

TAX POLICY AND RETIREMENT SAVINGS *

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Abstract

Governments around the world spend hundreds of billions of dollars subsidizing retirement savings through various tax preferences. This paper reviews the economics literature on retirement savings, with a particular focus on recent advances using behavioral economics and high-quality administrative data. This literature suggests that existing tax subsidies may not be an effective policy to increase retirement savings for three reasons. First, tax subsidies appear to primarily affect the allocation of savings across accounts, rather than the total amount of savings. Second, many savers are inattentive to tax policy when choosing the level of savings. Third, those savers most sensitive to tax subsidies are not those with the greatest savings inadequacy. These same forces suggest that alternative policies focusing on behavioral “nudges,” such as automatic enrollment and access to payroll-deduction accounts, may be more effective. Those savers most sensitive to tax subsidies are not those with the greatest savings inadequacy. These same forces suggest that alternative policies focusing on behavioral “nudges,” such as automatic enrollment and access to payroll-deduction accounts, may be more effective.

Tax subsidies for retirement savings are a prominent feature of all modern tax systems. Although the details differ from country to country, the core principle is the same: capital returns to assets held in accounts specially designated for retirement savings pay reduced (or no) tax. Many countries grant the underlying income originally deposited in the account favorable tax treatment as well.

In the U.S., tax subsidies for retirement savings have existed since the very beginning of the permanent income tax system in 1913 (Georgetown University Law Center, 2010). As retirement savings have grown, these subsidies have become increasingly costly; Figure 1 shows this rapid growth over the past two decades and the projected growth going forward. Tax expenditures for retirement savings totaled \$146 billion in FY2014, which is nearly double the inflation-adjusted level in 1993; the Office of Management and Budget projects that this expense will grow by an incredible 7.6% annually over the next decade to a total of \$303 billion in 2024 (U.S. Government, 2015). Retirement subsidies from states increase this by another 20% (Ghilarducci, 2015). All of this is despite the fact that the per-dollar subsidy for retirement savings has been flat or even shrinking over the past 20 years (Burtless and Toder, 2010).

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Supporters argue for these retirement tax subsidies based on a perceived deficit of savings, at both the national and the household level. Saving rates in the U.S. have fallen from 12.9% to 4.8% over the past forty years, as shown in Figure 2, while at the same time the U.S. population has rapidly aged. The result is that an increasing number of households reach retirement without sufficient funds to support adequate consumption (Poterba, 2014). By one calculation, 52% of working households have sufficiently few assets that, on current trend, they will be forced into a sharp consumption drop at retirement (Munnell, Hou and Webb, 2014). Traditional sources of support in retirement are also shrinking. Looking forward, the Social Security Administration projects that Social Security replacement rates for middle income workers will be just 40%, down from roughly 50% in the 1980s. Defined benefit plans are also in sharp retreat; just 13% of workers participated in such plans in 2013, down from 32% in 1989. All of these changes place ever more emphasis on individual retirement savings, which are the focus of these large tax subsidies.

This paper reviews the economics literature on savings to assess the impact and efficiency of tax subsidies for retirement. Relative to previous reviews on this subject (e.g., Bernheim 2002, Attanasio and Wakefield 2010), I highlight two recent advances in the literature that have important implications for our understanding of retirement tax policy. First, there has been much recent progress in this literature due to the rapidly expanding availability of high-quality administrative data, especially from tax records, retirement plan administrators, and large fund managers. In these datasets, measurement error of many important variables is essentially zero, and coverage is often near 100%. This high data administrative quality stands in contrast to the increasing problem of non-response and measurement error in more traditional survey datasets; for instance, 34% of dollars reported for major transfer programs are imputed, and 20% of individuals in the most recent Current Population Survey declined to answer questions about income (Meyer, Mok and Sullivan, 2015). Large sample sizes in administrative data also permit more plausible identification strategies.

Second, the literature on retirement savings has grown increasingly sophisticated in the ways that it models non-traditional or “behavioral” effects that are outside the canonical optimizing model. These innovations both help us understand observed responses to traditional tax subsidies for savings and also motivates new types of policies. For instance, by manipulating choice architecture in retirement plans, policies such as default settings, auto-escalation, and default asset allocations have potentially powerful effects on behavior. Following Thaler and Sunstein (2008), I will refer to these policies collectively as “nudges,” that is policies that may affect savings but do not affect an individual’s budget set. Although tax policies have not traditionally focused on such nudges, there is a rising chorus (including the President’s FY2016 Budget) that advocates such reforms.

To organize this review, I begin with a simple model of an individual’s retirement savings decision and the government policies that might affect it. Using this framework, I demonstrate how the efficacy of tax subsidies for increasing retirement savings depends on three key parameters. First, the extent to which tax subsidies drive increases or decreases in total savings for optimizing consumers (alternatively known as “pass-through” or “crowd-out” in much of the savings literature). Because of countervailing effects that both increase and decrease individual savings, tax subsidies have a theoretically ambiguous effect on savings, and so this parameter must be estimated empirically. Second, the extent to which individuals pay attention to tax subsidies or interest rates at all when choosing retirement savings. There is increasing evidence that individuals are not responsive to many different aspects of tax policy for behavioral reasons, either because of inattention (Chetty, 2009) or a lack of information (Chetty and Saez, 2013; Chetty, Friedman and Saez, 2013). Third, the extent to which tax subsidies increase savings most for those individuals who have the greatest savings deficit, which measures the quality of targeting. I also show how the effectiveness of savings

nudges depends on three similar parameters, but in the opposite direction. Conditions under which tax subsidies are highly effective - for instance, when individuals are most attentive to government savings policy and increase savings in response to subsidies - are exactly the circumstances when mandates or nudges will be ineffective. The converse is also the case.

Next, I summarize and evaluate the empirical literature on these three key parameters. I present a wide range of studies and highlight differences in the quality of identification or in the exact parameter identified. Of particular importance in this empirical literature is the ability to distinguish between instances when individuals truly reduce consumption, and thus increase savings, and those when individuals simply reallocate funds from one account to another or reallocate savings from one year to the next. I also review the effect of tax subsidies on savings in a wide variety of contexts, including both very broad tax subsidies for retirement (such as IRAs) and also much more targeted savings policies (such as the Saver's Credit). Where possible, I draw from papers that study employer policies (such as contribution matches) that closely mimic government policies. Given the recent interest in more "behavioral" tax policies, I also review the literature on savings nudges (which relies almost exclusively on employer policies).

Although there is a diversity of estimates and opinions in the literature, the weight of the evidence suggests that tax subsidies are not effective policies for addressing retirement savings inadequacy. First, although tax subsidies generate moderate increases in savings within designated accounts, the best evidence suggests that these contributions primarily reflect savings that would have occurred (or borrowing that would not have occurred) absent the tax subsidies. Total savings do not increase. Second, the evidence suggests that the vast majority of savers are inattentive, for one reason or another, to tax subsidies for savings, and thus do not respond at all (even in the tax-favored account). Third, the literature suggests that individuals who undersave are less likely to be attentive to tax policy, which implies that tax subsidies do not target those individuals with the greatest savings deficits. Conversely, these parameter estimates from the literature suggest that mandates and savings nudges are effective at increasing savings, and especially for those households who need it the most. As a result, the literature suggests that the tax subsidy could roughly be cut in half without seriously affecting savings (although the literature has very little to say on the potential effects of more drastic changes that would entirely eliminate the tax expenditure).

Finally, in light of increasing talk of comprehensive tax reform in the U.S., the last section of this paper describes and analyzes key retirement tax policies and proposals in the U.S. in light of the lessons from the literature. Courtesy of the Tax Policy Center, I present distributional scores of key proposals to reform the tax treatment of retirement savings in the U.S., including a rate limitation on the deductibility of retirement savings contributions and a conversion of the tax deduction into a tax credit for retirement savings contributions. The literature suggests that the U.S. focuses too much on tax subsidies, as opposed to other policies, in order to increase savings. In addition, the literature highlights several ways in which current savings incentives may be unnecessarily complex in ways that limit effectiveness. Although there is a lack of direct evidence on key alternative proposals, the literature suggests that expanding savings "nudges" could be more effective at increasing savings for those who need it. In addition to government policy, employers play an important role in encouraging savings through the provision of payroll-deduction retirement plans with features such as auto-enrollment and auto-escalation, but there is little good evidence on the determinants of employer plan design.

The paper is organized as follows. Section I presents a stylized model to organize the analysis of the effects of tax policy on retirement savings, as well as to highlight the empirical parameters that are most important for gauging the success of tax policies. Section II reviews the rich empirical literature studying retirement savings and tax policy. Section III analyzes key retirement-related tax policies in light of the empirical evidence from the literature. Section IV concludes.

I Conceptual Framework

In this section, I write down a simple two-type model of savings behavior. The goal of this model is not to capture all aspects of the savings decision but rather to highlight the importance of key parameters that bear on the tax treatment of savings. Importantly, I focus on the determinants of individual savings choice, holding constant savers' access to savings plans. In this simple framework there are three such key parameters: (1) the fraction α of savers who are potentially responsive to tax policy, who we will label as "active"; (2) the elasticity of total savings with respect to the tax subsidy ε , which controls the extent to which individuals increase savings in response to tax subsidies; and (3) the correlation ρ between an individual's propensity to undersave for retirement β_i and the consumption gains in retirement that result from the tax subsidies.

I.A Setup

Individuals live for two periods. They earn a fixed amount W in period 1, which they can either consume or save in one of two risk-free accounts: a retirement account or a taxable savings account. Let r denote the net-of-tax interest rate that individuals earn in the taxable account. The government offers a subsidy ψ that increases the return to saving in the retirement account to $r + \psi$. To simplify notation, we abstract from income and capital gains taxes and let ψ represent the net subsidy to retirement accounts taking all taxes into account. We assume that the subsidy is financed by a tax on future generations, so that the financing has no direct effect on national or private savings. Therefore, the subsidy as a whole has no effect on national savings absent an increase in private savings (i.e., a decrease in consumption) in response to the tax incentive. I also assume that the return r is set exogenously to the model; in practice, any changes in retirement savings due to policy would have only small effects on the national capital stock, and so the returns to capital should not be affected. Finally, the individuals pay no tax in this model, and so here I abstract away from the traditional vs. Roth treatment of tax-preferred savings. I return to this distinction in section III.

Let S_i represent the amount that individual i saves in the non-retirement (taxable) savings account. Let P_i denote the amount that individual i contributes to the retirement account. Consumption in the two periods is given by

$$\begin{aligned} c_{i,1}(S_i, P_i) &= W - S_i - P_i \\ c_{i,2}(S_i, P_i) &= (1 + r) S_i + (1 + r + \psi) (P_i). \end{aligned} \tag{1}$$

In this simple setting, saving in the retirement account strictly dominates saving in taxable accounts, and hence all individuals would optimally set $S_i = 0$ (or even less than 0 if institutional constraints allow). In practice, retirement accounts are illiquid and cannot be accessed prior to retirement, leading many individuals to save outside retirement accounts despite their tax disadvantage. We model the value of liquidity as a concave benefit $g(S_i)$ of saving in the non-retirement account.*

Accounting for the value of liquidity, individuals have utility

$$u(c_{i,1}) + \beta_i \delta u(c_{i,2}) + g(S_i). \tag{2}$$

where $u(c)$ is a smooth, concave function, $\delta < 1$ denotes the individual's rational discount factor, and $\beta_i \leq 1$ denotes the extent to which an individual underweights the future (relative to the society's

*Gale and Scholz (1994) develop a three period model in which individuals face uncertainty in the second period, motivating them to keep some assets in a liquid buffer stock. This model can be loosely interpreted as a reduced-form of the Gale and Scholz model.

weight). An individual with $\beta_i = 1$ weights the future the same as society, while individuals with $\beta_i < 1$ place too little weight on the future and will, as a result, save too little. While I assume away any heterogeneity in δ , for the sake of parsimony, I allow β_i to vary across individuals to capture the fact that undersaving may be concentrated among certain subgroups of the population.

In this model, the “irrational” discount factor β_i is the sole driver of savings inadequacy. The most natural explanations for this discrepancy between individual and social discount factors are psychological factors such as myopia (Kaplow, 2015) or hyperbolic discounting (e.g., Laibson 1997, Carroll et al. 2009), although there are also others (Kaplow, 2011). In these cases, governments simply seek to help individuals maximize their own “experienced” utility, which differs from “decision” utility, and in the case of hyperbolic discounting this is precisely how individuals would want government to act from behind the veil of ignorance.

In practice, there are many other theories for why individuals may undersave that do not rely on individual optimization errors (Feldstein and Liebman, 2002). For instance, some arguments focus on the government’s inability to commit to social insurance schemes that could leave citizens destitute in retirement (Buchanan, 1975; Kotlikoff, 1987). Other arguments rely on externalities from savings on productivity through an increase in the capital stock (Feldstein, 1974). While the weight of the evidence certainly suggests that psychological factors are the primary driver of savings inadequacy, the results that follow do not depend on which of these micro-foundations prevails.

An alternative justification of tax subsidies for savings is that r is too low due to the presence of capital taxation. A capital tax may be part of an optimal tax system, for instance in the Mirrlees framework, if higher-ability individuals have a larger preference for savings (Gruber and Saez, 2002; Golosov et al., 2013), in which case r would not be too low. But instead if a capital tax is an exogenous part of the tax system then policy-makers may seek to increase certain types of savings by increasing returns.[†] It is well known in the literature that a constant linear tax on capital income generates a distortion on the intertemporal allocation of consumption that grows exponentially with time. Suppose that τ is the tax rate on capital income; then the post-tax return over one period is $(1 - \tau)r$, and after N periods grows to $(1 - \tau)^N r$. Note that the Euler equation governing the choice of pension savings is that $u'(c_{i,1}) = \beta_i (1 + r + \psi) u'(c_{i,2})$. Therefore functional form aside, β_i too low and r too low are isomorphic rationales for government policies that increase saving.[‡]

Active vs. Passive Savers. Another potentially important feature of savings policy is savers who are inattentive to or otherwise choose savings without regard to the particular savings policies in place. To model this in a simple way, suppose that there are two types of agents, active savers and passive savers, who differ in the way they choose S_i and P_i . In particular, let $P_i = \theta_i P_i^*(\psi) + (1 - \theta_i) \bar{P}_i$, where $\theta_i \in \{0, 1\}$ denotes whether savers are active or passive. Active savers ($\theta_i = 1$) choose S_i and P_i to maximize utility (2) given ψ as in the neoclassical model, so that $P_i = \theta_i P_i^*(\psi)$. Passive savers ($\theta_i = 0$) set retirement contributions at an exogenous level $P_i = \bar{P}_i$ that does not vary with ψ . Again, there are several models in the literature for why individuals’ retirement savings plans are insensitive to incentives, such as fixed costs of adjustment that generate inertia, hyperbolic discounting that leads to procrastination in updating plans (Carroll et al., 2009), or a lack of information. Once again, the results that follow do not depend upon which of these micro-

[†]For instance, political economy may demand a capital income tax due to the concentration of capital income at the top of the income distribution and the desire for redistribution. In such circumstances, it would be consistent (both politically and economically) for policy-makers to attempt to increase retirement savings, especially for middle-income families.

[‡]To see this, note that one could rewrite the tax subsidy for savings as a proportional increase in the gross return, so that the return on pension savings was $(1 + r)\psi$, in which case a proportional reduction in β is exactly isomorphic to a proportional decrease in $(1 + r)$.

foundations drives passive behavior, and I therefore do not specify a particular model of passive choice. Let $\alpha = E[\theta_i]$ denote the fraction of active savers.

Regardless of how passive savers make choices, they must satisfy the budget constraint in (1), which can be rewritten as

$$c_{i,1} + S_i = W - \bar{P}_i, \quad (3)$$

i.e. consumption plus taxable saving equals income net of pension contributions. I assume that passive savers choose S_i (or, equivalently, $c_{i,1}$) as a function of net income $W - \bar{P}_i$, so that changes in retirement savings policies affect behavior in period 1 only if they affect retirement contributions. As before, I do not posit a specific model of how passive savers choose S_i . Instead, we show how the impacts of government policy depend upon the way in which passive savers adjust $c_{i,1}$ and S_i when net income changes.

I.B Results

I.B.1 Tax Subsidies for Savings

Consider now the effect of the tax subsidies for savings ψ on behavior. By assumption, tax subsidies impact neither pension contributions \bar{P}_i nor total savings ($\bar{P}_i + S_i$) of passive savers. The interesting economics therefore lie in studying the behavior of the active savers.

The effects of an increase in the subsidy on pension savings for active savers occur in two ways, as is well known in the literature (Gale and Scholz, 1994; Bernheim, 2002). First, tax subsidies reduce the price of consumption in retirement $c_{i,2}$ relative to consumption while working, $c_{i,1}$, which also leads to an increase in pension savings. Second, the tax subsidy increases lifetime wealth, which in turn may increase consumption earlier in life and in fact reduce pension savings. To see the intuition behind this latter effect, consider an extreme case where ψ is very large, for instance 1 million. In this case, an individual would only need to save a few dollars in order to guarantee a rich and comfortable retirement; very soon the saver would hit diminishing marginal utility of consumption in retirement and decide to stop saving and instead to spend the money today. Therefore the effect of tax subsidies on pension savings is theoretically ambiguous. I denote the parameter measuring the combination of these two effects as $\varepsilon = d(P + S)/d\psi$ for active savers. This parameter is closely related to the elasticity of intertemporal substitution (EIS) in the broader consumption literature.

Combining across the two types of savers, the total impact of tax subsidies on savings, which I denote by Δ_{TAX} , can be written as:

$$\Delta_{TAX} = \alpha\varepsilon.$$

Intuitively, this net force combines two separate effects; first, the fraction of savers α who are active and thus respond at all to tax subsidies in the first place, and the extent to which active savers increase or decrease savings as a result of the tax subsidy ε . These two parameters α and ε will therefore be critical to estimate empirically in order to assess the impact of tax subsidies on savings. Note that we can also decompose the responsiveness parameter $\varepsilon = dP/d\psi * d(S + P)/dP$, where $d(S + P)/dP$ is a pass-through rate - that is, what fraction of an increase in pension savings driven by the tax subsidy is reflected in total savings.[§] While the direct effect of any particular policy $dP/d\psi$ may vary depending on the particular tax incentive, the pass-through rate is a relatively stable parameter that permits comparison across settings. Note further that, for pass-through equal to or less than one (which is the sensible case), the direct effect of tax subsidies on pension savings provides an upper bound on the true effect on total savings. Intuitively, this is because

[§]Pass-through $d(S + P)/dP$ is also mathematically equivalent to one minus “offset,” which is dS/dP .

tax subsidies may induce shifting from taxable savings into pension savings, which of course has no effect on total savings. Indeed, one can construct cases where $dP/d\psi > 0$ but $\varepsilon < 0$.

It is also important to consider the distributional effects of tax subsidies. Like many tax expenditures, the tax preference for retirement savings redistributes income from certain demographic groups to others. However, it is very difficult to assess the impact of this redistribution in isolation, since what really matters is the transfers from the whole tax system. Such an analysis is beyond the scope of this paper. What has received less attention, though, is the extent to which tax subsidies help those individuals who are not saving enough for retirement. For individuals with $\beta_i = 1$, savings is sufficient without government intervention, and government intervention to increase savings is not just unnecessary but also wasteful, since it may distort savings choices. In contrast, individuals for whom $\beta_i < 1$ save too little, and government policies that increase savings can yield first order gains in welfare.

The effect of tax subsidies on consumption in retirement can, to first order, be written as

$$\frac{dc_{i,2}}{d\psi} = (r + \psi) * \theta_i \varepsilon + P_i$$

There are two distinct effects, captured in the two terms in the equation above. First, tax subsidies can increase consumption in retirement by encouraging additional private savings, if $\theta_i \varepsilon > 0$. Note that this first force is only relevant for active savers who might potentially respond to the tax subsidies if $\varepsilon > 0$. Second, tax subsidies have the mechanical effect of paying out an additional return on existing pension savings. This second effect operates on both active and passive savers who have pension savings; however it is less helpful for those individuals with $\beta_i < 1$, since the exact problem was that such workers saved too little (and perhaps nothing at all, if $\beta_i = 0$ in the first place). Therefore, the final key parameter in assessing tax subsidies for retirement savings is $1 - \rho = 1 - Corr(\theta_i, \beta_i)$, which is the extent to which those individuals who undersave the most are in fact those who are most responsive to tax subsidies.

I.B.2 Savings Nudges

Alongside tax subsidies, governments frequently attempt to influence savings behavior through mandates or nudges, which are elements of choice architecture - for instance automatic enrollment or active decision policies - that change savings without changing the budget set. As I will show, a similar set of parameters as identified above for tax subsidies will determine the efficacy of nudges in increasing savings.

To incorporate nudges into the model, I simply decompose pension savings into nudged savings N_i and then revisions to the nudge $P'_i = P_i - N_i$, so that total savings is $P'_i + N_i + S_i$. The budget constraint (equation 1 above) becomes:

$$\begin{aligned} c_{i,1}(S_i, P_i) &= W - S_i - P'_i - N_i \\ c_{i,2}(S_i, P_i) &= (1 + r) S_i + (1 + r + \psi) (P'_i + N_i). \end{aligned} \tag{4}$$

As above, I assume that active savers choose their saving and consumption in the standard way, while passive savers choose $P'_i = 0$ and so just go with the nudge. Note that individual revisions P'_i and savings nudges N_i are perfect substitutes in this model. One can also model mandates in a similar way, except that total savings equals $P'_i + M_i + S_i$, where M_i is mandated savings and P'_i is pension savings in addition to the mandate. For mandates, I assume that passive individuals choose other pension savings \bar{P}_i without reference to government policy, and therefore without regard to the mandate.

Consider now how savings nudges or mandates affect behavior. For active individuals, who rationally set P_i without regard to the nudge, the value of the nudge has no effect on either pension savings or total savings. (In the case of a mandated savings, this also applies for individuals who would choose to save more than the mandate.) Therefore (in contrast with tax subsidies) it is active savers who are essentially unaffected by nudges or mandates. Passive savers, on the other hand, do not change voluntary pension savings beyond the nudge (or ignore the mandate). Therefore, passive savers increase total pension savings dollar-for-dollar with the government mandates. Nudges are more complicated, since passive savers who would otherwise have saved $P_i > N_i$ would decrease savings, but in practice nudges seem to also increase savings almost unambiguously.

Importantly, though, it is ambiguous (as before) whether total savings will increase or not in response to nudges and mandates. Because total pension savings have increased, the budget constraint implies that either taxable savings or consumption (or both) must decrease to reflect the drop in disposable income. Therefore a key parameter in assessing the effect of mandates is $\varepsilon^N = d[P'_i + S_i + N_i]/dN_i$, the extent to which nudged increases in pension savings result in increased total savings for passive individuals.

Combining the responses for the two types of savers, the total impact of nudges on savings, which I denote by Δ_{NUDGE} , can be written as

$$\Delta_{NUDGE} = (1 - \alpha) \varepsilon^N.$$

Intuitively, this net force combines two separate effects that are essentially the opposite to those above for tax subsidies; first, the fraction of savers $1 - \alpha$ who are passive and thus respond at all to nudges or mandates in the first place, and the extent to which passive savers increase or decrease savings as a result of the nudge ε^N .

Mandates in particular also provide an opportunity to estimate α directly by studying $d(P' + M)/dM$, which is the effect of mandates on total pension contributions. To see this, note that the perfect substitutability between M_i and P'_i implies that $d(P' + M)/dM = 0$ for active savers, while the assumptions of the model imply that $d(P' + M)/dM = 1$ for passive savers. Therefore, in aggregate, $d(P' + M)/dM = \alpha * 0 + (1 - \alpha) * 1 = 1 - \alpha$. We can estimate α as one minus the pass-through rate of mandates to total savings.

The correlation $\rho = Corr(\theta_i, \beta_i)$ will also reveal the extent to which nudges and mandates produce favorable distributional effects. When active savers are those in most need of additional savings, so when ρ is negative, nudges will be ineffective; when passive savers face the largest savings deficits, so when ρ is large and positive, nudges effectively target individuals with inadequate savings. This demonstrates how the conditions under which saving mandates will be effective - that is when α is low, ε^N is large, and ρ is large - are essentially the opposite of those where tax subsidies will be effective.

II Empirical Evidence

The stylized framework in Section I shows that there are three key parameters that determine the efficacy of tax subsidies and mandates at increasing savings: (1) the effect of tax subsidies on total savings for active savers, as well as the same parameter for mandates on passive savers; (2) the fraction of active savers; and (3) the correlation between passivity and undersaving across individuals. I now provide a critical review of the literature to generate estimates of these crucial parameters. Table 1 provides a summary of some of the key papers in this literature which I discuss below.

II.A Elasticity of Savings to Interest Rate Subsidies

II.A.1 Evidence from Tax Subsidies

There is a large literature studying the relationship between tax subsidies and savings. The primary challenge in all of these papers is to credibly identify increases in savings caused by tax subsidies, as separate from differences in savings driven instead by a taste for saving, differences in wealth or disposable income, or differences in the need for current expenditure. The ideal design would exploit large changes in tax policy, which would be credibly exogenous to individual circumstances. Alternatively, researchers could exploit cross-sectional differences in eligibility for tax subsidies, provided that one can identify credibly exogenous variation in eligibility, which has proven quite difficult in practice.

Another challenge faced by this literature is limited data quality. Analysis of savings requires a comprehensive measure of both the stock of wealth and annual savings or dis-savings flows, including such variables as credit card debt, home equity or mortgage debt, bank balances, retirement account contributions, and other stock market holdings (e.g., Charles Schwab account). Unfortunately these data are not present in many survey datasets, at least in a complete way, or measured in a very noisy way. In addition, these variables are traditionally not all present together in administrative data, since the IRS (for instance) maintains no comprehensive records of wealth or debt. As a result, even in more recent years, many researchers have instead relied on much smaller and noisier survey datasets. This limits the scope of feasible identification strategies, since empirical strategies that focus too tightly on a narrowly defined treatment and control group lose power.

Much of the early literature focuses on Individual Retirement Accounts (IRAs), which were first permitted in the U.S. to individuals without pensions in 1974. These accounts remained quite small until Congress extended eligibility to all workers in 1981, before restricting access again for higher income households in the Tax Reform Act of 1986 (TRA 1986). It was therefore in just the narrow window 1982-1986 that IRA contributions boomed, even accounting for roughly 20% of all personal savings in 1986. Many papers in the early literature focused on whether this five-year explosion of IRA contributions represented new savings. Some papers focused on the changes in eligibility in 1982 and 1986 (e.g., Engen, Gale and Scholz 1994; Joines and Manegold 1995), while others looked at cross-sectional comparisons between the behavior of individuals with varying take-up of IRA accounts between 1982 and 1986 (e.g., Venti and Wise 1990; Feenberg and Skinner 1989; Gale and Scholz 1994; Attanasio and DeLeire 2002). Unfortunately limitations on data and econometric methods available at the time led to a series of results that, by modern standards, are not reliable (Bernheim, 2002).

Another branch of the early literature focused on 401(k) accounts, which gained in popularity very quickly following TRA 1986. 401(k) accounts are in many ways a more attractive policy to study. For instance, 401(k)s feature much higher contribution limits - in 2015 \$18,000 for individuals and \$53,000 for the combination of individual and employer contributions - that are hit by only a small fraction of individuals. In addition, unlike IRAs, which feature essentially universal eligibility (conditional on income), 401(k) accounts operate under ERISA through a worker's employer. Even today there remain vast differences in access within populations of essentially similar individuals, which might provide proper identification for research. Finally, 401(k)s often differ across employers - for instance in the employer matching provisions or in the choice architecture - and I return to consider these elements below.

The early literature on 401(k)s - most notably Poterba, Venti and Wise (1994) and Poterba, Venti and Wise (1995) - struggled with a number of critical data issues that made them rely on strong assumptions about the nature of selection into 401(k) eligibility. For instance, these

papers attempt to use policy changes in TRA 1986 as an instrument for eligibility, but they do so using the SIPP, which provides only repeated cross-sections of data, generating a number of econometric problems (Bernheim, 2002). In another analysis, these authors made the very strong assumption that 401(k) eligibility was exogenous, conditional on observables, and found essentially all of 401(k) contributions were new savings. More recently, Benjamin (2003) used a propensity score approach to control more non-parametrically for observables and found that roughly 50% of 401(k) contributions represented new savings. Although more reliable than previous estimates, this analysis still relies critically on the assumption that observable controls are sufficient to eliminate bias, as opposed to the more preferred approach of identifying credibly exogenous variation in eligibility.

Gelber et al. (2011) instead seek to identify credibly exogenous variation in 401(k) eligibility that does not rely on observable controls. They exploit the fact that some companies prevent new employees from contributing to 401(k)s until they have worked at the company for a minimum period, for instance one year. They find that eligibility significantly increases 401(k) contributions and find no offsetting reduction in other savings, but these latter estimates are quite imprecise and do not rule out significant shifting of assets. Setting aside the lack of precision with the estimates, Gelber's approach raised another concern of interpretation. The variation in 401(k) eligibility is temporary and expected, since workers know that they will gain eligibility soon. These estimates may therefore include significant shifting of 401(k) contributions from one period to another, leading to an overestimate of the effect of eligibility on savings and an underestimate of the extent to which 401(k) saving crowds out other asset accumulation. In contrast, the best identification for the policy-relevant effect of tax subsidies would be a permanent yet unexpected change.

Chetty et al. (2014b) analyze such a permanent unexpected change using administrative data from Denmark. Denmark has a similar retirement savings system to the U.S., with a social security system providing a consumption floor for all elderly, plus both employer- and employee-funded tax-preferred pensions that supplement social security for middle- and high-income households. Denmark also has similar national savings rates to the United States, more broadly suggesting that responses to savings policy in Denmark can bear on such policies in the U.S. (Chetty et al., 2014a). Unlike in the U.S., Denmark tax authorities receive third-party information reports on household wealth due to the one-time existence of a wealth tax (which had been phased out before their study period). They exploit a tax reform in 1999 that reduced the tax subsidy with lower deductibility of retirement savings contributions for individuals in the top tax bracket, but not lower down in the income distribution. Using a difference-in-difference approach, they demonstrate both a significant decrease in contributions to retirement accounts and also offsetting increases in other savings. On net, they estimate that only 1% of changes in retirement account contributions represent changes to total savings. Their estimates are also quite precise; they can rule out pass-through more than 28%.

The literature summarized above points to a relatively low pass-through of pension savings to total savings. This limits the effectiveness of tax subsidies that increase pension savings, but other work suggests that tax subsidies may have quite limited power to increase pension contributions in the first place. Freed from the need for data on total savings, papers in this literature have used large administrative datasets and correspondingly higher standards for identification. For instance, Dufflo et al. (2006) implement a randomized experiment at H&R Block, offering taxpayers randomly chosen match rates to contribute to a type of IRA. They find that a 25% match rate increases participation by roughly 5 percentage points, but increasing the match rate to 50% has no marginal effect. Engelhardt and Kumar (2007) study similarly high quality variation in company match rates within 401(k) plans, also estimating that a 25 percentage point increase in the match rate (e.g., 25% to 50%) increases participation in 401(k) by roughly 5 percentage points. Choi et al.

(2002, 2004) and Choi, Laibson and Madrian (2006) also study variation in match rates within and across a select number of companies and reach similar conclusions on the effectiveness of matching contributions for increasing participation and contribution rates.

In sum, then, the literature provides a wide variety of estimates that differ greatly in method. On balance, however, the most reliable estimates suggest that pass-through from pension savings to total savings is very low. Furthermore, the initial effect on pension savings may not be large either. Combining these two effects, I conclude that ε is likely to be quite small.

II.B Effects of Nudges and Mandates on Savings

Despite the very large literature studying the effect of tax subsidies on total savings, very few papers examine this question for mandates or nudges. Most of the literature focuses solely on the effects of such policies on retirement savings contributions, finding very large effects of these policies on the retirement savings account that include the nudge. For instance, Madrian and Shea (2001) find that default enrollments can increase the participation rate within a 401(k) plan by 50 percentage points relative to employers with slightly more tenure who did not face a default. Choi et al. (2004) also showed large effects, but find that the effect shrinks over time. At one level, it was a striking finding that such policies had any effect at all, as they signal significant deviations from the rational model. As discussed in section I, such findings are necessary but not sufficient for these policies to increase savings.

Card and Ransom (2011) took a first step towards total savings by studying substitution patterns across different retirement savings accounts. They show that academics moving from one university to another often experience very large changes in the employer-provided pensions, but that employee contributions do not come close to offsetting these difference. In particular, they find that differences in employer contributions have very little effect on individual retirement contributions. This suggests complete pass-through of mandated saving to total retirement savings, and is suggestive that pass-through might be similarly large for total savings. Chetty et al. (2014b) use a similar design to study pass-through to total savings. Using individuals who move between all different firms in Denmark, they show that approximately 80% of mandated savings from the employer ends up as an increase in total savings. This estimate is also quite precise, and the authors can rule out pass-through less than 72%.

Other papers study changes in mandates for savings through reforms to government pensions. For instance, a number of papers study the effects of changes to mandatory government pension schemes on private household savings in European countries (Attanasio and Rohwedder (2003a); Attanasio and Brugiavini (2003b)). These papers find that, as pension wealth decreases, households increase private savings, which would imply crowd-out of mandated savings. These results rely on assumptions about age-specific trends in savings, however, that by modern standards are rather strong. More recently, Chetty et al. (2014b) also study a Danish government mandate that workers above an income threshold deposit 1% of earnings in a special savings account. Using a regression-discontinuity around this income threshold, they show that this 1% contribution was entirely new savings, although the estimates are quite imprecise (they cannot rule out pass-through of just 65%).

In sum, in contrast to the much larger literature on the effect of tax subsidies, this smaller literature paints a more consistent picture: the effect of mandates on total savings ε^N is large, with the pass-through of increases in mandated savings to total savings closer to 100% than 50%.

II.C Active vs. Passive Savers

II.C.1 Fraction of Active Savers

The second crucial parameter is the fraction of savers who are active vs. passive. As noted in section I, one way to estimate this number is by looking at the pass-through of mandated savings to total pension savings. The pass-through cited above from Card and Ransom (2011) suggests that $\alpha = 1 - 67\% = 33\%$. Chetty et al. (2014b) estimate the pass-through of mandated employer savings to total pension savings at 95%, so that $\alpha = 1 - 95\% = 5\%$.

One criticism of these estimates is that savers may be differentially passive with respect to tax subsidies and nudges. Chetty et al. (2014b) therefore develop an alternative estimator for α using behavior from changes in tax subsidies alone. The key to this approach is to note that all active savers with positive pension savings must strictly prefer to change their contributions following an increase in the tax subsidy. To see this, note that such savers will allocate their savings between taxable and pension accounts by balancing the higher returns from the tax subsidy against the value of liquidity from taxable savings. An increase in the tax subsidies further increases the returns to savings in the pension account, while (before reallocation) the value of taxable savings remains the same. Therefore pension contributions must increase, at least due to this reallocation effect (if not also because of an increase in total savings).[¶] The fraction of savers who do not respond at all to a change in the tax subsidy is therefore an alternative estimate of the fraction of passive savers. Chetty et al. (2014b) implement this estimator when studying the reduction in deductibility of pension contributions in Denmark. Among current savers (that is, excluding those not making any contributions), they find only 19% adjust their savings rates at all, while the remaining 81% do nothing. This provides an estimate of $\alpha = 19\%$ that is specific to tax subsidies. The similarity to the mandate-based measure of α also suggests that this may be a relatively stable parameter across settings that is quite small.

II.C.2 Correlation Between Responsiveness and Undersaving

A number of papers also study the correlation between responsiveness to government policies and undersaving. Undersaving is difficult to measure directly, and so most of this literature uses demographic characteristics such as education and income to proxy for undersaving (where poorer and less educated individuals have larger undersaving problems). In one recent paper, Beshears et al. (2015a) study heterogeneity in the effects of default settings. This effort is more difficult than it might seem because different types of households may prefer different contribution rates, even in the absence of default settings. But adjusting for this potential confound, the authors find that low-income households are significantly more likely to be swayed by the default. In this setting it is not clear that lower-income households have larger savings inadequacy, so these results are intriguing but difficult to interpret. Chetty et al. (2014b) also investigate heterogeneity in the fraction of active savers. They find that wealthier and more educated individuals (but not higher income individuals, conditional on wealth) were significantly more likely to be active savers. This evidence collectively suggests that $\rho > 0$, that is the individuals who suffer the largest savings deficit also are least likely to be active.

A different literature has explored heterogeneity in the responsiveness of total savings to tax subsidies. Using repeated cross-sections from the SIPP, Engen and Gale (2000) estimate that 401(k) contributions are more likely to represent new savings for lower income households but a reallocation of savings for higher income households. Chernozhukov and Hansen (2004) use a

[¶]It is theoretically possible that individuals do not respond at all if income effects exactly cancel out price effects, but this is a knife-edge case that is rejected unambiguously by the data.

Quantile Treatment Estimator (QTE) to study heterogeneity in the 1991 SIPP. These authors find that the pension savings increases from 401(k) eligibility generated new wealth primarily for poor households, while mainly driving substitution from other sources of wealth for richer households. Although the underlying identification in these studies is somewhat weaker due to the lack of plausibly exogenous variation in tax subsidies (as discussed in section II), the results suggest a correlation between ε , the effect of tax subsidies on total savings, and β . Although the model above does not explicitly discuss such a correlation, it would increase the efficiency of tax subsidies all else equal since it would target the savings effects better (similar to a negative correlation $\rho < 0$ between passivity and savings inadequacy).

III Analysis of Tax Policies on Retirement

III.A General Tax Preferences for Retirement Savings

The most prominent tax policy to promote retirement savings is the series of tax preferences that apply to various retirement savings accounts, including IRAs, 401(k)s, and other retirement accounts. Contributions to such accounts are not only fully tax deductible but are also “above the line” deductions, in the sense that they directly reduce adjusted gross income and so are not subject to various limitations on deductions present in the code. Although defined benefit accruals do not directly appear in the individual tax statement, these same tax preferences effectively apply to those retirement savings as well (setting aside some details of corporate accounting issues). In 2014, JCT estimated these tax preferences to cost \$146 billion per year (about 0.85% of GDP), and they are projected to grow over the coming decade to more than 1% of GDP. Figure 3 shows that the retirement tax expenditure is also highly concentrated in the top tail of the income distribution; CBO (2013) has estimated that two-thirds of the money spent goes to the top 20% of the income distribution, and more than one-third of the benefit to the top 5%. This distribution is the result not only of higher levels of savings at higher incomes, but also of the fact that a tax deduction provides a larger value per dollar saved to richer households, who pay higher marginal tax rates on both earned and capital income.

The parameters estimated in the empirical literature on retirement suggest that this large subsidy may not be effective, since each of the three parameters that measure this effect are quite small. First, the literature suggests that the effect of tax subsidies on total savings ε is not large. This is both because of a limited initial effect of tax subsidies on pension contributions, but more importantly because any increases in pension contributions do not translate into large effects on total savings. Second, the literature suggests that most savers, perhaps 80-85%, are passive, so that $\alpha = 0.2$. Because tax subsidies rely on active savers to respond by increasing savings, a low value of α implies that relatively few individuals base savings decisions on tax subsidies to begin with. Third, the literature suggests that the correlation between savings deficits and inattention to tax subsidies ρ is positive. This implies that the particular households that are most attentive to tax subsidies are not those most in need of government support in increasing savings. There is also weaker evidence in the literature that the pass-through of pension contributions to total savings is higher for poor households, which is a point in favor of the targeting efficiency of tax subsidies. Importantly, these effects have primarily been estimated in a range around the current scope of the tax incentives; while this evidence suggests that cutting the tax incentive roughly in half would do little to reduce savings, we have essentially no evidence on the effects of completely eliminating the subsidy.

Outside of the framework discussed above, there are also other arguments in favor of the tax subsidy. For instance, a number of authors have argued that the illiquidity of retirement accounts

is critical, lest households withdraw much of the money before retirement (Munnell, Webb et al., 2015). Theoretically, the tax subsidy might be necessary in order to compensate consumers ex ante for their use of artificially illiquid accounts. It is probably true that individuals do need some tax subsidy to make retirement accounts “a good deal,” but for savers with higher marginal tax rates (who receive most of the tax expenditure) this subsidy is far larger than necessary solely for this purpose.

Another important caveat for this analysis is that it studies the individual response of savers, holding fixed the institutions through which savers access retirement accounts. But it is possible that changing the tax subsidy could alter those institutions as well; without further policy changes, this could negatively impact saving for a number of reasons.. First, retirement accounts accessible as workplace pensions (such as 401(k)s, 403(b)s, and 401(a)s) have considerably higher contribution limits than IRAs that can be accessed directly by consumers. Workplace pensions allow workers to benefit from the convenience of payroll-deduction accounts, which evidence suggests increase pension savings; in contrast, most IRAs do not offer such convenience. Second, non-discrimination rules for workplace pensions then give employers an incentive to encourage participation among employees, since the managers themselves would otherwise be barred from contributions. Certainly increasing participation in workplace pensions is a laudable goal, as only 51% of private-sector workers aged 21 to 64 had such access in 2013(Copeland, 2014).

While the important of access to payroll-deduction accounts is clear, the evidence is less clear that such employer responses are a serious problem for potential reforms to the tax expenditure for retirement savings. First, most employers provide workplace pensions in order to compete for workers, suggesting it is mostly employee demand that drives provision; in any case, firms bear very little cost for providing such access to their employees, so that an economy-wide tax subsidy for retirement savings is grossly out of proportion to the type of targeted tax credits that would accomplish the same thing. Taking a step back, however, the inefficiency of workers relying on firms for access to retirement savings accounts has prompted several proposals to directly mandate such provisions or to decouple retirement savings from firms, both of which I discuss below. More evidence on the determinants of the behavior of employers in this area, such as Bubb and Warren (2016), would be valuable to understand these concerns more thoroughly.

III.A.1 Alternative Policy Options

Motivated by the seeming inefficiency of tax expenditure on retirement savings - or perhaps by the need to cut spending in the budget for other purposes - a number of proposals have emerged to reform this large tax preference. Most prominently, President Obama proposed a 28% rate limitation for all deductions as part of the American Jobs Act of 2011, a proposal repeated in each Budget since. The literature summarized above suggests that this reform would have little effect on the savings of wealthy individuals. There is no publicly available score of the cost and distributional effects of such a change for just retirement savings, but the Tax Policy Center has recently produced such estimates for somewhat more stringent rate limitations of 15%, 20%, and 25%. A 25% (15%) limit would generate between \$12.8 (\$46.8) billion of additional revenue in the first full year in effect, with 99.5% (86.2%) of revenue coming from the top quintile of the income distribution.

A similar style of reform would reduce allowable contribution to retirement savings accounts, either by reducing annual contribution limits directly or by setting an asset cap beyond which individuals cannot make further contributions to tax-preferred accounts. Since FY2014, the President’s Budget has included such lifetime limits on savings. Conceptually, a lifetime cap is both better targeted (by focusing on the stock rather than the flow) and also more flexible (by allowing

individuals to reallocate contributions across years in a more flexible way), but the implementation details of a lifetime cap are considerably more complicated.

A more far-reaching alternative would be to convert the tax deduction into a tax credit, so that the tax subsidy per dollar of retirement savings would be fully equalized across the income distribution. New estimates from the Urban-Brookings Tax Policy Center, generously provided at the request of the author, show that such policies would generate moderate gains especially for middle-income households.[¶] For instance, replacing the deduction with a 25% non-refundable tax credit would generate \$13.2 billion of annual tax cuts for households outside the top quintile, almost exactly offsetting the \$12.7 billion of additional revenue from households in the top quintile (for whom the policy is exactly the same as the 25% rate-limitation discussed above). A refundable version of the same tax credit would generate an additional \$7.2 billion of annual tax cuts for middle-income households. In contrast, similar policies that offer 15% tax credit (either refundable or non-refundable) generate essentially the same net revenue as the 15% rate limitation discussed above. This is because few households below the 15% tax bracket (who would potentially benefit from the credit) save in retirement accounts.

III.A.2 Post-Tax vs. Pre-Tax Contributions

Among the many different flavors of retirement savings accounts, perhaps the most important distinction is between those for which contributions are made with pre-tax vs. post-tax dollars. For Roth IRAs, individuals receive no tax deduction for contributions but then pay no tax on earnings. For 401(k)s, traditional IRAs, and most other retirement accounts, individuals instead pay no tax on contributions up front, but pay full income tax on the gross value of withdrawals. Under certain circumstances - specifically, when income tax rates are constant and when individuals allocate a fixed amount of pre-tax dollars for saving - it is economically irrelevant whether taxes are paid upfront or upon withdrawal.

In practice, however, there are a number of important differences between the two types of accounts, most obviously when individuals expect a different marginal tax rate in retirement. One source of such a difference is the progressive nature of the U.S. tax system. Typically individuals plan to have about 30% less income in retirement than in their final working years; even adjusting for a rising real wage throughout the life-cycle, this should imply lower tax rates in retirement than during most working years (and especially the later working years in which retirement contributions are largest) and so a preference for pre-tax contributions. On the other hand, households may also expect an increase in tax rates in the future, either due to political forces or the projection of large future deficits, in which case they would prefer post-tax contributions.

Another set of differences relates to the potential for tax gaming. For instance, if an individual can redirect labor earnings into dividends paid on an asset held in a Roth IRA, then that income becomes tax-free. Similarly, any asset that is undervalued at the time of purchase will yield excess returns that are untaxed. Another way of expressing this difference is that, while neither account taxes the normal return to investment, pre-tax accounts tax the excess return but post-tax accounts do not. In practice, however, these forces likely affect only a small fraction of wealthy taxpayers; the vast majority of excess returns earned in retirement savings accounts likely reflects just the equity premium (in which the government could easily co-invest if it chose).

[¶]See Urban-Brookings TPC Tables T15-0156 through T15-0168. Precisely, the policy would limit the rate for deductions to 25% while giving non-refundable or refundable tax credits at a rate equal to the difference between 25% and a household's marginal statutory tax rate, to those households below the 25% bracket. A policy which attempted to completely replace the deduction with a tax credit would generate substantially more complex effects due to the interaction with the Alternative Minimum Tax (AMT) and various phase-ins and phase-outs.

Post-tax vs. pre-tax contributions also differ importantly in the frame of the contribution. Savers choose the number of dollars (or the fraction of income) to contribute to a retirement account, but a dollar contributed to a post-tax account is worth more in retirement consumption than a dollar contributed to a pre-tax account (since one has yet to pay tax). In a recent paper, Beshears et al. (2015b) demonstrate the intriguing possibility that confusion about this issue leads savers to contribute more, on an equivalent post-tax basis, to post-tax accounts than pre-tax accounts.** Their estimates suggest that savers essentially ignore the pre- vs. post-tax distinction, so that savings increase by roughly the marginal tax rate. If extrapolated nationally, post-tax accounts would increase savings by an average of 26% (the average marginal tax rate). Unfortunately, the progressive tax schedule would generate the largest increase in savings for the wealthiest taxpayers, so this policy would not be well targeted.

III.A.3 Revenue Timing and Tax Policy for Retirement

A final important difference between pre- and post-tax contributions is the timing of tax revenue. Holding all other economic forces constant, retirement savings accounts that take pre-tax contributions delay the receipt of taxes on that income typically until the owner retires, if not long after. Conversely, a shift from pre- to post-tax accounts brings forward substantial tax revenue, often by many decades. These timing shifts of course do not actually change the net present value of revenue collected. But under current budgetary scoring conventions, which look at the effects of policies only for the first ten years, such revenue retiming appears the same as true revenue, making such timing shifts politically attractive.

One notable recent proposal that relied on such revenue retiming was the comprehensive tax reform bill proposed by now-retired Rep. Dave Camp. This proposal included a partial shift from pre- to post-tax contributions, a provision that would generate \$143 billion in additional revenue over the first ten years of the reform.^{††} Essentially all of this money reflected a shift forward of revenue rather than any actual increase in revenue.

At least the revenue timing included in Camp's reform package would not do active harm to the retirement system; the same cannot be said for more pernicious tactics, such as "pension smoothing," which may do real harm. This provision allows employers to use artificially high interest rates when calculating future pension liabilities, thereby reducing the current contributions to maintain adequate funding levels. Because firms contribute less to pension plans, they pay more in current profit taxes (as well as potentially higher dividend and capital gains taxes from the distribution of those profits), raising revenue that has, in recent years, been directed to fund transportation spending (in 2012 and 2014). Of course this revenue too is simply the result of budget rules that do not capture the reduction in future revenue; what is worse, this maneuver contributes to the underfunding of pensions, potentially generating additional liabilities for the federal government not included in the official budget scores.

In all of these cases, there may be legitimate policy reasons to enact policies that shift the timing of revenue across years. However it is unfortunate that current budgetary rules do not adjust. At best, Congress may misestimate the budgetary consequences of the underlying reforms; at worst, politicians may take advantage of these budgetary gimmicks in a way that generates real harm.

**This argument is opposite to that suggested by Feenberg and Skinner (1989), who argued that the immediacy of the tax deduction under a pre-tax contribution system would increase savings relative to a Roth system.

^{††}See Joint Committee on Taxation, JCX-14-20.

III.B Targeted Tax Subsidies for Retirement Savings

In addition to the general tax subsidy for retirement savings, the tax code features several more powerful targeted tax incentives for savings. The most notable such policy is the Saver's Credit, which provides tax credits for up to \$2,000 in contributions to retirement accounts for single/married households with adjusted gross income below \$30,000/\$60,000 in 2014. Contributions earn a 50% tax rate - which is economically equivalent to a 100% match - for the poorest households, and the tax credit rate shrinks to 20% and then 10% as households have more income. Take-up of the Saver's Credit is quite low; although it is difficult to measure broad eligibility, Duflo et al. (2006) report that just 15% of eligible households made a contribution even at the highest tax credit rate. The tax expenditure for the Saver's Credit was \$1.2 billion in 2014.

Many of the general issues with retirement tax subsidies apply as well to the Saver's Credit, which might thus be expected to have a relatively small effect on net savings. In addition, a number of papers suggest that the particular form of the Saver's Credit reduces response, perhaps because it is too complicated. Duflo et al. (2006) compare the effect of the Saver's Credit to their randomized match rates and find that households were four times more responsive to subsidies framed as match rates, as compared with economically equivalent tax credits. This may be because taxpayers do not understand or do not know about the Saver's Credit, which has been shown to be an important determinant of tax credit take-up by low-income households in the context of the EITC (Chetty and Saez, 2013). Saez (2008) also demonstrates that savers are more responsive to matches that are deposited in the retirement account, as opposed to the same incentive given as cash. The importance of the design of tax credits is not surprising, given recent results on the crucial role that choice architecture plays in 401(k) participation and contribution rates. In fact, many of these lessons might be applied to the general tax preference for retirement savings.

Another problem with the Saver's Credit, as currently constituted, is the non-refundability of the credit. This provision effectively restricts eligibility to households with positive tax liability, which may make as many as 25% of otherwise eligible households effectively unable to benefit from the credit (Duflo et al., 2007).^{‡‡} This problem is especially acute for poorer households with children, since the Child Tax Credit (CTC) often eliminates residual tax liability. President Obama's 2011 Budget proposed to make the Saver's Credit fully refundable. This proposal, which also changed the credit structure to a 50% flat credit for the first \$500 of contributions per individual for single/married households with AGI below \$32,500/\$65,000, would have cost \$29.8 billion over ten years. While refundability of the Saver's Credit would certainly expand the potentially eligible population, it is not clear that such a policy would be substantially more successful than the current credit given the general problems with tax subsidies discussed above.

Research on other forms of targeted savings subsidies is less well developed. One notable example is the literature on Individual Development Accounts (IDAs), which are savings accounts, paired with financial education and counseling, that offer matching funds as an incentive if withdrawals are used for particular purposes (e.g., home-ownership, business formation). While these accounts were not dedicated to retirement savings, their similarity might lead to some impact on total savings. Grinstein-Weiss et al. (2015) studies the long-term effects on savings of randomized access to an IDA in Tulsa, Oklahoma. They find that, six years after the experiment ended, the IDA participants were no more likely to hold a retirement account or have sufficient balances to support stable consumption in retirement.

^{‡‡}In practice, the Saver's Credit is "stacked" before several refundable tax credits such as the Earned Income Tax Credit (EITC), so that households might still benefit from the Saver's Credit while owing no federal income tax. Technically, households must have a positive "total tax" balance in order to benefit from the Saver's Credit.

III.C Tax Policies that Support “Nudges”

The literature is unambiguous in its support for nudges as powerful tools for increasing retirement savings. It is perhaps not surprising, then, that various recent proposals attempt to harness tax policy to support the use of nudges. For instance, Iwry and John (2009) proposed Auto-IRA accounts, into which firms that do not offer retirement savings plans would be required to default workers. This proposal was subsequently taken up by the President’s FY2010 Budget (and included in all subsequent Budgets). This proposal would help address the fact that just 51% of private sector workers aged 21-64 have access to a workplace retirement account. Research has also shown that payroll-deduction - which is only available through one’s employer - increases savings, so it is critically important to get firms involved. The primary criticism of the auto-IRA proposal is that it includes a mandate that firms provide access for workers.

Although the auto-IRA proposal has faced opposition in Congress, a number of states are moving forward on similar initiatives. Illinois looks on track to be the first state to implement such a proposal. Specifically, Illinois will require employers with 25 or more employees and no other plan to set up auto-IRAs starting in 2017. The default rate will be 3% of salary, and the funds will be invested by default in life-cycle investment funds. A number of other states, including California, Massachusetts, Oregon, and Washington, have passed bills to implement similar systems and are working on implementation. In some cases the accounts would be standard IRAs; in others the accounts would be managed within existing pension infrastructures. For instance, California’s system provides for the accounts to be managed within the California Public Employees Retirement System (CalPERS). Five more states have created commissions to study the feasibility of such schemes, with many other states actively considering the issue.

One of the largest holdups has been the potential that such plans might generate fiduciary duty or other responsibilities for either employers or the state government under the Employee Retirement Income Security Act (ERISA); in fact most state legislation explicitly authorizes the creation of a system only if the accounts receive some form of exemption from ERISA. Most recently, in November 2015, the Department of Labor published a notice of proposed rule-making (NPRM) in order to provide a safe-harbor from for state-sponsored auto-IRAs, clearing the path for the states to proceed. The roll-out of these systems should provide fertile ground for the study of nudges in a public policy setting.

An alternative approach to mandated provision by employers would be to incentivize firms to provide access. New proposals in the President’s FY2016 Budget would provide small tax credits for small firms that choose to start a retirement savings plans, and additional credits for firms that auto-enroll workers in these plans. Friedman (2015) proposes a much larger permanent scheme of such incentives, funded by a rate limitation for the deductibility of retirement contributions.

IV Conclusion

The literature on tax policy and retirement has benefited greatly from recent research. Particularly by incorporating behavioral effects into models of tax response, and by utilizing rich new administrative datasets, we now understand in far greater detail how tax policy can, and cannot, influence savings. Applying consensus views within the literature suggests that tax subsidies for retirement savings, especially in their current form, are ineffective in addressing undersaving. In contrast, nudges such as default savings rates appear far more effective.

The challenge for tax policy is to find new more effective policies based on these results. Many authors have proposed alternative policies involving savings nudges, based on the successes in private firms, but there has yet to be a large-scale public policy trial of such an approach. Others

have proposed financial education as a more direct attack on savings inadequacy. Yet other authors have suggested that a combination of savings subsidies, nudges, and education is the best approach. There will be great value in learning which of these proposed approaches works best as public policy.

This review also highlights several areas in which further research is crucial. First, the literature is clear on the importance of choice architecture for retirement savings, but relatively few papers have studied similar approaches to make tax subsidies more effective. It is possible that alternative frames might increase their efficiency. More generally, the literature would benefit greatly from more work on heterogeneity in the effects of tax incentives, though of course this is a very challenging task given the difficulty in properly identifying their basic effect. Second, more work is needed to understand the effects of nudges on total savings. While several papers have studied conceptually similar mandates, the literature lacks direct estimates for policies like defaults. Third, the literature needs more work on why some firms offer or do not offer retirement savings plans as in Bubb and Warren (2016) and how employers may respond in their plan choice to changes in government policy.

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Figure 1. Tax Expenditures on Pension Contributions and Earnings in the US, 1993-2024

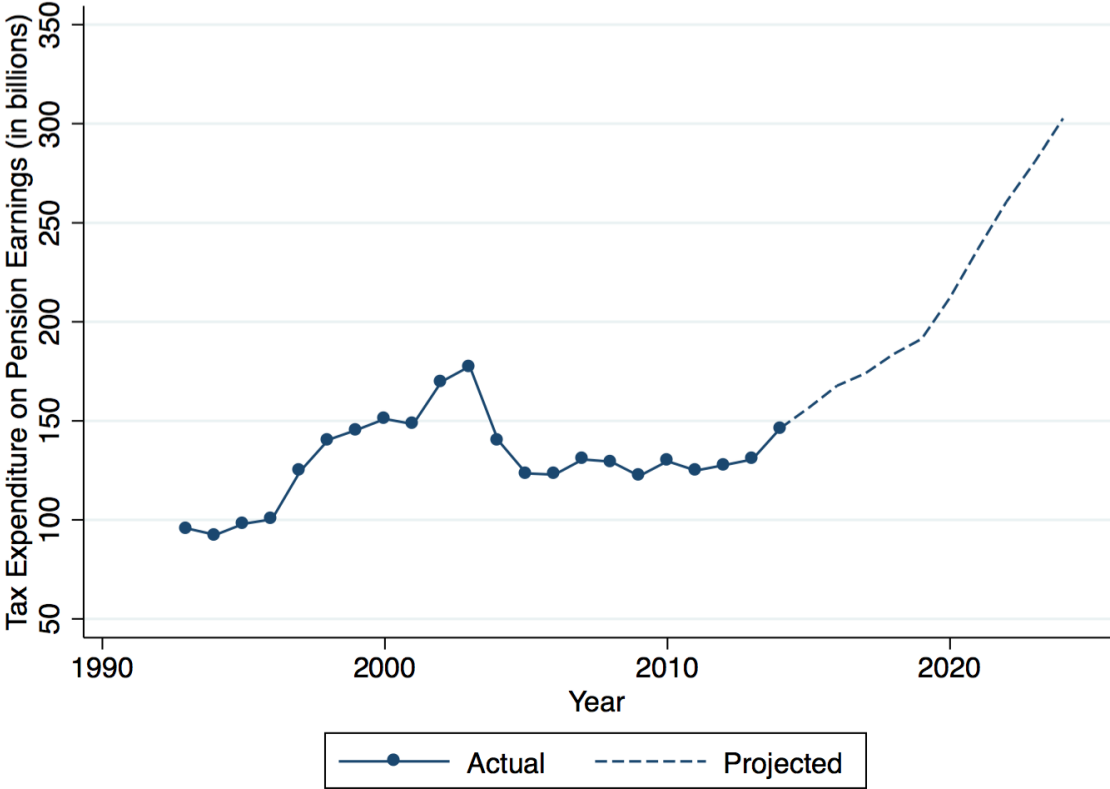


Figure 2. Savings Rate in the US, 1970-2014

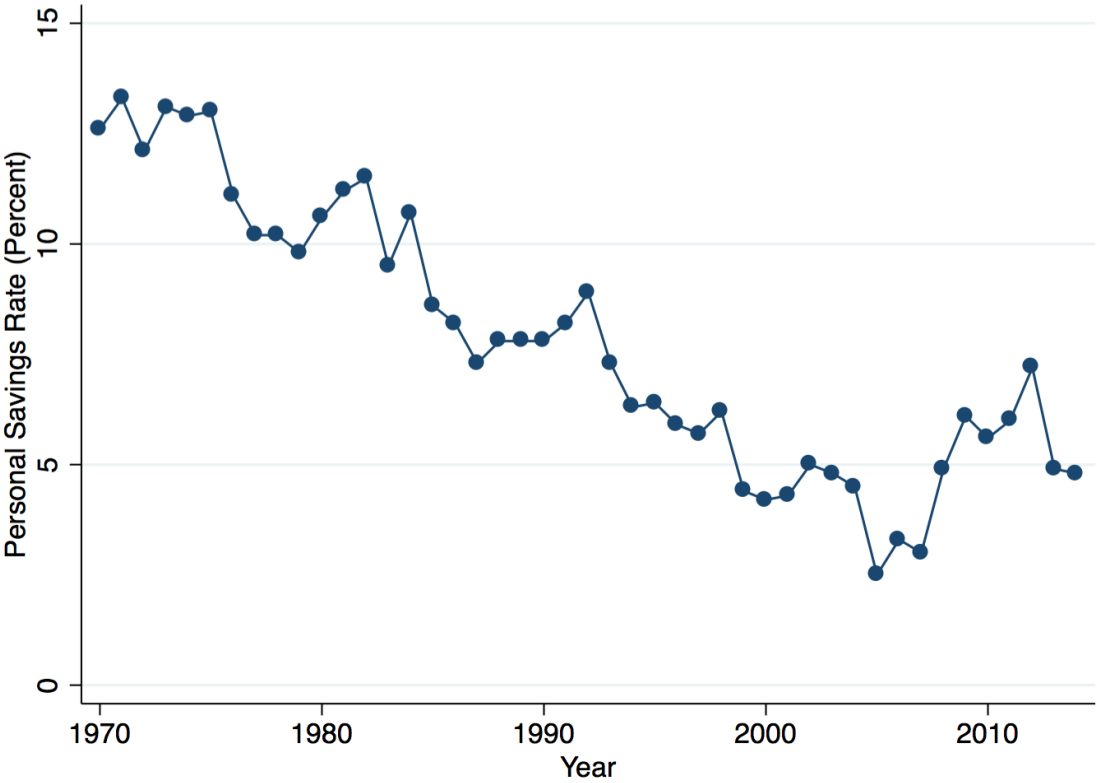
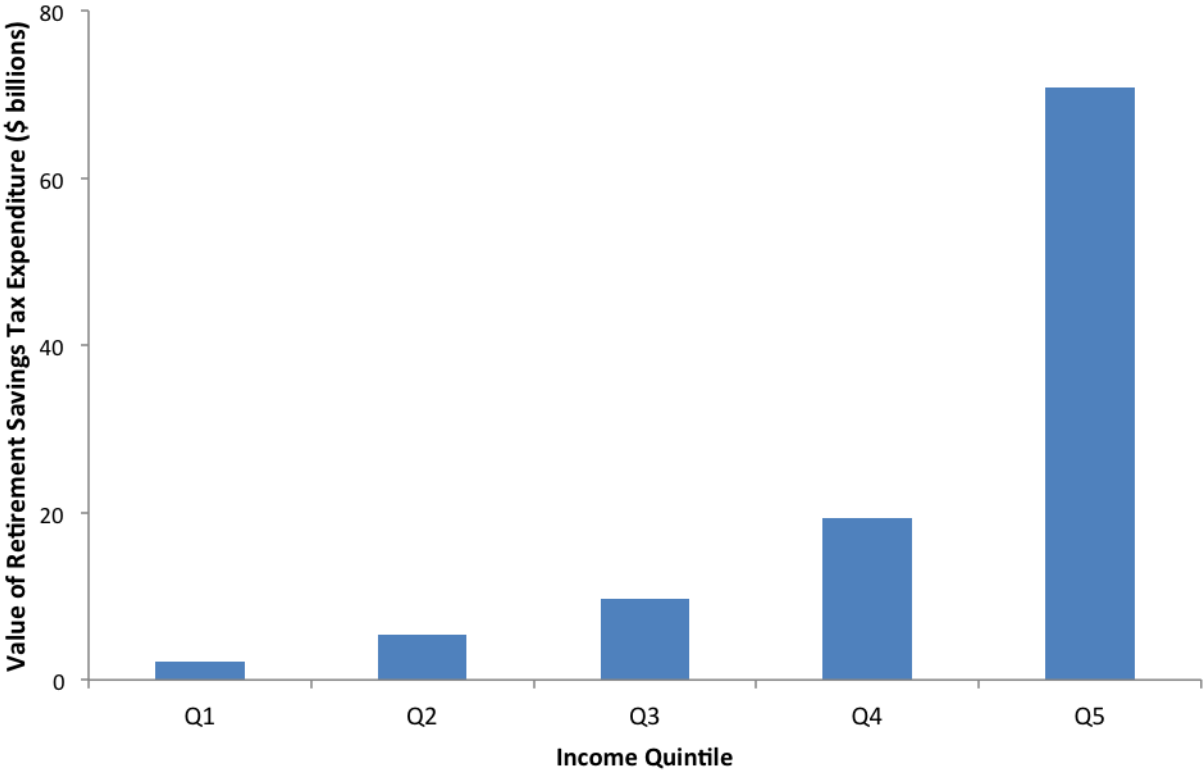


Figure 3. Distribution of Tax Expenditure for Retirement Savings Across Income Quintiles



Study	Main Question/ Study's Goal	Data + Design	Result
<i>Papers on the Effect of Tax Subsidies</i>			
Engen, Gale, and Scholz 1994	Studies the effects of saving incentives on private and national saving using empirical and simulation analyses.	Data on 401(k) participation from the SIPP, and data on IRA participants come from the IRS-Michigan Tax Panel. Between 1986-1991, 401(k) participants had expanded saving incentives and IRA participants had reduced savings opportunities. The authors compare wealth measures between 401(k) participants and IRA participants who are not eligible for a 401(k), to estimate the effect of 401(k) plans on private savings.	401(k) plans have not stimulated private saving or wealth. IRAs, 401(k) plans, and other retirement saving plans are, to some extent, substitutes in households' portfolios. A small proportion of IRA contributions represents new private saving; however, coupled with the revenue losses created, which is offset by tax revenue losses for no net national savings.
Venti and Wise 1990	Examines if IRAs contributed to new US savings.	Data come from the Consumer Expenditure Survey (CES) 1980-1985. Examine the correlation between IRA contributions and other savings, controlling for observables such as past saving and current income. The assumption required is that observables fully control for heterogeneity in taste for savings.	IRA and non-IRA savings are positively correlated, suggesting that IRA saving represents net new saving.
Feenberg and Skinner 1989	Studies differences in the behavior of individuals with varying take-up of IRA accounts over 1982-1986.	The authors use the IRS-University of Michigan taxpayer sample for income tax returns during 1980-1984 to estimate the correlations between IRA contributions and other types of saving, controlling for observables. The assumption required is that observables fully control for heterogeneity in taste for savings.	IRA and non-IRA savings are positively correlated, suggesting that IRA saving represents mostly new saving, with some reshuffling through increased borrowing. In addition, IRA participants did not take full advantage of its provisions, suggesting that a lack of public information about IRA limits led to underutilization of IRAs.
Gale and Scholz 1994	Examines the effects of Individual Retirement Accounts (IRAs) on private and national saving.	The authors construct a model of dynamic utility maximization that generates closed-form equations for IRA and other saving, and estimate this model using data come from the 1983-1986 Survey of Consumer Finances (SCF) and the University of Michigan/Ernst and Young Tax Research Data Base.	Of the increased IRA contributions that would have resulted from increases in contribution limits, roughly 2 percent would represent net additions to national saving, if the accompanying tax cut were entirely saved. If one half of the tax cut were consumed in the first year, this estimate falls to -14 percent.

<p>Poterba Venti, and Wise 1994</p>	<p>Studies the extent to which 401(k) contributions represent new saving.</p>	<p>Data are total assets of 401(k) participants over time from the SIPP (1984-1986). The authors: 1) examine whether differences in length of exposure to 401(k) plans affect savings, by comparing savings across demographically similar samples from different years (1984 vs. 1987), and 2) exploit exogeneity of 401(k) eligibility (determined by employers) by comparing saving among eligible and ineligible individuals, holding income constant.</p>	<p>401(k) plan contributions represent a net addition to saving, rather than transfers from other stores of wealth or displacement of other forms of saving. Individuals in the "treatment" group of both empirical strategies did not have lower IRA assets or other savings balances as a result of 401(k) exposure or eligibility.</p>
<p>Poterba, Venti, and Wise 1995</p>	<p>Describes patterns of participation in 401(k) plans, contrast these patterns with IRA participation, and evaluate the net impact of 401(k) contributions on personal saving.</p>	<p>Using data from SIPP (1984, 87, 91), the authors: 1) compare the financial assets of families who are eligible for 401(k) saving with the assets of those who are not eligible (for a given income), and 2) consider the change over time in the assets of similar groups of savers.</p>	<p>Authors find little evidence that 401(k) contributions substitute for other forms of personal saving, including IRA contributions. Results suggest that the promotion of savings plans may have an important effect on their use, and that an up-front tax deduction may be an important determinant of contribution behavior.</p>
<p>Benjamin 2003</p>	<p>Compares 401(k) eligible and ineligible households' wealth to estimate impact on private and national savings.</p>	<p>Data comes from 1991 SIPP. Improves on previous research (e.g. Engel 2000) by using propensity score subclasses instead of income-brackets to control for observed household characteristics; and by adjusting dep. variable (household wealth) to reduce measurement error caused by DB Contributions missing from the SIPP data.</p>	<p>On average, about 50% of 401(k) balances represent new private savings, and about 25% represent new national savings. Responses to eligibility vary considerably: households who normally save the most and who are most educated contribute funds they would have saved anyway.</p>
<p>Gelber 2011</p>	<p>Investigates the effect of 401(k) eligibility on saving.</p>	<p>Uses the 1996 SIPP. Exploits changes in eligibility due to the expiry of initial waiting periods that limit enrollment for new employees. Change in savings from Year 1 to 2 of households who are initially ineligible for 401(K) but later become eligible, is compared to the change in saving from Year 1 to Year 2 of those who are always eligible.</p>	<p>401(k) eligibility raises 401(k) contributions substantially. There is no evidence that eligibility impacts savings in other financial assets or significantly increases liabilities, but the confidence intervals are large enough that substantial changes in other assets or liabilities cannot be ruled out.</p>
<p>Chetty, Friedman, Leth-Petersen, Nielsen, and Olsen 2014</p>	<p>Studies the effect of a reduction in tax subsidies on pension savings and total savings.</p>	<p>Uses administrative tax data on the full Danish population, including third-party reported data on total savings and wealth. Uses a difference-in-difference approach to analyze the effects of a rate limitation on the deductibility of</p>	<p>The rate limitation causes a sharp drops in retirement savings, but total savings fall by only 1% as much. The confidence interval can rule out an effect larger than 28%. These responses are driven by 19% of</p>

		retirement savings that effected taxpayers in the top bracket but not below.	savers; the other 81% are non-responsive to the tax change.
Duflo, Gale, Liebman, Orszag, and Saez 2006	Analyzes the effect of matching incentives to taxpayers on participation and contributions to IRAs.	A large, randomized field experiment carried out on H&R Block clients, predominantly low- and middle-income neighborhoods in the St. Louis metro area. Taxpayers were randomly offered {50%, 20%, 0%} match rate for contributions to an IRA account.	Take-up rates were 3% for the control group, 8% for those getting a 20% match, and 14% for the 50% match group. Average IRA contributions (including those who decided not to put money in the IRA, but excluding the "matches") for the 20 percent and 50 percent match groups were 4 and 7 times higher than the control group, respectively.
Engelhardt and Kumar 2007	Studies the effect of firm match rates on 401(k) contributions.	The authors develop a model of 401(k) savings including matching, and estimate the effect of employer vs. employee contribution changes on savings, using data from the first wave of HRS and linked to SSA data (including W2s), over 1951-91.	An increase in the match rate by 25 cents per dollar of employee contribution raises 401(k) participation by 5 percentage points. The parametric and semi-parametric estimates for saving indicate that an increase in the match rate by 25 cents per dollar of employee contribution raises 401(k) saving by \$365 (in 1991 dollars).
<i>Papers on the Effect of Mandates and Nudges</i>			
Madrian and Shea 2001	Analyzes the impact of automatic enrollment on 401(k) savings behavior.	Data are from a Fortune 500 company in the health care and insurance industry, which implemented a change in 401(k) enrollment and eligibility on April 1, 1998.	401(k) participation is 50 percentage points higher under automatic enrollment. In addition, a substantial fraction of 401(k) participants hired under automatic enrollment retain both the default contribution rate and fund allocation even though few employees hired before automatic enrollment picked this particular outcome.
Card and Ransom 2011	Studies the effect of employer non-elective contributions on individual contributions to retirement accounts for university faculty.	Using a data set combining ten years of salary and pension information for older faculty at a sample of colleges and universities with TIAA-CREF pensions, the authors test for differential responses in employee savings to changes in mandated employee vs. employer contributions.	Supplementary savings are reduced by 60 to 80 cents per dollar of employee contributions to the regular pension, but only by one-half as much per dollar of employer contributions.

Attanasio and Brugiavini 2003	Studies the substitutability between private savings and public pensions in Italy	The authors exploit differential effects of a 1992 Italian pension reform on individuals belonging to different birth cohorts and occupational groups. They use a diff-in-diff approach to estimate increase in saving rates as a result of a reduction in pension wealth. Data comes from the Survey on Household Income and Wealth.	Pension wealth is a substitute for private saving, though estimates of pass-through vary greatly across the age distribution in ways that depend strongly on specification. Average pass-through coefficients are about 0.4.
Attanasio and Rohwedder 2003	Studies the substitutability between private savings and public pensions in the UK	The authors exploit a set of U.K. pension reforms as natural experiments to investigate the relationship between public pensions and discretionary private savings. They use a life-cycle model to scale the effects on each household depending on the effects on future wealth and timing of the reforms. Data comes from the Family Expenditure Survey.	Results indicate a considerable degree of substitutability (i.e., crowd-out) of 0.65-0.75 for private savings and earnings-related pensions, but essentially no crowd-out for the flat-rate pensions.
Chetty, Friedman, Leth-Petersen, Nielsen, and Olsen 2014	Studies the effect of savings mandates and employer non-elective contributions on pension savings and total savings.	Uses administrative tax data on the full Danish population, including third-party reported data on total savings and wealth. Uses changes in employer contributions as workers move between firms in an event study design. Also uses a regression discontinuity around a threshold for mandatory 1% contribution to a new government-sponsored account.	For each dollar in mandated savings from employers, individuals increase total pension savings by 95 cents and total savings by 77 cents. Government mandates generate full pass-through to total savings, but the effect is imprecisely estimated.

Papers on Heterogeneity of Effects

Engen and Gale 2000	Examines the impact of 401(k) plans on household wealth, allowing the impact to vary over time and earnings groups.	The authors provide a new econometric specification, and use data patterns to reject modeling constraints posed by previous authors. Data come from SIPP, 1987 and 1991.	The effects of 401(k)s on household wealth vary significantly by earnings level. 401(k)s held by groups with low earnings, who hold a small portion of 401(k) balances, are more likely to represent additions to net wealth than 401(k)s held by high-earning groups, who hold the bulk of 401(k) assets. Between 0 and 30 percent of 401(k) balances represent net additions to private saving in the sample period.
Chernozhukov and Hansen 2004	Studies impact of 401(k) plans on wealth by analyzing the effect of 401(k) participation on the entire wealth distribution, instead of just	Authors use the 1991 SIPP. 401(k) eligibility is used as an instrument for 401(k) participation. Authors use a Quantile Treatment Estimator (QTE) to analyze heterogeneity in the effects of 401(k) savings on total savings.	Participation in 401(k)s increases total wealth and that there is little substitution between financial assets in 401(k)s and other financial assets. In addition, the results suggest that there is substitution between assets held in 401(k)s and other components of wealth in the upper tail of the wealth distribution, but that most financial

	the mean or median.		assets held in 401(k)s in the lower tail of the distribution represent new savings.
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