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## Do 401(k) Plans Replace Other Employer-Provided Pensions?

Leslie E. Papke, Mitchell Petersen, and James M. Poterba

The rapid growth of 401(k) plans is one of the most striking trends in retirement saving during the last decade. These plans allow employees to defer income, to take advantage of generous employer matching provisions on some contributions, and to accumulate assets at the pretax rate of return. Strong employee demand for 401(k) plans is undoubtedly part of the explanation for their expansion during the 1980s. So too are various changes in the tax and regulatory treatment of defined-benefit (DB) pension plans that were enacted in the 1981 and 1984 tax reform bills and especially in the 1986 tax reform bill. These changes reduced employers' willingness to provide DB plans for their employees and contributed to the growth of defined-contribution (DC) pension plans, including 401(k)s.

A growing body of evidence suggests that 401(k) contributors do not offset their contributions by reducing their accumulation of other financial assets (see Poterba, Venti, and Wise 1994, 1995). This does not *necessarily* mean that 401(k) contributions represent net additions to private saving, however, since they could be offset by reduced contributions to other pension plans. In particular, if 401(k) plans have replaced other types of private pension arrangements, then their net effect on private saving may be smaller than the contribution flow to these plans would otherwise suggest.

To investigate the degree of substitution between 401(k) plans and other

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employer-provided retirement saving arrangements, and to obtain firm-level information on these plans more generally, we surveyed a stratified random sample of firms with 401(k) plans in 1987. We asked 401(k) plan administrators about the origins of their plan, in particular whether it replaced another pension plan for covered employees. We also inquired about various detailed provisions of the plan, including participation rates, employer matching rules, loan and hardship withdrawal provisions, and whether the plan had been affected by antidiscrimination rules.

This paper, which summarizes the results from our survey, is divided into six sections. Section 7.1 summarizes aggregate trends in contributions to 401(k) plans and other employer-provided pension plans, and describes the changing institutional environment in which firms select DB and DC pension plans. Section 7.2 explains our sample survey design, and presents summary statistics on the set of 401(k) plans in our sample. Section 7.3 reports our findings on the interaction between 401(k) plans and other retirement plans. We find that 401(k) plans do not appear to have displaced previous DB plans for many workers, but that these plans did in many cases replace preexisting DC thrift and profit-sharing plans.

The next two sections summarize the characteristics of 401(k) plans in our sample. Section 7.4 describes the pattern of participation rates and employer matching rates over time, and explores the links between these plan attributes. Section 7.5 explains the structure of antidiscrimination rules, describes their changes over time, and summarizes their effects on the 401(k) plans in our sample. There is a brief conclusion.

## **7.1 Trends in Defined-Benefit and Defined-Contribution Pension Plans**

The 1980s witnessed a substantial change in the relative flows of contributions to DB and DC pension plans. This was the result of at least two coincident developments. First, Bernheim and Shoven (1988) argue that high investment returns on existing DB plans reduced required contributions to DB plans in the mid-1980s. A second factor, explored in Chang (1991), Kruse (1995), and Silverman (1993), was the changing regulatory and tax environment in the 1980s.

The changing regulatory treatment of DB and DC pension plans began with the Employee Retirement and Income Security Act of 1974 (ERISA).<sup>1</sup> ERISA imposed minimum plan standards for participation, vesting, and retirement, as well as requirements for funding past-service liability. It also established the Pension Benefit Guaranty Corporation (PBGC) to insure pension benefits to employees in DB plans, and financed this insurance program with taxes on existing plans. ERISA placed a lower regulatory burden on DC plans, which were subject only to the minimum plan standards that also affected DB plans.

1. Clark (1987) and Beller and Lawrence (1992) discuss these issues in more detail.

Legislation since ERISA has raised PBGC premiums, required faster funding of liabilities, and penalized employers for claiming excess assets of terminated DB plans. The Tax Equity and Fiscal Responsibility Act of 1982 imposed faster vesting schedules for lower-paid employees in so-called top-heavy plans. The Tax Reform Act of 1986 (TRA86) imposed an excise tax of 10% on excess pension plan assets that revert to an employer upon termination of a pension plan. Subsequent legislation raised this tax to 20%, effective in 1990, and to 50% if the employer does not transfer a portion of the excess assets to a replacement plan, or increase benefits under the terminating plan.

The 1987 Omnibus Budget Reconciliation Act increased the basic PBGC premium from \$8.50 to \$16.00 per participant, and added a variable premium that depends on the plan's degree of underfunding. It also limited the tax deduction for plan contributions to 150% of the plan's termination liability; this had the effect of reducing employer contributions to DB plans (see Chang 1993). The net effect of these tax and regulatory changes has been a marked increase in the administrative cost, and a decrease in the benefits to employers from establishing DB pension plans.

Table 7.1 reports the number of DC and DB pension plans, the number of participants in these plans, and the level of contributions to these plans from 1975 to 1989. The table shows that the number of DC plans more than doubled between 1975 and 1982, and then rose by 50% again between 1982 and 1989. The number of DB plans increased during 1975–82, but the increase was slower than that for DC plans. Between 1982 and 1989, however, the number of DB plans actually *declined*. The second column in table 7.1 shows the total number of participants in DB and DC plans, which includes both working and retired participants. The number of participants in DB plans peaked in 1984 and has declined slightly in subsequent years. The number of *active* participants, current employees participating in DB plans, peaked in 1981, and has declined by several million since then. In contrast, the number of DC plan participants increased throughout the 1980s, although not as quickly as the number of DC plans. This reflects the growth of relatively small DC plans, particularly 401(k) plans, in recent years.

The last column in table 7.1 tracks contributions to DC and DB pension plans. The disparity between the contribution series is even more dramatic than that between the number of participants or the number of plans. DC plan contributions increased from \$23.5 billion in 1980 to \$80.1 billion in 1989, with \$46.1 billion of the 1989 total accounted for by 401(k) contributions. Contributions to DB plans, however, peaked at \$48.4 billion in 1982, and then declined to only \$24.9 billion by 1989. The rapid growth in contributions to DC plans is largely due to the growth of 401(k) plans. Without them, contributions to DC plans would have been only \$34 billion in 1989.

There are at least two reasons why 401(k) plans may have grown faster than other DC plans during the 1980s. First, 401(k)s offered tax advantages relative to the profit-sharing and thrift plans that they often replaced. The opportunity for employees to defer tax on a substantial share of their salary was, and contin-

Table 7.1 Trends in Pension Plans, Participants, and Contributions

Year	Plans (thousands)	Participants (millions)	Contributions (billions of \$)
<i>Defined-Contribution Plans (401 (k) in parentheses)</i>			
1975	207.7	11.5	12.8
1976	246.0	13.5	14.2
1977	281.0	15.2	15.9
1978	314.6	16.3	18.4
1979	331.4	18.3	20.7
1980	340.8	19.9	23.5
1981	378.3	21.7	28.4
1982	419.5	24.6	31.1
1983	426.6 (1.7)	29.1 (4.4)	36.1
1984	435.4 (17.3)	32.9 (7.5)	43.4 (16.3)
1985	462.0 (29.9)	35.0 (10.3)	53.2 (24.3)
1986	545.0 (37.4)	36.7 (11.6)	58.3 (29.2)
1987	570.0 (45.1)	38.3 (13.1)	62.3 (33.2)
1988	584.0 (68.1)	37.0 (15.5)	64.9 (39.4)
1989	599.0 (83.3)	36.5 (17.3)	80.1 (46.1)
<i>Defined-Benefit Plans</i>			
1975	103.3	33.0	24.2
1976	114.0	34.2	28.5
1977	121.7	35.0	31.2
1978	128.4	36.1	27.6
1979	139.5	36.8	40.6
1980	148.1	38.0	42.6
1981	167.3	38.9	47.0
1982	175.0	38.6	48.4
1983	175.1	40.0	46.3
1984	168.0	41.0	47.2
1985	170.2	39.7	42.0
1986	172.6	40.0	33.2
1987	163.1	40.0	29.8
1988	146.0	40.7	26.3
1989	132.5	40.0	24.9

Source: Data are drawn from U.S. Department of Labor (1993).

ues to be, an important attraction of these plans. Second, 401(k)s are more flexible than many other pension arrangements. Since each eligible employee can determine the amount of saving he or she does through the 401(k) plan, these plans are likely to be more attractive at firms with heterogeneous workforces. Finally, from the firm's perspective, 401(k) plans may cost less for a given level of employer contribution to the median employee.<sup>2</sup> With other DC

2. The median employee may be critical in determining how the firm's wage payments adjust to the level of employer contribution. Provided there is some trade-off between wages and pension benefits from the worker's perspective, the net cost of an employer pension contribution is smaller than the amount of this contribution.

plans, the employer must contribute on behalf of all eligible workers. Even though participation in 401(k) plans is high, however, not all eligible employees participate in these plans. For a given level of employer contribution per participating employee, therefore, the firm's total cost will be lower with a 401(k) than with other DC plans.

## 7.2 Sample Survey Design

It is not possible to study the substitution between 401(k) plans, DB pension plans, and other DC pension plans using the household-level data sets that underlie prior research on 401(k)s and household saving. Household data sets such as the Survey of Income and Program Participation and the Current Population Survey (CPS) do not collect sufficiently detailed information on the respondent's pension arrangements. In addition, neither of these data sets contains any information on the pension arrangements at the respondent's firm *before* the 401(k) option became available.<sup>3</sup>

To remedy these data deficiencies, we prepared a new survey instrument and mailed it to a subset of U.S. corporations. Our questionnaire draws heavily on a General Accounting Office survey in 1987 (see U.S. GAO 1988a, 1988b), but includes additional questions on the origins of the 401(k) plan at the survey firm, whether it had replaced a previous DB or DC plan, and the degree of overlap between 401(k) and other pension coverage for the firm's employees. We also queried firms about both the *current* structure of their 401(k) plan and historical attributes of their plan. This enables us to chart patterns in 401(k) participation and contributions *conditioning* on a firm effect.

We obtained addresses for 401(k) plan administrators from IRS form 5500 data filings for 1987, the most recent year for which public use data were available when we mailed our questionnaires. Given the skewed size distribution of 401(k) plans, the characteristics of the average plan may be quite different from the plan that is available to the average worker. To achieve some representativeness with respect to workers, we adopted a sampling scheme that assigned a higher sampling probability to larger plans.

Table 7.2 shows the number of 401(k) plans in the form 5500 database. We disaggregate plans by their number of participants, and show the selection probability we used to identify survey recipients as well as our response rate to date. We mailed 786 questionnaires. After a dismal first-round response of only 33 surveys, we designed a shorter follow-up survey, which we mailed to 100 nonrespondents. This was followed with a telephone call to explore the status of the survey and, if necessary, provide an opportunity for the 401(k) administrator to report information by telephone. This second-stage survey

3. The Health and Retirement Survey, which will become available for public use in the near future, includes more detailed data on pension arrangements. It will therefore be possible to study some of these substitution issues using that data set.

**Table 7.2** Sample Survey Design

Plan Size (participants)	Plans on 1987 Form 5500 Tape	Surveys Distributed	Usable Responses
0-500	7,380	275 (4%)	6
500-5,000	2,660	266 (10%)	13
>5,000	405	245 (60%)	24
Total	10,445	786	43

Source: Authors' tabulations from survey responses.

yielded another 10 usable responses. Much of our analysis is therefore based on data from 43 firms.<sup>4</sup>

Our survey response rate is disappointing, and raises important questions about the representativeness of the firms in our sample and the generality of our results. Our response rate is apparently similar, however, to typical response rates to mail surveys conducted by the Department of Labor. In light of the small sample size, the results below should be viewed with caution.

Table 7.3 reports summary characteristics for the 401(k) plans that responded to our survey. The overwhelming majority of these plans involve both a salary-reduction component and a company matching rate. This arrangement characterizes more than two-thirds of the plans and participants in our sample.

Table 7.3 also provides information on the distribution of company matching rates for 401(k)s. While 10% of the responding plans do not match employee contributions, these plans are smaller than average, and account for only 2% of the *participants* in our survey. Ten percent of the responding plans, representing nearly one-third of the participants, match employee contributions *dollar for dollar*. Nearly 90% of the participants in the responding 401(k) plans face matching rates of at least 25 cents per dollar contributed.

These results on matching rates are comparable to those in other surveys of 401(k) plans. The General Accounting Office (1988a) found that 51% of firms with 401(k) plans match employee contributions and that, conditional on matching, more than two-thirds provided at least a 25% matching contribution. A separate survey by the Massachusetts Mutual Life Insurance Company (1991) found that 20% of plans had matching rates of 100% or more, while 29% had no employer matching. Hewitt Associates' (1991) survey found that 84% of 401(k) plans provide some level of employer matching funds.

### 7.3 401(k) Plans and Other Pension Arrangements

One battery of questions on our survey inquired about how and why the 401(k) plan was established. We asked if the 401(k) plan was a new plan, or if

4. Four surveys were returned because the 401(k) plan no longer existed, for example, because the parent firm had ceased operations. We also received six responses indicating that the firms did not participate in surveys.

**Table 7.3** Summary Statistics and 401(k) Plan Characteristics (%)

	Simple Average	Participant-Weighted Average
Features of 401(k) plan		
Salary-reduction plan	84	83
Thrift plan	79	75
Profit-sharing plan	14	39
Section 125 flexible spending account	7	2
Contribution structure		
Employer contributions only	0	0
Salary reduction only	9	1
Salary reduction and company matching	70	69
Salary reduction and company discretionary	2	0*
Salary reduction, company matching, and company discretionary	19	30
Company matching rate (1990)		
0	10	2
0.01–0.25	10	9
0.26–0.50	41	37
0.51–0.75	23	19
0.76–0.99	0	0
1.00	10	30
>1.0	5	4

Source: Authors' tabulation of survey results.

\*Actual value was 0.46, which was rounded to 0.

it replaced another pension plan. Table 7.4 summarizes the survey responses. Forty-five percent of the responding firms, representing 37% of the 401(k) participants in our survey, indicated that another pension plan was *converted* to the 401(k).<sup>5</sup>

Two percent of the responding firms (one firm) reported that DB pension plans were terminated and replaced with a 401(k). Many more firms reported that they converted previous thrift plans or profit-sharing plans to 401(k)s. Our findings also suggest that at least half of the 401(k) plans did *not* replace previous plans. These results do not support the view that 401(k) contributions are simply a relabeling of contributions that were previously directed to other pension plans.

The motivation for converting thrift and profit-sharing plans to 401(k)s, as noted above, was that contributions to the former were made on an after-tax basis, while 401(k) contributions were made before employee taxes. In addition, until TRA86 tightened the limits on both 401(k) contributions and with-

5. This estimate is based on the thirty-three responses to our initial "long form" questionnaire. We have confirmed the survey responses for most of our sample firms by examining their 5500 filings. We find clear evidence for some firms that one or several DC plans were either terminated or ceased receiving contributions when the 401(k) plan was established.

**Table 7.4** 401(k) Plan Initiation Decisions (%)

	Simple Average	Participant-Weighted Average
Date when 401(k) plan started		
Before 1981	14	19
1981-83	16	30
1984-86	51	42
Since 1986	19	15
New plans <sup>a</sup>	55	63
Type of plan converted <sup>a</sup>		
Thrift/saving	53	49
Profit-sharing	40	50
Other	7	1
Why was plan started?		
Supplement primary defined-contribution plan	19	14
Supplement primary defined-benefit plan	63	66
Replace primary defined-contribution plan	9	6
Replace primary defined-benefit plan	2	17
Optional tax-deferred saving plan	58	59
Is the 401(k) the primary retirement plan? (% yes)	26	6
Percentage of 401(k) eligibles also covered by		
Defined-benefit plan		
1986	85	88
1990	73	82
Defined-contribution plan		
1986	37	32
1990	36	30
Percentage of 401(k) eligibles for whom the 401(k) is the <i>only</i> retirement plan		
1986	5	4
1990	19	10

Source: Authors' tabulations from survey responses.

<sup>a</sup>Questions that were not asked on the second-round survey; tabulations are based on thirty-three rather than forty-three responses.

drawals, 401(k)s offered a highly liquid and tax-favored means to accumulate assets. The limit on 401(k) contributions was \$30,000 per year until 1986, and with federal marginal tax rates of 50% on high-income individuals, the incentive to defer income and accumulate savings at the pretax rate of return was substantial.

The survey responses indicate that 401(k)s are typically supplemental plans, added to preexisting DB (63%) or DC (19%) plans. A direct test of whether 401(k) plans have replaced *all* other pension coverage is provided by our question on the fraction of 401(k) eligible workers who are also covered by other pension arrangements at the firm. In 1990, 82% of the participants in 401(k) plans were also covered by another DB plan at the same firm, and 30% were also covered by another DC plan. These responses are not exclusive: 401(k)

eligibles could be covered by both. The 401(k) was the *only* retirement plan for covered workers at 19% of the plans, representing 10% of the participants.

The survey findings on the extent of sole pension coverage by 401(k) plans can be compared with information based on published tabulations from the IRS form 5500 filings. For 1989, the most recent year for which data are available, the Department of Labor (1993) reports that 14% of the assets of 401(k) plans with at least one hundred employees were held in plans that were the only employer-sponsored pension plan for employees.<sup>6</sup> This suggests that, at most, a small fraction of current 401(k) plans could possibly have displaced all other pension arrangements at providing firms.

There is some indication that the pattern of pension plan coverage for 401(k) participants has been changing. Between 1986 and 1990, the share of 401(k) participants covered by another DB plan fell from 88% to 82%, and the share covered by another DC plan fell from 32% to 30%.<sup>7</sup> The fraction of 401(k) plans that represented the only pension coverage for participants rose during this period, but this increase was concentrated among smaller plans.

The disparity between the results in the first and second columns of table 7.4 suggests important differences between the roles played by 401(k) plans at large and small firms. Small firms are more likely to rely on 401(k)s as their primary retirement vehicle. The diffusion of 401(k)s across firms during the 1980s began with large firms; recent adopters are, on average, smaller than those with established plans.

The differences between large and small firms are apparent even in our small sample. The 401(k) was the only retirement plan for 14% of the workers at firms that started their 401(k) plans in 1986 or later, compared with only 7% of the workers at firms with plans that started before 1986. While 18% of the plans that began before 1986 are primary retirement plans, 40% of the post-1986 plans are primary plans.

The foregoing results suggest that only a small minority of firms replaced DB pension plans with 401(k) plans. Only one of our sample respondents, but a relatively large firm, indicated that this was the origin of the 401(k) plan. There is more evidence, although it applies at less than half of the firms with 401(k)s, that these plans replaced previous DC thrift plans. Estimating the size of the thrift-plan contribution flow that was redirected to 401(k)s requires more detailed information on these plans than our survey collected.

#### 7.4 401(k) Plan Characteristics and Participation Rates

One of the central questions about 401(k) plans, as well as other types of tax-deferred retirement saving programs, is the sensitivity of plan contributions

6. The 401(k) plans with at least one hundred participants accounted for \$41.5 billion of the \$46.1 billion of 401(k) contributions in 1989.

7. With our current sample size, we cannot reject the null hypothesis that the percentage of 401(k) eligibles covered by other plans was the same in 1986 and 1990.

to tax and other incentives. One strategy for analyzing this question is to compare the participation rates in 401(k)s with different employer matching rates. While the matching rate may be endogenous, it is not clear why one would expect a high matching rate as opposed to a high employer contribution at firms where large pools of workers want to participate in a 401(k).<sup>8</sup> In this case, the correlation between matching rates and participation rates may reflect firm decisions rather than employee decisions regarding the amount to save through the 401(k).

One unique feature of our data set is the presence of repeated observations on employee participation rates, as well as some aspects of the 401(k) plan such as the matching rate. This permits us to study the persistence of participation and contribution rates, as well as the intertemporal stability of employer matching rates.

Table 7.5 summarizes the joint distribution of the employer matching rate in 1986 and 1990. We present these data in a transition matrix, showing the pattern of matching rates in both 1986 and 1990. The table shows that there is very strong persistence in the matching rates that firms apply to employee contributions. Eighty-six percent of the firms responding to our survey applied the same matching rate in 1986 and 1990, and the relatively small number that did not changed relatively little. With one exception, the set of firms with zero matching rates in both years, this fraction is relatively insensitive to the choice between plan and participant weighting, as the similarity between the upper and lower panels of the table suggests.

Table 7.6 uses a format similar to table 7.5 to report information on employee participation rates in 401(k) plans in both 1986 and 1990. This table again suggests important stability. We divide firms into four participation-rate groups, and 78% of the plans are in the same group in 1986 and 1990. Larger plans are more likely than smaller firms to exhibit *high* participation rates, but they exhibit the same degree of stability as smaller firms. The panel B of table 7.6, which weights participation rates by plan size, shows that 90% of the 401(k) participants in 1990 were in plans with participation rates of 75% or more. In contrast, only 65% of the plans have participation rates this high. The distribution of participation rates provides a check on the representativeness of our sample. Weighting firms by their number of participants, the average participation rate is approximately 76%. Tabulations from the 1991 CPS reported in Poterba, Venti, and Wise (1995) suggest an average participation rate of 71%. Papke (1995) also finds similar participation rates in tabulations of the 1989 IRS form 5500 filings.

The strong persistence of participation rates across firms suggests, but does not prove, that employees do not alter their 401(k) status with any frequency.

8. Further analysis of participation decisions, recognizing the potential endogeneity of the matching rate, would require a more extensive data set with information on firm and worker characteristics, possibly from a time period before the growth of 401(k)s.

**Table 7.5** Distribution of Employer Matching Rates, 1986 and 1990 (%)

A. Distribution of Plans						
1986 Matching Rate	1990 Matching Rate					
	0	0.01–0.25	0.26–0.50	0.51–0.75	0.76–0.99	>0.99
0	12	0	0	0	0	0
0.01–0.25	0	9	0	0	0	0
0.26–0.50	0	0	38	15	0	0
0.51–0.75	0	0	0	12	0	0
0.76–0.99	0	0	0	0	0	0
>0.99	0	0	0	0	0	15

  

B. Distribution of Plan Participants						
1986 Matching Rate	1990 Matching Rate					
	0	0.01–0.25	0.26–0.50	0.51–0.75	0.76–0.99	>0.99
0	2	0	0	0	0	0
0.01–0.25	0	4	0	0	0	0
0.26–0.50	0	0	36	13	0	0
0.51–0.75	0	0	0	8	0	0
0.76–0.99	0	0	0	0	0	0
>0.99	0	0	0	0	0	37

Source: Authors' tabulations from survey responses.

**Table 7.6** Distribution of Employee Participation Rates, 1986 and 1990 (%)

A. Distribution of Plans				
1986 Participation Rate	1990 Participation Rate			
	<.25	.26–.50	.51–.75	>.75
<.26	4	0	0	0
.26–.50	0	9	4	0
.51–.75	0	0	17	17
>.75	0	0	0	48

  

B. Distribution of Participants				
1986 Participation Rate	1990 Participation Rate			
	<.25	.26–.50	.51–.75	>.75
<.26	0	0	0	0
.26–.50	0	2	0	0
.51–.75	0	0	8	39
>.75	0	0	0	51

Source: Authors' tabulations from survey responses.

Unfortunately, data on firm-level participation rates are not ideal for measuring the persistence of contributor behavior. One difficulty is that an individual can be a plan participant in a given year without making a contribution in that year. A second, and more difficult, problem, is that it is possible that *firm* participation rates are stable even though *individual* participation decisions are not. For example, a firm could display a 60% participation rate in two consecutive years if 40% of the workers participated in the first but not the second year, a separate 40% of the workers participated in the second year but not the first, and only 20% of workers participated in both years. Evidence against this possibility is presented in Kusko, Poterba, and Wilcox (1994). That study analyzes individual contribution data from one large 401(k) plan, and finds that contribution decisions are extremely persistent from one year to the next. This supports the view that deciding to contribute to a 401(k) plan is a form of self-control (see Shefrin and Thaler 1988) and that these contributions are effectively removed from the household's disposable income.

The information we have collected can be used to study how participation decisions are affected by employer matching rates. An ordinary least squares regression of plan participation rates in 1986 and 1990 on employer matching rates and an indicator variable for 1990 yields

$$\text{PART} = .602 + .187 \cdot \text{MATCH} - .008 \cdot \text{DUM90}.$$

(.058)    (.070)                    (.055)

The  $R^2$  for this equation is .124. A 10-percentage-point increase in the employer matching rate is predicted to raise the participation rate by almost 2 percentage points. The point estimate for the 1986 cross-section is somewhat smaller (1.6 percentage points, with a standard error of 1.3 points). We have also replaced the level of the matching rate with a sequence of indicator variables corresponding to matching rates of zero, 0.01–0.25, 0.26–0.50, and so forth. The estimates from such an equation show that moving from a matching rate of zero to one between 0.01 and 0.25 is associated with an increase in the participation rate of 15%. While higher matching-rate categories have higher participation rates still, we cannot reject the null hypothesis that participation rates at all matching rates above zero are the same.

Previous research on the association between matching rates and 401(k) participation and contribution decisions has generated mixed results. Papke (1995) analyzes plan-level data from IRS form 5500 filings, and finds that the effect of changes in the matching rate on the contribution rate is dependent on the level of the matching rate. At low levels of matching, increases in the matching rate appear to raise the share of salary contributed, although at high matching rates, there appears to be a negative effect. Andrews (1992) studies data from the May 1988 CPS, which includes information on whether an individual contributes to a 401(k), what fraction of salary is contributed, and whether or not the plan includes corporate matching. The CPS does not include information on the level of the matching rate. Andrews finds a positive relation-

ship between participation and the presence of matching, but a negative relationship between the contribution rate and the matching rate.

Our survey data include two observations for most firms, so we can *difference* the matching rates and participation rates for the firms, allowing for unobserved plan effects. The resulting estimate is .139 (.116), suggesting that the effect of employer matching on the participation decision is not just the result of interplan heterogeneity.<sup>9</sup> This finding of a positive, but statistically weak, effect of changes in matching rates on changes in participation contrasts with the evidence for a single 401(k) plan in Kusko, Poterba, and Wilcox (1994). The study finds relatively little behavioral response to changes in employer matching rates.

Table 7.7 explores another aspect of 401(k) plan structure: where participants invest their assets. Most plans allow participants at least three investment options, including a stock fund, a bond fund, and a money-market fund. The table shows that 401(k) investors hold roughly half of their total assets in equities, with about 40% of the equity portfolio in *company* stock. The most common investment vehicles are guaranteed investment contracts (GICs), followed by common stock funds. The estimated portfolio shares are probably measured with some error, given our small sample size. They can be compared to Vanderhei's (1992) tabulations of aggregate 401(k) portfolio shares, based on 1989 form 5500 data. Those tabulations show that common stock accounts for 21% of the asset value in 401(k) accounts, while GICs account for 41% of asset holdings. Part of the difference between these results may be due to a shift away from GICs as the prospective returns on these investment vehicles has declined.

One of the central differences between 401(k) plans and traditional DB pension plans is that investment decisions are made by individual plan participants rather than by professional money managers. In more than half of the plans in our sample, participants have full control over the investment of both the employee and employer component of 401(k) contributions. In virtually all of the remaining plans, employees can self-direct their own contributions.

Table 7.8 provides information on another important aspect of 401(k) plan structure: the availability of hardship withdrawals and loans. A recent survey of 401(k) participants by John Hancock Financial Services (1993) suggest that many at least *consider* the possibility of using 401(k) assets for preretirement expenses. While 98% of their sample respondents indicated that they planned to use their 401(k) as a retirement saving vehicle, 27% suggested that they might use the funds for educational expenses, 27% for medical expenses, and 12% for home purchase. Table 7.8 shows that 87% of the 401(k) participants in our survey participate in 401(k)s that allow loans, and that 91% of the plans

9. Our data set includes information on the employer matching rate as well as the maximum percentage of salary that is eligible for matching. The cross-section data show that firms that match at a higher rate cap the share of salary they will match at a lower level.

**Table 7.7** Financial Assets in 401(k) Plans, 1990 (%)

	Simple Average	Participant-Weighted Average
Equity mutual funds	19	30
Company stock	24	22
Guaranteed investment contracts	36	29
Money market funds	7	4
Bonds (government and other)	7	7
Other	7	8

Source: Authors' tabulation of results from initial "long form" survey, based on a total of thirty-three responses.

**Table 7.8** Loans and Hardship Withdrawal Provisions

	Simple Average	Participant-Weighted Average
Plans with loan provisions (%)	70	87
Hardship withdrawal provisions (%)		
Employee contributions	92	91
Employer contributions	61	69
Definitions of hardship withdrawal (%)		
Major medical expenses	93	95
Family education	93	100
House purchase/renovation	97	100
Layoff	14	3
Divorce	10	2
Immediate unplanned financial need	34	29
Number of outstanding loans/participant	0.32	0.14
Hardship withdrawal claims/participant	0.11	0.04

Source: Authors' tabulation of results from initial "long form" survey, based on a total of thirty-three responses.

allow hardship withdrawal of employee contributions. A smaller share of the plans, 61%, allow employees to make hardship withdrawals of *employer* contributions.

Table 7.8 also reports information on the types of hardship that qualify for withdrawals at various plans. Virtually all of the plans consider medical expenses, home purchase, and family education as acceptable justifications for withdrawal. Many fewer plans consider divorce and layoff in this category. There is some evidence that smaller plans are more generous in their definition of hardship withdrawals. One question about 401(k)s that may become increasingly important in the future is whether the current 401(k) contributors will withdraw their funds before retirement, or instead allow the funds to build and to support them in old age. Since the buildup of assets in these plans is a recent phenomenon, resolving this issue must await further experience with 401(k)s.

## 7.5 Antidiscrimination Rules and 401(k) Plans

One of the important advantages of 401(k) plans over traditional DC pension plans is that they permit different employees to contribute different amounts to the plan. To avoid the possibility that tax-deferred saving plans with employer matching could be used to channel additional compensation to selected groups of employees, with tax subsidy, Congress has enacted a set of *nondiscrimination tests* that 401(k) plans must satisfy. These regulations restrict the share of each year's contributions to 401(k) plans that can be made by "highly compensated employees." Analogous rules apply to DB plans and other types of retirement and benefit programs.

Until 1986, the average percentage of salary deferred by the highest-paid one-third of the participant group could not exceed the greater of (1) 150% of the average deferral percentage (ADP) for other eligible employees, or (2) the lesser of 250% of ADP for other employees, and the other-employee ADP plus 3%. This was known as the "1/3, 2/3 test." TRA86 limited the tax deferral benefits that highly compensated employees could receive. First, it reduced the maximum elective pretax contribution limit from \$30,000 to \$7,000. Second, TRA86 changed the structure of antidiscrimination provisions and added specific 401(k) nondiscrimination tests to the general rules prohibiting discrimination in contributions and benefits.

TRA86 also introduced what became known as "the ADP test." The test required that the ADP deferred by highly compensated employees could not be more than (1) 125% of the ADP for all other eligible employees, or (2) the lesser of twice the ADP for all other employees, or the ADP for all other employees plus two percentage points.<sup>10</sup> For example, if the ADP of the highly compensated group is 6%, and the ADP for the non-highly compensated group is 4%, the plan would pass the test because it satisfies the second set of criteria. If the ADP for the highly compensated group were 6.5%, the plan would fail. Even though under criteria 2 6.5% is less than twice 4%, it is more than two percentage points higher than the ADP for non-highly compensated workers. TRA86 also added a second test, the actual contribution percentage (ACP) test, which applies a similar set of restrictions to the combined employee after-tax and employer contributions to the plan.

If a 401(k) plan fails to satisfy either or both of the ADP and ACP tests, the firm can either make additional contributions on behalf of lower-paid employees, so-called helper contributions, or restrict contributions by highly compensated employees. Helper contributions include qualified, nonelective employer contributions and qualified matching contributions. As a result of these contributions, the stated matching rate in some 401(k) plans is a lower bound on

10. TRA86 defined highly compensated employees as those who were more than 5% owners, officers who earn more than \$45,000 per year, employees who earn more than \$75,000, and employees who earn more than \$50,000 and are in the top 20% of paid employees.

the *effective* matching rate for participants outside the highly compensated group.

Table 7.9 provides information on how the antidiscrimination rules affect 401(k) plans in our sample. The first question we asked was whether the plan was forced to limit or return contributions by high-wage employees. Only 15% of the plans responded affirmatively, and only 3% of the participants were at these firms. Three percent of the plans reported making additional contributions for low-wage employees.

Parallel evidence on the importance of ADP testing is found in the Massachusetts Mutual Life Insurance (1991) survey of 401(k) plans. This survey found that 81% of plans passed the ADP test without any correction such as helper contributions. The most important difference between plans that passed and those that did not initially pass the ADP test was the participation rate of non-highly compensated employees: 70% at firms that passed, 57% at firms that required correction. The evidence from the current study, and that from the Massachusetts Mutual (1991) survey, contrasts with the findings of an earlier Buck Consultants (1989) survey, and the Hewitt Associates (1991) survey. The former found that, for the 1988 plan year, only 60% of the surveyed plans

**Table 7.9** Antidiscrimination Rules and 401(k) Plans

	Percentage of Plans Sample	Percentage of Participants Sample
Plans that returned high-wage employee contributions in 1990	15	3
Plans that made additional contributions for low-wage workers in 1990	3	0
Plan average employees in low-wage group		
1986	76	51
1990	76	55
Plan average of employees in high-wage group		
1986	24	49
1990	21	45
Actual deferral percentages		
Low-wage group, 1986	4.0	4.1
Low-wage group, 1990	5.0 <sup>a</sup>	5.8 <sup>a</sup>
High-wage group, 1986	5.1	5.6
High-wage group, 1990	6.0 <sup>a</sup>	6.8 <sup>a</sup>
All workers, 1986	4.5	4.5
All workers, 1990	5.6 <sup>a</sup>	7.4 <sup>a</sup>
Salary breakpoint for 1/3, 2/3 test	\$38,800	\$47,100

*Source:* Authors' tabulation of survey results.

<sup>a</sup>Results are based on a total of forty-three responses to both the first- and second-round surveys; others are based on thirty-three responses to the first-round survey only.

passed the ADP test without corrective action, and the Hewitt (1991) survey found that 60% of plans needed some adjustment to pass the nondiscrimination test. While the difference between surveys could reflect changes in the overall difficulty of complying with ADP rules through time, this does not appear to be a sufficient explanation for the differences. This issue requires further investigation.

The relative infrequency with which these constraints bind does not imply that high- and low-wage employees are contributing equal shares of their compensation. Table 7.9 shows the actual deferral percentages for workers categorized in the high- and low-wage groups. The participant weighted-average ADP for the high-wage group is 6.8% in 1990, compared with 5.8% for the low-wage group. The ratio of these ADPs is very close to the 125% constraint value described above. One important issue that our results raise is whether the positive “externalities” received by highly compensated employees when their lower-income counterparts contribute to a 401(k) plan are a key factor in the drive by employers to encourage widespread participation in 401(k) plans.

## 7.6 Conclusion

This paper reports the preliminary findings from a new survey of firms that provide 401(k) plans for their employees. Our results do not support the view that 401(k) plans replaced preexisting DB pension plans at firms that adopted 401(k)s in the mid-1980s. None of the firms in our data sample reported substituting a 401(k) plan for a DB plan. Several firms, however, reported replacing previous thrift or profit-sharing plans with the 401(k) plan, presumably because 401(k)s provided more attractive opportunities for employees to defer taxable income.

Our survey results also provide new evidence on patterns of 401(k) participation. We collected data on 401(k) participation rates in 1986 and 1990, and found very little variation in these rates across this four-year period. This pattern of stability confirms other findings, based on data for individual contributors to 401(k) plans, that suggest that 401(k) participants are not making marginal decisions of whether to contribute to the plan in a given month, or even year, but rather make long-term commitments. We explore the link between corporate matching rates and 401(k) participation rates, and find evidence of a statistically significant, but substantively small, positive relationship. The predicted effect of a 50% employer matching rate is only a 10% increase in participation, which suggests that other factors, such as employer encouragement or a desire to take advantage of tax-deferral schemes, must explain the high overall participation rate in 401(k) plans.

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## Comment      Richard Thaler

There is a lot for a behavioral economist to like about this paper. First of all, it provides new data, always welcome. Second, it highlights a little-discussed feature of 401(k) saving plans, namely, that once people get started they tend to keep contributing. I have two sorts of comments: the first concerning the survey methods used, the other regarding the best conceptual framework for thinking about the role of 401(k)s.

Economists are generally reluctant to collect their own data through surveys, as the authors of this paper have done. There seem to be two reasons for this. First there is what we might call the *machine-readable illusion of validity*. Most economists seem to feel that numbers are not real unless they are on computer tape and someone else has taken care of putting them there. So the Panel Survey of Income Dynamics (PSID) and the census data are “hard,” but surveys collected personally are “soft.” People who have looked carefully at the PSID are likely to conclude that both data sources are a mixed bag, but it is time we all agreed that some data is better than none. The second reason why economists don’t like to collect their own data is well illustrated by this paper—it is a pain in the neck! These authors exerted a lot of effort to survey firms about their pension plans, only to be frustrated by a very low response rate. Those economists who might have been tempted to collect their own data will hardly find this team’s experience comforting. However, before we give up on surveys again, I think it is important to think about why the response rate was so low. In this case my main guess is that the survey instrument was simply too long. With the benefit of hindsight, I think that more would have been learned from the combination of a shorter instrument and a higher response rate. Other potential surveyors should take note.

My other comments are about the general question of evaluating programs such as 401(k)s as a vehicle for increasing the rate of private saving. Elsewhere (Thaler 1990, 1994) I have stressed that when evaluating a savings program we need to take a long-term perspective. It seems ironic to have to make this point, since saving is, per se, about the future. However, many authors have continued to stress essentially short-run factors when discussing IRAs, 401(k)s, and the like. The short-run questions are, where did the money come from? and do these programs represent “new” saving? The question I think we need to address is, over the next few decades, will the existence of such programs increase the rate of capital accumulation by U.S. households? The magnitude of the long-run increase in saving is determined by several behavioral factors. In the case of 401(k)s I would like to emphasize three phenomena: initiation (how

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people get started), leakage (does the money stay put), and persistence (do people keep putting more money in).

What determines whether an employee will start contributing to a 401(k) plan? Two economic factors are important, and are correctly stressed in this paper: taxes and matching. Contributions and accumulations are tax free, creating an obvious incentive to participate, and many firms actually match employees' contributions in whole or in part. As Papke, Petersen, and Poterba show, employees seem to be sensitive to this matching provision. The higher the matching rate, the higher the participation rate. While these factors are important, there are also behavioral factors that determine how many employees contribute. (1) Peer pressure: if contributing to the 401(k) is considered the "smart thing to do," more employees will do so. A high matching rate undoubtedly helps produce this peer pressure. (2) Salience: firms may engage in drives to encourage employees to participate (in part because of the antidiscrimination rules). Just as advertising may have helped sell IRAs, a push within the firm may also help, especially for lower-income workers who have many pressing demands on their paychecks. (3) Ease of joining: economists think of saving as a rational calculation, but we all know that inertia matters in our own daily lives. If contributing to a saving plan is made easy, more people will do it. Of course this is just reducing a transactions cost, but my point is that eliminating a seemingly trivial one-time cost, such as going to a bank and setting up an IRA account (trivial in comparison to the costs of an underfunded retirement), may play an important role. (4) Payroll deductions: from a psychological perspective, the least painful way of saving money is to have it deducted from your paycheck. What you don't see doesn't hurt to give up.

Getting the money into a savings vehicle is just the first step. For people to successfully save for retirement, as opposed to next month's splurge, the money has to stay invested. In the life-cycle framework it makes no difference where wealth sits. Households simply consume the annuity value of the wealth in every period. However, the evidence suggests that the marginal propensity to consume differs across various mental accounts (Shefrin and Thaler 1988). In particular, people are much more likely to spend from liquid assets such as savings accounts than they are from money coded as retirement savings, for example, IRAs and 401(k)s. (For clear evidence of this, see Gale and Scholz 1994.) In this sense, 401(k)s are savings repositories that exhibit low *leakage*.

The third factor in determining long-term saving is what might be termed persistence. Contributing to a pension plan for a year is good, but contributing for many years is much better. What we would like to know is something like a transition probability: if a worker contributes to a 401(k) in year  $t$ , what is the chance that he or she will contribute again in year  $t + 1$ ? To answer this question properly, one needs panel microdata (another survey!). However, the data presented here give a strong suggestion that for 401(k)s the persistence rate is quite high because the percentage of employees who contribute is remarkably stable over time. IRA contributors also appear to display remarkable

persistence, although this has not been studied carefully either. I believe that the issue of persistence of contributions deserves more study.

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