avg monthly contribution rate | 6.2 | 7.1 | 0 | 100 |
| Conditional avg monthly contribution rate | 6.7 | 7.1 | 0.03 | 100 |
| Employee monthly contribution $ | 387.2 | 507.4 | 0 | 17,500 |
| Employer monthly contribution $ | 211.7 | 220.6 | 0 | 1,875 |
| Employee + Employer monthly contribution $ | 598.9 | 687.9 | 0 | 18,900 |
| Currently hold a loan % | 23.1 | - | - | - |
| Ever carried a loan % | 27.8 | - | - | - |
| Account balance ($) | 79,584 | 134,172 | 0 | 852,973 |
| | | | | |
| N of companies | 29 | | | |
| N of company-plans | 28 | | | |
| N of observations | 597,980 | | | |

*Note: HCE – highly compensated employees with an over $120,000 (2016's standard, $115,000 for 2015 and 2014) annual gross income. There are 38,803 employees who did not contribute at all during the whole observation sample.*

Table 2: Active versus Terminated Employees' Demographics and Contributions

| | Active Employees Mean (SD) | Terminating Employees Mean (SD) |
|---|---|---|
| Age at hire date | 31.9 (9.3) | 31.1(9.6) |
| Years of tenure | 9.7 (8.5) | 5.9 (6.2) |
| Annual income ($) | 68,449 (49,771) | 60,802 (50,897) |
| High compensation employees % | 14.4 (-) | 13.0 (-) |
| Female % | 50.8 (-) | 57.2 (-) |
| | | |
| Unconditional monthly contribution rate % | 6.3 (7.3) | 5.8 (6.0) |
| Conditional monthly contribution rate % | 6.9 (7.4) | 5.8 (6.0) |
| Currently hold a loan % | 24.9 (-) | 15.7 (-) |
| Ever carried a loan % | 29.3 (-) | 21.4 (-) |
| Account balance ($) | 89,648 (142,298) | 36,598 (78,266) |
| N of observations | 484,541 | 113,439 |

Table 3: Summary Statistics of Retirement Plans

| | Mean | SD | Min | Max |
|---|---|---|---|---|
| *Retirement plan characteristics* | | | | |
| Plans with auto-enrollment (AE) | 87.8% | | | |
| Default rate (conditional on AE) | 3.3% | 1.6% | 1% | 6% |
| Match rate | 90.3% | 18.5% | 30% | 100% |
| Match threshold | 5.1% | 1.3% | 4% | 15% |
| Vesting Years | 2.1 | 1.7 | 0 | 5 |
| | | | | |
| N of companies | 28 | | | |
| N of plans | 29 | | | |
| N of individuals | 597,980 | | | |

*Note: 1) 24 of the 29 plans have the default contribution rates. Individuals covered by plans with auto-enrollment would automatically be enrolled within 30 to 90 days unless they make a clear claim of opting out. 2) 8 of the 29 plans are offered immediate vesting plans, 16 offered cliff vesting, and 5 offered grade vesting (see Figure 1).*

Table 4: Distribution of Key Retirement Plan Features

| Match Rate | Match Threshold | Vesting Yr. (Min) | Vesting Yr. (Max) | # Plans | # Employees |
|---|---|---|---|---|---|
| 30% | 15% | 0 | 0 | 1 | 6,086 |
| 50% | 6% | 3 | 5 | 4 | 78,421 |
| 67% | 6% | 3 | 3 | 1 | 6,565 |
| 70% | 6% | 5 | 5 | 1 | 5,454 |
| 75% | 4% | 3 | 3 | 1 | 16,074 |
| 80% | 5% | 3 | 3 | 1 | 33,991 |
| 100% | 4% | 0 | 3 | 7 | 206,936 |
| 100% | 5% | 0 | 2 | 3 | 124,914 |
| 100% | 6% | 0 | 5 | 9 | 113,937 |
| 100% | 7.5% | 3 | 3 | 1 | 5,602 |

Table 5: Terminating Employees' Retirement Asset Leakage Decisions

| | All Terminating Employees | | Excluding balance <= $1k | |
|---|---|---|---|---|
| | Employees % | Average Balance ($) | Employees % | Average Balance ($) |
| Keep money in the old plan | 33.4 % | 64,482 | 39.3% | 66,243 |
| Roll over money into a new plan | 28.6 % | 44,746 | 29.7% | 52,133 |
| Cash-out Leakage | 38.0 % | 5,949 | 31.0% | 8,595 |
| N Employees | 113,439 | | 93,680 | |

*Note: a) We define cash-out leakage as either a lump-sum or partial cash withdrawal following a job separation. All the federal and state tax transactions were observed in our data set; b) 19,759 (17.4%) out of 113,439 have less than $1k balances at the time of job separation.*

Table 6: Leakage Decisions by Loan Status at Job Termination

| | N | Avg. balance | No leakage | Full Cash-out | Partial Cash-out |
|---|---|---|---|---|---|
| Overall | 113,439 | $ 36,598 | 62.2% | 33.9% | 3.9% |
| | | | | | |
| Never taken a loan | 89,187 | $ 37,342 | 67.7% | 29.4% | 2.9% |
| Ever taken a loan | 24,252 | $ 33,861 | 41.6% | 50.7% | 7.7% |
| | | | | | |
| Outstanding loan at termination | 17,836 | $ 31,623 | 44.0% | 47.2% | 8.8% |
| Paid back loan by termination | 6,416 | $ 40,081 | 34.9% | 60.4% | 4.7% |

*Note: The independence of values across ever/not take a loan and leakage decisions are rejected.*

Table 7: Cash-Out Behaviors Conditional on Leakage

| | One Time Total Cashout | Multiple Time Total Cashout | One Time Partial Cashout | Multiple Time Partial Cashout |
|---|---|---|---|---|
| # of employees | 30,260 | 8,224 | 3,820 | 632 |
| % of employees | 70.5% | 19.2% | 8.9% | 1.5% |
| % of balance leaked in the 1st cashout | 99.9% | 73.0% | 49.0% | 29.8% |
| Months till the 1st cashout | 1.5 | 1.0 | 2.9 | 2.8 |
| Months till balance depleted | 1.5 | 6.1 | - | - |

*Note: we examine whether cash-out is total or partial, and whether it occurs in one versus multiple withdrawals over time after job separation (see Figure 3a-3c for the distributions)*

Table 8: Random Effect Logistic Model on Leakage Incidence

| | Estimate | S.E. | |
|---|---|---|---|
| Termination year: 2015 (vs. 2014) | -0.007 | (0.010) | |
| Termination year: 2016 (vs. 2014) | -0.033 | (0.010) | *** |
| Number of months since termination | -0.284 | (0.014) | *** |
| Number of months since last leakage | -0.103 | (0.021) | *** |
| Number of withdrawals since termination | 0.675 | (0.234) | *** |
| Loan at job termination | 0.771 | (0.145) | *** |
| $\sigma_u$ | 0.001 | 175.9 | |
| $\rho$ | 0.000 | 0.132 | |
| N of obs. | 1,992,935 | | |
| Log likelihood | -204,675 | | |

*Note: dependent variable is whether there is cash-out leakage in each month following job termination.*

Table 9: Decomposition of Variance in Employers' Contribution Proportion of 401(k) Balance

| Source of Variation | Terminating Employees | Variance % |
|---|---|---|
| Across Plans (plan dummies) | 1,501.22 | 32.92% |
| Employee elective contribution rate above match threshold | 86.90 | 1.90% |
| Vesting percentage by termination | 2,659.74 | 58.32% |
| Unexplained | 312.67 | 6.86% |
| Total | 4,560.50 | 100% |
| N | 113,439 | |

*Note: the ANOVA results do not imply that the across-plan variation is less important than the within-plan variation, as cliff vesting schedules would produce zero percentage contribution from employer, create deviation from the mean, and contribute more variation in the ANOVA analysis. The three components are not orthogonal to each other. 55.2% plans offer a cliff scheme such that the employer contribution proportion would be zero if the service years do not satisfy the requirement.*

Table 10: Results of Individual Elective Contribution Deviation from the Default

| | Estimate | S.E. | |
|---|---|---|---|
| Peer deviation from the default | 0.547 | (0.069) | *** + |
| Peer log (tenure years + 1) | 0.028 | (0.007) | *** + |
| Match threshold minus the default contribution | 1.120 | (0.350) | *** |
| Match rate | 0.034 | (0.038) | |
| Hired age | 0.001 | (0.0003) | *** |
| Log income | -0.005 | (0.009) | |
| Gender (Female) | -0.006 | (0.004) | |
| Vesting Grade Scheme Years | -0.004 | (0.009) | |
| Vesting Cliff Scheme Years | -0.005 | (0.014) | |
| Immediate Vesting | -0.032 | (0.038) | |
| Ever take a loan (1=yes) | -0.017 | (0.004) | *** |
| Industry FE | Yes | | |
| N of obs. | 597,980 | | |

*Note: (1) bootstrapped standard errors clustered by company in parentheses (repetition = 38); (2) the dependent variable is individual elective contribution deviation from the default rate; (3) Tobit model is used with the deviation bounded between -6% and 100%; (4) * p < 0.1, ** p < 0.05, *** p < 0.01; (5) + the two instruments have F statistics at 62.8 and 16.0, reflecting a strong instrument (Stock et al. 2002).*

Table 11: Estimation Results of Survival Model on Tenure Years

| | Estimate | S.E. | |
|---|---|---|---|
| Peer deviation from the default | 3.036 | (0.295) | *** |
| Peer tenure years | -0.154 | (0.005) | *** |
| Match threshold minus the default contribution | -23.319 | (6.550) | *** |
| Match Rate | -0.805 | (0.793) | |
| Hired age | -0.013 | (0.002) | *** |
| Log income | -0.028 | (0.085) | |
| Gender (Female) | 0.105 | (0.038) | *** |
| Vesting Grade Scheme Years | 0.112 | (0.212) | |
| Vesting Cliff Scheme Years | 0.437 | (0.348) | |
| Immediate Vesting | 1.312 | (1.111) | |
| Ever taken a loan (1=yes) | -0.212 | (0.022) | *** |
| Hire year FE | Yes | | |
| Industry FE | Yes | | |
| N of obs. | 597,980 | | |
| log p | 1.546 | (0.076) | |

*Note: (1) clustered standard errors by company in parentheses; (2) we model individual i's service years using a parametric Weibull distributed survival function $S(t) = exp(-(\lambda t)^p)$ and accommodate the right censoring of tenure years for the still active employees at the end of our observation window. We reparameterize $log(\lambda_i)$ as a function of the variables in the table; (3) * p < 0.1, ** p < 0.05, *** p < 0.01;*

Table 12: Estimation Results of the Leakage Decision at Job Termination

| | (1) | (2) |
|---|---|---|
| Observed employer proportion | 1.436*** | / |
| | (0.311) | |
| Predicted employer proportion | / | 1.233*** |
| | | (0.466) |
| Observed log (1+balance) | -0.946*** | / |
| | (0.163) | |
| Predicted log (1+ balance) | / | -0.615*** |
| | | (0.049) |
| Ever taken a loan (1=yes) | 2.146*** | 1.555*** |
| | (0.149) | (0.128) |
| Match threshold minus the default contribution | -4.805 | -4.568 |
| | (10.662) | (11.957) |
| Match Rate | -1.235 | 1.095 |
| | (1.674) | (1.692) |
| Hired Age | 0.014*** | 0.016*** |
| | (0.002) | (0.004) |
| Log income | -0.070 | -0.439* |
| | (0.051) | (0.224) |
| Gender (Female) | -0.018 | -0.052 |
| | (0.050) | (0.056) |
| Vesting Grade Scheme Years | -0.017 | -0.070 |
| | (0.424) | (0.444) |
| Vesting Cliff Scheme Years | -0.038 | -0.173 |
| | (0.737) | (0.725) |
| Immediate Vesting | 0.138 | -0.278 |
| | (2.172) | (2.228) |
| Industry FE | Yes | Yes |
| N of obs. | 113,439 | 113,281 |

*Note: (1) bootstrapped standard errors clustered by company in parentheses (repetition = 50) (2) * p < 0.1, ** p < 0.05, *** p < 0.01;*

Table 13: Counterfactual Results of a 50% Match Rate Increase on Employee Account Balance

| | Leakage prob. | Leakage incidence |
|---|---|---|
| Accumulated balance before job termination | | |
| 1. Predicted balance before | $124,786 | |
| 2. Predicted balance after | $175,641 | |
| 3. Balance Change (2 – 1) | $50,855 | |
| Leakage probability / incidence | | |
| 1. Before | 33.9% | 26.7% |
| 2. After | 38.8% | 34.0% |
| 3. After while shutting down the framing effect | 30.1% | 20.9% |
| 4. Effect of increased balance (3-1) | -3.8% | -5.8% |
| 5. Effect of account framing (2-3) | 8.7% | 13.1% |
| 6. Net impact (2-1) | 4.9% | 7.3% |
| Cashout leakage amount $ | | |
| 1. Before | $15,958 | $4,053 |
| 2. After | $30,415 | $11,262 |
| 3. After while shutting down the framing effect | $20,540 | $3,736 |
| 4. Effect of increased balance (3-1) | $4,582 | -$317 |
| 5. Effect of account framing (2-3) | $9,875 | $7,526 |
| 6. Net impact (2-1) | $14,457 | $7,209 |
| Remaining balance after leakage $ | | |
| 1. Before | $108,828 | $120,733 |
| 2. After | $145,226 | $164,379 |
| 3. After while shutting down the framing effect | $155,101 | $171,905 |
| 4. Effect of increased balance (3-1) | $46,273 | $51,172 |
| 5. Effect of account framing (2-3) | -$9,875 | -$7,526 |
| 6. Net impact (2-1) | $36,398 | $43,646 |
| Cashout amount % out of the additionally accrued balance | | |
| 1. When there is no framing … | 9.01% | -0.62% |
| 2. When there is framing … | 28.43% | 14.18% |
| 3. Difference between the two scenarios | 19.42% | 14.80% |

*Note: a) we evaluate the policy influence on the whole sample of 597,672 individuals; b) the two columns indicate a continuous measure of leakage probability and a discrete measure of leakage incidence; c) we attribute the difference between the simulated results ('After') and the simulated results while shutting down the framing effect to the effect of account framing. We attribute the difference between the simulated results while shutting down the framing effect and the predicted results before simulation ('Before') as the effect of retirement account balance increase; d) the cashout dollar percentage measures the percentage of the accrued extra balance of $50,855 that was cashed out.*

Table 14: Counterfactual Results by Predicted Years of Tenure

| | By predicted years of tenure | | | | |
|---|---|---|---|---|---|
| | 0-5 years | 5-10 years | 10-20 years | 20-30 years | 30+ years |
| N of obs. | 218,012 | 108,599 | 122,266 | 61,871 | 86,924 |
| Avg tenure increase (in years) | 0.2 | 0.6 | 1.2 | 2.0 | 1.1 |
| Accumulated balance before job termination | | | | | |
| 1. Before | $13,500 | $54,472 | $116,643 | $232,854 | $426,278 |
| 2. After | $20,700 | $80,331 | $171,144 | $335,746 | $575,684 |
| 3. After - Before | $7,200 | $25,859 | $54,501 | $102,892 | $149,406 |
| Leakage incidence | | | | | |
| 1. Before | 46.1% | 35.4% | 30.1% | 22.4% | 15.1% |
| 2. After | 51.5% | 40.4% | 34.9% | 26.8% | 19.2% |
| 3. After shutting down framing | 42.8% | 30.2% | 25.4% | 18.8% | 12.9% |
| 4. Due to account framing (2-3) | 8.7% | 10.2% | 9.5% | 8.0% | 6.3% |
| 5. Due to increased balance (3-1) | -3.3% | -5.2% | -4.7% | -3.6% | -2.2% |
| 6. Net impact (2-1) | 5.4% | 5.0% | 4.8% | 4.4% | 4.1% |
| Cashout leakage amount $ | | | | | |
| 1. Before | $1,972 | $5,468 | $7,748 | $5,164 | $1,514 |
| 2. After | $4,809 | $12,784 | $20,398 | $18,681 | $7,412 |
| 3. After shutting down framing | $2,556 | $6,044 | $6,187 | $3,028 | $869 |
| 4. Due to account framing (2-3) | $2,253 | $6,740 | $14,211 | $15,653 | $6,543 |
| 5. Due to increased balance (3-1) | $584 | $576 | -$1,561 | $-2,136 | -$645 |
| 6. Net impact (2-1) | $2,837 | $7,316 | $12,650 | $13,517 | $5,898 |
| Remaining balance after leakage $ | | | | | |
| 1. Before | $11,528 | $49,004 | $108,895 | $227,690 | $424,764 |
| 2. After | $15,891 | $67,547 | $150,746 | $317,065 | $568,272 |
| 3. After shutting down framing | $18,144 | $74,287 | $164,957 | $332,718 | $574,815 |
| 4. Due to account framing (2-3) | -$2,253 | -$6,740 | -$14,211 | -$15,653 | -$6,543 |
| 5. Due to increased balance (3-1) | $6,616 | $25,283 | $56,062 | $105,028 | $150,051 |
| 6. Net impact (2-1) | $4,363 | $18,543 | $41,851 | $89,375 | $143,508 |
| Cashout amount % out of the additionally accrued balance | | | | | |
| 1. When there is no framing … | 8.11% | 2.23% | -2.86% | -2.07% | -0.43% |
| 2. When there is framing ... | 39.41% | 28.29% | 23.21% | 13.14% | 3.95% |
| 3. Diff between the two scenarios | 31.30% | 26.06% | 26.07% | 15.21% | 4.38% |

*Note: a) we evaluate the policy influence on the whole sample of 597,672 individuals; b) we denote leakage incidence if the predicted leakage probability is higher than 50%; c) we attribute the difference between the simulated results ('After') and the simulated results while shutting down the framing effect to the effect of account framing. We attribute the difference between the simulated results while shutting down the framing effect and the predicted results before simulation ('Before') as the effect of retirement account balance increase; d) the cashout dollar percentage measures the percentage of the accrued extra balance that was cashed out (e.g. $2,837/$7,200 for those <5 tenure years).*

## Figures

Figure 1: Vesting Feature Distributions

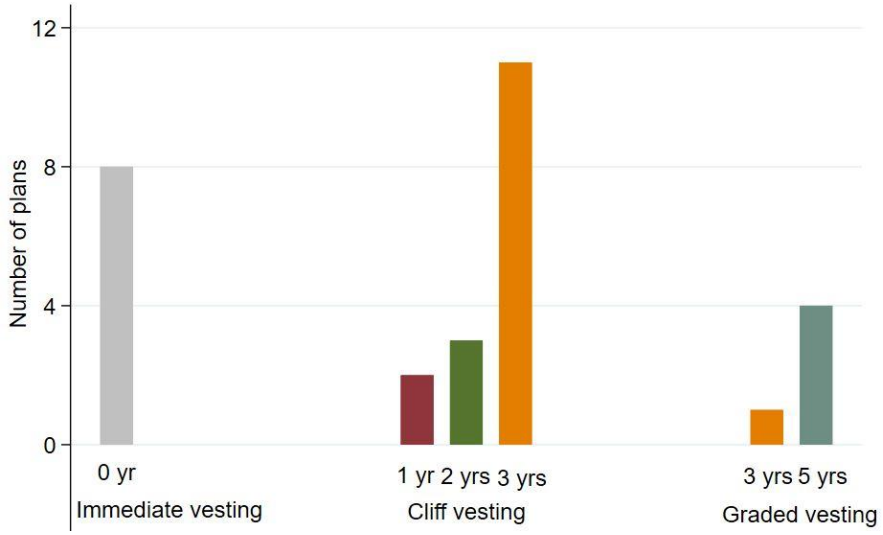



Figure 2: Retirement Asset Leakage Percentage by Loan Conditions at Job Termination

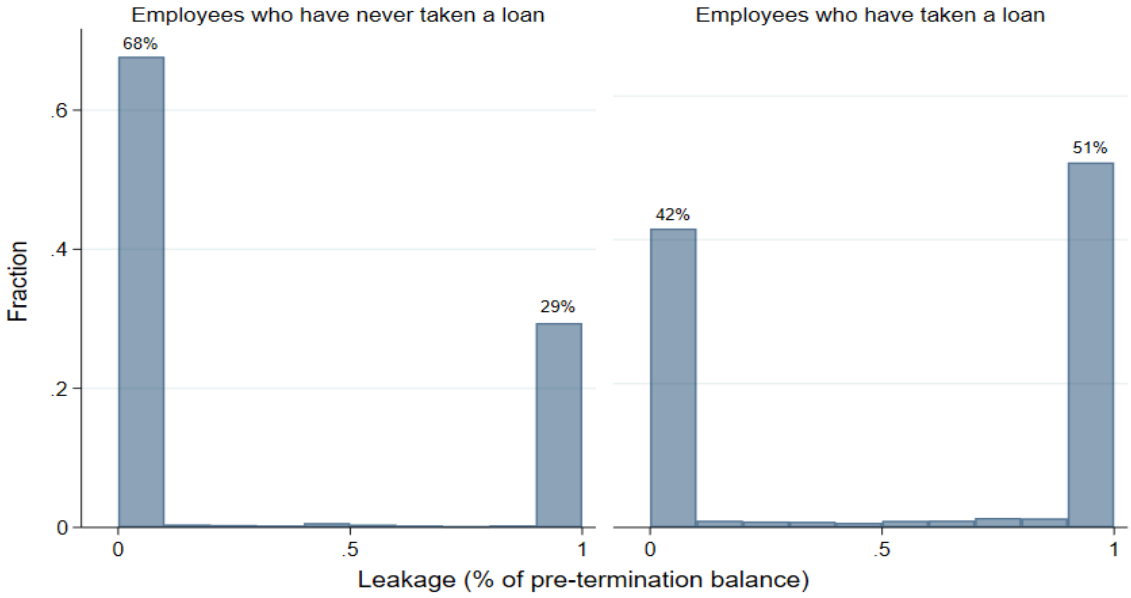


Figure 3a: Number of Months Elapsed after Job Separation until the First Withdrawal

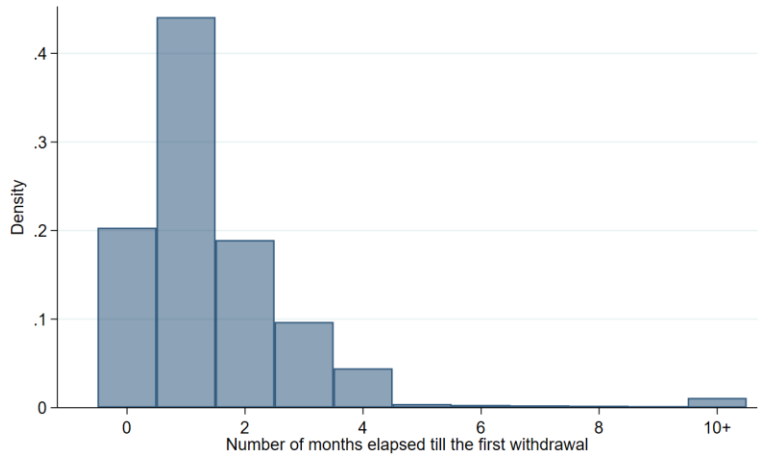



Figure 3b: Distribution of Cash-out Frequencies Conditional on Leakage at Job Termination

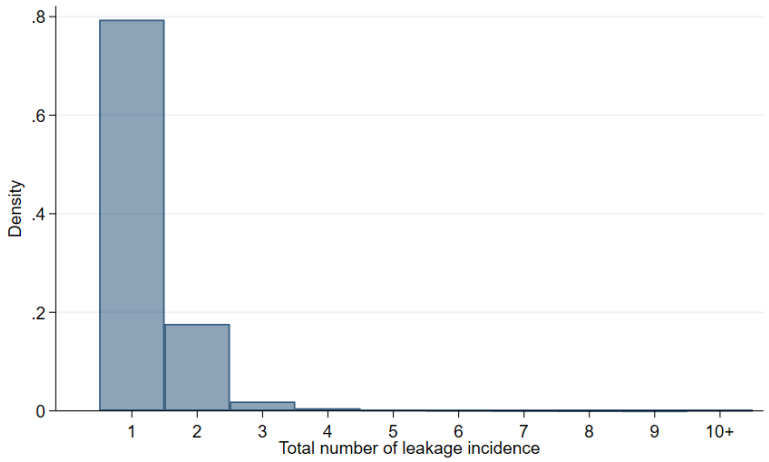



Figure 3c: Months until Account Depletion for Employees with Multiple Leakage Incidences

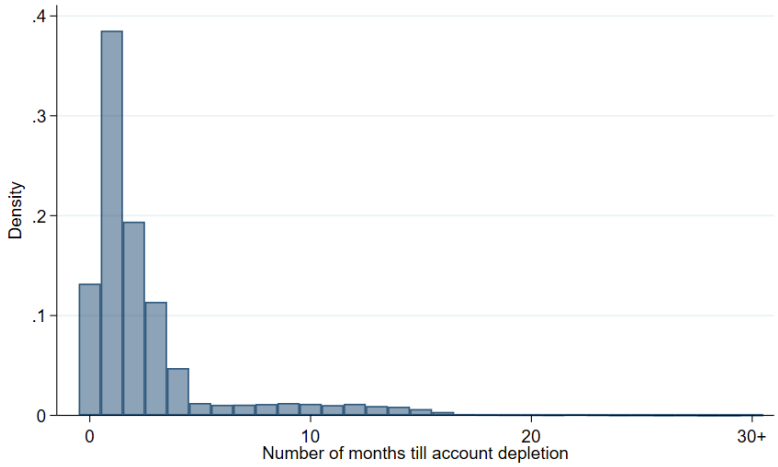
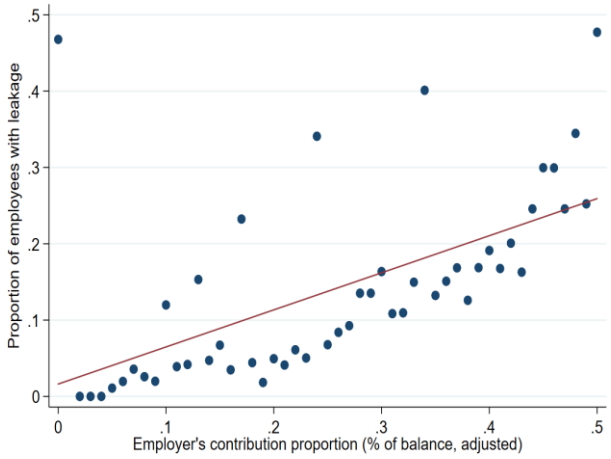


Figure 4: Leakage Rate and Vesting Adjusted Employer Contribution Proportion




*Note: Each dot indicates the average leakage rate in the 0.01 interval of the variable of employer's contribution proportion out of the 401k balance after adjusting for vesting scheme at job termination.*

Figure 5: Relationship between Leakage Rate and Vesting Adjusted Employer Contribution Proportion by Balance, Income, Age, and Gender at the Median Split

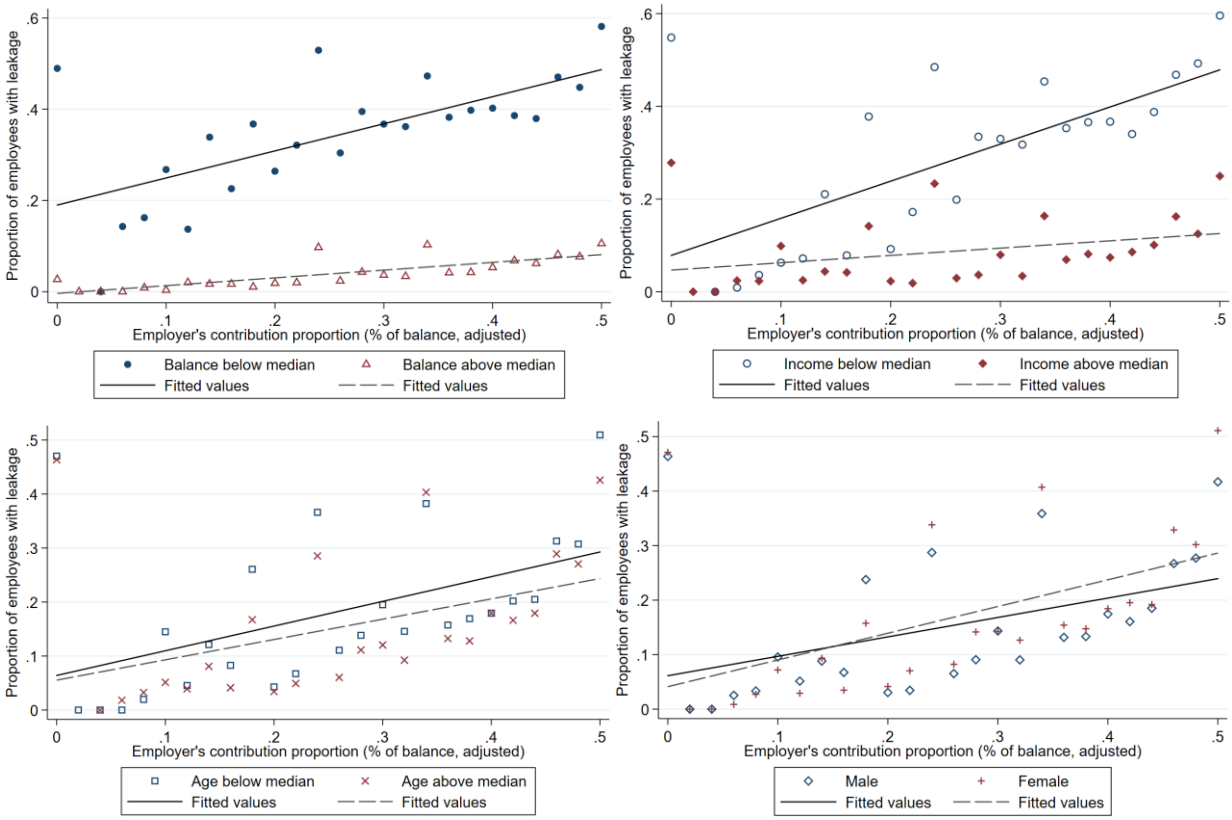
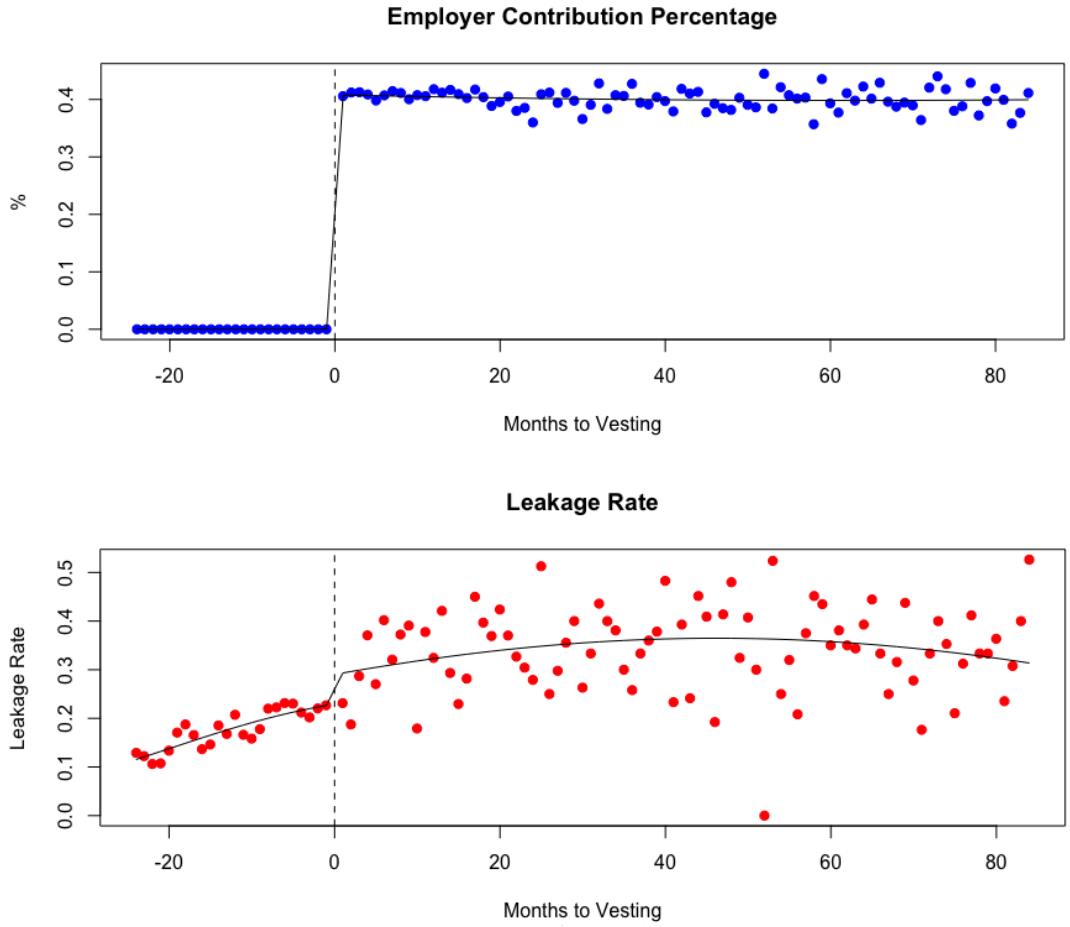


Figure 6: Leakage Rate Comparison between Individuals Who Quit Before vs. After the Service Year Requirement in 3-Yr Cliff Vesting Plans




*Note: we consider job termination before and after the vesting schedule (and therefore subject to zero vs. non-zero percentage of balance coming out of employer) as a natural experiment. We match employees who terminated before the cliff vesting day (without employer contribution) with those who quit after (with employer contribution) on account balance, annual income and outstanding loans (yes/no) allowing for replacement match. We end up with a matching sample with 7,599 separating individuals before the vesting day and 3,593 separating individuals after the vesting day. Due to the smaller sample size post vesting day, there is a larger variation in the monthly average leakage rate after the vesting day versus before. We fit logistic regression of the leakage decision (yes/no) using quadratic time trends in the period before and after the vesting day, separately. A significant increase in the leakage odds (37.84%) is found when employees quit the job with employer contribution versus without. The discontinuity regression results are provided in Web Appendix A6.1-A6.3.*

Figure 7: Model Framework

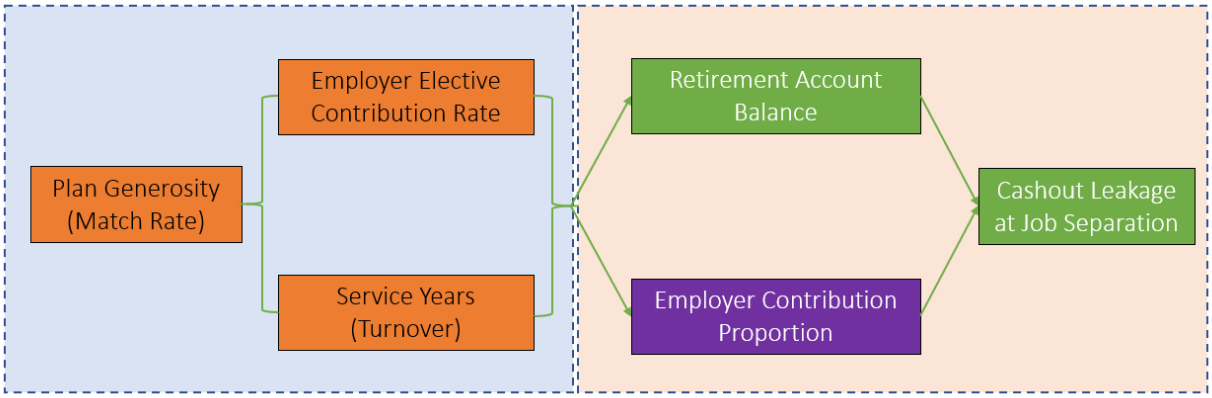



Figure 8. Relationship between Leakage Rate and Employee Contribution Rate (0.01 bins)

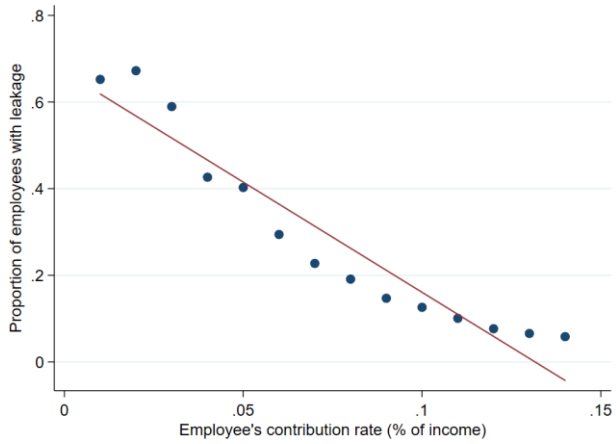



Figure 9: Distribution of Employee Elective Contribution Rates

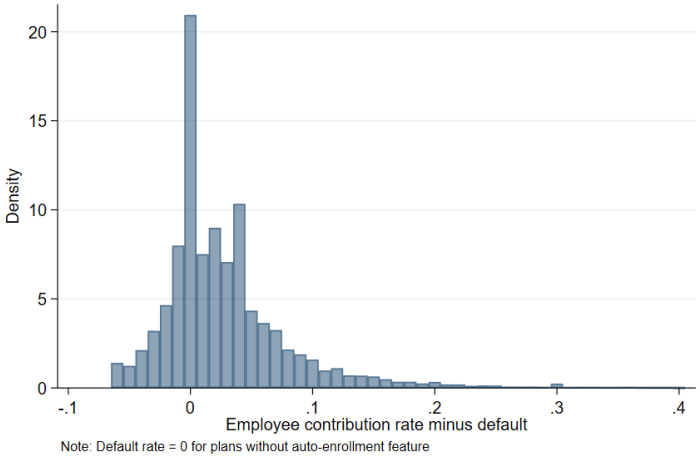
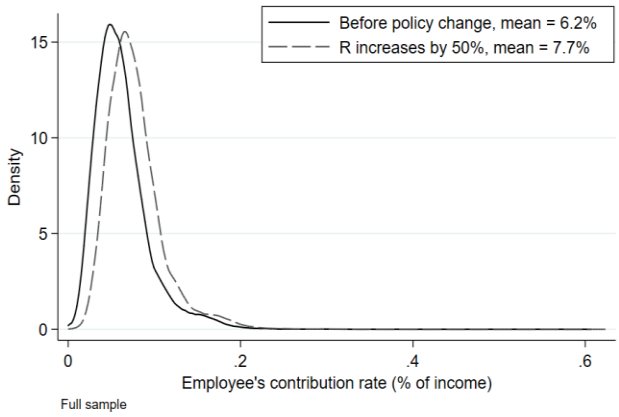
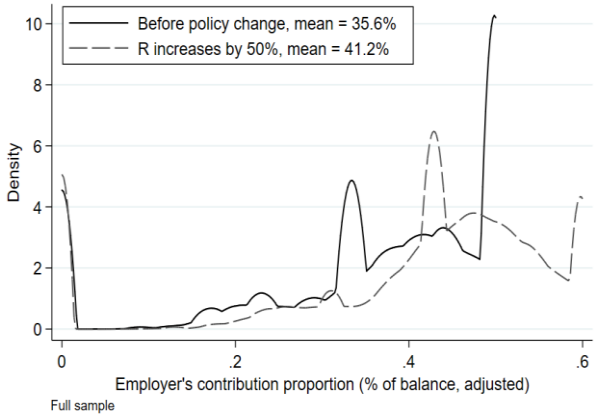


Figure 10: Simulated Distributions before and after a 50% Increase in Matching Rate (R).

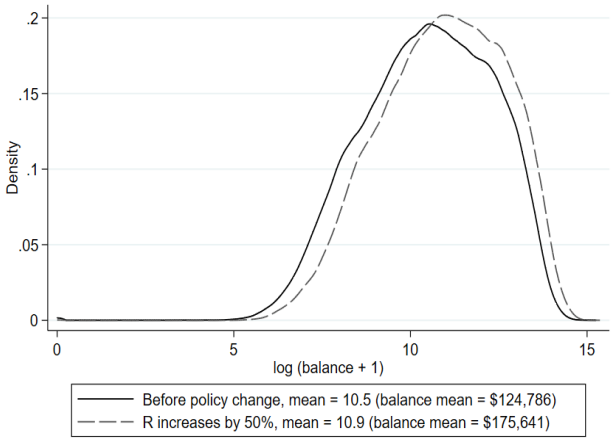
(a) Employee's contribution rate




(b) Employer's contribution proportion




(c) Log(balance+1)




(d) Leakage probability

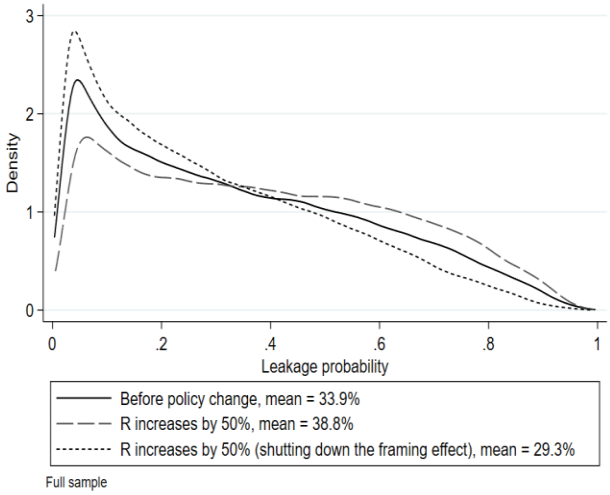


Figure 11a: What Proportion of the Accrued Extra Balance Is Leaked vs. Kept in the 401(k) Pool When Match Rate Increases by 50%?

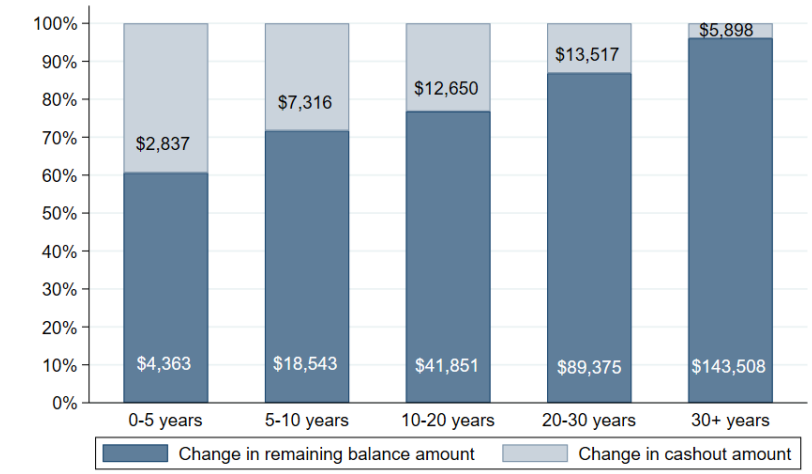
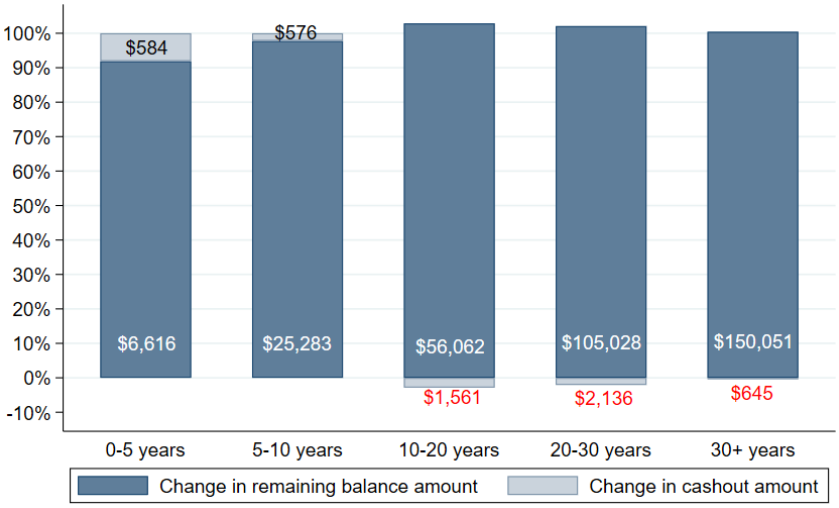
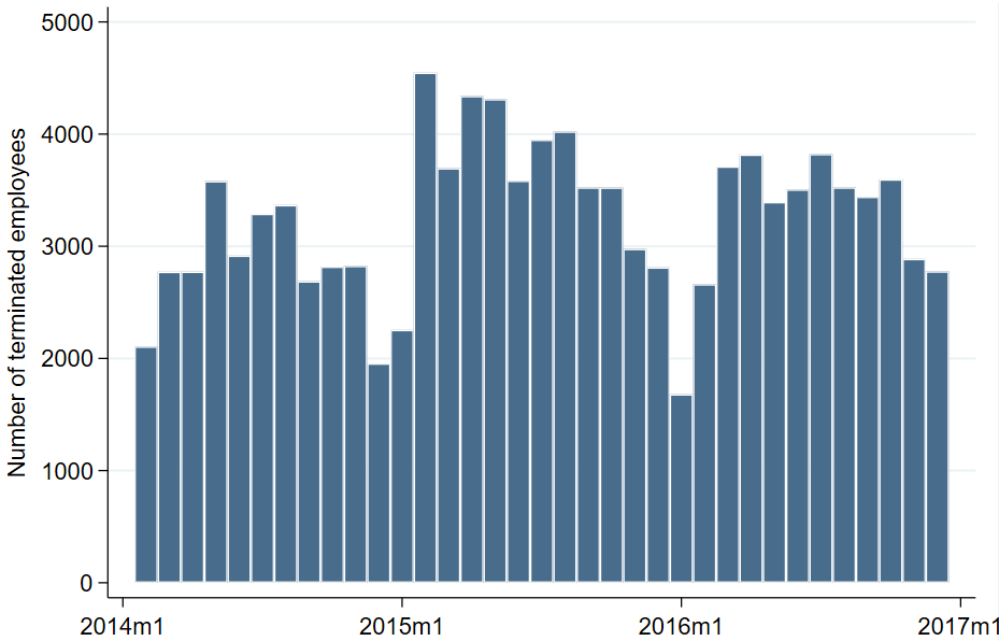



Figure 11b: What Proportion of the Accrued Extra Balance Is Leaked vs. Kept in the 401(k) Pool When Match Rate Increases by 50% While the Framing Effect is Shut Down?

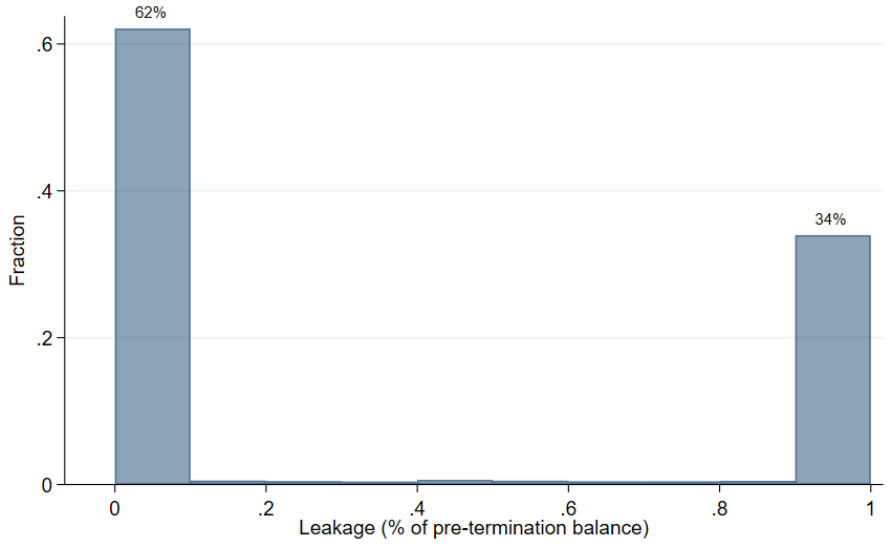


Web Appendices

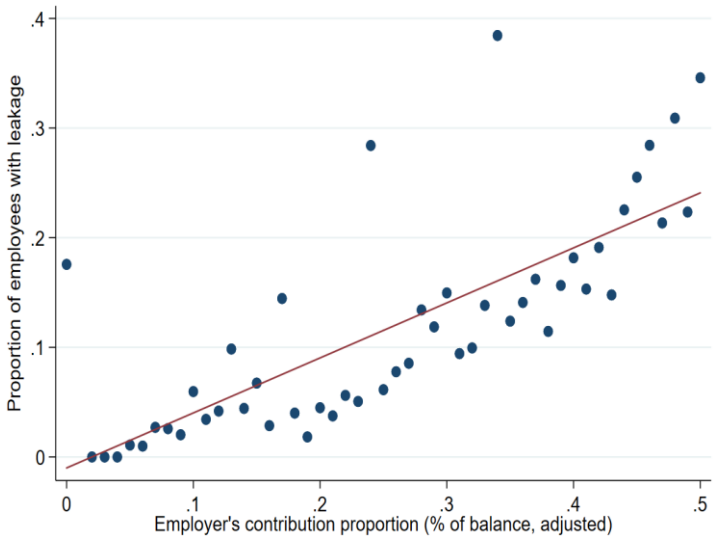
Web Appendix A1: Termination Patterns




Web Appendix A2: Histogram of Retirement Asset Leakage Percentage at Job Separation

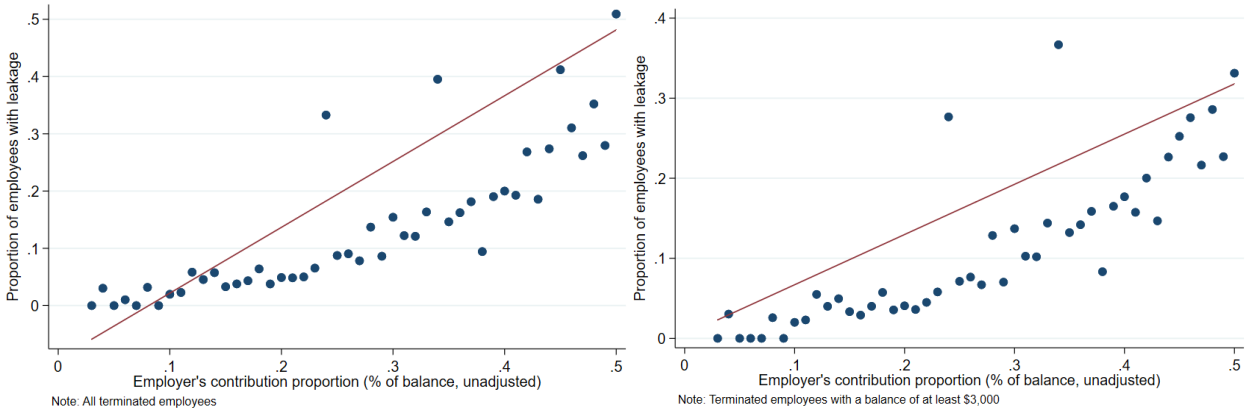


Web Appendix A3: Leakage Rate and Vesting-Adjusted Employer Contribution Proportion Excluding Small Balance <3K



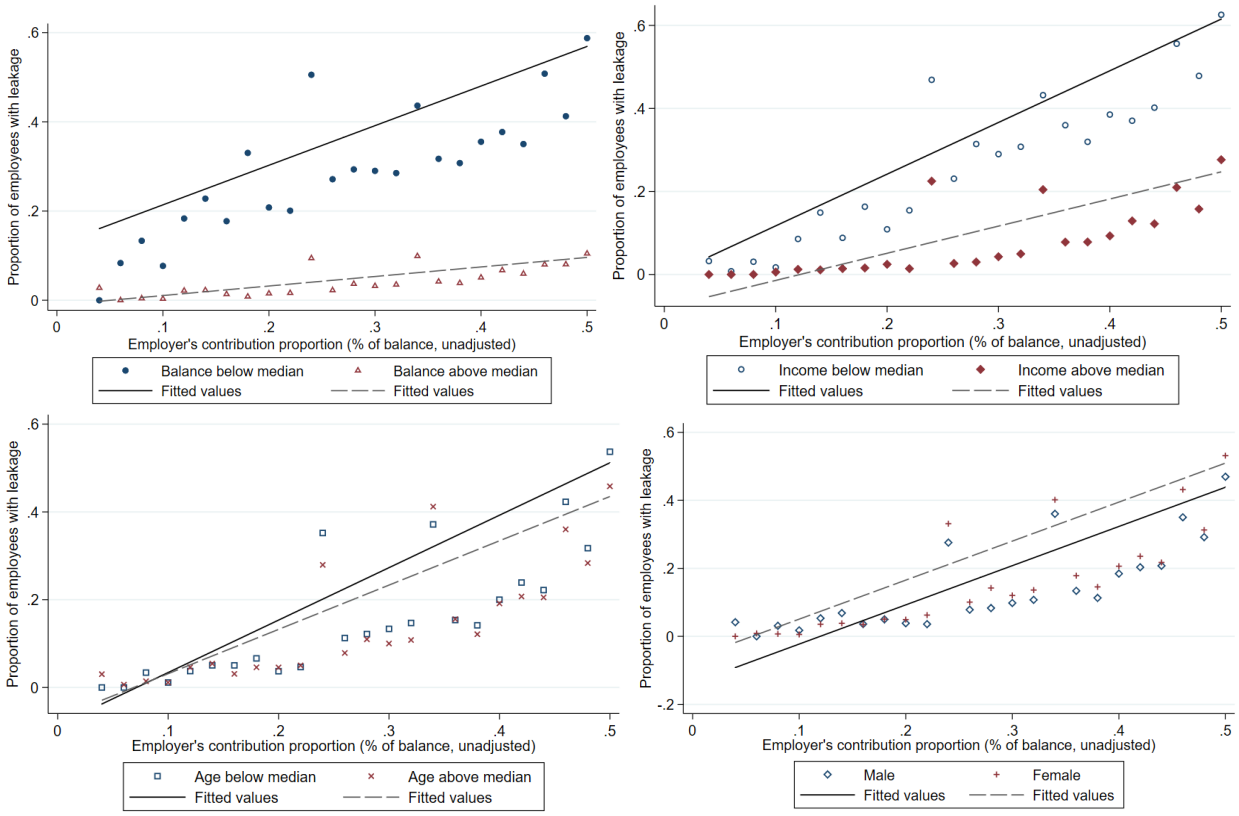

*Note: (a) The employer's contribution proportion is adjusted by the vesting scheme. (b) Each dot indicates the average leakage rate in the 0.01 interval of the variable of employer's contribution proportion out of the 401k balance at the time of job termination.*

Web Appendix A4: Leakage Rate and Vesting-Unadjusted Employer Contribution Proportion




*Note: (a) the x-axis is the percentage of balance coming out of employer's contribution when we do not adjust for the fact that part of the employer's contribution is not fully vested due to the unfulfilled required number of service years. (b) The left panel is with all the terminating employees, and the right panel excludes terminating employees with a small balance less than 3K. (c) Each dot indicates the average leakage rate in the 0.01 interval of the variable of employer's contribution proportion out of the 401k balance at the time of job termination.*

Web Appendix A5: Bivariate Relationship between Leakage Rate and Vesting-Unadjusted Employer Contribution Proportion by Income, Age, Balance, and Gender at the Median Split




*Note: (a) Each dot indicates the average leakage rate in the 0.01 bin interval of the variable of employer's contribution proportion out of the 401k balance at the time of job termination. (b) The fitted lines are weighted by the number of observations in each bin (dot).*

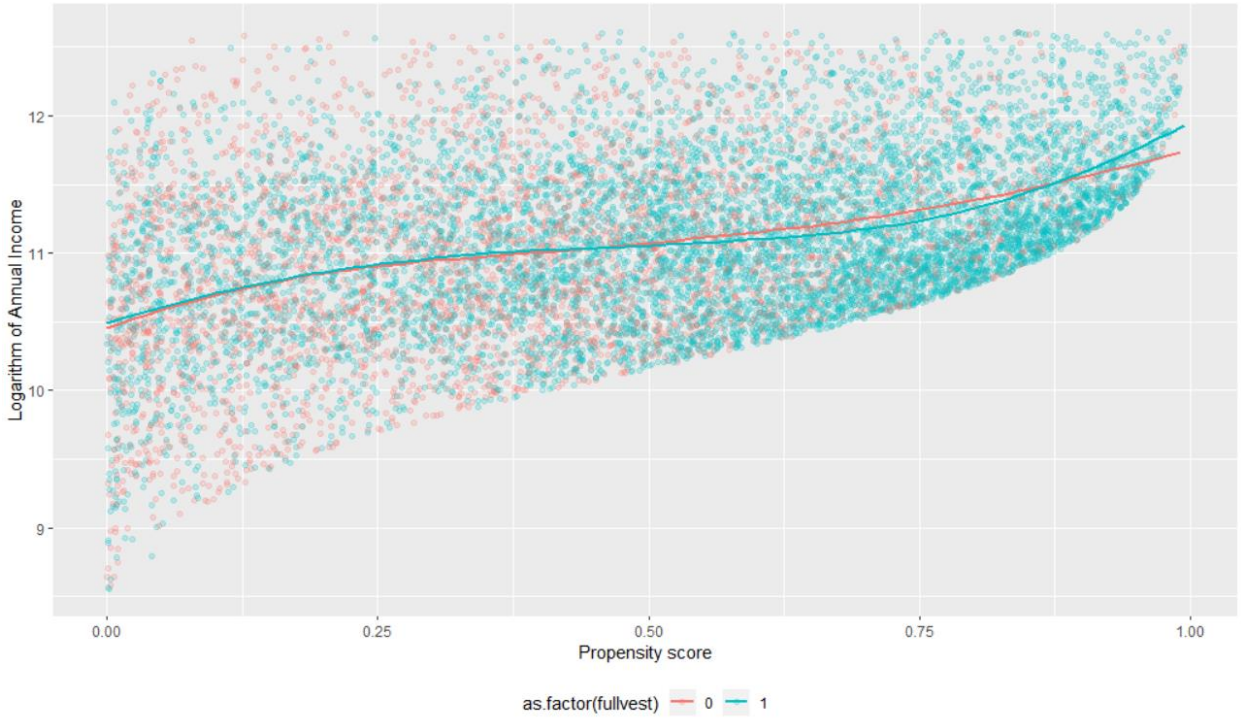
Web Appendix A6.1: Leakage Rate Comparison between Individuals Who Quit Before vs. After the Service Year Requirement in 3-Yr Cliff Vesting Plans

| | Estimate | S.E. | p-value | |
|---|---|---|---|---|
| Intercept | -1.215 | 0.095 | <0.01 | *** |
| Discontinuity Change in the intercept | 0.321 | 0.122 | 0.009 | ** |
| Months to vesting (left side) | 0.015 | 0.018 | 0.428 | |
| Quadratic Months to vesting (left side) | -0.001 | 0.001 | 0.278 | |
| Months to vesting (right side) | 0.0001 | 0.019 | 0.995 | |
| Quadratic Months to vesting (right side) | 0.001 | 0.001 | 0.383 | |
| N | 11,192 | | | |

*Note: we consider job termination before and after the vesting schedule (and therefore subject to zero vs. non-zero percentage of balance coming out of employer) as a natural experiment. We match 7,599 employees who terminated before the cliff vesting day with more than 3K balance (without employer contribution) with 19,048 who quit after (with employer contribution) on account balance, annual income and outstanding loans (yes/no). The 7,599 individuals in the treatment group was matched with 3,593 individuals in the control group with replacement. Due to the smaller sample size post vesting day, Figure 6 shows that there is a larger variation in the monthly average leakage rate after the vesting day versus before. We fit logistic regression of the leakage decision (yes/no) using quadratic time trends separately before and after the vesting day (with vs. without employer match). For example, 18 months before vesting is coded as -18, while the 18 months after vesting is coded as 18. A significant increase in the leakage odds (exp(0.321)-1 = 37.84%) is found when employees quit the job with employer contribution versus without.*

Web Appendix A6.2: Propensity Score Matching on the Variable of Account Balance

Web Appendix Figure A6.3: Propensity Score Matching on the Variable of Annual Income



Web Appendix A7: Robustness Checks for the Leakage Equation

| | (1) Excluding those with balance < 1k | (2) Add cohort turnover rate | (3) Add state fixed effects |
|---|---|---|---|
| Predicted employer proportion | 1.324*** | 1.227*** | 1.128** |
| | (0.250) | (0.435) | (0.472) |
| Predicted log (1+ balance) | -0.480*** | -0.612*** | -0.596*** |
| | (0.045) | (0.068) | (0.049) |
| Match threshold minus the default contribution | -9.673 | -4.621 | -2.425 |
| | (6.222) | (12.173) | (12.059) |
| Match Rate | -0.164 | 1.099 | 1.207 |
| | (1.088) | (1.745) | (1.644) |
| Hired age | 0.017*** | 0.016*** | 0.015*** |
| | (0.002)) | (0.003) | (0.003) |
| Log income | -0.466*** | -0.441* | -0.434** |
| | (0.151) | (0.229) | (0.216) |
| Cohort turnover rate | / | 0.038 | / |
| | | (0.406) | |
| Gender (Female) | -0.091** | -0.051 | -0.054 |
| | (0.045) | (0.056) | (0.055) |
| Vesting Grade Scheme Years | -0.0001 | -0.069 | -0.054 |
| | (0.309) | (0.448) | (0.422) |
| Vesting Cliff Scheme Years | -0.009 | -0.173 | -0.166 |
| | (0.524) | (0.723) | (0.694) |
| Immediate Vesting | 0.487 | -0.277 | -0.296 |
| | (1.651) | (2.224) | (2.151) |
| Ever taken a loan (1=yes) | 1.744*** | 1.557*** | 1.539*** |
| | (0.109) | (0.121) | (0.123)) |
| Industry FE | Yes | Yes | Yes |
| State FE | No | No | Yes |
| N of obs. | 93,680 | 113,281 | 113,281 |

*Note: (1) bootstrapped standard errors clustered by company in parentheses (repetition = 41, 38, 38, respectively); (2) * p < 0.1, ** p < 0.05, *** p < 0.01.*

Web Appendix A8: Robustness Check of Heckman Selection Model for the Leakage Decisions

| | Full sample | | Excluding those with balance < 1k | |
|---|---|---|---|---|
| | (1) Selection equation | (2) Leakage equation | (3) Selection equation | (4) Leakage equation |
| Predicted employer proportion | / | 0.673*** (0.245) | / | 0.671*** (0.123) |
| Predicted log (1+ balance) | / | -0.341*** (0.033) | / | -0.238*** (0.042) |
| Match threshold minus the default contribution | -1.801 (1.918) | -2.920 (6.922) | -2.190 (2.048) | -5.449 (4.120) |
| Match Rate | 0.037 (0.314) | 0.636 (0.983) | 0.028 (0.308) | -0.049 (0.804) |
| Hired age | -0.010*** (0.001) | 0.010*** (0.002) | -0.009*** (0.001) | 0.010*** (0.001) |
| Log income | 0.298** (0.149) | -0.282** (0.136) | 0.313** (0.129) | -0.315*** (0.084) |
| Individual income percentile in industry | -0.005* (0.003) | / | -0.005 (0.003) | / |
| Cohort turnover rate | 2.834*** (0.154) | / | 2.586*** (0.198) | / |
| Gender (Female) | 0.096*** (0.024) | -0.034 (0.033) | 0.102*** (0.018) | -0.064** (0.025) |
| Vesting Grade Scheme Years | 0.017 (0.109) | -0.039 (0.265) | 0.022 (0.093) | 0.005 (0.173) |
| Vesting Cliff Scheme Years | 0.066 (0.151) | -0.107 (0.427) | 0.083 (0.138) | -0.018 (0.272) |
| Immediate Vesting | 0.0005 (0.446) | -0.145 (1.298) | 0.113 (0.422) | 0.276 (0.825) |
| Ever taken a loan (1=yes) | -0.065** (0.028) | 0.933*** (0.075) | -0.054** (0.021) | 1.047*** (0.060) |
| Industry FE | Yes | Yes | Yes | Yes |
| $\rho$ (transformed) | -0.098 (0.146) | | -0.204 (0.153) | |
| N of obs. | 113,281 | | 93,680 | |

*Note: (1) bootstrapped standard errors clustered by company in parentheses (repetition = 40, 42, respectively); (2) * p < 0.1, ** p < 0.05, *** p < 0.01.*

Web Appendix A9: Robustness Check of the Leakage Equation Using Plan Feature Fixed Effects

| | Estimate (SE) | |
|---|---|---|
| Predicted employer contribution proportion | 1.667 | * |
| | (0.920) | |
| Predicted log (1+ balance) | -0.663 | *** |
| | (0.055) | |
| Hired age | 0.016 | *** |
| | (0.005) | |
| Log income | -0.283 | * |
| | (0.170) | |
| Gender (Female) | 0.049 | |
| | (0.081) | |
| Ever taken a loan (1=yes) | 1.795 | *** |
| | (0.121) | |
| Plan Feature Fixed Effects | Yes | |
| N of obs. | 113,281 | |

*Note: (1) Bootstrapped standard errors clustered by company in parentheses (repetition = 46 and 18, respectively); (2) * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (3)* fixed effects of 10 dummies of the combinations of match rate and match threshold are included.

Web Appendix A10: Counterfactual Results of a 50% Match Rate Increase on Account Balance of Employees Who Were Predicted to Terminate within the Three-Year Window

| | Leakage prob. | Leakage incidence |
|---|---|---|
| Accumulated balance before job termination | | |
| 1. Predicted balance before | $29,477 | |
| 2. Predicted balance after | $43,867 | |
| 3. Balance Change (2-1) | $14,391 | |
| Leakage probability / incidence | | |
| 1. Before | 41.5% | 35.2% |
| 2. After | 46.3% | 44.8% |
| 3. After while shutting down the framing effect | 38.2% | 31.0% |
| 4. Effect of increased balance (3-1) | -3.3% | -4.2% |
| 5. Effect of account framing (2-3) | 8.1% | 13.8% |
| 6. Net impact (2-1) | 4.8% | 9.6% |
| Cashout Leakage Amount $ | | |
| 1. Before | $5,213 | $2,240 |
| 2. After | $9,846 | $5,240 |
| 3. After while shutting down the framing effect | $7,074 | $2,696 |
| 4. Effect of increased balance (3-1) | $1,861 | $456 |
| 5. Effect of account framing (2-3) | $2,772 | $2,544 |
| 6. Net impact (2-1) | $4,633 | $3,000 |
| Remaining balance after leakage $ | | |
| 1. Before | $24,263 | $27,237 |
| 2. After | $34,022 | $38,628 |
| 3. After while shutting down the framing effect | $36,794 | $41,172 |
| 4. Effect of increased balance (3-1) | $12,531 | $13,935 |
| 5. Effect of account framing (2-3) | -$2,772 | -$2,544 |
| 6. Net impact (2-1) | $9,759 | $11,391 |
| Cashout amount % out of the additionally accrued balance | | |
| 1. When there is no framing … | 12.92% | 3.16% |
| 2. When there is framing … | 32.19% | 20.85% |
| 3. Difference between the two scenarios | 19.27% | 17.69% |

*Note: a) we evaluate the policy influence on the 71,921 individuals who were predicted to terminate their jobs within the observation window; b) the two columns indicate a continuous measure of leakage probability and a discrete measure of leakage incidence; c) we attribute the difference between the simulated results ('After') and the simulated results while shutting down the framing effect to the effect of account framing. We attribute the difference between the simulated results while shutting down the framing effect and the predicted results before simulation ('Before') as the effect of retirement account increase; d) the cashout dollar percentage measures the percentage of the accrued extra balance of $14,391 that was cashed out.*