AN ISSUE IN BRIEF
CENTER FOR
RETIREMENT
RESEARCH
AT BOSTON COLLEGE

September 2006, Number 52

INVESTMENT RETURNS: DEFINED BENEFIT VS. 401(k) PLANS

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Introduction

Pension coverage in the private sector has shifted from defined benefit plans where professionals manage the money to 401(k) plans where participants invest their own accounts. The supposition is that individuals are not very good at investing their own money. The question is whether the supposition is borne out by the facts. That is, are returns on 401(k) plans markedly lower than those on traditional defined benefit plans?

This *brief* first reports rates of return on defined benefit and 401(k) plans over the period 1988-2004. The second section then looks at the holdings of the two types of plans to see whether the differences in returns can be explained by a more risky portfolio. The third section speculates about the role fees play in the results. The fourth section explores the implications of the findings for 401(k) participants. The final section reports on Individual Retirement Accounts (IRAs), because the assets in these accounts now exceed holdings in either defined benefit or defined contribution plans, and most of the money is rolled over from employer-sponsored plans.

The bottom line is that over the period 1988-2004 defined benefit plans outperformed 401(k) plans by one percentage point. This outcome occurred despite the fact that 401(k) plans held a higher portion of their assets in equities during the bull market of the 1990s. Part of the explanation may rest with higher fees, which are deducted before returns are reported to participants. But the one percentage point shortfall understates the investment problem in 401(k) plans, since an aggregate number does not reflect the fact that more than half of participants in 401(k) plans do not follow the prudent investment strategy of diversifying their holdings. Finally, the available data suggest that IRAs produce even lower returns than 401(k) plans, which, if true, implies trouble ahead given the massive amount of money that is being rolled over into these accounts.

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Rates of Return in Defined Benefit and 401(k) Plans

Financial assets in private sector defined benefit and defined contribution plans (including IRAs) totaled $8.5 trillion at the end of 2005 (see Table 1). At that time, defined benefit assets accounted for only 23 percent of the total, while self-directed defined contribution plans and IRAs made up the rest. Thus, the question of how individuals fare when investing their own retirement funds is an important one.

Table 1. Private Sector Retirement Assets, Year End 2005

Type of plan	Billions of dollars	Percent of total
Defined benefit	$1,916.5	22.7 %
Defined contribution	2,868.7	33.9
IRAs	3,667.0	43.4
Total	8,452.2	100.0

Source: U.S. Board of Governors of the Federal Reserve System (2006).

The first step in assessing the performance is to compare median annual rates of return for defined benefit and 401(k) plans. The analysis focuses on companies that sponsor both types of plans to minimize the effect of company or participant characteristics on the results.[1] The formula for calculating rate of return is one commonly used by actuaries.[2] It relates the change in assets ($A_t - A_{t-1}$), netting out the impact of benefit payments from the plan (B) and contributions to the plan (C), to initial assets (A_{t-1}) plus half of net inflows (C – B):

$$\text{Rate of return} = \frac{(A_t - A_{t-1}) + B - C}{(A_{t-1}) + \frac{1}{2}(C - B)}$$

The Department of Labor's Form 5500 filings provide data on assets, contributions, and benefits for each plan over the period 1988-2004.[3]

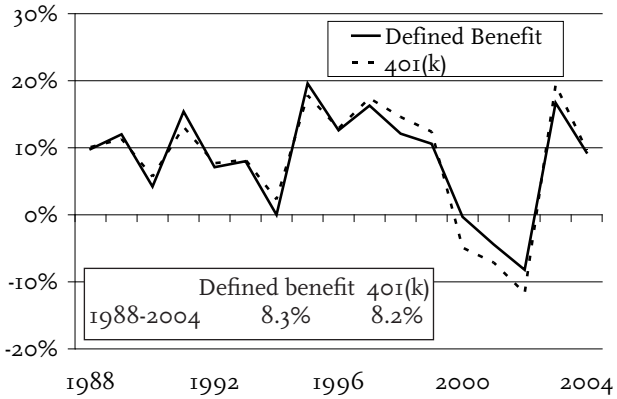
Returns, even median returns, can be calculated in a number of ways. The analysis presented below starts with the simplest approach, and one used in earlier studies, that arrays the plans and reports the return for the plan at the 50th percentile. In terms of the example shown below, the median rate of return would be 5 percent. One obvious question is whether comparing median rates of return is the right exercise, since three-quarters of the total assets in the example are in Plan A earning 10 percent. An alternative measure would be one that weighted returns by plan assets, and then identified the median. Such an approach would yield a return of 10 percent in this example. In our view, this is the preferred approach, although both results are reported below.

Example: Unweighted versus Weighted Medians

Plan	Assets	Rate of return
Plan A	$75	10 %
Plan B	20	5
Plan C	5	2

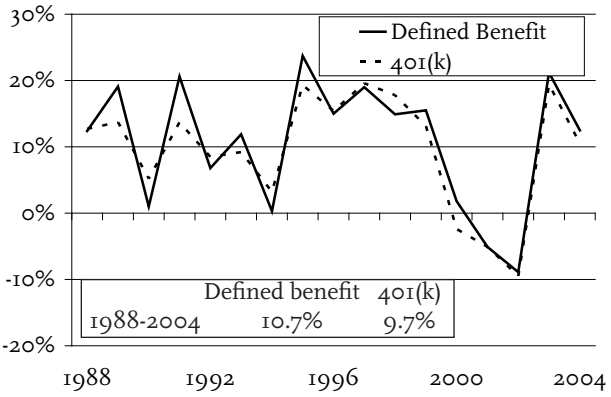
Figure 1 shows the simple medians over the period 1988-2004.[4] During the period, the average of this measure suggests that the performance of defined benefit and 401(k) plans is virtually identical — 8.3 percent versus 8.2 percent.[5]

Figure 1. Unweighted Median Rates of Return for Defined Benefit and 401(k) Plans, 1988-2004



Source: Authors' calculations from U.S. Department of Labor (1990-2006).

Figure 2. Weighted Median Rates of Return for Defined Benefit and 401(K) Plans, 1988-2004



Source: Authors' calculations from U.S. Department of Labor (1990-2006).

Figure 2 recalculates rates of return weighting returns by assets in the plan. Two factors change. First, the returns are higher. Second, defined benefit plans appear to have outperformed 401(k) plans by one percentage point (10.7 percent versus 9.7 percent).

The higher return reflects the fact that larger plans have historically performed better than smaller ones (see Table 2). The usual explanation is that large plans can hire better managers and spread fees over a larger base. Size matters much less for 401(k) plans, because the outcome reflects a myriad of individual investment decisions.

Table 2. Median Rates of Return by Asset Quintile for Defined Benefit and 401(k) Plans, 1988-2004

Asset quintile	Defined benefit	401(k)
Largest 20 percent	10.1%	8.8%
Second	8.9	8.1
Third	8.2	7.8
Fourth	7.4	7.6
Smallest 20 percent	5.6	6.6

Source: Authors' calculations from U.S. Department of Labor (1990-2006).

The Impact of Portfolio Allocation

One question is the extent to which portfolio differences can explain differences in rates of return. Based on historical performance, stocks have a high yield and big fluctuations in annual rates of return; corporate bonds have a lower yield and much less variation; Treasury bills are the most predictable investment but provide the lowest return (see Table 3).

Table 3. Annual Total Returns on Various Financial Instruments, 1926-2005

Financial instrument	Rate of return	Standard deviation
Stocks	10.4%	20.2%
Long-term corporate bonds	5.9	8.5
Intermediate government bonds	5.3	5.7
U.S. Treasury bills	3.7	3.1
Inflation	3.0	4.3

Source: Ibbotson Associates (2006). Based on copyrighted works by Ibbotson and Sinquefield. All rights reserved. Used with permission.

Table 4 shows a breakdown by type of investment for both defined benefit and defined contribution plans.[6] Defined benefit plans appear to hold about 59 percent of assets in equities, compared to 35 percent for defined contribution plans.[7] But that is not the end of the story because mutual funds also reflect equity holdings, and mutual funds are a very important component of the assets of defined contribution plans. In 2005, roughly 78 percent of the mutual fund assets in 401(k) plans were equities.[8] Applying that percentage to both the defined benefit and defined contribution mutual fund numbers yields total equity holdings of 67 percent in defined benefit plans and 65 percent in defined contribution plans.

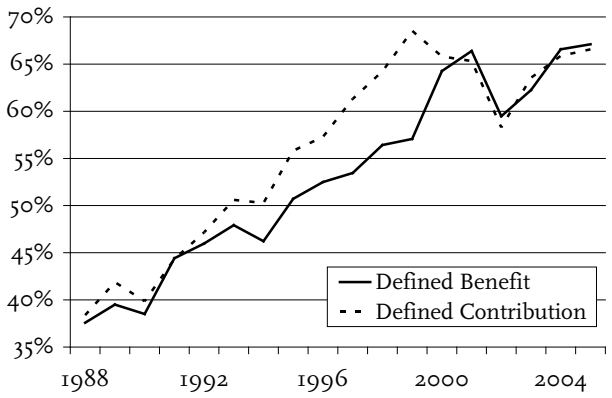
Table 4. Percentage Distribution of Assets in Private Sector Defined Benefit and Defined Contribution Plans, Year End 2005

Financial instrument	Defined benefit	Defined contribution
Equities	58.8%	35.2%
Mutual funds	10.6	38.5
Bonds	21.9	6.7
Cash	3.1	4.5
GICs	3.6	8.7
Other	2.0	6.4
Total	100.0	100.0

Source: U.S. Board of Governors of the Federal Reserve System (2006).

Figure 3 shows the percentage of the portfolios in equities for defined benefit and defined contribution plans over the period 1988-2005, where a portion of mutual funds are included in equities as described above. The higher share in equities for defined contribution plans in the late 1990s allowed 401(k) plans to outperform defined benefit plans. The reliance on equities also meant that 401(k) participants were hurt more when the stock market collapsed in 2000, and then did better when the stock market recovered.

Figure 3. Equities as a Percent of Total Portfolio, Defined Benefit and Defined Contribution Plans, 1988-2005



Sources: Authors' calculations from U.S. Board of Governors of the Federal Reserve System (2006); Investment Company Institute (2005); and Investment Company Institute (2006b).

One interesting aspect of Figure 3 is not the difference between the defined benefit and defined contribution portfolios, but the fact that both professional managers and individual 401(k) participants dramatically increased their holdings of equities over the period. If defined benefit portfolios were optimally balanced in the early 1990s with about 40 percent in equities, what would make 65 percent optimal by the end of the period? In the case of defined benefit plans, an aging beneficiary population would argue, if anything, for less equity investment. Some potential explanations include: 1) professional managers, like individual investors, forgot to re-balance; 2) professional managers, like individual investors, got swept up in the euphoria of the boom and purposely increased their holdings of stocks; 3) sponsors of fully funded defined benefit plans felt like they could gamble with their "surplus" funds; or 4) defined benefit managers wanted to hold the market portfolio and the boom caused equities to increase as a share of the total market. Regardless of the explanation, defined benefit and defined contribution plans both held 40 percent of their portfolios in equities in 1990 and increased their holdings to 65 percent by 2000. The difference is that during most of that period, individual 401(k) investors had higher equity holdings.

The Role of Fees

Another possible explanation for the lower return in defined contribution plans is investment fees, which typically account for 75 to 90 percent of total expenses associated with managing 401(k) plans.[9] These fees compensate providers of, say, mutual funds for selecting the stocks and undertaking the research that leads to buy and sell decisions. These fees are usually assessed as a percentage of invested assets, and are paid by the employee in that they are deducted directly from investment returns.[10]

Mutual funds are the major investment vehicle for 401(k) participants, and Table 5 reports the fees for alternative investments. The fees vary substantially depending on whether the investments are actively managed or follow an index. For example, an actively managed Global Fund costs 1.72 percent of assets annually compared to 0.59 percent for an S&P Index Fund. Given these charges, it is probably reasonable to assume that fees reduce the gross return on 401(k) plans by about one percentage point.

Of course, defined benefit plans also involve some expenses but these are small compared to those associated with 401(k) plans.[11]

Table 5. Mutual Fund Fees as a Percent of Assets, July 31, 2006

Category	Fee
Global Fund	1.72%
Equity Income Fund	1.33
Balanced Fund	1.22
Intermediate Bond Fund	0.92
S&P Index Fund	0.59
Institutional Money Market Fund	0.45

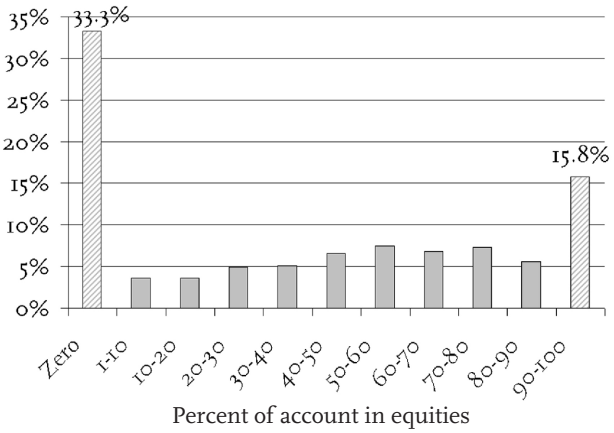
Source: Lipper (2006).

The Implications for Individual 401(k) Participants

So far the discussion has focused only on totals and averages, which tell us little about how individuals might invest. After all, if a plan has 100 participants and half invest all their assets in stocks and the other half all their assets in bonds, the aggregate data suggest that participants are well diversified when in fact they are not. Therefore, it is useful to look at investment data from particular 401(k) plans to see whether the individual participants have balanced portfolios or whether the balance simply reflects offsetting behavior.

As shown in Figure 4, detailed data on the asset allocation of individual participants show that nearly half of all participants have either none of their account in equities or virtually all of their account in equities. So even though the aggregate data suggest that participants make sensible investment choices on average, the individual data reveal that a majority of participants are not diversified at all. Given their choices, most participants face the risk of ending up with inadequate retirement income or exposing themselves to large swings in the value of their assets.[12] Thus, the one percentage point difference in returns between defined benefit and 401(k) plans understates the poor investment decisions made by individuals.

Figure 4. Equities as a Percent of 401(k) Participant Account Balances by Percent of Participants, 2005



Source: Holden and VanDerhei (2006).

Table 6. Asset Holdings of IRAs by Institution, Year End 2005

Institution	Percent of total
Mutual funds	39.0 %
Life insurance companies	11.1
Money market mutual funds	4.4
Commercial banking	4.6
Saving institutions	1.5
Credit unions	1.3
Other self-directed accounts	38.0
Total	100.0
Memorandum: total assets (billions)	$3,667.0

Source: U.S. Board of Governors of the Federal Reserve System (2006).

The Inclusion of IRAs

It has become impossible to ignore the role of IRAs. As shown earlier in Table 1, IRAs now hold more money than either defined benefit or defined contribution plans. And even though most IRAs are not sponsored by employers, the Investment Company Institute (2006b), the national association for mutual fund companies, reported that 94 percent of the money flowing into traditional IRAs was rolled over from employer-sponsored plans in the period 1997-2003.[13] Although detailed information is not available, it is probably reasonable to assume that most of the rollovers come from defined contribution plans — although lump-sum payments are becoming increasingly common in defined benefit plans.

Only limited information is available on the asset allocation in IRAs. The Flow of Funds data show only the type of institution holding the account, as opposed to the type of asset in the account (see Table 6). About 73 percent of the mutual fund assets — the

largest component — are in stock.[14] But no information is available on the composition of IRA assets held by other institutions, which hold the majority of the assets.

The Investment Company Institute (2006a) provides data on beginning-year assets, year-end assets, contributions, rollovers, and withdrawals for traditional IRAs that make it possible to calculate the aggregate average return for the period 1998-2003. Table 7 summarizes these results and compares them to returns earned on defined benefit and 401(k) plans over the same period. If estimates of the flows into and out of IRAs are correct, the rate of return numbers suggest that IRA investments produced significantly lower returns than either defined benefit or 401(k) plans during the six-year period.[15] More important than the precise numbers, however, is the message that the performance of IRAs will have a significant impact on the retirement security of people in the future.

Table 7. Rate of Return for IRAs, Defined Benefit Plans and 401(k)s, 1998-2003

Year	IRA	Defined benefit	401(k)
1998	13.6 %	14.9 %	17.8 %
1999	15.7	15.5	13.1
2000	-6.0	1.8	-2.4
2001	-4.6	-5.1	-5.1
2002	-8.1	-8.9	-9.5
2003	12.1	21.2	19.4
1998-2003	3.8	6.6	5.6

Source: Authors' estimates based on Investment Company Institute (2006a).

Conclusion

Three main conclusions emerge from this review. First, defined benefit plans outperformed 401(k) plans over the period 1988-2004. This conclusion is most evident using the weighted median. A higher equity allocation most likely led to higher 401(k) returns during the 1990s, while fees inevitably reduced returns. These two effects may well have balanced each other out, leaving a one percentage point shortfall due to poor timing and other investment mistakes.

Second, lower returns are only one component of the investment problems facing 401(k) investors. The other is that despite a reasonable mix for 401(k) assets in the aggregate, nearly half of 401(k) participants are either nearly fully invested in stocks or hold no stocks at all. That is, nearly 50 percent of participants are not diversified in their retirement accounts. The combination of the lack of diversification and the lower returns suggests that introducing balanced portfolios as a default, which would remove the individual from the decision making, would significantly improve the performance of 401(k) plans.

Finally, IRAs are now bigger than either defined benefit or defined contribution plans, and their performance is going to have a major impact on retirement security in the future. Preliminary data suggest that IRAs underperform employer-sponsored plans. IRAs are too big and important a form of retirement saving to not know what is going on with these accounts. Some mechanism is needed to identify the asset allocations in these accounts as well as document the inflows and outflows. Only by including IRAs will it be possible to understand fully how well people are investing for retirement.

Endnotes

1 This formulation follows Watson Wyatt (2002 and 2003). Calculations for the entire universe of plans showed very similar results.

2 Including one half of contributions less benefits assumes that net inflows occur at an even rate over the year so that on average half the annual net inflows are available for investment. This assumption is necessary because the Form 5500 lacks detailed information on the timing of benefits and contributions over the year.

3 See Buessing and Soto (2006) for a detailed description of the Form 5500 data.

4 The median refers to the across-firm rates of return per year for defined benefit and defined contribution plans. The average returns shown are the arithmetic means of the median rates of return over the period 1988-2004. The geometric means do not differ widely from the arithmetic means calculated for the unweighted and weighted median rates of return. Appendix Table A1 shows the unweighted and weighted median rates of return as well as the arithmetic and geometric means.

5 For the 1990-2002 period, the results are similar to results from Watson Wyatt (2004) with defined benefit plans outperforming 401(k) plans. The difference in defined benefit and 401(k) returns is 0.35 percent while Watson Wyatt showed a difference of 0.56 percent for this period. The improved performance of 401(k)s over the 1988-2004 period comes simply from adding four more years of data to what was a very close outcome.

6 Separate data on 401(k) plans are not available on a comparable basis. But in 2004, 401(k) assets accounted for 88 percent of total private sector defined contribution assets for plans sponsored by employers with 100 or more employees. See Munnell and Perun (2006).

7 Since most 401(k) participants invest through mutual funds, the high number for "Equities" for defined contribution plans (that is, direct equity holdings as opposed to equities held through mutual funds) in Table 4 is surprising. The explanation is that "Equities" include pools of stocks that companies set up themselves for their 401(k) plans; only mutual funds bought off the shelf are included in the mutual fund line. The other large category of direct equity holdings is employer stock. The final category of direct equity investment arises from a relatively small percentage of 401(k) participants who invest directly through brokerage accounts.

8 Investment Company Institute (2006a).

9 Munnell and Sundén (2004).

10 Fees are generally not explicitly reported in the Form 5500. See U.S. Department of Labor (2004).

11 Council of Institutional Investors (2005).

12 Of course, critics contend that assessing individuals' 401(k) holdings without knowing their entire asset holdings is of limited value. They argue that most people who save through a 401(k) plan also have Social Security, human capital, defined benefit pension wealth, housing, and taxable savings. But for most people taxable savings are miniscule, and their 401(k) plan is their major financial asset. Thus the investment allocation within their 401(k) plan is important.

13 In 2005, assets in traditional IRAs accounted for 90 percent of total IRA assets. This share was down slightly from 95 percent in 1997.

14 Investment Company Institute (2006a).

15 One likely explanation for the lower returns in IRAs is that IRAs are often held by older workers who have rolled over their 401(k) assets. Older workers tend to invest in assets with lower returns to avoid the potentially large fluctuations that are associated with riskier investments.

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APPENDIX

Appendix A

Table A1. Unweighted and Weighted Median Rates of Return for Defined Benefit and 401(k) Plans, 1988-2004

Year	Unweighted		Weighted	
	Defined benefit	401(k)	Defined benefit	401(k)
1988	9.8	10.1	12.4	12.7
1989	12.0	11.3	19.1	13.7
1990	4.2	5.7	1.0	5.2
1991	15.4	13.1	20.6	13.7
1992	7.1	7.7	6.8	8.5
1993	8.0	8.2	11.9	9.2
1994	0.0	2.3	0.3	3.2
1995	19.6	17.8	23.7	19.3
1996	12.6	12.9	15.0	15.4
1997	16.3	17.4	19.0	19.6
1998	12.1	14.6	14.9	17.8
1999	10.6	12.4	15.5	13.1
2000	-0.3	-4.9	1.8	-2.4
2001	-4.4	-7.1	-5.1	-5.1
2002	-8.2	-11.7	-8.9	-9.5
2003	16.7	19.4	21.2	19.4
2004	9.3	9.7	12.5	10.5
Arithmetic Mean	8.3	8.2	10.7	9.7
Geometric Mean	8.0	7.8	10.2	9.3

Source: Authors' calculations from U.S. Department of Labor (1990-2006).

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The Center for Retirement Research thanks AARP, AIM Investments, AXA Financial, Citi Street, Fidelity Investments, John Hancock, Nationwide Mutual Insurance Company, Prudential Financial, Standard & Poor's and TIAA-CREF Institute for support of this project.

The research reported herein was supported by the Center's Partnership Program. The findings and conclusions expressed are solely those of the authors and do not represent the views or policy of the partners or the Center for Retirement Research at Boston College.