The Retirement Security Project

Policy Brief

The Automatic 401(k): Revenue & Distributional Estimates

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Introduction

One of the most promising aspects of retirement saving policy in recent years is the advent of "automatic" or opt-out features in 401(k) plans. Automatic 401(k)s enable saving even if the worker makes no effort to participate in their 401(k) plan. In a 401(k) plan without automatic features, workers have to actively choose whether or not to sign up for the plan, how much to contribute to the plan and the investment allocation for their assets (see Gale, Iwry, Orszag 2005 for additional background). These decisions can be complex and daunting. As a result, busy people often procrastinate or are unable to decide the best way to proceed; the result of such inaction is that these workers do not participate in their 401(k) plan or they make imprudent investment choices. By contrast, in a 401(k) with automatic enrollment, workers are automatically enrolled in their employer's plan at a default contribution rate, and funds are directed into balanced, prudently diversified investment accounts, unless participants affirmatively choose otherwise. Therefore, those who are unwilling or unable to make these complicated decisions would be saving through automatic 401(k)s.

Automatic 401(k) plans are beneficial to workers on several levels. First, they start workers on a saving path earlier than they otherwise would. With automatic enrollment, participation in 401(k)s increased from 75 percent to as high as 90 or 95 percent of newly eligible employees (Madrian and Shea 2001); the change was highest among lower-income and minority workers. Second, workers will generally be invested in more appropriate and diversified funds in automatic 401(k)s than if they invest on their own.[2] Third, contributions to 401(k) plans are generally tax-preferred relative to saving outside of 401(k)s because contributions to 401(k)s are tax deductible.

This paper provides estimates of the effects – on federal revenue and the distribution of after-tax income – of a policy under which all 401(k) plans in the U.S. were converted to automatic 401(k)s. In recent years auto 401(k)s have become more prevalent, in part due to the passage of the Pension Protection Act (PPA) of 2006, which provided new incentives for automatic 401(k) plans and addressed several employer concerns regarding automatic 401(k)s.[3] Between 2006 and 2007, the number of employers offering automatic enrollment increased from 26 percent to 44 percent among surveyed employers.[4] The paper should play an important role in helping policymakers, analysts, and pension administrators evaluate the merits of automatic 401(k)s.

Due to the preferred tax treatment of 401(k) contributions, federal income tax revenues are expected to decline with the increase in 401(k) participation – generated through higher enrollment rates and higher contribution rates. In addition, automatic 401(k)s will differentially impact workers at different income levels. Workers with higher marginal tax rates will receive a larger reduction in tax when they contribute to 401(k)s than workers with lower marginal tax rates. On the other hand, in practice, automatic features in 401(k)s disproportionately increase enrollment for workers with lower-income, who face lower marginal tax rates. Furthermore, the default contribution rates were, for some workers, lower than what they may have chosen in the absence of automatic features, which lower both their level of tax benefit and the revenue loss.

We find the revenue costs to be modest over the ten-year budget window, particularly in relation to the revenue cost of providing saving incentives through employer-sponsored retirement saving plans. The revenue loss from making automatic enrollment in 401(k)s universal and implementing a default contribution rate is between $3.5 billion and $6.9 billion per year, and with losses between $35 billion and $69 billion over fiscal years 2008-17. The higher revenue estimates are associated with a model that includes the escalation of the default contribution rate over time.

We find that the distributional effects of making automatic enrollment in 401(k)s universal and implementing a default contribution rate are progressive relative to the current system. Specifically, we find the proportion of the benefit going to taxpayers in the bottom four income quintiles – taxpayers in the bottom 80 percent range of the income distribution – is larger than their share of the overall tax burden.

Section I describes the Automatic 401(k) proposal. Our modeling procedure is described in Section II. Section III presents and discusses the central results. Section IV concludes.

I. Description of Automatic 401(k) Plans

In traditional 401(k) plans, workers must make active decisions about whether to sign up, how much to contribute, how to allocate investment funds, how often to rebalance their portfolios, what to do with the available funds when they change jobs and at retirement. These decisions can be difficult, and many workers either make poor choices or simply end up making no choice at all. In this system, a worker who is intimidated by the complexity remains outside of the 401(k) system and does not benefit from the tax-advantaged retirement saving opportunities that 401(k)s provide.

In contrast, with an automatic 401(k) — sometimes called an opt-out plan — the situation is reversed. Workers are automatically enrolled in the plan unless they actively choose not to participate; they are assigned a default contribution level, which may increase over time; and a default investment allocation, all of which they can choose to change. That is, each stage of the 401(k) saving process is automatically set at a pro-saving default. Workers who prefer different saving choices may opt-out of the default but for others, the same force of inertia that stymied saving in a traditional 401(k) would promote saving in an automatic 401(k) plan.

In addition to the decision about whether or not to participate in a plan, workers in traditional 401(k) plans must also decide how much to contribute and how to invest their contributions. Automatic 401(k)s would set a default for these choices which, like the decision about whether or not to participate, could be revised by the worker. The default contribution is determined as a proportion of earnings; for example, a company might set the default contribution as 3 percent of a worker's monthly earnings. Default contribution rates can either remain constant over time or increase gradually. In this paper, we model three assumptions about default rates: one scenario where the default contribution rate remains constant at 3 percent of earnings, another scenario where the default contribution rate is initially set at 3 percent of earnings and gradually rises to 6 percent of earnings, and a third scenario where contribution rates gradually rise (as in the second scenario), but higher income workers also contribute 1.5 times the rate of other workers.

With traditional defined-benefit pensions, the decision about how to invest is made by a pension administrator, while 401(k)s require the investment decision to be made by the worker; this decision may be a difficult one for some 401(k) participants. An additional feature of automatic enrollment is that workers' contributions may be automatically invested in a diversified portfolio of assets (qualified default investment alternatives, QDIAs) suitable for retirement saving. This feature would prevent many workers from overinvesting in company stock, a common problem in 401(k) plans (see Benartzi 2001 and Gale and Iwry 2005), while still allowing workers the option to make investment decisions. In this paper we do not model the default allocation feature as portfolio allocation is beyond the scope of the TPC model.[5]

II. Modeling the Impact of Automatic Enrollment.

We use the TPC microsimulation model to estimate revenue and distributional effects of making automatic enrollment in 401(k)s universal and implementing a default contribution rate. The TPC model allows researchers to model the revenue and distributional effects of a change in tax policy. The primary data used by the model is tax returns, which are merged with demographic information provided by the Current Population Survey (CPS). The TPC model, its capabilities, and a detailed description of our methodology are included in the appendix.

Estimating the impact of automatic enrollment required making assumptions about the number of workers eligible for automatic enrollment, the participation rates of eligible workers, and the contribution rates of those who participate.

We base our assumption about participation rates in automatic 401(k) plans from observed take-up rates reported in Madrian and Shea (2001). The authors study the changes in participation rates in a company before and after the adoption of automatic enrollment. We utilize Madrian and Shea's estimate of participation rates by age and income to simulate whether a worker subject to automatic 401(k) will elect to opt-out of the program. Additional details of our simulation procedure, including modeling limitations, are provided in the appendix.

We employ three scenarios for contribution rates in auto enrollment programs:

Baseline: Auto 401(k) participants contribute 3 percent of earnings throughout the 10-year period (our budget window).

Escalating: Auto 401(k) participants contribute 3 percent of earnings in 2008. Contributions increase by one percent annually up to 6 percent in 2011 and remain at that level throughout the budget window.

Alternate Escalating: Taxpayers with earnings less than $100,000 (in 2008 dollars) contribute the same rate as in the baseline escalating scenario throughout the budget window. Taxpayers with earnings over $100,000 contribute 4.5 percent of earnings (1.5 times the rate in the baseline escalating scenario) throughout the budget window.

Simulating contribution rates presents a challenge as it is difficult to know how workers might contribute to accounts for which they were automatically enrolled given the wide variation in demographic and employment characteristics, employer-provided pension incentives, and default contribution rates. Several economists have studied the impact of automatic enrollment on contribution rates. Madrian and Shea (2001), for example, find that the average contribution rate among *participants* drops with the initiation of an auto enrollment program with a 3 percent default contribution rate, and that there are larger proportional decreases in contributions for participating employees at the lower end of the compensation scale. Madrian and Shea also found that the average contribution rate for employees with higher compensation remained

well-above the default rate, while the average contribution rate for employees with less compensation approached the default rate as compensation decreased.[6] Other studies of default rates under automatic enrollment, such as Choi et al. (2004) and Beshears et al. (2006), found that employees commonly contribute the default contribution rate, and that raising default rates increases the contribution rates among participating employees.

Still, it is difficult to generalize the results of these few studies to a larger population for a number of reasons. One, a complicating factor is the potential existence of auto-escalation, where default contribution rates are gradually increased over time to a set level; we don't know how workers would respond to such a policy. Two, while employee contribution levels are sensitive to default rates, they are also sensitive to other savings incentives, such as employer matching and tax benefits, which further complicate our ability to model worker contribution rates under automatic enrollment. Three, worker saving rates under automatic enrollment may also be sensitive to macroeconomic factors, such as wage growth, stock market activity, and employment security, of all which complicate assumptions about contribution rates.

Given the lack of empirical evidence measuring the impact of auto-enrollment on 401(k) contribution rates, particularly those that encompass automatic escalation of default rates, we present results under three scenarios of contribution rate trends. It is important to note that we are only estimating the participation rates of pension participants who are incorporated in a company pension due to automatic enrollment, not the aggregate contribution levels of a cohort that includes workers who would have "opted-into" a program without the existence of automatic enrollment.

Our baseline case corresponds to a constant default contribution rate equal to 3 percent; the most common default rate chosen by firms. Moreover, studies of companies that adopted the 3 percent default rate found that employees in these plans frequently remained at this rate. Madrian and Shea (2001), for example, studied a firm that implemented a 3 percent default contribution rate and found that 76 percent of automatically enrolled 401(k) participants contributed the default rate of 3 percent, as opposed to just 10 percent prior to automatic enrollment. Since the mean contribution rate under a program with a 3 percent non-escalating default rate is likely to be higher than the default rate, this scenario represents a lower-bound for the revenue costs of automatic enrollment.

The second scenario simulates a company plan with escalating default contribution rates. With the enactment of recent legislation, escalation of the default contribution rate is expected to become a more common feature among companies offering automatic enrollment. It is unclear how employees will respond to automatic escalation – some employees might opt to lower the contribution rate as it rises each successive year, others might opt to leave the contribution rate unchanged from the default rate, and another group may opt to contribute at a rate higher than the default. Here, we assume that workers do not opt out of the default contribution rate throughout the budget window.

The third scenario combines the observation that automatic enrollees commonly contribute the default rate with the observation that high-income workers are more likely to opt out of the default contribution rate and adopt a high contribution level. Madrian and Shea, for example, found that the average contribution rate for high income workers was approximately 50 percent to 100 percent higher relative to other workers. Here we assume that high-income workers opt to increase their contributions and contribute 1.5 times the default rate, while all other workers remain at the default level.

III. Revenue and Distributional Estimates

This section presents revenue costs and distributional estimates of making automatic enrollment in 401(k)s universal and implementing a default contribution rate. Revenue costs are the change in net federal tax revenue as a result of the change in 401(k) contributions attributable to automatic features, and can be considered the direct fiscal "cost" of implementing the policy. Distributional estimates measure how a reform affects taxpayers with different circumstances. In this paper we examine how automatic enrollment in 401(k)s would affect taxpayers with different incomes, where income is defined in terms of "cash income," a broader measure than adjusted gross income and a better representation of economic status.[7]

There are several factors that influence the distributional results. The first factor concerns participation. Taxpayers with higher wages are more likely to participate in a company 401(k) prior to the implementation of automatic enrollment, both because they are more likely to work at a company that offers 401(k)s to its workers and also

Table 1
Revenue Effect of Automatic Enrollment in 401(k)s
Static Impact on Revenue ($ billions), 2008-17[1]

	Year										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2008-17
Fiscal Year Revenue[2]											
Baseline[3]	-1.9	-2.7	-2.9	-3.2	-3.5	-3.8	-4.0	-4.2	-4.4	-4.6	-35.1
Escalating[4]	-1.9	-3.3	-4.5	-6.1	-6.9	-7.3	-7.8	-8.2	-8.5	-9.0	-63.6
Alternate Escalating[5]	-2.1	-3.6	-4.9	-6.6	-7.5	-7.9	-8.4	-8.8	-9.3	-9.8	-68.9
Calendar Year Liability											
Baseline[3]	-2.5	-2.7	-3.0	-3.3	-3.6	-3.8	-4.0	-4.2	-4.4	-4.7	-36.2
Escalating[4]	-2.5	-3.6	-4.9	-6.6	-7.0	-7.5	-7.9	-8.3	-8.6	-9.1	-65.9
Alternate Escalating[5]	-2.8	-3.9	-5.3	-7.1	-7.6	-8.1	-8.5	-8.9	-9.4	-9.9	-71.4

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

[1] The proposals are effective January 1, 2008. Estimates are static and do not account for any potential microeconomic behavioral response.
[2] Fiscal-year revenue numbers assume a 75-25 split. The actual effect on receipts could differ.
[3] Baseline is current law. The proposal would automatically enroll all eligible workers in an automatic 401(k) plan unless they choose to optout. We assume taxpayers that enroll contribute three percent of their earnings, subject to contribution limits. For more on how this proposal is modeled, see the description in the paper.
[4] Same as scenario [3] except contributions increase 1 percent each year from 3 percent in 2008 to 6 percent in 2011. After 2011, contributions remain at 6 percent.
[5] Same as scenario [4] except individuals earning more than $100,000 in 2008 dollars are assumed to contribute 50 percent more.

Table 2
Distributional Effect of Automatic Enrollment in 401(k)s
Distribution of Federal Tax Change by Cash Income Percentile, 2012[1]

Cash Income Percentile[2-3]	Percent of Tax Units[4]		Percent Change in After-Tax Income[5]	Share of Tota Federal Tax Change	Average Federal Tax Change		Share of Federal Taxes		Average Federal Tax Rate[6]	
	With Tax Cut	With Tax Increase			Dollars	Percent	Change (% Points)	Under the Proposal	Change (% Points)	Under the Proposal
Lowest Quintile	1.8	0.3	0.0	3.9	-4	-0.6	0.0	0.8	0.0	5.4
Second Quintile	5.3	0.1	0.1	19.3	-23	-0.6	0.0	4.5	-0.1	13.0
Middle Quintile	5.7	0.0	0.1	26.4	-34	-0.3	0.0	11.2	-0.1	19.2
Fourth Quintile	5.7	0.0	0.1	27.4	-43	-0.2	0.0	18.6	0.0	22.3
Top Quintile	4.3	0.0	0.0	23.1	-41	-0.1	0.1	64.9	0.0	28.6
All	4.4	0.1	0.0	100.0	-26	-0.1	0.0	100.0	0.0	24.0
Addendum										
80-90	4.9	0.0	0.0	11.3	-39	-0.1	0.0	14.3	0.0	25.0
90-95	4.2	0.0	0.0	6.0	-44	-0.1	0.0	10.2	0.0	26.1
95-99	3.4	0.0	0.0	5.0	-45	0.0	0.0	15.7	0.0	28.1
Top 1 Percent	2.1	0.0	0.0	0.7	-25	0.0	0.0	24.7	0.0	33.2
Top 0.1 Percent	1.8	0.0	0.0	0.1	-33	0.0	0.0	12.4	0.0	35.7

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

[1] Calendar year. Baseline is current law. The proposal would automatically enroll all eligible workers in an automatic 401(k) plan unless they choose to opt-out. We assume taxpayers that enroll contribute three percent of their earnings, subject to contribution limits. For more on how this proposal is modeled, see the description in the paper.
[2] Tax units with negative cash income are excluded from the lowest income class but are included in the totals. For a description of cash income, see http://www.taxpolicycenter.org/TaxModel/income.cfm
[3] The cash income percentile classes used in this table are based on the income distribution for the entire population and contain an equal number of people, not tax units. The breaks are (in 2008 dollars): 20% $19,740, 40% $38,980, 60% $69,490, 80% $117,535, 90% $169,480, 95% $237,040, 99% $619,561, 99.9% $2,832,449.
[4] Includes both filing and non-filing units but excludes those that are dependents of other tax units.
[5] After-tax income is cash income less: individual income tax net of refundable credits; corporate income tax; payroll taxes (Social Security and Medicare); and estate tax.
[6] Average federal tax (includes individual and corporate income tax, payroll taxes for Social Security and Medicare, and the estate tax) as a percentage of average cash income.

because higher income workers are more likely to participate in a 401(k) if eligible.[8] This condition means that automatic enrollment is more likely to incorporate lower-wage workers into company retirement plans, since these workers are less likely to be enrolled in such plans (a worker who is already enrolled in a company 401(k) cannot benefit from automatic enrollment).

The second factor concerns contribution rates and tax benefits. Since we assume that workers will contribute the default rate, expressed as a percentage of earnings, newly-enrolled workers with high wages will have higher contribution levels to their 401(k)s. In addition, the tax benefit for a contribution to a 401(k) increases with income, since marginal tax rates are higher for high income workers. As an example, consider the benefits associated with a $1 contribution for a worker in the 15 percent tax bracket compared to a worker in the 35 percent tax bracket. The $1 contribution by the worker in the lower bracket will drop that worker's taxable earnings by $1, which will result in a reduction of 15 cents in taxes paid. In contrast, the $1 contribution for the high income worker, resulting in a $1 drop in taxable earnings, will produce a 35 percent drop in taxes paid. The end result is that relative to lower-income workers, wealthier taxpayers will have higher contributions due to their higher wages, and will have larger tax benefits due to their elevated marginal tax rates.

Table 1 presents the revenue costs of automatic 401(k)s under the baseline, escalating, and alternate escalating scenarios; table 2 presents distributional effects by cash income percentile under the baseline scenario. Distributional results by income level are presented in the appendix.

A. Revenue Costs

The revenue costs of the auto 401(k) proposal are modest relative to the total value of tax expenditures for retirement saving. For the baseline case, we find that the auto 401(k) proposal would reduce revenues by an average of about $3.5 billion per year over the 10 year budget window, for a total 10 year cost of $35.1 billion. As a benchmark for the relative magnitude of these costs, the Joint Committee on Taxation estimates that the total value of tax expenditures for contributions to employer-sponsored retirement plans is $498.7 billion over 2008-11. This suggests that that automatic enrollment would increase total federal outlays for employer-sponsored retirement plans by approximately 2.2 percent. For the escalating case, where the default contribution rate is increased by 1 percent annually until it reaches 6 percent, we estimate the average annual cost to be $6.4 billion, with a ten-year cost of $63.6 billion over 2008-17. For the alternate escalation case, where the default rate is increased and we assume higher contribution rates for high-income workers, the average annual cost would be about $6.9 billion and the ten-year cost is $68.9 billion over 2008-17.

B. Distributional Effects

We find the distributional effects to be progressive relative to the current system, and that low- and middle-income taxpayers receive a disproportionately larger benefit relative to their existing tax burdens than higher-income taxpayers. Specifically, we find the proportion of the benefit going to taxpayers in each of the bottom four income quintiles – taxpayers in the bottom 80 percent range of the income distribution – to be larger than their share of the overall tax burden. For example, taxpayers in the middle income quintile receive 26.4 percent of the overall benefit of the auto 401(k) proposal, despite only paying 11.2 percent of the aggregate tax burden. Taxpayers in the top income quintile receive a lower share of the benefit (23.1 percent) relative to their share of the federal tax burden (64.9 percent).

We find that the participation rates across the top four income quintiles to be relatively constant at approximately 5 percent, and that the average benefit increases with income. Our results for 2012 – the midpoint of the ten-year budget window — show that taxpayers in the middle quintile receive an average benefit of $34 annually, which indicates that the mean benefit for participating taxpayers is approximately $600 per year.[9] Taxpayers in the top income quintile receive an average benefit of $41 annually, or approximately $950 per participating taxpayer. Taxpayers in the bottom income quintile are less likely to contribute to a 401(k) as the result of automatic enrollment, and also receive fewer tax benefits when they do participate. However, given the uneven distribution of current tax incentives for retirement saving, these estimates suggest that the automatic 401(k) plan is a useful mechanism for distributing the benefits of these incentives across income groups.

We also estimate the distributional effects under the escalating scenario and alternate escalating scenario, and also present distributional effects by cash income level. These estimates are presented in the appendix; distributional patterns are not markedly different under these alternate scenarios.

IV. Conclusion

As the notion of automatic enrollment gains traction in the policy arena and on Capitol Hill, it is important to understand the distributional and revenue effects of such reforms. Using the Tax Policy Center's microsimulation model, we find the distributional effects of making automatic enrollment in 401(k)s universal and implementing a default contribution rate to be progressive relative to the current system, and that low- and middle-income taxpayers receive a disproportionately larger benefit relative to their existing tax burdens than higher-income taxpayers. Specifically, we find the proportion of the benefit going to taxpayers in each of the bottom four income quintiles – taxpayers in the bottom 80 percent range of the income distribution – to be larger than their share of the overall tax burden.

We find the revenue costs to be modest over the ten-year budget window, particularly in relation to the total revenue cost of providing saving incentives through employer-sponsored retirement saving plans. We estimate the annual average cost to be between $3.5 billion and $6.9 billion, and the ten-year cost of fully implementing the auto 401(k) to be between $35.1 billion and $68.9 billion over fiscal years 2008-17.

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Appendix: Methodology

A. Model Description and Data

We use the Tax Policy Center microsimulation model (see Rohaly, Carasso, Saleem 2005 for documentation) to estimate revenue and distributional effects of making automatic enrollment in 401(k)s universal and implementing a default contribution rate. TPC has developed a large-scale microsimulation model of the U.S. federal income tax system to produce revenue and distribution estimates of tax policy changes. The model is similar to those used by the Congressional Budget Office (CBO), the Joint Committee on Taxation (JCT), and the Treasury's Office of Tax Analysis (OTA). The model consists of three components: a database of tax returns from 2004 supplemented with demographic information; a statistical routine that "ages" or extrapolates the data to create a representative sample of filers and nonfilers for future years; and a detailed tax calculator and set of incidence assumptions that computes tax liability and tax burdens for filers under current law and alternative proposals.

The tax model uses two data sources: the 2004 public-use file (PUF) produced by the Statistics of Income (SOI) Division of the Internal Revenue Service (IRS), and the 2005 Current Population Survey (CPS). The PUF contains approximately 150,000 income tax records with detailed information from federal individual income tax returns filed in the 2004 calendar year. It provides key data on the level and sources of income and deductions, income tax liability, marginal tax rates, and use of particular credits, but it excludes most information about pensions and IRAs as well as demographic information such as age.

To model retirement saving,[10] we supplement the PUF and CPS data described above with information from the 2004 Federal Reserve Board of Governors' Survey of Consumer Finances (SCF) and the Survey of Income and Program Participation (SIPP). Our principal data source for type of pension, pension participation, and contributions by employers and employees is the SCF, a stratified sample of about 4,400 households with detailed data on wealth and savings. For the purposes of this paper, income is defined in terms of "cash income," a broader measure than adjusted gross income and a better representation of economic status.[11]

B. Imputing 401(k) Eligibility

To measure the effect of automatic saving plans, the first step is to impute auto 401(k) eligibility for individuals in the TPC model. Since the auto 401(k) program targets those taxpayers who are eligible to participate in a 401(k), but chose not to "opt in" to the program, it was necessary to impute values for 401(k) eligibility, in addition to DC participation.

We adopted earlier techniques used by TPC researchers and used the probit maximum likelihood estimator to estimate the likelihood of being eligible for the auto 401(k) program. Under the probit model, the coverage is observed if and only if $X1\beta1 + \varepsilon1 > 0$, where $\varepsilon1$ is assumed to be a standard normal random variable with mean 0 and variance 1, X is a vector of exogenous variables, and β is a vector of parameters to be estimated. The list of exogenous variables for

each probit regression is designed to be an exhaustive set of relevant variables that exist on both the SCF and the PUF. These variables include number of dependents, age (included as 10-year bracket dummies), income, and the following components of income: income from a farm or business, tax-exempt interest income, taxable interest income, rental income from schedule E, pension income, taxable dividends, and realized capital gains (all defined as the natural logarithm of the sum of one plus the income item). We include dummies for negative income from a business or farm and negative capital income. In addition, we include dummies for whether the individual itemizes deductions on his or her federal tax return, and dummies for whether certain federal tax schedules are filed (C for business income, E for rental income, and F for farm income). The list of exogenous variables is identical for each equation. Equations are estimated separately for head of household and spouse, but are based on household-level values for the exogenous variables with the exception of age and earnings.[12,13]

Given the estimates of coverage and eligibility from the SCF, we impute values to tax filing units in the PUF/CPS database. Imputation is done in two steps. First, we simulate whether the taxpayer is eligible for an employer-sponsored pension. For consistency, pension contributions are attributed only to tax returns that are not shown ineligible by virtue of their IRA contributions.[14] Using the estimated coefficients from the probit estimation for 401(k) eligibility and values of exogenous variables in the tax model database, we calculate *Xb1* (where *b1* refers to the probit estimate for $\beta 1$). We then calculate the threshold probability, $z = \Phi\text{-}1(X1b1)$, where Φ is the cumulative standard normal probability distribution, and draw a uniform random number, p, between 0 and 1. If $p < z$, we assign a nonzero value for the item.[15] Second, we adjust the imputed aggregates to match SCF totals. After the adjustment, the number of participants in employer-sponsored pensions and eligible taxpayers for automatic enrollment programs match approximately the totals reported in the SCF.

It should also be noted that the statutory eligibility in the model complements the imputed eligibility calculations discussed above. That is, a taxpayer may be deemed "eligible" to receive an auto 401(k), but is still subject to the statutory limits of the tax benefits associated with those pensions.

C. Modeling Auto-401(k) Take-Up Rates

After imputing values for auto 401(k) eligibility, we modeled take-up rates for eligible taxpayers using estimates derived from Madrian and Shea (2001). Madrian and Shea studied the experience of employees at a company that adopted auto-enrollment in a 401(k) plan, and measured the program's effects on take-up rates by gender, race, age, and compensation. Since the PUF/CPS data does not contain information on gender or race, we only used estimates of the age and compensation effects on take-up rates. We adjust the aggregate mean estimates in Madrian and Shea to calculate each taxpayer's probability of taking up a

pension given auto-enrollment, given that the taxpayer has already failed to "opt-in" to a 401(k) or IRA pension. Specifically, where Madrian and Shea calculated the following probabilities:

p_i = the probability of an employee in age group i participating prior to auto-enrollment
p_j = the probability of an employee in compensation group j contributing prior to auto-enrollment
p'_i = the probability of an employee in age group i contributing post auto-enrollment
p'_j = the probability of an employee in compensation group j contributing post auto-enrollment
$\overline{p}$ = the average participation rate prior to auto-enrollment
$\overline{p}'$ = the average participation rate post auto-enrollment

We calculate the expected probability of participation for each age and compensation profile[16]:

$$p_{ij} = \frac{(\overline{p}' - \overline{p})}{(1-\overline{p})} + \frac{(p'_i - p_i)}{(1-p_i)} + \frac{(p'_j - p_j)}{(1-p_j)}$$

Then, in a technique similar to that utilized in the imputation process, we calculate the threshold probability, $z = \Phi\text{-}1(pij)$, where Φ is the cumulative standard normal probability distribution, and draw a uniform random number, p, between 0 and 1. If $p < z$, we model that taxpayer as having automatically enrolled in a 401(k) plan.

Appendix Table 1
Distributional Effect of Automatic Enrollment in 401(k)s
Distribution of Federal Tax Change by Cash Income Level, 2012[1]

Cash Income Level (thousands of 2008 dollars)[2]	Percent of Tax Units[3]		Percent Change in After-Tax Income[4]	Share of Total Federal Tax Change	Average Federal Tax Change		Share of Federal Taxes		Average Federal Tax Rate[5]	
	With Tax Cut	With Tax Increase			Dollars	Percent	Change (% Points)	Under the Proposal	Change (% Points)	Under the Proposal
Less than 10	0.3	0.6	0.0	-0.2	0	0.1	0.0	0.2	0.0	5.4
10-20	2.9	0.2	0.1	4.2	-7	-0.8	0.0	0.7	0.0	5.4
20-30	5.3	0.1	0.1	9.6	-20	-0.7	0.0	1.9	-0.1	11.0
30-40	5.6	0.0	0.1	10.8	-29	-0.5	0.0	2.8	-0.1	15.2
40-50	6.2	0.0	0.1	10.1	-34	-0.4	0.0	3.4	-0.1	18.0
50-75	5.3	0.0	0.1	19.4	-36	-0.3	0.0	9.7	-0.1	20.1
75-100	5.9	0.0	0.1	15.6	-43	-0.2	0.0	9.8	-0.1	21.9
100-200	5.0	0.0	0.0	22.2	-41	-0.1	0.0	26.2	0.0	24.8
200-500	3.7	0.0	0.0	7.2	-45	-0.1	0.0	17.8	0.0	27.5
500-1,000	2.5	0.0	0.0	0.7	-27	0.0	0.0	7.6	0.0	29.2
More than 1,000	2.0	0.0	0.0	0.4	-28	0.0	0.0	19.8	0.0	34.2
All	4.4	0.1	0.0	100.0	-26	-0.1	0.0	100.0	0.0	24.0

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

[1] Calendar year. Baseline is current law. The proposal would automatically enroll all eligible workrs in an automatic 401(k) plan unless they choose teo opt-out. We assume taxpayers that enroll contribute three percent of their earnings, subject to contribution limits. For more on how this proposal is modeled, see the description in the paper.
[2] Tax units with negative cash income are excluded from the lowest income class but are included in the totals. For a description of cash income, see http://www.taxpolicycenter.org/TaxModel/income.cfm
[3] Includes both filing and non-filing units but excludes those that are dependents of other tax units.
[4] After-tax income is cash income less: individual income tax net of refundable credits; corporate income tax; payroll taxes (Social Security and Medicare); and estate tax.
[5] Average federal tax (includes individual and corporate income tax, payroll taxes for Social Security and Medicare, and the estate tax) as a percentage of average cash income.

Footnotes

[1] We thank Lina Walker, Bill Gale, Mark Iwry, and David John for helpful comments, and Greg Leiserson for assistance with the TPC model.

[2] See Gale and Iwry (2005) for a general discussion of the benefits of a diversified 401(k) portfolio. Poterba (2003) and Meulbroek (2002) discuss the problem of overinvestment in own company stock.

[3] See Gale, Iwry, and Walters (2007) for additional details.

[4] Data from Wells Fargo (2007). Furthermore, of the employers who offer automatic 401(k)s, 42 percent used 3 percent as the default contribution rate while 20 percent use a default rate that is higher than 3 percent. About one quarter of employers who offer automatic enrollment also automatically escalate contributions.

[5] Assumptions regarding portfolio allocation and the subsequent rates of return on those portfolios do not apply to the TPC model, which does not model the retirement decision by workers. See Burman et al. (2004) for more documentation.

[6] These conclusions are confined to cohorts with between 3 and 15 months of tenure at the company. The company studied provided a 50 percent match on the first 6 percent of compensation after the first year, so many of these employees were not eligible for a company match. Madrian and Shea (2001) also control for demographic and employment differences, and find that automatic enrollment with a default rate decreases contributions rates by 2.2 percent for employees with 3 to 15 months tenure.

[7] For a complete description of the definition of cash income, see footnote 11 in the appendix.

[8] See Copeland (2007) for a description of trends concerning participation in company retirement plans.

[9] The TPC model presents mean benefit for all taxpayers in a given quintile. We calculate average benefit for participating taxpayers by dividing the total tax benefit for taxpayers in the quintile by the number of taxpayers in the quintile participating in automatic enrollment.

[10] See Burman, Gale, Hall, and Orszag (2004) for a more complete description of the data and methods used in modeling the revenue and distributional effects of retirement saving accounts.

[11] Cash income includes wages and salaries, employee contribution to tax-deferred retirement savings plans, business income or loss, farm income or loss, Schedule E income, interest income, taxable dividends, realized net capital gains, Social Security benefits received, unemployment compensation, energy assistance, Temporary Assistance for Needy Families (TANF), worker's compensation, veteran's benefits, supplemental security income, child support, disability benefits, taxable IRA distributions, total pension income, alimony received, and other income including foreign earned income. Cash income also includes imputed corporate income tax liability and the employer's share of payroll taxes. This puts the income measure on a pretax basis. See http://www.taxpolicycenter.org/TaxModel/income.cfm for more discussion of income measures. Note that since cash income is a broader measure than adjusted gross income (AGI), some people with low reported AGI actually appear in higher income quintiles because they have other income such as pension contributions or tax-exempt bond interest that does not appear in AGI. As a result, some people in higher income quintiles are eligible for income-tested tax benefits, and more people in the bottom quintile of cash income are subject to income tax than in the bottom quintile of AGI.

[12] The SCF is a household-based survey that records only total income and wealth items for all individualsin the "primary economic unit" (PEU); it does not attribute shares of those amounts to individuals within the PEU. This provides a slight complication for those PEUs that consist of two unmarried individuals living together (with or without other financially interdependent members of the PEU). These individuals will show up in the

income tax file as two single tax returns but will show up in the SCF as one unit. We assume that an unmarried couple living together with shared finances behaves like a married couple and thus include them in the married category when running the regressions. The results do not change significantly if these individuals are dropped from the analysis.

[13] It is not appropriate in the SCF to simply run regressions or probits on the entire dataset because of its approach to missing variables. The SCF imputes missing values for a number of fields. To reflect the variance introduced by that process, the SCF database includes five replicates of each observation. Missing values are drawn randomly for each replicate from the estimated probability distribution of the imputed value, whereas nonmissing values are simply repeated. We estimate coefficients by computing each estimate separately for each sample replicate and then averaging the coefficient estimates.

[14] Tax returns include data on contributions to traditional IRAs. Since taxpayers above certain AGI thresholds may not make contributions to IRAs if their employers offer a pension, any in those categories who report IRA contributions must not participate in an employer plan. See Geissler and Harris (2007) for a discussion of taxpayer eligibility for IRAs.

[15] Without adjustment, this process can produce too many or too few individuals with pension contributions in the PUF dataset. We force the numbers to match published totals by shifting the threshold probabilities by a constant (up or down) so the simulated number of contributors matches the estimates on the SCF.

[16] The mean aggregate participation rate in Madrian and Shea (2001) for auto 401(k) eligible workers is 85.9 percent (our value of above) , compared to 37.4 percent (our value for above) for workers who are not automatically enrolled. Each age-compensation profile yields an expected participation rate in (0,1), indicating that all age-compensation profiles are naturally constrained to this interval.

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Mission Statement

The Retirement Security Project is dedicated to promoting common sense solutions to improve the retirement income prospects of millions of American workers.

The goal of The Retirement Security Project is to work on a nonpartisan basis to make it easier and increase incentives for middle- and lower-income Americans to save for a financially secure retirement.

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