

Do 401(k) contributions crowd out other personal saving?

James M. Poterba^{a,b}, Steven F. Venti^{b,c}, David A. Wise^{*,b,d}

^a*Department of Economics, Massachusetts Institute of Technology, Cambridge, MA 02139, USA*

^b*National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138, USA*

^c*Department of Economics, Dartmouth College, Hanover, NH 03755, USA*

^d*Kennedy School of Government, Harvard University, Cambridge, MA 02138, USA*

Received June 1993; revised version received April 1994

Abstract

During the late 1980s, contributions to 401(k) plans eclipsed contributions to Individual Retirement Accounts (IRAs) as the leading form of tax-deferred individual retirement saving in the United States. In this paper we describe 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. We find that 401(k) participation conditional on eligibility exceeds 60% at all income levels. In contrast, IRA participation at the height of that program rose sharply with income. We use two methods to evaluate the net saving effect of 401(k) contributions on personal saving: we compare the financial assets of families who are eligible for 401(k) saving with the assets of those who are not eligible, and we consider the change over time in the assets of like groups of savers. We find little evidence that 401(k) contributions substitute for other forms of personal saving, including IRA contributions.

Keywords: Saving; Retirement

JEL classification: H2; H3

* Corresponding author. Address correspondence to National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138, USA.

1. Introduction

Two retirement saving programs became important channels for personal saving in the United States in the 1980s. One, the Individual Retirement Account (IRA), has been the subject of substantial public discussion and economic analysis. It grew from a very limited program in the early 1980s to one that attracted almost \$40 billion in contributions and accounted for a quarter of personal saving by 1986. Contributions fell precipitously after the Tax Reform Act of 1986, which limited the tax benefits of IRAs for middle- and high-income taxpayers. The other program, the 401(k), also began in the early 1980s, and grew to a saving plan with \$49 billion in contributions in 1990. It is still growing rapidly. In contrast to IRAs, almost no public discussion or economic analysis has been directed at the 401(k) program.

The core of this paper is an evaluation of the saving effect of 401(k) contributions. To give context to the discussion of 401(k) saving, we also consider the contrasts between 401(k) and IRA saving. We explore not only the substitution between 401(k) and conventional personal financial asset saving, but also the substitution between the similar 401(k) and IRA programs themselves. Our analysis is based on simple but robust methods, with substantial reliance on the essentially exogenous determination of 401(k) eligibility status. We find little substitution between 401(k) saving and other forms of financial asset saving, and little substitution between 401(k) saving and IRA saving. We therefore conclude that most 401(k) contributions represent net new saving. An important implication of the empirical findings is that prominent features of 401(k) and IRA saving are largely unexplained by rate-of-return calculations. This suggests that other factors must play an important role in determining individual saving behavior.

The paper is organized as follows. The structure of 401(k) and IRA plans is described in Section 2, and contribution patterns for the two plans are contrasted. Particular attention is given to the implications of the decline in IRA contributions following the Tax Reform Act of 1986. Section 3 presents the methodology we use for evaluating the extent of substitution between 401(k) saving and conventional financial asset saving. Section 4 presents our central empirical findings. We then consider, in Section 5, the extent of substitution between IRA and 401(k) plans, with explicit analysis of IRA contributions by 401(k) eligibility status. Section 6 presents a brief conclusion.

2. Rules and patterns of personal retirement saving in the United States

2.1. Retirement saving programs in the United States

The current U.S. tax code includes a number of provisions intended to encourage personal saving for retirement by reducing taxes on saved

income. The most important program now is the 401(k) plan. The 401(k) program was created by the Revenue Act of 1978, but was not widely used until the IRS issued clarifying regulations in 1981. Only employees of firms that offer such plans are eligible to participate in a 401(k) plan. Deposits in 401(k) accounts are tax-deductible and the return on the contributions accrues tax free. Taxes are paid upon withdrawal. Prior to 1987 the employee contribution limit was \$30,000, but the Tax Reform Act of 1986 reduced the limit to \$7,000 and indexed this limit for inflation in subsequent years. The contribution limit is \$9,235 for the 1994 tax year.

There are several important features of 401(k) plans. First, employers can ‘match’ employee contributions. About 60% of contributions are matched at rates above 10%, and 26% at rates above 100%. Employer matching strengthens the incentives for saving through these plans. Second, some plans permit ‘hardship withdrawals’, usually subject to a penalty tax. Finally, subject to individual employer rules, employees may borrow funds from their 401(k) accounts. The U.S. General Accounting Office (1988) summarizes the characteristics of 401(k) plans in more detail.

The other important retirement saving plan, the Individual Retirement Account, became popular after the Economic Recovery Act of 1981 made IRAs available to all wage earners and their spouses. Between 1981 and 1986, any wage earner could contribute up to \$2,000 per year to an IRA and the wage earner’s spouse could contribute up to \$250, with the contributions deducted from taxable income. Interest income accrued tax free. Taxes were paid upon withdrawal according to income tax rates in effect then. A 10% penalty was imposed on withdrawals before age 59½.

The Tax Reform Act of 1986 substantially cut the IRA tax advantage of middle- and upper-income individuals and families. The tax deductibility of contributions was phased out between \$30,000 and \$40,000 for single persons and between \$40,000 and \$50,000 for families, if the contributor also had an employer-provided pension plan. Higher-income taxpayers could still make non-deductible IRA contributions, with tax-free accumulation of the return, but this change removed a substantial fraction of the IRA advantage over conventional saving.

The relative returns to 401(k), IRA, and conventional saving can be evaluated by considering a saver who plans to withdraw assets for consumption in T years, when he is more than 59½ years old. Suppose that the interest rate is r and the marginal tax rate is τ . The value in T periods of one dollar of pre-tax income in a conventional account is

$$V_{\text{conventional}} = (1 - \tau)e^{r(1-\tau)T}. \quad (1)$$

If the dollar is invested in a tax-deductible IRA, the value is

$$V_{\text{IRA}} = (1 - \tau)e^{rT}. \quad (2)$$

In a non-deductible IRA, the value would be

$$\begin{aligned} V'_{\text{IRA}} &= (1 - \tau)e^{rT} - \tau[(1 - \tau)e^{rT} - (1 - \tau)] \\ &= (1 - \tau)[(1 - \tau)e^{rT} + \tau]. \end{aligned} \quad (3)$$

Finally, a pre-tax dollar invested in a 401(k) yields

$$V_{401(k)} = (1 - \tau)(1 + m)e^{rT}, \quad (4)$$

where m is the employer match rate for employee contributions. The ratio of the value of the tax-deductible IRA yield to the value of the conventional investment is e^{rT} , and the ratio of the 401(k) value to the conventional investment value is $(1 + m)e^{rT}$. The ratio of the value of the non-deductible IRA, to the value of the conventional investment, is $[1 - \tau + e^{-rT}]e^{rT}$.

Thus on the basis of strictly financial calculations and ignoring early withdrawal penalties, the 401(k) investment dominates a deductible IRA whenever the employer match rate is positive. And, deductible as well as non-deductible IRAs dominate conventional saving. We suspect, however, that rate-of-return calculations may not be the only, or even the most important, determinant of saving behavior.

2.2. Aggregate trends and individual participation in 401(k) and IRA saving

Total contributions to 401(k) and IRA accounts are shown in Fig. 1. Annual contributions to 401(k) plans began at a low level in 1982 and then increased continuously, reaching almost \$49 billion in 1990. IRA contributions increased from less than \$5 billion to almost \$30 billion as soon as they became available to all wage earners in 1982. Thereafter, annual contributions increased to almost \$40 billion in 1986. But the Tax Reform Act of 1986 led to a dramatic reduction in IRA contributions, which were less than \$10 billion by 1990. The data show no change in the growth of 401(k) contributions after the Tax Reform Act of 1986.

The negligible proportion of families eligible for a 401(k) in the early 1980s increased to 13.3% by 1984 and to 34.7% by 1991. Data on 401(k) eligibility and participation given eligibility are presented in Table 1.¹ Conditional on eligibility, the participation rate increased from 58.1% in 1984 to 70.8% in 1991. The third column gives the overall 401(k) participation rate, the product of the eligibility rate and the conditional participation

¹ The 'family' is defined as the household reference person and spouse if present. Families are included in the sample if the household reference person is between the ages of 25 and 65, at least one family member reports earned income, and no family member reports self-employment income.

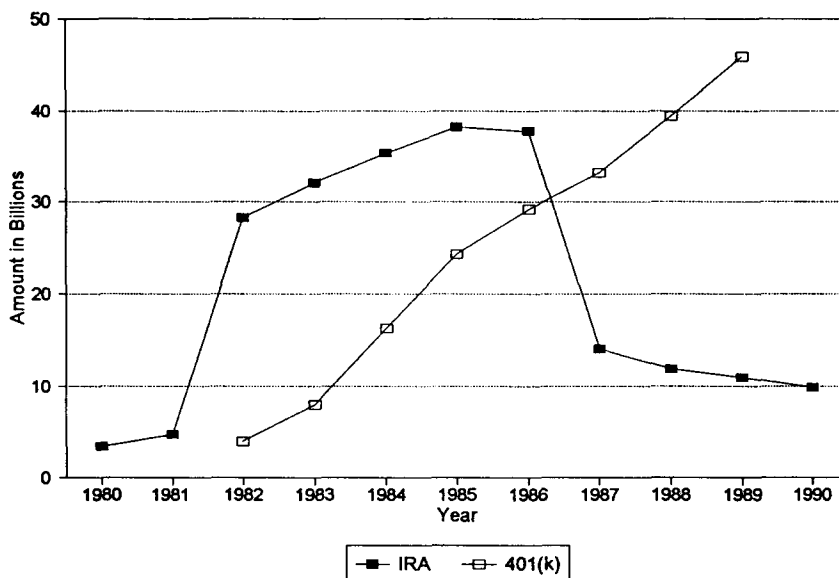


Fig. 1. 401(k) and IRA contributions (in billions, 1980-1990).

rate. By 1991 almost one-quarter of all families participated in a 401(k). The last column shows the IRA participation rate which, in contrast to the 401(k) conditional participation rate, has never exceeded 30%.²

Eligibility and participation rates by age and income in 1991 are shown in

Table 1
401(K) eligibility, and participation in 401(k)s and IRAs, selected years

	Percent eligible for a 401(k)	Percent 401(k) participation given eligibility	Percent 401(k) participation	Percent with IRA account
1984	13.3	58.1	7.7	25.4
1987	20.0	62.6	12.5	28.8
1991	34.7	70.8	24.6	27.1

Source: Authors' tabulations from the SIPP, as described in the text.

² These figures are the percent of families that have a positive balance in an IRA each year. Since many families may have an IRA but no longer make contributions, these figures overestimate the IRA participation rate. For comparison, a better number would be the percent of families contributing to an IRA in each year. Unfortunately, the SIPP data do not report contributions. Data on tax returns indicate that IRA participation reached a peak of about 16% in 1986.

Table 2
Eligibility and participation rates by age and income in 1991: 401(k) and IRA compared

Age	Income							All
	<10	10–20	20–30	30–40	40–50	50–75	>75	
<i>Percent Eligible for a 401(k)</i>								
25–35	5.1	14.8	30.2	40.1	38.9	51.3	51.2	31.4
35–45	11.2	20.2	34.6	42.8	46.0	53.9	47.1	39.2
45–55	2.1	16.5	27.6	32.8	48.7	56.4	52.5	35.9
55–65	7.9	14.4	20.9	36.5	37.7	51.9	37.0	28.9
All	6.4	16.6	29.7	39.0	43.7	53.8	48.1	34.7
<i>Percent 401(k) participation given eligibility</i>								
25–35	79.8	63.2	70.3	74.1	73.8	76.1	86.2	73.5
35–45	58.4	67.7	59.8	63.7	68.7	67.2	83.8	67.7
45–55	72.5	51.5	57.6	58.5	81.6	75.1	88.1	72.3
55–65	85.2	68.3	49.0	72.5	67.8	84.0	85.7	72.3
All	70.8	63.0	61.7	67.3	72.9	73.3	85.8	70.8
<i>Percent 401(k) participation</i>								
25–35	4.1	9.4	21.2	29.7	28.7	39.1	44.2	23.0
35–45	6.6	13.6	20.7	27.3	31.6	36.3	39.5	26.5
45–55	1.5	8.5	15.9	19.2	39.8	42.3	46.3	25.9
55–65	6.7	9.8	10.2	26.5	25.6	43.6	31.7	20.9
All	4.5	10.5	18.4	26.2	31.8	39.4	41.3	24.6
<i>Percent with IRA account</i>								
25–35	3.8	4.8	9.3	14.8	17.9	23.6	43.2	13.2
35–45	10.1	6.8	15.4	20.0	33.0	38.7	59.9	26.3
45–55	6.0	12.9	24.9	31.3	47.3	50.2	66.3	35.3
55–65	14.8	24.1	37.6	45.7	59.5	63.4	75.5	43.8
All	7.9	9.7	18.6	24.7	35.6	41.1	61.6	27.1

Source: Authors' tabulations from the SIPP, as described in the text.

Table 2. Eligibility for a 401(k) increases with income, but is not strongly related to age. Given eligibility, participation is unrelated to age and is above 60% for all income groups. The relationship between income and 401(k) participation shown in the third panel of the table is due largely to the relationship of eligibility to income. In contrast, participation in an IRA, for which all wage earners were eligible until 1986, is strongly related to both age and income. Participation in 401(k) plans in 1991, given eligibility, and participation in IRAs in 1986 are graphed in Fig. 2. The IRA rates are based on Internal Revenue Service data and represent IRA contribution rates at the height of that program.

The high 401(k) participation rate may be due partly to employer matching. But data presented in Poterba et al. (1994) show 1986 participation rates of 50% even when the match rate is zero, and although the

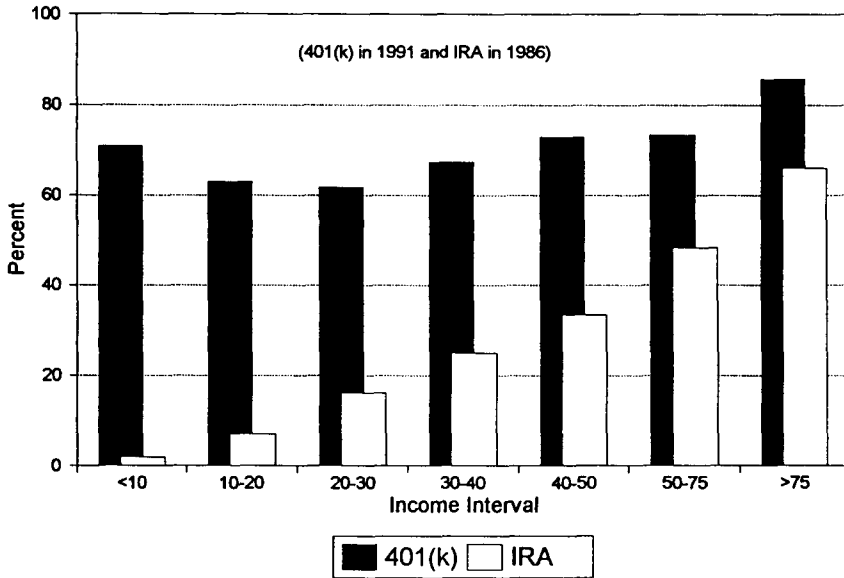


Fig. 2. 401(k) versus IRA: participation rates, by income.

participation rate is higher when the match rate is greater than zero, there is little relationship between participation and the match rate given that it is positive.³

An alternative explanation of the high 401(k) participation rate is that contributions are usually made through payroll deduction, that may serve as a form of self-control and ensure adherence to a saving plan. Once the deduction form has been signed, saving is removed from day-to-day competition with consumption; the reductions never appear as spendable earnings. Shefrin and Thaler (1988) propose a theory of saving emphasizing ‘mental accounting’ and self-control. Employer encouragement to participate and hardship withdrawal provisions may also increase 401(k) participation.

2.3. Decline in IRA contributions after 1986

The Tax Reform Act of 1986 limits on IRA tax deductibility had much greater effects on contributions than evaluation of the legislation—as in

³ Kusko et al. (1994) and Papke (1994) also present evidence on the relationship between match rates and participation in 401(k) plans. The former study finds relatively small effects of large changes in the match rate at a single firm, while the latter suggests that at low (high) match rates, increases in the match rate raise (lower) contributions.

Hausman and Poterba (1987), for example—might have suggested. Approximately 73% of all tax filers were unaffected by the changes. One would have expected little change in IRA contributions of lower-income groups who could still make tax-deductible contributions. And one would have expected a reduction in contributions at higher income levels to be mitigated by the retention of the tax-free accrual of interest.

Contrary to these expectations, even lower-income families reduced contributions by 40–50% and families that lost the up-front tax deduction virtually stopped contributing after the 1986 legislation. Fig. 3 shows IRA contribution rates in 1985 and 1988, by income interval.⁴ Close to 70% of families with incomes greater than \$50,000 made IRA contributions before 1986. But after the legislation, the proportion fell to less than 10%. Families with incomes between \$40,000 to \$50,000—over which the up-front deduction was phased out—reduced their contribution rate by 70%.

The across-the-board reduction in the IRA contribution rate was probably due in part to a misperception of the 1986 legislation by lower-income families. Higher-income families may also have misunderstood the legislation, thinking that both the up-front deduction and the tax-free accumula-

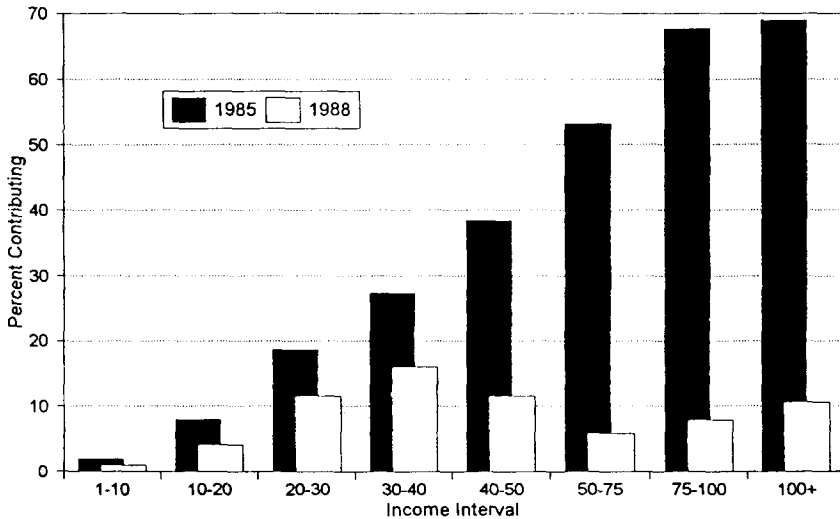


Fig. 3. IRA contribution rate, by income interval, 1985 and 1988.

⁴ The data used to construct the figure are from the Internal Revenue Service *Statistics of Income* series.

tion of returns had been eliminated. The systematic decline in contributions at all income levels suggests also that the promotion of these accounts by financial institutions may have been an important determinant of IRA saving.

2.4. Trends in personal and total retirement saving

Personal retirement saving accounts significantly altered the composition of retirement saving in the United States during the 1980s. Not counting Social Security, total retirement saving is composed largely of employer contributions to defined benefit and defined contribution pension plans, and individual contributions to IRAs, Keogh, and 401(k) plans. Total contributions to each of these plans are shown in Fig. 4. The figure does not include other forms of financial asset saving and accumulation of housing wealth, some of which also consists of retirement saving.

The figure indicates that total retirement saving increased sharply until 1985 and fell substantially thereafter. The pattern of total saving follows the pattern of IRA contributions, and if it had not been for 401(k) contributions, total retirement saving would have fallen much more than it did. In spite of the increase in the number of defined contribution pension plans in the 1980s, total contributions to these plans remained almost constant over the entire period. There was a large drop in contributions to defined benefit pension plans, reflecting increases in the value of pension funds invested in

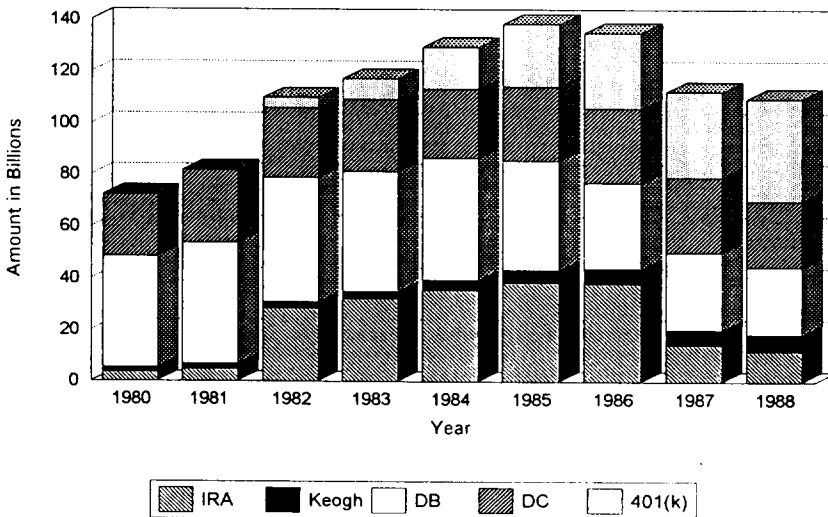


Fig. 4. Retirement saving, by saving plan, 1980–1988 (401(k) estimated in 1982 and 1983).

the stock market and thus smaller contributions to meet projected benefit entitlements, as discussed in Bernheim and Shoven (1988). The trend is much greater than the decline that can be attributed to falling defined benefit coverage. Piacentini and Foley (1992) report that the number of participants in defined benefit plans increased from 38 million to 41 million between 1980 and 1988, although the number of plans fell from 148,000 to 146,000.

By 1989, contributions to 401(k)s, IRAs, and Keogh plans together accounted for almost 53% of total retirement saving. Thus these new saving plans have rapidly become an extremely important component of the future financial support of the elderly. Counting defined contribution pension plans, 76% of the flow of 1988 retirement saving was directed to 'individual' accounts, with a value that the individual can track as it accrues; only 24% was through defined benefit plans. In 1980, 'individual' accounts comprised only 43% of the total.

3. The net saving effect of 401(k) contributions: Methodology

The key obstacle to determining the saving effect of 401(k)s is saver heterogeneity; some people save and others do not, and the savers tend to save more in all forms. For example, families with 401(k) accounts may have larger financial asset balances than families without 401(k)s. But this does not necessarily mean that 401(k)s increase total saving. Savers may be disproportionately represented among families with 401(k) accounts. Thus a conventional comparison of assets of contributors and non-contributors cannot be used to infer the saving effect of these plans.

We use two simple approaches to infer the 401(k) saving effect. Both are intended to control for heterogeneity in saving behavior. The first approach relies on the largely exogenous determination of 401(k) eligibility, *given income*. Eligibility is determined by employers. If household saving behavior is largely independent of individual characteristics related to the probability of working at a firm with a 401(k) plan, a hypotheses we evaluate based on saving behavior before 401(k)s became available, then a comparison of the financial assets of families with and without 401(k) eligibility can be used to infer the saving effect of these plans. If there is no saving effect, 401(k)-eligible families should have similar net worth but lower non-401(k) assets than non-eligible families.

The second approach is also motivated by the concern that persons who are eligible for a 401(k) or who contribute to an IRA may be different with respect to saving behavior than persons who are not eligible for a 401(k) or who do not have an IRA. But recognizing that the heterogeneity that matters is differential saving behavior by eligibility or method of saving, this

approach divides individuals into ‘homogeneous’ saver groups defined by 401(k) eligibility and IRA contributor status. Then, individuals within these groups—we call them ‘like families’—are followed *over time* and inferences are made on the basis of the *changes in the assets of the homogeneous saver groups*.⁵

We consider three demographically similar random cross-sections of families. The random samples have been ‘exposed’ to 401(k)s for different time periods and the central question is whether longer ‘exposure’ results in greater saving. The samples are randomly chosen, and thus are similar with respect to age, income, and other economic and demographic characteristics. One sample is from 1984, another from 1987, and the third from 1991. In principle, we are comparing the typical person, say at age 40, in 1984, with the typical person age 40 in 1987, and with the typical person age 40 in 1991. In each case the typical person is at the same point in the life-cycle and would presumably have accumulated similar levels of assets, abstracting from possible aggregate effects due to asset appreciation rates or nominal income changes for example between 1984 and 1991. There is one important difference, however. The 401(k) contributor in 1984 had roughly two years over which contributions could have been made, the 401(k) contributor in 1987 had roughly five years, and the 1991 contributor roughly nine years.

Not all 1991 contributors would have contributed for nine years, however. As shown in Table 1, there were many new contributors between 1984 and 1991. Nonetheless, if 401(k) contributions represent asset transfers, or are accompanied by reduced new saving in other forms, then the total asset balances of the 1984, 1987, and 1991 contributors should be roughly the same. Any 401(k) contributions, made for up to nine years, would replace saving that would have been made in other forms. If 401(k) contributions represent new saving, however, then other financial assets should be about the same in each year and the total financial assets, including 401(k)s, of the 1991 contributors will exceed the total assets of the 1984 contributors by the amount contributed to 401(k)s between 1984 and 1991. The average balance in 401(k) accounts, however, will depend on the mix of new and longtime contributors.

⁵ This method was used by Venti and Wise (1992) to evaluate the saving effect of IRAs, and in an earlier paper by Poterba et al. (1994) that considered 401(k) plans. As explained in Venti and Wise (1993), the comparisons that are made in this analysis are the same as the key comparisons made in more conventional cohort analysis. An issue that cannot be controlled for with this approach is the possibility that the persons who took up the 401(k) option were those who were about to *change* their saving behavior and the 401(k) just happened to be available at the opportune time, and it was used as the saving vehicle for the reborn saver who would have increased saving in another form, had it not been for the 401(k) option. The first approach tends to minimize the potential confounding effect of this coincidence possibility. This issue is discussed in more detail with respect to IRAs in Venti and Wise (1992).

Under both approaches to control for heterogeneity, the critical comparisons pertain to total financial assets and to other (non-401(k), non-IRA) financial assets. The first approach leads to a comparison of the assets of eligible and non-eligible families in a *given year*. The second approach leads to a comparison of changes in assets over time within the homogeneous groups. To provide a more formal motivation for the analysis, suppose that the balance held by person i in year t in asset a , A_{ait} , depends on several factors and may be described by

$$A_{ait} = \beta_a X_{it} + \alpha_{at} + u_{ai} + \epsilon_{ait}. \quad (5)$$

We consider four asset categories: total financial assets, 401(k) assets, IRA assets, and other financial assets. The term $\beta_a X_{it}$ recognizes that asset levels depend on family characteristics X , like age and income, with effects that differ by asset, through β_a . The term α_{at} is the year t effect for asset a , recognizing that the level of some assets may depend on the calendar year. In particular, the assets in 401(k) plans and in IRAs will depend on exposure to these plans. The term u_{ai} is an individual-specific effect representing unobserved saving behavior heterogeneity; the balance in asset category a depends on saver type i . The two methods that we use represent different ways to control for this heterogeneity.

3.1. The eligibility experiment

If individuals were randomly assigned to 401(k) eligibility, the simple comparison of the assets of eligible and non-eligible families would show the saving effect of the 401(k) plan. With respect to Eq. (5), the effect of 401(k) eligibility in a given year could be estimated by a simple regression of the form

$$A_{ait} = b_a + \gamma_a E_i + \epsilon_{ait}, \quad (6)$$

where E is an 401(k) eligibility indicator variable and γ_a is the eligibility effect on the balance of asset type a . The heterogeneity term u_{ai} is uncorrelated with E and the year effect α_{at} is not relevant because estimation is by year. Although eligibility is not random overall, we believe that it is approximately *random with respect to saving behavior, given income*. Thus, we use a specification of the form

$$A_{ait} = \sum_{j=1}^7 b_{aj} Y_{ij} + \sum_{j=1}^7 \gamma_{aj} (Y_{ij} \times E_i) + \epsilon_{it}, \quad (7)$$

where families are explicitly indexed by i , where Y_{ij} is an indicator variable for household i in income interval j , and E_i is a 401(k) eligibility indicator variable for household i . The income intervals are: <10K, 10–20, 20–30,

30–40, 40–50, 50–75, and 75 + . As explained below, we control for additional demographic variables as well.

3.2. *The comparison of like families*

Suppose that persons are grouped according to the assets that they have or, in the case of 401(k)s, are eligible for. That is, the assets that individuals hold are used to separate them into like saver groups. What is important is that the *average* saver type within the group does not change over time. We consider the change in assets over time within these ‘homogeneous’ groups. With respect to Eq. (5), this amounts to analyzing

$$A_{ari} - A_{ati} = \beta_a(X_{ri} - X_{ti}) + \alpha_{ar} - \alpha_{at} + \epsilon_{ari} - \epsilon_{ati}. \quad (8)$$

The heterogeneity term is differenced out so the change for an individual is not confounded by the heterogeneity term u_{ai} . The change in assets depends only on the change in the characteristics (X) and on the difference in the year effects, reflecting in particular differences in the time of exposure to 401(k) and IRA saving opportunities.

The SIPP data provide a series of random samples, but SIPP does not follow the same persons for extended periods. We therefore present results in terms of median or average balances. According to the formulation in Eq. (5), the average balance in asset category a in year t is given by

$$\bar{A}_{at} = \beta_a \bar{X}_t + \alpha_{at} + \bar{u}_a + \bar{\epsilon}_{at}. \quad (9)$$

The difference between the year t and year τ averages is given by

$$\bar{A}_{ar} - \bar{A}_{at} = \beta_a (\bar{X}_r - \bar{X}_t) + \alpha_{ar} - \alpha_{at} + \bar{u}_a - \bar{u}_a + \bar{\epsilon}_{ar} - \bar{\epsilon}_{at}. \quad (10)$$

If, $\bar{X}_r = \bar{X}_t$, the difference is

$$\bar{A}_{ar} - \bar{A}_{at} = \alpha_{ar} - \alpha_{at} + \bar{\epsilon}_{ar} - \bar{\epsilon}_{at}. \quad (11)$$

In this case, the average level of the asset varies systematically only because of the year effect. The α_{at} and α_{ar} are then means (or medians), and the critical comparison is the difference between them.

We estimate Eq. (9) by saver group, distinguished by 401(k) eligibility and by IRA contributor status. We focus on the change in total financial asset balances and on the change in other financial asset balances as the average balance in 401(k) (and IRA) accounts increases. The data show that the saving behavior of IRA holders is very different from the saving behavior of families without IRAs. But controlling for IRA status, there is much less difference in saving behavior by 401(k) eligibility. The important requirement is that the *means* of the individual saver effects, \bar{u}_a , do not change importantly over time *within* the group. Because the data for each

year represent a random sample of families, most demographic characteristics do not vary much from year to year. Nonetheless, we estimate means and medians controlling for age, education, and marital status, as well as income.

Data on financial assets are very skewed and sample averages are often importantly affected by outliers. Thus in both the eligibility experiment and the like families methods, we emphasize medians instead of means, with estimates obtained by analysis of variance quantile regression.⁶ Comparisons based on means are also shown in appendix tables.

4. The net saving effects of 401(k) contributions

4.1. Assets of eligibles versus non-eligibles

4.1.1. Medians by income interval

Table 3 presents the results of estimating Eq. (7), focusing on medians by income interval, for 1984, 1987, and 1991 respectively. In addition to income, the estimates control for age, education, and marital status. Differences between the eligible and non-eligible balances that are significant at the 5% level are noted with an asterisk. The key results are for 1987 and 1991, but the data for 1984 are particularly important in judging the reliability of the method.

The inferences about the net saving effect of 401(k) contributions depend on the exogenous determination of 401(k) eligibility status, given income. It is important that the eligible group not be composed disproportionately of savers, persons with large individual-specific saving effects. The data show little evidence of this type of heterogeneity in saving behavior. The most compelling evidence is for 1984. In that year the two groups had about the same level of other financial assets, controlling for income. Indeed, the average of the income interval cell ratios of eligible to non-eligible non-401(k) assets, weighted by cell sample sizes, was 1.00. Thus near the outset of the 401(k) program, families that were newly eligible for a 401(k) exhibited about the same previous saving behavior as families that were not eligible.⁷ Eligible and non-eligible families also had about the same level of other financial assets in 1991 and in 1987, although the differences are

⁶ Estimates are obtained by a minimum distance algorithm and analytic standard errors by the diagonal of $\hat{\sigma}^2(X'X)^{-1}$. For a discussion of the comparison between these analytic standard errors and those obtained by a bootstrap method, see Rogers (1992).

⁷ Andrews (1992) presents summary information on the attributes of individuals who are, and are not, eligible for 401(k)s. There are evident differences, in age and income, between these groups. But the key issue is whether these groups exhibit different saving propensities, controlling for income.

Table 3
Conditional median asset balances by 401(k) eligibility and income

Asset category and eligibility status	Income						
	<10	10–20	20–30	30–40	40–50	50–75	>75
<i>(a) Results for 1991 (1991 \$s)</i>							
Total financial assets							
Eligible for a 401(k)	2,033	4,045*	5,499*	8,683*	14,470*	26,093*	51,080*
Not eligible for a 401(k)	1,378	1,997	2,558	3,256	6,206	10,080	29,842
Non-IRA-401(k) assets							
Eligible for a 401(k)	538	1,138	1,500	2,835*	4,724	8,699*	18,188*
Not eligible for a 401(k)	663	1,063	1,411	2,052	4,250	5,437	17,000
401(k) Assets							
Eligible for a 401(k)	1,171	1,008	1,211	2,092	3,073*	4,833*	14,300*
Not eligible for a 401(k)	0	0	0	0	0	0	0
IRA assets							
Eligible for a 401(k)	0	0	0	0	0	1,437	6,029*
Not eligible for a 401(k)	0	0	0	0	0	978	2,882
<i>(b) Results for 1987 (1987 \$s)</i>							
Total financial assets							
Eligible for a 401(k)	2,061	2,404	4,206*	9,062*	12,588*	24,384*	57,348*
Not eligible for a 401(k)	1,581	1,902	2,624	4,605	6,726	14,108	30,971
Non-IRA-401(k) assets							
Eligible for a 401(k)	591	1,029	1,711	3,398*	5,663*	10,776*	24,044*
Not eligible for a 401(k)	799	1,004	1,554	2,904	4,246	8,462	20,383
401(k) assets							
Eligible for a 401(k)	456	474	607	895	1,255*	1,755*	8,056*
Not eligible for a 401(k)	0	0	0	0	0	0	0
IRA assets							
Eligible for a 401(k)	0	0	0	0	0	3,564	9,064*
Not eligible for a 401(k)	0	0	0	0	0	2,770	4,950
<i>(c) Results for 1984 (1984 \$s)</i>							
Non-IRA-401(k) assets							
Eligible for a 401(k)	561	1,042	1,988	3,861*	5,027	11,683*	28,824*
Not eligible for a 401(k)	754	1,138	1,746	3,076	5,082	10,846	21,485
IRA assets							
Eligible for a 401(k)	0	0	0	0	0	2,250	3,181
Not eligible for a 401(k)	0	0	0	0	0	1,484	2,084

* Difference between eligibles and non-eligibles is significant at the 95% confidence level.

statistically significant in some income intervals. The weighted mean of the ratios of eligible to non-eligible other assets was 1.11 in 1987 and 1.19 in 1991. These data suggest that 401(k) eligibility is indeed largely independent of overall saving propensity, given income.

The data for 1987 and 1991 are very similar and we focus on 1991. The first two rows of Table 3, panel (a), present the estimates of total financial assets for eligible ($b_{aj} + \gamma_{aj}$) and non-eligible (b_{aj}) families. The median total financial asset balance of the 401(k) eligibles is much larger than the balance of the non-eligibles and the differences are statistically significant in all but the lowest income interval. However, the difference in the non-401(k), non-IRA, other financial asset balances is small for each income interval, although it is statistically significant in three intervals.

To explain the findings, consider the set of households with incomes above \$75,000 (\$1987) in 1991. The median level of financial assets of 401(k) eligible families in this group was \$51,080, whereas the median for non-eligible families was only \$29,842. If families reduced saving in other forms when they became eligible for a 401(k) plan, the typical eligible family in 1991 would have accumulated less wealth in other financial assets than the typical non-eligible family. This was not the case.

The table shows that there was little difference between the other financial assets of eligible and non-eligible families. Indeed, the eligible families had somewhat higher levels of other financial assets. Looking over all income intervals, the total financial assets of the eligible families were typically two to eight times as large as the financial assets of the non-eligible families. The data show no substitution of 401(k) contributions for other financial asset saving.

Mean, instead of median, estimates are shown in Table A.1 in the appendix. We draw the same conclusions from the mean as from the median estimates. The means are measured much less precisely than the medians, however. To summarize the results, the weighted average ratio of the total assets of eligible to non-eligible families is shown by year in Table 4. On the basis of mean estimates, eligible families had *lower* non-401(k) assets than non-eligible families in 1984, but an *F*-test does not reject the hypothesis of equal assets ($F = 0.81$). In addition, using the mean estimates, it is meaningful to compare the 401(k) assets of eligibles and non-eligibles with their total assets. We consider the weighted average ratio of the difference between the total assets of eligibles and non-eligibles, divided by the difference in 401(k) assets. This ratio is 1.12 for 1987 and 0.81 for 1991. Thus the 1987 and 1991 differences between the total assets of eligibles and

Table 4

	1984 ^a	1987	1991
Median	1.00	1.62	2.22
Mean	0.87	1.33	1.33

^a Recall that, for 1984, the total asset value for each family does not include the value of 401(k) plan assets, because there was no such question on the survey.

non-eligibles, which evolved after the introduction of the 401(k) program, are approximately accounted for by 401(k) assets. The hypothesis of equal total assets of eligibles and non-eligibles, controlling for income, is rejected in both years, with an F -statistic of 13.18 for 1987 and 5.17 for 1991.⁸

4.1.2. Effect of 401(k) eligibility over the entire distribution of assets

The estimates in Table 3 pertain to median asset levels. The effect of 401(k) eligibility over the whole distribution of assets is shown in Fig. 5. The figure shows the inverse of the cumulative distribution function of total assets for eligible (shaded bars) and not eligible (unshaded bars) households. The figure highlights the low asset levels of typical households, even those with relatively high incomes. For example, the median total assets of families earning between \$50,000 and \$75,000 is less than \$11,000, and the 95th percentile is only about \$100,000. The graph also shows that the total assets of eligibles is greater than the total assets of non-eligibles at each percentile level, while there is very little difference in other assets at any percentile level. This pattern appears for virtually all income groups. Only for the top percentiles in the open-ended highest income interval, those with incomes greater than \$75,000, are the total assets of the eligible households no greater than the total assets of non-eligible households.

4.2. Like families' asset balance changes

The results of our analysis of changes in asset balances for 'like families', stratified by 401(k) eligibility and IRA status, are reported in Table 5. There is one panel for each of three 'like family' comparison groups. The focus here is on the change in other financial assets within these groups. The medians reported in the table were obtained by quantile regression, using an analysis of variance specification that controls (linearly) for income, age, education, and for marital status. Asset balances and income have been converted to 1987 dollars, based on the Consumer Price Index, but to control for possible composition changes, income is included as a control variable as well. The entries in the first three columns of the table are medians evaluated at the 1987 means of the control variables. Unlike the result for mean regression, this conditional median for 1987 is not equal to the overall 1987 median. For comparison, these values are reported in the last column of the table. Mean values based on the same specification are reported in Table A.2 in the appendix.

Panel (a) of Table 5 presents results for all families by 401(k) eligibility status. Results by 401(k) eligibility for families with IRAs are reported in

⁸ $F_{0.01}(\infty, 7) = 5.65$, $F_{0.05}(\infty, 7) = 3.23$. The sample sizes are 10,305 and 5,938 in 1987 and 1991, respectively.

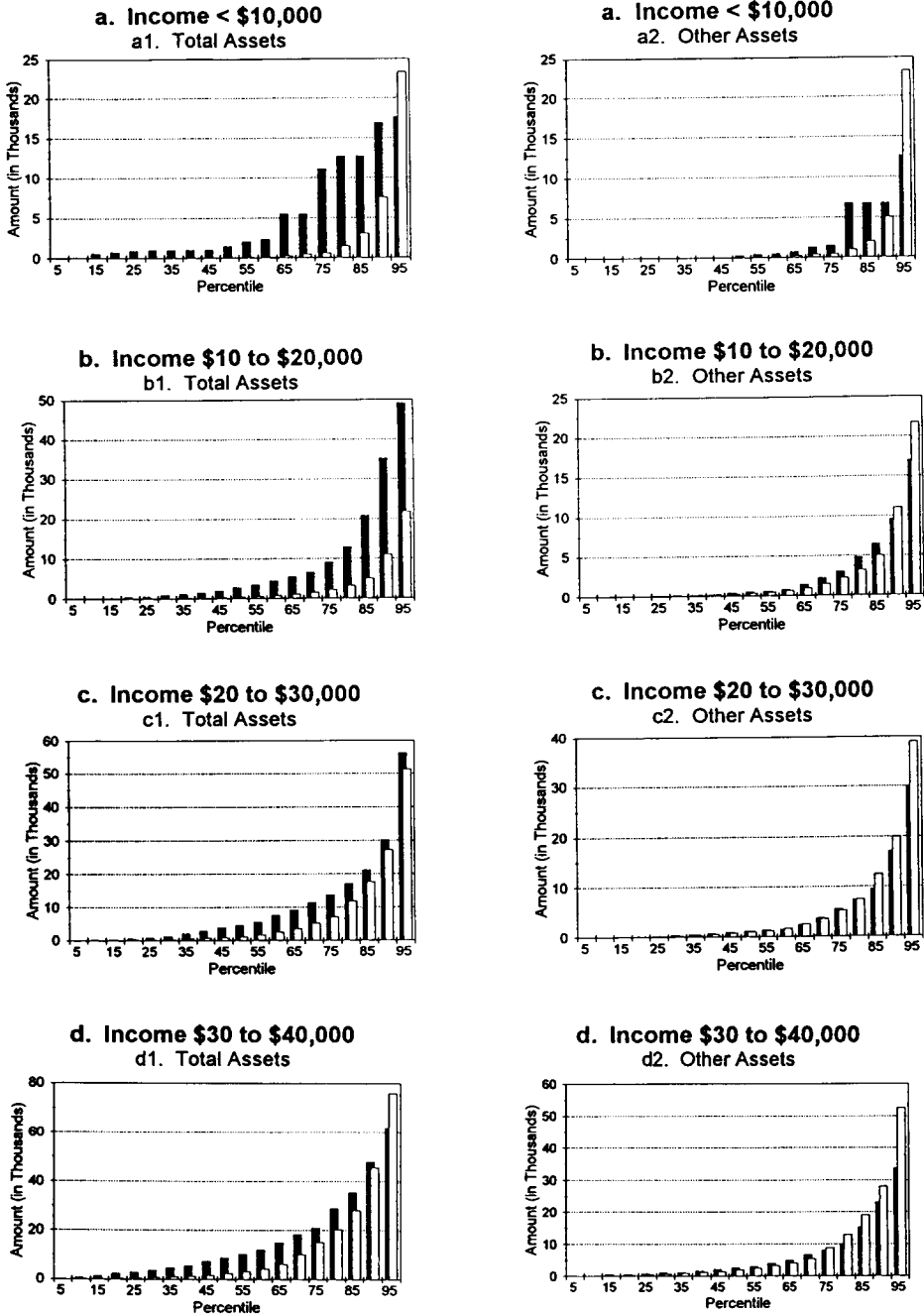


Fig. 5. Distribution of total and other assets, by income interval.

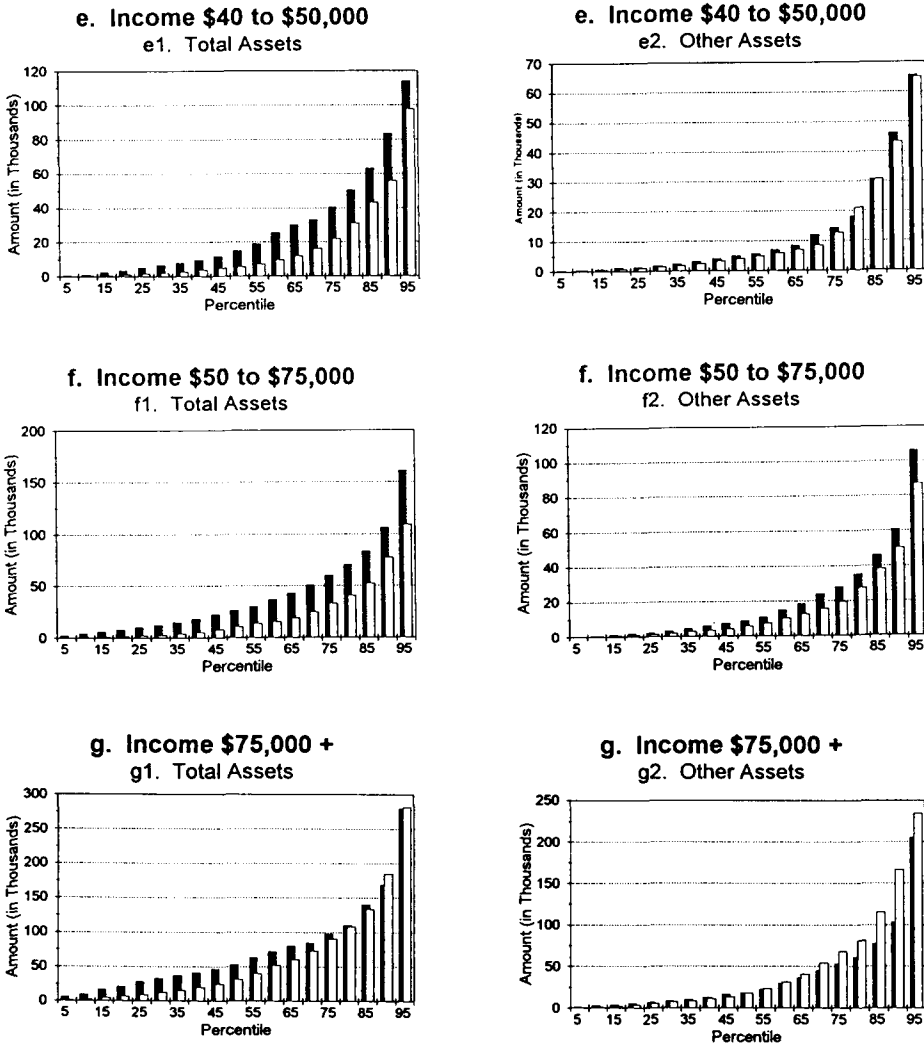


Fig. 5 (continued).

panel (b) of the table, and for families without IRAs in panel (c). In each case the key information is the change in other assets. In particular, we consider whether the non-401(k) saving of 401(k) eligible families declined between 1984 and 1991, as it would have if 401(k) saving substituted for other saving. Consider first all families not eligible for a 401(k). For this group there was essentially no change in the median of non-IRA financial assets, or in the median of total assets, between 1984 and 1991. The other

Table 5
Median asset balances (1987 \$) by 401(k) eligibility and IRA status, 1984, 1987, and 1991*

Eligibility status and asset category	1984	1987	1991	1987 overall median
<i>(a) All families</i>				
Eligible for a 401(k)				
Total financial assets	-	16,763	19,608 (572)	10,330
Non-IRA-401(k) assets	6,924 (202)	6,796	7,037 (191)	4,000
IRA	982 (52)	1,205	1,112 (49)	0
401(k)	-	2,054	2,964 (125)	1,000
Not eligible for a 401(k)				
Total financial assets	4,516 (81)	4,607	4,573 (110)	1,870
Non-IRA-401(k) assets	3,075 (50)	3,010	3,025 (68)	1,300
IRA	-	-	-	-
<i>(b) Families with an IRA</i>				
Eligible for a 401(k)				
Total financial assets	-	37,882	44,432 (1884)	30,600
Non-IRA-401(k) assets	16,881 (958)	16,032	17,212 (936)	12,000
IRA	5,691 (532)	8,861	9,510 (520)	8,000
401(k)	-	4,448	6,814 (463)	2,900
Not eligible for a 401(k)				
Total financial assets	20,686 (736)	23,537	27,094 (1053)	19,646
Non-IRA-401(k) assets	13,098 (577)	13,269	13,355 (822)	9,700
IRA	5,348 (237)	7,826	9,335 (340)	7,500
<i>(c) Families without an IRA</i>				
Eligible for a 401(k)				
Total financial assets	-	5,748	7,013 (309)	3,900
Non-IRA-401(k) assets	2,992 (143)	2,737	2,757 (133)	1,923
401(k)	-	629	1,413 (92)	225
Not eligible for a 401(k)				
Total financial assets	1,261 (25)	1,202	1,210 (34)	623
Non-IRA-401(k) assets	1,261 (25)	1,202	1,210 (34)	623

* Evaluated at the mean of the demographic variables. The standard errors pertain to the difference from the 1987 median.

financial asset median was \$3,075 in 1984 and \$3,025 in 1991. In contrast, the total median of 1991 eligible families was 17% larger than the 1987 median and the increase over 1984 was undoubtedly much larger.⁹ The median of other financial assets of the eligibles remained virtually unchanged; it was \$6,924 in 1984 and \$7,037 in 1991. Thus these data show no evidence of substitution of 401(k) saving for other financial asset saving.

⁹ Data on 401(k) asset balances are not available for 1984, but it may be assumed that the median balance was very low near the outset of the 401(k) program.

Similar results are obtained if the groups are defined more narrowly, again considering medians by 401(k) eligibility but considering separately families with and without IRAs. Consider first families without an IRA. There was essentially no change in the assets of families not eligible for a 401(k). In addition, these data highlight the extremely low saving of the typical family without an IRA; the medians evaluated at the mean levels of income, age, education, and marital status are about \$1,200. The overall medians are even lower, between \$600 and \$700. There was essentially no change in the other assets of the 401(k) eligible families without an IRA, but there was a substantial increase in the total assets of these families, from \$5,748 to \$7,013 between 1987 and 1991 alone. There is no evidence of substitution between 401(k) and other financial assets.

Families who have chosen to open an IRA account and are eligible for a 401(k) have the highest levels of financial asset saving and their assets increased by 17%, from \$37,882 to \$44,432, between 1987 and 1991 alone. Again, however, there was no decline in the other financial assets of this group; the estimated median was \$16,881 in 1984 and \$17,212 in 1991. The total financial assets of non-eligible families with an IRA increased from \$20,686 to \$27,094 between 1984 and 1991, reflecting the increase in the IRA assets of this group. But again, there was essentially no change in the other assets of the group—\$13,098 in 1984 and \$13,355 in 1991.¹⁰

Eligible and non-eligible families had about the same level of IRA assets in 1984 and the increase between 1984 and 1991 was essentially the same for the two groups. The fact that both eligibility groups had the same level of IRA assets in 1984, and almost identical increases, suggests little substitution between 401(k) and IRA assets. Further analysis of this issue is presented in the next section.

The like family groupings discussed above are defined by whether the family has an IRA account and, within these groups, by 401(k) eligibility. An alternative grouping is based only on whether the family has a 401(k) or an IRA account. We have considered three such comparisons: (1) families with only a 401(k) compared with families without a 401(k); (2) families with only an IRA compared with families without an IRA; and (3) families with both accounts compared with families with neither. We have chosen these groupings to distinguish the saving effects of the two programs and to minimize the potential for confounding the fall in IRA contributions—caused by the Tax Reform Act of 1986—with the change in other financial assets.

The results based on medians are presented in Table 6 and mean results are shown in Table A.3 in the appendix. The median comparisons typically show either that there was no change in the other financial assets of families

¹⁰ These findings are consistent with earlier studies by Venti and Wise (1990, 1991), and inconsistent with the work of Gale and Scholz (1994) on IRAs.

Table 6
 Conditional median assets (1987 \$s), by comparison group, 1984, 1987, and 1991

Family and asset category	1984	1987	1991
401(k)			
<i>Families with 401(k)</i>			
Total financial assets	–	8,566	9,808 (653)
Other than 401(k) or IRA	3,723 (2110)	2,587	2,498 (180)
401(k)	–	3,145	4,424 (312)
Debt	1,153 (152)	1,247	1,240 (131)
<i>Families without 401(k)</i>			
Total financial assets	3,570 (83)	3,602	3,312 (112)
Non-IRA	2,472 (60)	2,339	2,145 (81)
IRA			
<i>Families with IRA:</i>			
Total financial assets	19,068 (738)	20,969	23,892 (1035)
Other than IRA	11,595 (476)	10,818	10,717 (667)
IRA	5,343 (192)	7,680	8,957 (269)
Debt	674 (33)	654	573 (46)
<i>Families without IRA:</i>			
Total financial assets	1,274 (38)	1,274	1,509 (47)
Non-401(k)	1,180 (31)	1,091	1,069 (38)
401(k) and IRA			
<i>Families with IRA and 401(k):</i>			
Total financial assets	–	42,655	45,724 (2,586)
Other than IRA or 401(k)	15,653 (1,356)	16,795	16,253 (1,269)
IRA	5,504 (578)	9,286	9,412 (538)
401(k)	–	6,929	9,373 (865)
IRA and 401(k)	– (177)	18,265	27,837 (998)
Debt	751 (108)	814	831 (102)
<i>Families with neither IRA nor 401(k):</i>			
Total financial assets	1,060 (25)	972	939 (32)

See references to Table 5.

with the account(s) and a decline in the other financial assets of families without the account(s), or, a small decline in the other assets of families with the account(s) and a similar decline for families without the account(s). The mean comparisons typically show little or no decline in the other assets of families with the account(s) and a decline in the other assets of families without the account(s). Thus we believe that the alternative grouping supports our conclusion of little substitution between special retirement plan saving and other financial asset saving.

5. Substitution between 401(k)s and IRAs

Whether 401(k) saving increases personal saving depends on the extent to which saving through these programs substitutes for conventional saving. We find that, for the most part, it does not. This finding is inconsistent with the view that individuals treat all forms of saving as perfect substitutes. We now pursue the question of substitutability further by considering the extent to which 401(k)s and IRA plans are themselves treated as close substitutes. If different forms of saving tend to be treated as close substitutes in general, then surely these plans, with their similar tax treatment and focus on retirement saving, might be expected to be very close substitutes. But the data on aggregate contributions to 401(k) plans and IRAs, graphed in Fig. 1 above, cast doubt on this view.

We consider two aspects of the substitution between 401(k)s and IRAs. First, we examine the relationship between 401(k) eligibility and the IRA contribution rate in 1982, at the outset of the 401(k) and IRA programs, and again in 1987, after the 1986 legislation. Second, we consider the relationship between 401(k) eligibility and the fall in the IRA contribution rate between 1982 and 1987. We are concerned with whether the decline in IRA contributions during the 1980s is the result of the growing availability of 401(k) plans. Because employer matching makes the typical 401(k) plan more advantageous than an IRA, one might expect the IRA contribution rate to be lower for persons who could take advantage of the more generous 401(k) opportunity. One might also expect that the 1986 legislation would reduce IRA contributions more for persons who had the option of making a 401(k) contribution than for those who did not. Actual experience, however, is not consistent with these expectations.

We estimate the difference in IRA contribution rates by 401(k) eligibility status and income level in 1982 and in 1987, as well as the *difference* in the change in IRA contribution rates for 401(k)-eligibles and non-eligibles between 1982 and 1987. The data for the 1982 tax year were obtained from the May 1983 Current Population Survey and supplemental Survey of Retirement and Pension Plan Coverage. The data for the 1987 tax year were

obtained from the May 1988 Current Population Survey and supplemental Survey of Employee Benefits.

We use a basic ANOVA specification of the form

$$C_i = \sum_{j=1}^7 \delta_j Y_{ij} + \sum_{j=1}^7 \theta_j (Y_{ij} \times E_i) + \sum_{j=1}^7 \phi_j (Y_{ij} \times D87_i) + \sum_{j=1}^7 \psi_j (Y_{ij} \times E_i \times D87_i) + \epsilon_i, \quad (12)$$

where C_i is an indicator variable for whether household i contributed to an IRA, $D87_i$ is an indicator variable for 1987, and the other variables are as defined in Eq. (7). For a given income subgroup (j), Eq. (12) implies IRA contribution rates by year and 401(k) eligibility status as shown in Table 7. Thus θ_j is the difference between the contribution rates of 401(k) eligible and non-eligible households in the j th income interval in 1982, and $\theta_j + \psi_j$ is the difference in 1987. In particular, we are interested in whether θ_j and $\theta_j + \psi_j$ are significantly less than zero. The difference between the change (decline) in the IRA contribution rates of 401(k) eligible and non-eligible households after 1986 is indicated by ψ_j . Negative values of ψ_j would imply a greater decline for 401(k) eligibles.

Estimates of the parameters in Eq. (12) are shown in Table 8. These estimates, based on data from the 1983 and 1988 Current Population Surveys, can be used to find IRA contribution rates in 1982 and in 1987 by income interval, as in the decomposition above. The rates are graphed in Fig. 6. Three findings are important. First, controlling for income, the percent of 401(k) eligibles who contributed to an IRA in 1982 was very close to the percent of non-eligibles who contributed. The contribution rates are significantly different only for the $< \$10,000$ and $> \$75,000$ income groups, and for these groups the percent of eligibles contributing to IRAs is *higher* than the percent of non-eligibles. If IRAs and 401(k)s were treated as close substitutes, then IRA accounts would be less prevalent among those eligible for a 401(k). Thus this fact casts doubt either on standard assumptions about household saving behavior, or on the assumption that IRAs and 401(k)s are close substitutes.

Second, the pattern of decline in IRA contributions after 1986 is inconsistent with a high degree of substitution between IRAs and 401(k)s, except possibly at higher-income levels. Given the changes in the Tax

Table 7

	1982	1987
Not eligible for 401(k)	δ_j	$\delta_j + \phi_j$
Eligible for 401(k)	$\delta_j + \theta_j$	$\delta_j + \theta_j + \phi_j + \psi_j$

Table 8
IRA contribution rate by 401(k) eligibility status

Variable	Parameter estimate	Standard error
<i>Income interval Y:</i>		
<10 K	0.1186	0.0048
10–20	0.1607	0.0049
20–30	0.2427	0.0064
30–40	0.3679	0.0102
40–50	0.5046	0.0177
50–75	0.5924	0.0211
75 +	0.6446	0.0292
<i>Y * E:</i>		
<10 K	0.0904	0.0232
10–20	0.0238	0.0165
20–30	-0.0133	0.0173
30–40	0.0239	0.0268
40–50	-0.0420	0.0436
50–75	-0.0402	0.0554
75 +	0.2092	0.0958
<i>Y * D₈₇:</i>		
<10 K	-0.0464	0.0079
10–20	-0.0644	0.0073
20–30	-0.0849	0.0091
30–40	-0.1848	0.0136
40–50	-0.2625	0.0228
50–75	-0.3269	0.0269
75 +	-0.2721	0.0412
<i>Y * E * D₈₇:</i>		
<10 K	-0.0345	0.0298
10–20	0.0021	0.0199
20–30	-0.0044	0.0205
30–40	-0.0321	0.0299
40–50	-0.0472	0.0479
50–75	-0.0297	0.0602
75 +	-0.2950	0.1036

Source: Authors' estimates using 1983 and 1988 Current Population Surveys. Estimates are based on Eq. (12) in the text.

Reform Act of 1986, one would have expected little change in IRA contribution behavior at low-income levels, and the greatest response among high-income households that were eligible for a 401(k) plan. The estimates of ϕ_j show that actual IRA contribution percentages fell dramatically for all income groups after 1986. Moreover, the data show that the decline in the IRA contribution rate was largely independent of 401(k) eligibility. Only for the > \$75,000 income group was the *fall* in the

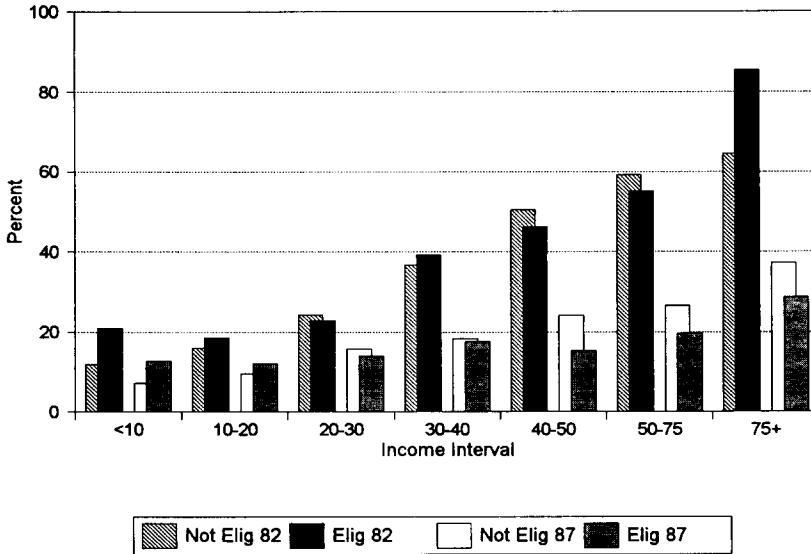


Fig. 6. IRA contribution rate, by 401(k) eligibility, 1982 and 1987.

contribution rate for 401(k) eligibles significantly greater than the fall in the contribution rate for the 401(k) non-eligibles. The growing utilization of the 401(k) option between 1985 and 1987 therefore cannot explain the drop in IRA contributions during this period.

Third, the pattern of contribution rates in 1987 suggests only a modest relationship between IRA contributions and 401(k) eligibility. The difference between 1987 contribution rates for eligibles and ineligibles is given by $\theta_j + \psi_j$ in Eq. (12). The estimates of this sum, and the associated standard errors, which are not shown in Table 8, are given in Table 9. The contribution rates for 401(k) eligibles are significantly lower than the rates for non-eligibles in income categories above \$40,000, the income categories in which IRA contributions are unlikely to be fully deductible. At lower-

Table 9

Income category	$\hat{\theta}_j + \hat{\psi}_j$
<10 K	0.0558 (0.0187)
10–20	0.0259 (0.0112)
20–30	–0.0177 (0.0109)
30–40	–0.0082 (0.0133)
40–50	–0.0892 (0.0198)
50–75	–0.0700 (0.0237)
75 +	–0.0858 (0.0394)

income levels, however, there is little relationship between IRA participation and the availability of a 401(k) plan. Indeed, the IRA participation rate for eligibles is significantly higher than the rate for non-eligibles in the two lowest income intervals. This suggests that for households that remained eligible for tax-deductible IRAs after the 1986 tax reform, 401(k) saving did not displace IRA saving. Taken together, the results suggest that IRA contributions were curtailed as a result of the 1986 tax reform but not displaced by 401(k)s. Even two saving instruments that would appear to be close substitutes, IRAs and 401(k)s, apparently are not treated as such by most U.S. households.

6. Conclusions and discussion

Contributions to 401(k) plans grew continuously over the 1980s, and these plans are still growing rapidly. In 1980, IRAs and 401(k)s accounted for less than 5% of targeted retirement saving, and employer-provided defined benefit pension plans accounted for 59%. By 1988, however, 401(k)s and IRAs accounted for 47% of retirement saving. Although IRAs have been the topic of considerable public debate and economic analysis, 401(k)s have received little attention.

Our analysis of household saving data from the SIPP yields two basic conclusions. The first is that 401(k) saving is not treated as a close substitute for conventional financial saving. The second is that even 401(k)s and IRAs, although both intended for retirement saving and with similar tax incentive and other provisions, are not close substitutes. Thus contributions to 401(k) plans represent largely net additions to personal saving. An analysis by Venti and Wise (1993) finds little substitution between these forms of saving and employer-provided pension assets, and Hoynes and McFadden (1994) find little substitution between these and other forms of personal financial asset saving and housing wealth.

In addition to these results, other findings also bring into question standard assumptions about saving behavior. The reduction of IRA saving after the Tax Reform Act of 1986 is one example. Even taxpayers whose contributions remained tax-deductible reduced their IRA contribution rate by 40%–50%. Higher-income families virtually stopped contributing. This suggests that the promotion of saving plans may have an important effect on their use, and that an up-front tax deduction may be an important determinant of contribution behavior. Another example is that even though a 401(k) plan is more attractive than an IRA for the typical family, we find no evidence of lower IRA contributions among families eligible for a 401(k). Such findings bring into question the extent to which different forms of saving are treated as perfect substitutes, as well as the extent to which

individual saving behavior is determined largely by rate of return calculations. Our analysis suggests that standard assumptions about the determinants of saving behavior leave important aspects of actual saving unexplained, and thus encourage us to look more broadly for explanations of saving behavior.

Acknowledgments

We are grateful to the National Institute on Aging (grant no. 5 P01 AG05842), the National Science Foundation (Poterba), the Center for Advanced Study in Behavioral Sciences (Poterba), and the Hoover Institution (Wise) for financial support. B. Douglas Bernheim, Jonathan Gruber, Jonathan Skinner, and two anonymous referees provided comments at an earlier stage of this project.

Appendix

Table A.1
Conditional mean asset balances by 401(k) eligibility and income

Asset category and eligibility status	Income						
	<10	10–20	20–30	30–40	40–50	50–75	>75
<i>(a) Results for 1991 (1991 \$s)</i>							
Total financial assets							
Eligible for a 401(k)	6,736	12,665	14,411	19,270	30,147	45,132*	81,066*
Not eligible for a 401(k)	5,870	8,853	11,159	19,103	23,488	24,592	71,304
Non-IRA-401(k) assets							
Eligible for a 401(k)	2,858	5,202	7,995	9,692	15,072	24,700	46,498*
Not eligible for a 401(k)	4,238	6,476	8,629	15,250	18,295	18,326	60,120
401(k) assets							
Eligible for a 401(k)	1,206	4,328*	3,864*	6,880*	11,155*	13,825*	23,368*
Not eligible for a 401(k)	0	0	0	0	0	0	0
IRA assets							
Eligible for a 401(k)	2,042	2,506	2,222	2,068	3,290	5,977	10,570
Not eligible for a 401(k)	1,074	1,568	1,872	3,214	4,497	5,702	10,994
<i>(b) Results for 1987 (1987 \$s)</i>							
Total financial assets							
Eligible for a 401(k)	5,735	7,567	13,790*	17,798	21,171	62,843*	78,949*
Not eligible for a 401(k)	5,753	6,943	9,876	14,241	19,006	28,904	55,540
Non-IRA-401(k) assets							
Eligible for a 401(k)	3,823	4,045	9,321	10,104	11,963	26,647	51,391
Not eligible for a 401(k)	4,409	5,504	7,910	11,405	15,443	23,188	47,810
401(k) assets							
Eligible for a 401(k)	695	2,154*	2,489*	4,817*	5,807*	9,124*	16,778*
Not eligible for a 401(k)	0	0	0	0	0	0	0
IRA assets							
Eligible for a 401(k)	1,183	1,334	1,947	2,842	3,367	5,867	10,745*
Not eligible for a 401(k)	1,310	1,393	1,891	2,789	3,545	5,822	7,975
<i>(c) Results for 1984 (1984 \$s)</i>							
Non-IRA-401(k) assets							
Eligible for a 401(k)	3,311	5,776	6,107	9,860	13,233	21,261	67,372
Not eligible for a 401(k)	3,877	6,091	7,577	11,318	16,337	24,053	62,400
IRA assets							
Eligible for a 401(k)	636	771	875	1,413	2,068	3,963	5,040
Not eligible for a 401(k)	519	898	1,236	1,760	2,367	3,555	4,504

* Difference between eligibles and non-eligibles is significant at the 95% confidence level.

Table A.2

Conditional mean asset balances (1987 \$s) by 401(k) eligibility and IRA status, 1984, 1987, and 1991

Eligibility status and asset	1984	1987	1991
<i>(a) All families</i>			
Eligible for a 401(k)			
Total financial assets	-	27,550	32,387 (1,535)
Non-IRA-401(k) assets	17,032 (1,510)	17,285	18,004 (1,324)
IRA	2,267 (246)	4,092	4,867 (216)
401(k)	-	6,172	9,506 (415)
Not eligible for a 401(k)			
Total financial assets	13,049 (567)	13,480	15,821 (773)
Non-IRA-401(k) assets	11,506 (546)	10,960	13,071 (743)
IRA	1,543 (83)	2,520	3,297 (113)
<i>(b) Families with an IRA</i>			
Eligible for a 401(k)			
Total financial assets	-	50,935	63,509 (3,362)
Non-IRA-401(k) assets	32,750 (3,516)	30,891	35,042 (3,056)
IRA	6,312 (534)	10,260	13,626 (464)
401(k)	-	9,784	14,814 (899)
Not eligible for a 401(k)			
Total financial assets	34,538 (1,810)	36,446	49,599 (2,512)
Non-IRA-401(k) assets	28,135 (1,760)	26,768	35,825 (2,442)
IRA	6,404 (243)	9,678	13,774 (337)
<i>(c) Families without an IRA</i>			
Eligible for a 401(k)			
Total financial assets	-	12,033	14,352 (1,292)
Non-IRA-401(k) assets	7,500 (1,223)	8,258	8,038 (1,076)
401(k)	-	3,775	6,326 (398)
Not eligible for a 401(k)			
Total financial assets	5,895 (406)	5,396	4,898 (550)
Non-IRA-401(k) assets	5,895 (406)	5,396	4,898 (550)

See references to Table 5.

Table A.3

Conditional mean assets (1987 \$s), by comparison group, 1984, 1987, and 1991

Family and asset category	1984	1987	1991
401(k)			
<i>Families with 401(k)</i>			
Total financial assets	-	16,567	18,486 (1,974)
Other than 401(k) or IRA	9,016 (2,024)	9,702	8,728 (1,646)
401(k)	-	6,865	9,783 (600)
Debt	3,261 (380)	3,071	3,223 (309)
<i>Families without 401(k)</i>			
Total financial assets	13,354 (562)	13,375	14,486 (743)
Non-IRA	11,782 (536)	10,878	11,342 (709)
IRA			
<i>Families with IRA:</i>			
Total financial assets	35,386 (1,785)	35,617	45,714 (2,396)
Other than IRA	28,954 (1,724)	26,076	32,244 (2,314)
IRA	6,433 (239)	9,542	13,472 (321)
Debt	4,389 (890)	3,580	4,996 (1,194)
<i>Families without IRA:</i>			
Total financial assets	6,325 (409)	6,519	7,381 (504)
Non-401(k)	6,328 (400)	5,880	5,447 (494)
401(k) and IRA			
<i>Families with IRA and 401(k):</i>			
Total financial assets	-	59,224	67,812 (4,485)
Other than IRA or 401(k)	34,569 (4,811)	35,016	35,941 (4,018)
IRA	6,455 (671)	10,992	13,596 (560)
401(k)	-	13,215	18,065 (1,128)
IRA and 401(k)	-	24,208	31,661 (1,329)
Debt	3,831 (875)	3,552	2,882 (731)
<i>Families with neither IRA nor 401(k):</i>			
Total financial assets	6,107 (395)	5,488	4,779 (520)

See references to Table 5

References

- Andrews, Emily S., 1992, The growth and distribution of 401(k) plans, in: J. Turner and D. Beller, eds., *Trends in pensions 1992* (U.S. Department of Labor, Washington, DC).
- Bernheim, B. Douglas and John B. Shoven, 1988, Pension funding and saving, in: Z. Bodie, J. Shoven and D. Wise, eds., *Pensions in the U.S. economy* (University of Chicago Press, Chicago, IL).
- Gale, William G. and John Karl Scholz, 1994, IRAs and household saving, *American Economic Review*, in press.
- Hausman, Jerry A. and James M. Poterba, 1987, Household behavior and the Tax Reform Act of 1986, *Journal of Economic Perspectives* 1, 101–119.
- Hoynes, Hilary W. and Daniel McFadden, 1994, The impact of demographics on housing and non-housing wealth in the United States, NBER Working Paper 4666, March.
- Kusko, Andrea, James Poterba, and David Wilcox, 1994, Employee decisions with respect to 401(k) plans: Evidence from individual-level data, NBER Working Paper 4635, February.
- Papke, Leslie, 1994, Participation in and contributions to 401(k) plans, *Journal of Human Resources*, in press.
- Piacentini, Joseph S. and Jill D. Foley, 1992, *EBRI data book on employee benefits*, 2nd edn. (Washington, DC).
- Poterba, James M., Steven F. Venti and David A. Wise, 1994, 401(k) plans and tax-deferred saving, in: D. Wise, ed., *Studies in the economics of aging* (University of Chicago Press, Chicago, IL).
- Rogers, William, 1992, Quantile regression standard errors, *Stata Technical Bulletin* 9, 16–19.
- Shefrin, Hersh M. and Richard Thaler, 1988, The behavioral life-cycle hypothesis, *Economic Inquiry* 26, 609–643.
- U.S. General Accounting Office, 1988, *401(k) plans: Incidence, provisions, and benefits* (General Accounting Office, Washington, DC).
- Venti, Steven F. and David A. Wise, 1990, Have IRAs increased U.S. saving?: Evidence from the Consumer Expenditure Surveys, *Quarterly Journal of Economics* 105, 661–698.
- Venti, Steven F. and David A. Wise, 1991, The saving effect of tax-deferred retirement accounts: Evidence from SIPP, in: B.D. Bernheim and J.B. Shoven, eds., *National saving and economic performance* (University of Chicago Press, Chicago, IL).
- Venti, Steven F. and David A. Wise, 1992, Government policy and personal retirement saving, *Tax Policy and the Economy* 6, 1–41.
- Venti, Steven F. and David A. Wise, 1993, The wealth of cohorts: Retirement saving and the changing assets of older Americans, NBER Working Paper 4600, December. Forthcoming in: *Public policy toward pensions* (Wyatt Company).