Does front-loading taxation increase savings? Evidence from Roth 401(k) introductions

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ABSTRACT

Can governments increase private savings by taxing savings up front instead of in retirement? Roth 401(k) contributions are not tax-deductible in the contribution year, but withdrawals in retirement are untaxed. The more common before-tax 401(k) contribution is tax-deductible in the contribution year, but both principal and investment earnings are taxed upon withdrawal. Using administrative data from eleven companies that added a Roth contribution option to their existing 401(k) plan between 2006 and 2010, we find no evidence that total 401(k) contribution rates differ between employees hired before versus after Roth introduction, which implies that take-home pay declines and the amount of retirement consumption being purchased by 401(k) contributions increases after Roth introduction. We reject several neoclassical explanations for our null finding. Results from a survey experiment suggest two behavioral explanations: (1) employee confusion about and neglect of the tax properties of Roth balances and (2) partition dependence.

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Choosing the right retirement savings rate is complicated. As a result, many employees seem to choose their 401(k) contribution rates using rules of thumb such as “contribute the minimum amount necessary to earn the maximum employer match,” “contribute the maximum amount allowed by the plan,” or “contribute 10% of my pre-tax income” (Choi et al., 2002; Benartzi and Thaler, 2007; Choi et al., 2013). These heuristics are not contingent on the tax treatment of the particular type of 401(k) account used. Even savings recommendations by sophisticated practitioners frequently do not vary according to how the savings vehicles used are taxed (e.g., Ibbotson et al., 2007). If individuals neglect taxes when choosing how much to save, it may be possible for governments to increase the after-tax stock of private savings without altering the present value of taxes by shifting the timing of taxation. Rather than allowing savings to be deducted from taxable income today and then taxing both principal and investment earnings when withdrawn in retirement, have individuals save with after-tax dollars today and then exempt the accumulated savings from taxation in retirement.

The following two-period example illustrates how this mechanism would work. Suppose that an individual earns $100 of pre-tax income in period 1, and he follows a rule of thumb when making his savings decision, setting aside 10% of his pre-tax income regardless of the tax rules. The income tax rate is 20%, and the rate of return is r.

First consider the case in which savings are tax-deductible initially and principal and investment earnings are taxed in period 2. The individual saves $10 in period 1, following the 10% rule of thumb; the government collects ($100–$10) × 0.2 = $18 in tax revenue; and the individual consumes the rest of his income, $72. In period 2, the

individual has $10 \times (1 + r) \times (1-0.2) = $8 \times (1 + r)$ of savings available to consume, and the government collects $2 \times (1 + r)$ in taxes.

Now consider the case in which savings cannot be deducted from taxable income initially but principal and investment earnings are not taxed in period 2. The individual’s budget constraint is unchanged; by saving only $8 in period 1, he finances the same consumption stream as in the previous scenario. In addition, the after-tax rate of return on saving is unchanged. Hence, we should expect a rational agent who saves $10 in the first regime to save only $8 in the second. Based on this intuition, Robalino et al. (2005, p. 212) conclude that “any difference in the economic impacts of either [tax regime] will be of a second order of magnitude.”

But if the individual continues to follow the 10% rule of thumb, he saves $10 in period 1; the government collects $20 in tax revenue; and the individual consumes the rest of his income, $70. In period 2, the individual has $10 \times (1 + r)$ of savings available to consume—a 25% increase over the first scenario. This increase in period 2 consumption occurs because period 1 savings did not fall in response to the fact that, in the second scenario, each dollar of savings in period 1 buys more consumption in period 2. The increase in period 2 consumption is financed by the $2 decrease in period 1 consumption, which is necessitated by the fact that savings are not deductible from taxable income. The government collects $0 in taxes in period 2 in the second scenario, but in both scenarios, the present value of taxes is the same, $20.

The introduction of Roth 401(k) savings plans allows us to test whether the above mechanism plausibly exists. Since January 1, 2006, U.S. employers have had the option to include a Roth contribution alternative in their 401(k) retirement savings plans. The Plan Sponsor Council of America (2012) reports that 49% of 401(k) plans offered a Roth option in 2011. Like contributions to a Roth IRA, employee contributions to a Roth 401(k) are not deductible from current taxable income, but withdrawals of principal and investment earnings in retirement are tax-free. In contrast, before-tax 401(k) contributions – the most common type of 401(k) contribution – are deductible from current taxable income, but all principal and investment earnings are taxed upon withdrawal. Therefore, a dollar of Roth balances purchases more retirement consumption than a dollar of before-tax balances if the marginal tax rate in retirement is positive. If people neglect taxes in making savings decisions, the total dollars contributed to the 401(k) will not change when a Roth becomes available, causing effective retirement savings to increase (and current consumption to fall), provided that some of those dollars are contributed to the Roth.

We use administrative 401(k) data from companies that introduced a Roth 401(k) between 2006 and 2010 to analyze the impact of a Roth option on savings plan contributions. We find no evidence that total contribution rates differ between employees hired after a Roth option is introduced and employees hired before. We consider and reject several neoclassical explanations for our null finding: the fact that the Roth introduction relaxes the effective 401(k) contribution limit, low employee take-up of the Roth option, and kinks in the budget set created by the employer match that inhibit employee savings responses.

The unresponsiveness of total 401(k) contributions to Roth introduction could also be due to the fact that the Roth option makes 401(k) savings more attractive. Savings that would otherwise occur outside the 401(k) (e.g., in a Roth IRA) may shift into the 401(k). Because we have only 401(k) data, we are unable to rule out such a shift. In addition, because tax rates are not flat and time-invariant as in our stylized example, the introduction of the Roth weakly increases the employee’s after-tax expected return from saving. If the substitution effect is large enough relative to the income effect, total desired savings weakly increases, and the 401(k) contribution rate should be the margin of adjustment. These forces could in combination fully offset the drop in 401(k) contributions that would otherwise be expected when a Roth becomes available.

Because our field data do not allow us to test these last two explanations, we ran an online survey experiment on 7000 defined contribution plan participants. Respondents were asked to make a 401(k) contribution rate recommendation for a fictional couple for whom asset shifting and substitution effects are not relevant. We also asked four questions to test knowledge of 401(k) tax rules. We continue to find that adding a Roth option causes more retirement consumption to be purchased. Consistent with our motivating hypothesis, we find evidence of employee confusion about and neglect of the tax properties of before-tax and Roth accounts. The experimental results also suggest that partition dependence (Fox et al., 2005) helps keep total contribution rates from falling when a Roth option is introduced. Partition dependence, which results from a bias towards allocating an equal amount to every discrete option available in a choice set, predicts an increase in total savings when the choice set is {current consumption, before-tax saving, Roth saving} instead of {current consumption, before-tax saving}.

The remainder of the paper proceeds as follows. In Section 1, we summarize the key institutional rules regulating 401(k) plans. Section 2 describes our 401(k) data. Section 3 discusses our estimates of the impact of Roth 401(k) introduction on total 401(k) contribution rates, and Section 4 presents our survey experiment. Section 5 concludes.

1. Background on 401(k) contributions

A traditional 401(k) savings plan allows employees to make before-tax 401(k) contributions that are deductible from current-year taxable income. In lieu of current taxation, the principal and investment earnings are taxed at the individual’s ordinary income tax rate upon withdrawal. Hence, the marginal dollar of pre-tax income buys $1 + r(1 − τ_r)$ of future consumption if it is contributed to a before-tax 401(k) account, where $r$ is the return earned on the contribution between the contribution and withdrawal dates and $τ_r$ is the household’s marginal ordinary income tax rate in the year of the withdrawal plus an adjustment if the withdrawal generates an increase in the taxation of Social Security benefits or a reduction in means-tested benefits. An additional 10% tax penalty applies to both the principal and earnings withdrawn if the account owner is younger than 59½ years old.

In contrast to contributions to a before-tax 401(k), Roth contributions are not deductible from current-year taxable income, but principal and investment earnings may be withdrawn tax-free if the withdrawal is considered qualified.3 The marginal dollar of pre-tax income can thus purchase $(1 − τ_r)(1 + r)$ of future consumption if a Roth account is used as the savings vehicle and the balance is accessed through a qualified withdrawal, where $τ_r$ is the household’s marginal ordinary income tax rate plus any marginal reduction in means-tested benefits due to the additional dollar of taxable income in the year of the contribution. Put another way, each dollar contributed to a Roth account buys $1 + r$ of future consumption. For non-qualified withdrawals, the withdrawn principal is not taxed, but the earnings are subject to ordinary income tax. If the account owner is younger than 59½, the withdrawn earnings are also assessed a 10% tax penalty under most circumstances. The appeal of Roth contributions relative to before-tax contributions increases with the probability of withdrawal before age 59½, since Roth principal is exempt from the 10% early withdrawal penalty but before-tax principal is not.

Some 401(k) plans allow participants to make after-tax contributions. Like Roth contributions, after-tax 401(k) contributions are not deductible from current taxable income, and principal can be withdrawn tax-free from after-tax accounts. Unlike Roth contributions, however, earnings on after-tax contributions are taxed at the ordinary income tax rate when withdrawn. If an after-tax 401(k) account is used, the marginal dollar of pre-tax income can buy $(1 − τ_r)(1 + (1 − τ_r)r)$ of future consumption; equivalently, each dollar contributed to an after-tax account buys $1 + (1 − τ_r)r$ of future consumption. An additional 10% tax penalty applies to earnings (but not principal) withdrawn by account owners younger than 59½. After-tax contributions are not common. In

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2 See also Whitehouse (1999).

3 A withdrawal is considered qualified if (i) the account has been held for at least five years and (ii) the account owner is either older than 59½, disabled, or deceased.
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