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THE ASSET ALLOCATION OF PRIVATE PENSION PLANS

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**MEMORANDUM**

**TO: Distribution List**  
**FROM: Annie Spillane**  
**DATE: August, 1991**  
**RE: *ERRATUM FOR WORKING PAPER NO. 3745, "The Asset Allocation of Private Pension Plans"***

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The paragraph which appears at the top of page 7 is incorrect. The corrected version appears below.

... traditionally recommended a 50/50 or 40/60 mix of bonds and equities.<sup>14</sup>

Conventional wisdom maintains that the fixed-income portion will hold its value well enough during down market-cycles to enable the funds to meet their obligations, and the equity portion will enable them to capitalize on up market-cycles.<sup>15</sup>

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THE ASSET ALLOCATION OF PRIVATE PENSION PLANS

ABSTRACT

This paper summarizes the Form 5500 data on private pension fund investment. Using Form 5500 data from 1981 to 1987, the asset allocation of single employer and multiemployer defined benefit and defined contribution plans is reported, as well as the asset mix of the following subgroups: defined benefit plans categorized by plan funding ratio, sole and multiple defined contribution plans, savings or thrift, money purchase, ESOP, and 401(k) defined contribution plans. A brief survey of the literature on pension fund investment policy is also included; however, the focus of the paper is to describe the Form 5500 data and inform subsequent research on investment policies of private pension funds.

The average single employer defined benefit plan holds about 50 percent in fixed-income securities, 20 percent in equities, and 20 percent in pooled funds (a 50/20/20 mix). Larger single employer defined benefit plans hold a 60/30/2 portfolio on average. While portfolio theory for these plans predicts extreme investment policies, few portfolios are extreme. About 20 percent of plans hold more than 60 percent in equity; about 9 percent of plans hold more than 60 percent in long term fixed-income securities. Multiemployer defined benefit plans hold a 63/19/8 mix.

Single employer defined contribution plans invest in a 41/30/20 mix on average, where the mix is 49/38/2 for larger plans. A defined contribution plan which is one of several plans invests more in equities and less in fixed income securities than the average sole defined contribution plan. Multiemployer defined contribution plans invest more heavily in fixed-income securities (73/5/8).

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## INTRODUCTION

Pension funds are a substantial presence in the capital markets. Public and private pensions constitute 23 percent of all financial assets, totalling \$1,980.9 billion in 1989. Private pension assets alone constitute 14 percent. While asset holdings of all pension plans are published on a regular basis in the Federal Reserve Board's Flow of Funds Accounts, these aggregates conceal much heterogeneity in the investment policies of different types of pension plans. This chapter categorizes private pension plans by type and summarizes their asset mix from 1981 to 1987 using data from the Internal Revenue Service (IRS) Form 5500.

Policy makers are especially interested in the investment policy of defined benefit plans, since private defined benefit pensions are insured by a government agency, the Pension Benefit Guaranty Corporation (PBGC).<sup>1</sup> While the PBGC is legally self-supporting, this federal insurance may involve taxpayers in the guarantee of pension fund solvency in much the same way they are providing funds to the Federal Savings and Loan Insurance Corporation for troubled thrift institutions. While several federal laws regulate funding levels, there is no corresponding regulation of asset allocation.

The purpose of this chapter is to summarize the Form 5500 pension investment data and to inform subsequent empirical work on pension investment policy. The chapter begins with an overview of the Form 5500 asset data and

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<sup>1</sup>The Employee Retirement Income Security Act (ERISA) of 1974 created the PBGC, and the Pension and Welfare Benefits Administration (PWBA) of the Department of Labor to supervise funding and investment practices of pension plans. As of January, 1987, the PBGC's single-employer pension plan termination insurance program covered approximately 31 million participants of about 110,000 defined benefit plans.

its potential uses. This is followed by a brief summary of the literature on pension investment policy. An empirical test of these theories is beyond the scope of this chapter. Instead, the chapter focuses on summary statistics of investments by different categories of pension plans.

#### Investment Data on the Form 5500

The Form 5500 is a plan-level source of pension finance data. A sponsor of a plan with more than 100 employees is required to file a Form 5500 with the IRS.<sup>2</sup> These data include private noninsured (trust fund) assets reported at market value as of the beginning and end of the plan fiscal year (about 70 percent of plan fiscal years coincide with the calendar year).<sup>3</sup> The change in asset holdings over one plan year can be calculated from one report, or investments over several years can be compared.<sup>4</sup>

The following asset categories are reported: cash (separated into certificates of deposit, other interest bearing, and non-interest bearing), U.S. government securities (short- and long-term), state and municipal

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<sup>2</sup>Smaller plans file a Form 5500-C form every 3 years, and Form 5500-R (a short registration form) in between Form 5500-C filings.

<sup>3</sup>Two other sources publish summary statistics on asset allocation from plan-level data. The Employee Benefit Research Institute (EBRI) publishes the "Quarterly Pension Investment Report" (QPIR), which provides tabulations of assets and rates of return for both trustee and insured pension funds, and for state and local government pension plans. EBRI uses the Federal Reserve's Flow of Funds Accounts and the Form 5500 data. A second source is the small private compilation published annually by Greenwich Research. It reports personal interviews with approximately 1,000 of larger plan sponsors. These two sources are compared to the Form 5500 in Bodie and Papke (1991a).

<sup>4</sup>Time series, cross-section comparisons are possible. However, detailed asset data are available for only a random stratified sample of plans (weighted to represent the universe) on the Department of Labor's Sample Form 5500 tapes. Ten to 20 percent of the sample changes each year. Very large plans are always included, however, and it may be possible to construct a panel of plans by linking them by plan number and the Employer Identification Number of their sponsor.

securities, corporate debt instruments (short- and long-term), corporate stocks (preferred and common), mortgages and other loans, pooled funds, master trusts, party-in-interest investments (separated into these same categories), buildings and depreciable property, and unallocated insurance contracts. More asset categories have been added on the most recent Form 5500 (futures contracts, for example).

The Form 5500 data includes defined contribution plans, where, as the name suggests, a formula determines contributions to be paid into the fund on behalf of plan beneficiaries (e.g., 15 percent of annual wages), and defined benefit plans where a formula defines benefits to be received at retirement (e.g., 1 percent of final pay per year of service). Both single employer and multiemployer private plans are reported. Public pension plans do not file a Form 5500; indeed, there is no uniform reporting of public pension plan assets. The Form 5500 data is the most comprehensive, publicly available source of plan-level investment data for pension funds.

There is a potential limitation to inferring investment policy from the Form 5500 data. First, the reported asset mix reflects a plan's investment policy at a point in time. Unfortunately, the Form does not include questions about investment policy per se, and it is possible that a snapshot may not accurately reflect the plan's overall investment policy. For example, a plan may invest in derivative securities which do not appear in the Form 5500 data but which effectively convert the reported allocation into an entirely different package of securities.<sup>5</sup>

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<sup>5</sup>For example, suppose a plan holds 100 percent equity, but sells short a futures position in an S&P 500 index fund with a maturity of one year. Since futures contracts are an investment with zero net wealth, this asset is not reported on the Form 5500, which would reflect only the 100 percent equity investment. Yet, in holding equity in combination with the futures contract, the

As a second example, consider a dynamic investment policy for an overfunded plan. The plan's assets are invested primarily in stocks. The investment policy includes a stop-loss order such that, as the market value of pension assets falls close to the value of the liability, funds are switched from stocks to fixed-income securities whose duration matches the liability. This is an example of contingent immunization, a type of portfolio insurance strategy designed to guarantee a minimum rate of return, yet achieve some of the upside potential of the stock market. Again, the static asset mix does not accurately reflect the underlying investment policy.

#### PENSION FUND INVESTMENT STRATEGIES

This section briefly reviews the literature on pension fund investment policy. While a test of these theories is beyond the scope of this chapter, the findings of other empirical studies are summarized.

The special tax status of pension funds creates the same incentive for both defined benefit and defined contribution plans to tilt their asset mix towards assets with the largest spread between pretax and after-tax rate of return.<sup>6</sup> In a defined contribution plan, because the participant bears all the investment risk, the optimal asset mix also depends on the risk tolerance of the participant. To fully exploit this legal tax shelter, it is necessary to invest in assets with the highest spread between pretax and after-tax rates of return for a given risk level. In the U.S., this means investing in fixed-income securities issued by non-tax-exempt entities — mostly corporate bonds and mortgages.

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fund has essentially invested in a one-year Treasury bill.

<sup>6</sup>See Black (1980) and Tepper (1981) for a discussion of this strategy for defined benefit plans.

In defined benefit plans, if the sponsor anticipates sharing some of the upside potential of the pension assets with plan participants, there is an additional incentive to eliminate all investment risk by investing in securities that match the promised benefits.<sup>7</sup> If, for example, the plan sponsor has to pay \$100 per year for the next 5 years, it can provide this stream of benefit payments by buying a set of five zero-coupon bonds, each with a face value of \$100 and maturing sequentially. By so doing the sponsor eliminates the risk of a shortfall and immunizes the pension liability.

For an underfunded plan of a corporation in financial distress, PBGC insurance may unintentionally create an incentive to invest in stocks and other risky assets. The PBGC's insurance of pension benefits, in effect, transfers much of the downside risk from the sponsor to the government. The value of PBGC insurance increases with the risk of the underlying assets, but the cost to the sponsor does not.<sup>8</sup>

Before the Single-Employer Pension Plan Amendments Act of 1986, even healthy firms with underfunded pension plans had some incentive to exploit PBGC insurance by voluntarily terminating an underfunded plan. Now a standard termination is permitted only if the plan has sufficient assets to pay all the benefit commitments under the plan, and a distress termination requires a bankruptcy petition.<sup>9</sup> The Pension Protection Act of 1987 included incentives to encourage more rapid funding of underfunded plans, further reducing the possibility that the PBGC insurance will be abused.

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<sup>7</sup>These other influences are relevant only to single employer plans. See Bodie (1991) and Bodie and Papke (1991b).

<sup>8</sup>See Harrison and Sharpe (1983).

<sup>9</sup>See Utgoff (1988).



Firms in financial distress, however, still have an incentive to invest pension fund money in the riskiest assets, just as troubled thrift institutions insured by the government have had similar motivation with respect to their loan portfolios.<sup>10</sup> While there are legal minimum and maximum plan funding requirements, there are no comparable regulations for asset holdings.

Empirical tests of these theories have not resulted in definitive conclusions about the economic significance of these theories. There is some evidence of a link between profitability, tax-paying status, and fixed-income investment, but it has little economic significance.<sup>11</sup> It is clear that profitable sponsors do not fully take advantage of the tax arbitrage opportunity by investing solely in corporate bonds.<sup>12</sup> There is some evidence that underfunded plans whose sponsors are in financial distress do invest a smaller proportion in fixed-income securities, as the discussion of PBGC insurance suggests.<sup>13</sup>

One possible explanation for the lack of compelling evidence for these theories is that pension fund investment managers and other practitioners have

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<sup>10</sup>These predictions are discussed more fully and tested empirically in Bodie and Papke (1991b).

<sup>11</sup>See Friedman (1983), Bodie, Morck, Light and Taggart (1987), and Bodie and Papke (1990).

<sup>12</sup>This also implies that sponsors are not immunizing their liabilities in anticipation of sharing the surplus. While the Form 5500 contains no questions about investment strategy, it is possible to determine the strategy for underfunded plans. Bodie and Papke (1991b) find that only about one-third of under- to just fully-funded plans invest 100 percent in fixed-income securities and may be immunizing. It is not possible to determine the investment strategy for overfunded plans from the static asset mix because a sponsor of an overfunded plan could be using contingent immunization as explained above.

<sup>13</sup>See Bodie and Papke (1991b).

traditionally recommended a 50/50 or 60/40 mix of bonds and equities.<sup>14</sup> Conventional wisdom maintains that the fixed-income portion will hold its value well enough during down market-cycles to enable the funds to meet their obligations, and the equity portion will enable them to capitalize on up market-cycles.<sup>15</sup> This 60/40 portfolio mix is reflected in the tables accompanying this chapter.

#### THE ASSET ALLOCATION OF PRIVATE PENSION PLANS

For the purposes of this chapter, financial assets reported on the Form 5500 are categorized into cash, long-term fixed-income securities, equity, real estate, unallocated insurance contracts, pooled funds, and other securities.<sup>16</sup> (The Form 5500 includes the total value of unallocated insurance contracts, but does not report allocated insurance amounts, the assets in insured pension funds, which are managed by life insurance companies.<sup>17</sup>) Table 17.1 presents average asset holdings of single employer and multiemployer defined benefit and defined contribution plans, and all

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<sup>14</sup>See Ambachtsheer (1991) for a review of the debate.

<sup>15</sup>See Greenwich Reports (1990) for a discussion.

<sup>16</sup>Accounts receivable are not included in total assets for the purposes of these tables.

<sup>17</sup>See Hoffman (1989) for a comparison of the Federal Reserve Board's Flow of Funds (FOF) Accounts with Form 5500 data. The FOF includes an economy-wide estimate of insured pension assets, and Hoffman discusses how data from the American Council of Life Insurance (ACLI) can be used to determine the appropriate portion of life insurance companies' assets allocable to group pensions.

The economy-wide FOF pension assets estimates are not directly comparable to a total constructed from the Form 5500 data because most FOF assets are reported at book value, while equities are based on market value (and valued as of the end of the calendar year). Secondly, the Form 5500 includes some data items omitted from the FOF data, primarily noninvestment and nonfinancial items (accounts receivable, real estate, and buildings and property, for example).

plans combined for the 1987 plan year.<sup>18</sup> Because of the large sample sizes, virtually any difference between two estimates is statistically significant at the 95 percent confidence level. The magnitude of the estimates determines whether they are of economic significance.

While there were fewer multiemployer defined benefit plans (about 2,000 versus over 22,000 single employer plans), multiemployer plans had over four times the number of participants (4,104) than did single employer plans on average. Total financial assets of multiemployer defined benefit plans averaged \$57.2 million, while single employer plans averaged \$28.8 million. There were over 27,000 single employer defined contribution plans with more than 100 employees, but defined contribution plans were much rarer in multiemployer situations (totalling 849 in 1987).

Single employer defined benefit plans held on average about 23 percent of their assets in equity, and 50 percent in cash, long-term fixed-income securities, and insurance contracts. Pooled funds accounted for another 20 percent of total assets. Single employer defined contribution plans held more equity (30 percent) and less in cash, long-term fixed-income assets, and insurance contracts (about 41 percent) on average.

Multiemployer defined benefit plans invested about 63 percent of assets in cash, long-term fixed-income securities and insurance contracts, and about 19 percent in equities on average. Pooled funds averaged only about 8 percent for multiemployer defined benefit plans. Multiemployer defined contribution plans held over 72 percent in cash, fixed-income securities and insurance contracts, and only about 5 percent in equity. Each plan type held less than 1 percent in real estate.

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<sup>18</sup>Beginning of the 1987 plan year data are used.

The treatment of bank pooled funds is a potential limitation of this data. Pooled funds are the combined contributions of many plans which are managed by one or more banks. Pooled funds are reported in total for each plan on the Form 5500, that is, the proportions invested in equity, bonds, cash, and other assets are not available. This potentially introduces more uncertainty in the asset calculations for single employer plans than for multiemployer plans since the average proportion invested in pooled funds is much higher for single employer plans.

However, this is much less of a problem for calculating the single employer plan investment mix than Table 17.1 indicates. Frequency distributions of asset categories for the four plan types are provided in Tables 17.2-17.5. Each cell reports the percentage of plans whose holdings fell into the reported asset percentile. These tables demonstrate that about two-thirds of single employer and three-fourths of multiemployer plans invested less than 10 percent in pooled funds.<sup>19</sup>

The frequency distributions reveal plan investment heterogeneity hidden in the previous averages. Over half of all single employer defined benefit plans, for example, held 10 percent or less of total assets in equity, and 56 percent held 10 percent or less in long-term fixed-income securities.

While portfolio theory for single employer defined benefit plans predicts extreme investment policies, few portfolios were extreme. About 20 percent of plans held more than 60 percent in equity. About 9 percent of plans held more than 60 percent in long-term fixed-income securities and about 16 percent of plans invested 100 percent in insurance contracts (probably the

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<sup>19</sup>Zero asset values may be the result of reporting error. Plans which report zero in every category are excluded from the sample.

popular Guaranteed Investment Contracts). Less than one-half of single employer defined benefit plans (46 percent) invested more than 60 percent of their portfolio in fixed-income securities. Only 1.3 percent of defined benefit plans invested totally in equities, while 15.7 percent of single employer defined contribution plans did.

Smaller plans (in terms of number of participants and total assets) made more use of bank pooled funds. Table 17.6 presents statistics for single employer defined benefit and contribution plans categorized by the fraction invested in pooled funds (20 percent or less versus more than 20 percent). A majority of defined benefit plans invested only about 2 percent in pooled funds on average, and these plans had 20 percent more participants and 1.5 times as many assets as those which invested more heavily in pooled funds. The average investment mix of these defined benefit plans can be more precisely calculated to be a 60/30 fixed-income securities/equity mix.

The same general characteristics held true for those single employer defined contribution plans which invested less than 20 percent in pooled funds. They averaged 1,000 more participants and almost four times as many assets as those which relied more on pooled funds. These larger plans averaged about a 50/38 fixed-income securities/equity mix.

#### Asset Allocation by Degree of Funding

The discussion of PBGC insurance of pension liabilities implies that there is a link between a sponsor's financial distress and its fund's asset allocation — namely that these sponsors will tend to invest more in risky assets. A comparison of average asset mix by funding ratio is not a test of this theory (a sponsor's financial well-being must be controlled for), but it is interesting in its own right and may be suggestive of a relationship

between funding and investment policy.

Tables 17.7 and 17.8 provide average asset percentages by degree of plan funding for single employer and multiemployer defined benefit plans. The funding ratio (total assets as a fraction of liability) is calculated from actuarial data provided in Schedule B of the Form 5500. It is comparable to that used to determine legal funding requirements.<sup>20</sup> The Omnibus Budget Reconciliation Act of 1987 (OBRA) uses this funding ratio to set maximum limits on the amount of tax-qualified contributions a corporation can make as a proportion of the current liability (contributions are limited to 150 percent of current liability).<sup>21</sup> Liabilities are adjusted to a common discount rate (used by the PBGC in valuing liabilities) as described in the Appendix of this chapter.

There were notable differences in the equity holdings of underfunded versus overfunded defined benefit plans but they do not appear to be in the direction predicted by the theory. Equity holdings appear to rise on average, not fall, with the degree of funding. The most underfunded plans invested about 19 percent in equities; the most overfunded plans invested more than 25 percent.

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<sup>20</sup>Total pension assets in the numerator of the funding ratio include accounts receivable. A comparison of this funding ratio with one constructed using financial assets only indicated that for single employer plans in 1987, 82 percent of the ratios were within 10 percent of each other, and 92 percent were within 30 percent. The relevant percentages for multiemployer plans were 97 and 99, respectively.

<sup>21</sup>The measure of pension liability, the guaranteed nominal benefit (or liability), used in OBRA is essentially the same chosen by the Financial Accounting Standards Board (FASB), the rule-making body of the accounting profession, in FASB Statement 87. The rule specifies that the measure of corporate pension liability to be used on the corporate balance sheet in external reports is the accumulated benefit obligation — that is, the present value of pension benefits owed to employees under the plan's benefit formula absent any salary projections and discounted at a nominal rate of interest.

While there is some variation within each of these three categories, cash, long-term fixed-income securities, and insurance contracts accounted for about 50 percent of assets regardless of the degree of funding in single employer plans. Cash, long-term fixed-income securities, and insurance contracts averaged about 60 percent in multiemployer plans at every level of funding, and equity holdings ranged between 14 and 23 percent.

#### Defined Contribution Plans

Several different types of pension plans are classified as defined contribution plans. Some are intended to be the primary source of retirement income, while others are designed to be supplemental tax-deferred savings plans or vehicles for corporate profit-sharing. These plans are described in greater detail elsewhere in this volume. This section reports the investment mix of subgroups of defined contribution plans.

Table 17.9 provides asset averages for savings, thrift, and profit-sharing plans (hereafter referred to as thrift plans), and money purchase plans for single employers and multiemployers as of the beginning of the 1987 plan year.<sup>22</sup> Single employer thrift plans averaged about 32 percent in equities, and about 39 percent in cash, fixed-income securities, and insurance contracts. Money purchase plans for these employers invested much less in equities (14 percent) and over half (53 percent) of all assets in cash, fixed-

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<sup>22</sup>Savings or thrift plans require the participants as well as the employer to contribute. Employee contributions are generally based on a percentage of compensation (usually selected from a range by the employee) with the employer fully or partially matching the contribution. Generally, employee contributions are made out of after-tax income.

The retirement benefit of a profit-sharing plan is based on the employer's contribution and the earnings of the fund. The employer's contributions are based on profits, and may be calculated either by formula or made on a discretionary basis. Money purchase plans resemble defined benefit plans in that the employer's contribution are usually determined as a fixed percentage of compensation.

income securities, and insurance contracts. Party-in-interest investment averaged 15.5 percent of all assets for thrift plans.<sup>23</sup>

The 221 multiemployer thrift plans held over 70 percent in cash, fixed-income securities, and insurance contracts, as did the 628 money purchase plans.<sup>24</sup> Only about 5 percent of assets in these plans were invested in equities.

Table 17.10 presents the investment mix for sole and multiple defined contribution plans. A sole plan is the only pension plan in a company, while a multiple plan is one of at least two, and possibly several, plans. Over 70 percent of sponsors with a primary defined benefit plan (in which participation is mandatory), for example, also offer a voluntary defined contribution plan.<sup>25</sup> This table illustrates that multiple plans of single employers invested a higher percentage in equity than sole plans (37.3 versus 21.4 percent) and less in cash, fixed-income securities and insurance contracts (35.4 versus 47.6 percent).

Table 17.11 describes the asset allocation of Employee Stock Ownership Plans (ESOPs) and 401(k) plans in 1987.<sup>26</sup> Tables 17.12-17.15 present the asset frequency distributions for these plans. ESOPs averaged 80 percent equity, while 401(k) plans were invested in a manner more similar to the

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<sup>23</sup>Profit-sharing, thrift, and salary reduction plans are not restricted, as most plans are, to 10 percent or less investment in the sponsor's securities. A typical profit-sharing plan distributes shares of stock to participants.

<sup>24</sup>There are no multiemployer profit-sharing plans.

<sup>25</sup>See Beller (1989).

<sup>26</sup>An ESOP is a stock bonus, or money purchase plan which invests primarily in employer securities. A 401(k) plan, also called a cash or deferred arrangement, is a salary reduction plan in which taxes on employee as well as employer contributions are deferred until assets are distributed.



average defined contribution plan (reported in Table 17.1), although 401(k)s invest about 10 percent less in equities and about 10 percent more in insurance contracts. Over two-thirds of ESOPs invested solely in equities, and over 12 percent of 401(k) plans invested solely in unallocated insurance contracts.

#### Historical Pension Fund Investments

Tables 17.16 and 17.17 present pension fund asset allocation from 1981 to 1987 for single employer and multiemployer defined benefit plans. The historical pattern could broadly be interpreted as indicating some evidence of portfolio balancing to counter market movements. For example, while there were large increases in the value of the stock market over this period, the fraction of the value invested in equities on average increased only about 4 percent from 1981 to 1987.<sup>27</sup> Recall, however, that even broad movements in assets cannot be gauged completely accurately because the holdings of pooled funds are not reported.

For single employer plans, with the exception of the rise in equities from 18.8 percent in 1984 to 25.5 percent in 1985 (and a drop to 22.6 percent in 1986) the averages were fairly stable. The proportion of multiemployer funds invested in equities increased from 13.9 percent in 1981 to 18.6 percent in 1987. While multiemployer plan investment in cash fell about 4 percent to 15.5 percent, holdings of long-term fixed-income securities rose by the same amount to 29.3 percent, maintaining roughly the same fixed-income securities proportion overall.

Tables 17.18 and 17.19 present the frequency distributions of funding

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<sup>27</sup>The October crash of 1987 is not reflected in the beginning-of-plan year asset values.

ratios for single employer and multiemployer defined benefit plans from 1981 to 1987. There was an increase in the percentage of single employer plans which were underfunded (have a funding ratio less than 1.0) from 15 percent in 1981 to 22.1 percent in 1987. Seventy to 80 percent of plans in any given year are over 150 percent funded. The sponsors of these plans will be constrained in their ability to make tax-qualified contributions under the 1987 Omnibus Budget Reconciliation Act rules. There are more underfunded multiemployer than single employer plans — 24 percent in 1981 and 26.7 percent in 1987. However, over 70 percent were more than 150 percent funded.

The asset mix for defined contribution plans of single employer and multiemployer plans from 1981 to 1987 is reported in Tables 17.20 and 17.21. Equity investment for single employer plans remained about 22 percent each year, while the fraction invested in pooled funds rose from 17.5 percent in 1981 to 22.2 percent on average in 1987.<sup>28</sup> Multiemployer plans reduced the proportion invested in cash on average, and increased investment in longer maturity fixed-income securities. The 5.2 percent invested in equities in 1987 was the result of an almost steady but small increase over the 7 years.

Table 17.22 reports holdings of corporate and government bonds as a percentage of total assets from 1981 to 1987. Single employer defined benefit plans held about 10.5 percent in government bonds in 1987, up from 6.4 percent in 1981, but the proportion invested in corporate bonds fell from 7.1 percent to 5.8 percent over the same period. Multiemployer defined benefit plans invested a higher fraction in government bonds (about 19 percent) and in corporate bonds (about 10 percent) over this period.

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<sup>28</sup>This may be a result of the rise in the number of new, and therefore smaller, defined contribution plans which rely on pooled fund investment. See Beller (1989) for trends in the types of pension plans.

Single employer defined contribution plans invested about 5 percent in government bonds and about 4 percent in corporate bonds. Multiemployer defined contribution plans invested about 13 percent in government securities and 6.5 percent in corporate bonds in 1987.

Appendix

Reported liabilities on Schedule B may differ across firms with the same present value of liability because different interest rates are assumed. The formula below was developed by an actuary at the Department of Labor to adjust Schedule B reported liabilities to a common rate.

Define

$$\begin{aligned} r &= \text{Common rate (PBGC rate)} \\ r' &= \text{assumed interest rate} \\ i_1 &= .94^{-r'} \\ i_2 &= [(100 + r') / (100 + r)]^{\text{Ret. age} - 50} \end{aligned}$$

Then the present value (PV) of benefits is the sum of the present value of benefits for retired lives and non-retired lives. That is:

PVB = PVBR + PVBNR where

PVBR (retired lives) =  $[\underline{6}(d)i] * i_1$

PVBNR (actives, vested and nonvested) =

$$(\underline{6}(d)ii + \underline{6}(e) + [.8 * \underline{2}(b)]) * i_1 * i_2$$

These data correspond to the following questions on Schedule B of the 5500:

Retirement age = 12(d)

r = 12(c)

$\underline{6}(d)i$  = PV vested benefits for retired participants and beneficiaries receiving benefits

$\underline{6}(d)ii$  = PV vested benefits for other participants

$\underline{6}(e)$  = PV of nonvested benefits

$\underline{2}(b)$  = Employer's normal cost for plan year (annual)

## References

- Ambachtsheer, K.P., "Would the Real Pension Fund Investment Policy Please Stand Up?" The Ambachtsheer Letter #46, January 8, 1991.
- Beller, D.J., "Coverage and Vesting Patterns in Private Pension Plans, 1975-1985," in Trends in Pensions, J.A. Turner and D.J. Beller, eds., 1989.
- Black F., "The Tax Consequences of Long Run Pension Policy," Financial Analysts Journal, September-October 1980, pp. 17-23.
- Bodie, Z., "Shortfall Risk and Pension Fund Asset Management," Financial Analysts Journal, May/June 1991.
- Bodie, Z., J.O. Light, R. Morck and R.H. Taggart, Jr., "Corporate Pension Policy: An Empirical Investigation," in Issues in Pension Economics, Bodie, Shoven and Wise, eds., Chicago: University of Chicago Press, 1987.
- Bodie, Z. and L.E. Papke, Report to the Department of Labor under contract number J-9-P-8-0097, 1990.
- Bodie, Z. and L.E. Papke, "Pension Fund Finance," In Pensions and the U.S. Economy: Sources, Uses, and Limitations of Data, ed. Z. Bodie and A. Munnell, Philadelphia: University of Pennsylvania Press, 1991a.
- Bodie, Zvi and L.E. Papke, "Pension Fund Finance: Theory and Evidence," mimeo, 1991b.
- Greenwich Reports, "Suggestion: Stress Strategy," 1990.
- Friedman, B.M., "Pension Funding, Pension Asset Allocation and Corporate Finance: Evidence from Individual Company Data," in Financial Aspects of the United States Pension System, Chicago: University of Chicago Press, 1983.
- Harrison, M.J. and W.F. Sharpe, "Optimal Funding and Asset Allocation Rules for Defined Benefit Pension Plans," Chapter 4 of Bodie and Shoven, eds., Financial Aspects of U.S. Pension Systems, University of Chicago Press, 1983.
- Hoffman, A.J., "Pension Assets and the Economy," in Trends in Pensions, J.A. Turner and D.J. Beller, eds., 1989.
- Tepper, I., "Taxation and Corporate Pension Policy," Journal of Finance, March 1981, pp. 1-13.
- Utgoff, K.P., "Pension Reform Strengthens Defined-Benefit Plans," Compensation and Benefits Management, Summer 1988.

Table 17.1.  
Asset allocation<sup>1</sup> of private pension plans with 100 or more participants, 1987  
(Percent)

	Single employer <sup>2</sup> defined benefit	Single employer defined contribution	Multiemployer <sup>3</sup> defined benefit	Multiemployer defined contribution	All plans and entities
Cash <sup>4</sup>	11.3	15.7	15.5	35.1	14.2
Long-term fixed-income	16.7	9.1	29.3	20.5	13.5
Equity	22.9	30.1	18.6	5.4	26.3
Real estate	0.8	0.6	0.7	0.3	0.7
Unallocated insurance contracts <sup>5</sup>	22.4	16.1	18.1	17.0	18.9
Pooled funds	20.4	19.6	8.2	7.8	19.1
Other	5.5	8.7	9.6	13.8	7.4
Total percent	100	100	100	100	100
Average party-in-interest investment	1.5	14.1	0.2	0.5	7.9
Average total financial assets (millions)	28.8	11.4	57.2	9.2	20.4
Average total participants	1,378	1,061	4,104	1,632	1,277
Plans <sup>6</sup>	22,132 (20,376)	27,605 (24,130)	2,058 (2,034)	849 (784)	54,722 (48,223)
Obs. <sup>7</sup>	6,306 (5,847)	6,823 (6,097)	1,809 (1,787)	746 (689)	15,989 (14,569)

<sup>1</sup>All tables report plan-weighted average portfolios, not asset-weighted portfolios.

<sup>2</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>3</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>4</sup>Includes certificates of deposit, other interest-bearing assets, and non-interest bearing securities.

<sup>5</sup>Unallocated insurance contracts are funds held in general accounts of an insurance company which are not associated with any named participant. At retirement, an allocated contract may be established for a participant. Allocated insurance contracts are not reported on the Form 5500.

<sup>6</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>7</sup>Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.2.  
 Frequency distribution of assets of single employer<sup>1</sup> defined benefit plans with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	34.3	45.6	47.4	88.0	58.6	56.3	65.3
10	37.6	10.4	4.8	10.1	10.7	11.4	24.0
20	11.4	9.9	4.0	1.5	3.7	6.3	3.4
30	6.0	9.6	5.0	0.2	2.5	3.3	1.8
40	2.4	8.8	6.6	0.1	1.5	2.5	1.1
50	1.9	6.7	11.1	0.2	1.8	1.9	0.6
60	1.2	3.0	10.9	0.0	1.6	1.5	0.3
70	0.6	2.3	5.0	0.0	1.7	1.5	0.5
80	0.6	1.3	2.4	0.0	1.1	1.4	0.3
90	0.5	1.2	1.5	0.1	1.3	1.2	0.2
100	3.4	1.3	1.3	0.0	15.8	12.7	2.4
Plans <sup>2</sup>	20,376						
Obs. <sup>3</sup>	6,306						

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population.

<sup>3</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.



Table 17.3.  
 Frequency distribution of assets of single employer<sup>1</sup> defined contribution plans with 100  
 or more participants, 1987  
 (Percent)

Percentile	Cash	Long- term fixed- income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	29.4	61.6	43.8	95.5	76.4	58.8	71.8
10	38.9	14.7	6.9	2.7	2.3	9.0	13.2
20	8.8	6.3	4.8	0.9	1.2	4.9	3.3
30	4.7	5.1	5.3	0.4	1.1	3.9	1.9
40	3.8	4.0	6.5	0.2	1.3	3.2	1.0
50	2.3	3.2	5.3	0.1	1.1	2.6	0.7
60	2.2	1.9	5.0	0.1	1.5	1.9	1.2
70	1.6	1.3	2.6	0.1	1.5	1.9	1.1
80	1.0	0.7	1.9	0.1	1.9	1.5	1.2
90	1.0	0.5	2.3	0.1	2.0	1.9	1.2
100	6.3	0.6	15.7	0.1	9.8	10.4	3.5
Plans <sup>2</sup>	24,130						
Obs. <sup>3</sup>	6,823						

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population.

<sup>3</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.4.  
 Frequency distribution of assets of multiemployer<sup>1</sup> defined benefit plans with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	3.4	28.1	40.7	59.8	67.4	72.5	23.6
10	58.0	8.9	8.7	38.9	6.0	10.9	54.6
20	15.2	6.9	8.6	0.7	3.0	4.9	8.3
30	7.9	8.4	10.9	0.4	2.2	2.6	3.4
40	4.8	11.9	11.1	0.1	1.8	1.6	2.0
50	2.4	12.6	11.2	0.1	2.2	1.1	1.4
60	1.4	8.0	5.6	0.1	2.0	1.1	1.2
70	1.3	5.7	2.1	0.1	1.7	1.3	0.9
80	0.9	4.0	0.6	0.0	1.1	0.3	0.9
90	1.0	3.0	0.3	0.0	1.3	0.5	0.7
100	3.9	2.6	0.2	0.0	11.4	3.3	3.0
Plans <sup>2</sup>	2,033						
Obs. <sup>3</sup>	1,809						

<sup>1</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population.

<sup>3</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.5.  
 Frequency distribution of assets of multiemployer<sup>1</sup> defined contribution plans with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	6.4	53.5	80.3	85.1	73.9	82.0	42.5
10	36.3	7.5	6.0	14.3	2.2	3.3	34.3
20	9.5	4.5	3.3	0.0	2.1	4.4	5.0
30	8.6	5.3	3.4	0.0	2.3	1.3	3.3
40	5.7	5.3	2.5	0.0	1.4	1.2	1.1
50	4.3	3.2	1.4	0.3	1.1	0.7	1.7
60	2.3	5.4	1.3	0.0	1.3	1.3	0.9
70	1.8	4.7	0.3	0.0	1.4	0.7	0.9
80	2.1	4.5	0.4	0.1	1.3	0.1	2.0
90	2.9	2.9	0.0	0.0	2.0	0.6	1.4
100	20.2	3.3	1.1	0.0	11.0	4.4	7.0
Plans <sup>2</sup>	784						
Obs. <sup>3</sup>	746						

<sup>1</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population.

<sup>3</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.6.  
 Asset allocation of single employer<sup>1</sup> plans with 100 or more participants by pooled fund investment, 1987  
 (Percent)

	Defined benefit		Defined contribution	
	< 20 percent	> 20 percent	< 20 percent	> 20 percent
Cash	12.9	3.0	15.9	8.1
Long-term fixed-income	21.0	6.7	9.3	5.9
Equity	30.1	7.0	37.8	9.0
Real estate	0.8	0.3	0.3	0.5
Unallocated insurance contracts	26.5	8.2	24.2	4.8
Pooled funds	1.9	73.0	1.5	68.0
Other	6.9	1.7	11.1	3.7
Total percent	100	100	100	100
Average party-in interest investment	1.6	0.5	18.3	2.3
Average total financial assets (millions)	35.1	23.0	19.4	4.9
Average total participants	1,570	1,281	1,635	627
Plans <sup>2</sup>	8,635	7,059 (5,303)	7,676	10,051 (6,577)
Obs. <sup>3</sup>	2,459	1,929 (1,470)	2,121	2,129 (1,403)

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>3</sup>Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.7.  
 Asset allocation of single employer<sup>1</sup> defined benefit plans with 100 or more participants  
 by funding status, 1987  
 (Percent)

	Funding ratio <sup>2</sup>			
	Less than 0.75	0.75-1.0	1.0-1.5	1.5 and greater
Cash	13.9	12.0	9.7	9.5
Long-term fixed- income	14.5	16.7	17.9	17.9
Equity	19.3	22.4	23.6	25.4
Real estate	0.6	0.6	0.7	0.8
Unallocated insurance contracts	21.6	23.0	24.7	21.1
Pooled funds	23.6	20.2	17.3	20.8
Other	6.4	5.7	6.0	4.4
Total percent	100	100	100	100
Average funding ratio	0.4	0.9	1.3	2.1
Average total financial assets (millions)	9.6	18.3	37.8	30.5
Average total participants	1,229	1,269	1,690	1,264
Plans <sup>3</sup>	2,723 (2,093)	2,973 (2,841)	6,773 (6,444)	6,961 (6,636)
Obs. <sup>4</sup>	733 (588)	840 (798)	2,831 (1,123)	1,996 (1,900)

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Funding ratio calculated from Schedule B actuarial data, reported as of the beginning of the plan year. See text for description.

<sup>3</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>4</sup>Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.8.  
 Asset allocation of multiemployer<sup>1</sup> defined benefit plans with 100 or more participants by  
 funding status, 1987  
 (Percent)

	Funding ratio <sup>2</sup>			
	Less than 0.75	0.75-1.0	1.0-1.5	1.5 and greater
Cash	19.1	15.1	13.1	13.0
Long-term fixed- income	29.4	30.0	30.5	29.7
Equity	18.0	14.3	19.7	23.0
Real estate	1.6	0.7	0.5	0.7
Unallocated insurance contracts	15.1	19.2	18.0	17.2
Pooled funds	6.0	9.4	8.7	8.8
Other	10.8	11.4	9.3	7.5
Total percent	100	100	100	100
Average funding ratio	0.4	0.9	1.2	2.0
Average total financial assets (millions)	42.1	82.4	58.4	42.6
Average total participants	6,243	5,460	3,797	2,786
Plans <sup>3</sup>	161 (156)	309 (307)	966 (959)	329 (328)
Obs. <sup>4</sup>	142 (138)	273 (271)	852 (846)	290 (289)

<sup>1</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.



<sup>2</sup>Funding ratio calculated from Schedule B actuarial data, reported as of the beginning of the plan year. See text for description.

<sup>3</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>4</sup>Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.9.

Asset allocation of savings, thrift, profit-sharing and money purchase defined contribution plans with 100 or more participants, 1987  
(Percent)

	Single employer <sup>1</sup> savings, thrift & profit sharing	Single employer money purchase <sup>2</sup>	Multiemployer <sup>3</sup> savings & thrift	Multiemployer money purchase
Cash	15.4	18.1	36.7	34.5
Long-term fixed-income	9.1	9.2	22.1	20.0
Equity	32.3	13.7	5.2	5.4
Real estate	0.6	0.6	0.2	0.3
Unallocated insurance contracts	14.8	26.1	12.9	18.5
Pooled funds	19.2	22.7	7.6	7.9
Other	8.6	9.6	15.3	13.3
Total percent	100	100	100	100
Party-in-interest investment	15.5	3.2	0.6	0.5
Average total financial assets (millions)	12.3	5.5	7.8	9.7
Average total participants	1138	515	1512	1674
Plans <sup>4</sup>	24,201 (21,417)	3,404 (2,713)	221 (201)	628 (584)
Obs. <sup>5</sup>	6,162 (5,569)	661 (528)	193 (176)	553 (513)

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Includes target benefit and other money purchase plans.

<sup>3</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>4</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>5</sup>Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.10.  
 Asset allocation of sole and multiple<sup>1</sup> defined contribution plans with 100 or more participants, 1987  
 (Percent)

	Single employer <sup>2</sup> sole defined contribution	Single employer multiple defined contribution	Mutiemployer <sup>3</sup> sole defined contribution	Mutiemployer multiple defined contribution
Cash	20.2	12.0	36.4	27.0
Long-term fixed-income	11.6	7.1	20.8	19.0
Equity	21.4	37.3	5.2	6.4
Real estate	0.8	0.4	0.3	0.2
Unallocated insurance contracts	15.8	16.3	16.1	23.1
Pooled funds	22.2	17.6	7.7	8.9
Other	8.0	9.3	13.6	15.5
Total percent	100	100	100	100
Average party-in-interest investment	6.5	20.2	0.3	1.6
Average total financial assets (millions)	3.4	18.0	9.2	9.3
Average total participants	364	1626	1641	1579
Plans <sup>4</sup>	12,354 (10,684)	15,250 (13,447)	721 (674)	129 (110)
Obs. <sup>5</sup>	2,264 (1,990)	4,559 (4,109)	634 (594)	112 (95)

<sup>1</sup>A sole plan is the only one in the company. A multiple plan may be one of several plans.

<sup>2</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>3</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

\*Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

\*Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.11.  
 Asset allocation of single employer<sup>1</sup> plans with ESOP features, or 401(k) plans, with 100  
 or more participants 1987  
 (Percent)

	ESOP	All 401(k)	Sole <sup>2</sup> 401(k)	Multiple <sup>3</sup> 401(k)
Cash	8.1	12.7	15.4	11.1
Long-term fixed-income	2.9	6.7	8.3	5.7
Equity	80.0	21.7	16.4	24.9
Real estate	0.5	0.3	0.3	0.2
Unallocated insurance contracts	1.8	23.0	23.2	22.8
Pooled funds	3.6	24.0	25.2	23.2
Other	3.2	11.7	11.1	12.0
Total percent	100	100	100	100
Average party-in- interest investment	56.4	8.6	5.1	10.7
Average total financial assets (millions)	12.9	16.9	3.8	25.2
Average total participants	2,394	1,220	431	1,716
Plans <sup>4</sup>	4,672 (4,376)	10,445 (8,642)	4,034 (3,272)	6,411 (5,370)
Obs. <sup>5</sup>	1,490 (1,394)	2,909 (2,554)	809 (695)	2,100 (1,859)

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-  
 employer noncollectively bargained plans.

<sup>2</sup>A sole plan is the only one in a company.

<sup>3</sup>A multiple plan may be one of several plans.

<sup>4</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>5</sup>Total number of observations (number of observations used in asset percent calculations).

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.12.  
 Frequency distribution of assets of single employer<sup>1</sup> plans with ESOP features, with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	24.4	86.0	8.8	93.3	96.0	80.0	83.5
10	60.6	6.4	2.4	0.9	1.1	12.9	11.1
20	4.8	2.0	1.5	0.1	0.2	1.6	1.3
30	2.2	2.2	1.4	0.0	0.1	0.9	0.7
40	1.0	0.6	2.2	0.3	0.5	1.5	0.1
50	0.9	1.7	2.1	0.0	0.2	0.8	0.3
60	0.7	0.0	1.9	0.0	0.7	0.2	0.4
70	0.9	0.3	2.6	0.0	0.5	0.6	0.6
80	0.3	0.3	3.2	0.0	0.2	0.3	0.1
90	0.1	0.0	5.6	0.0	0.1	0.3	0.9
100	4.3	0.4	68.4	0.3	0.5	1.0	1.1
Plans <sup>2</sup>	4,301						
Obs. <sup>3</sup>	1,367						

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population.

<sup>3</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.



Table 17.13.  
 Frequency distribution of assets of single employer<sup>1</sup> 401(k) plans with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	39.2	62.5	50.6	97.5	67.3	50.3	69.7
10	34.9	20.1	6.9	1.8	1.5	10.2	10.4
20	6.4	4.8	5.6	0.4	1.5	6.2	3.9
30	3.5	4.6	6.3	0.0	1.1	4.9	2.1
40	3.8	2.5	7.2	0.1	2.1	4.0	1.9
50	2.3	2.7	5.5	0.0	1.9	3.6	0.8
60	2.3	1.1	4.7	0.0	2.6	1.9	0.9
70	1.7	0.8	2.8	0.0	2.9	2.1	2.0
80	0.9	0.5	1.8	0.0	3.4	1.5	2.0
90	1.1	0.3	2.1	0.0	3.6	2.7	1.8
100	3.7	0.2	6.6	0.1	12.1	12.8	4.7
Plans <sup>2</sup>	8,539						
Obs. <sup>3</sup>	2,525						

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population.

<sup>3</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.14.  
 Frequency distribution of assets of single employer<sup>1</sup> sole<sup>2</sup> 401(k) plans with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	39.8	59.5	59.7	96.5	67.8	48.3	71.4
10	27.6	19.3	7.5	2.3	2.1	10.7	10.3
20	8.8	4.7	5.6	0.7	1.2	5.3	3.4
30	3.7	6.1	5.1	0.0	0.7	5.5	1.8
40	6.0	3.3	4.4	0.3	1.4	4.2	1.8
50	2.5	3.3	4.0	0.0	2.3	4.1	0.6
60	2.1	1.6	4.0	0.0	2.3	2.2	1.0
70	1.7	0.9	2.3	0.0	2.0	1.6	1.6
80	1.7	0.5	1.0	0.0	3.1	1.0	2.0
90	1.5	0.7	1.9	0.0	3.5	3.8	1.1
100	4.6	0.2	4.6	0.0	13.6	13.2	5.1
Plans <sup>3</sup>	3,243						
Obs. <sup>4</sup>	688						

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>A sole plan is the only one in a company.

<sup>3</sup>Total number of plans, weighted to represent population.

<sup>4</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.15.  
 Frequency distribution of assets of single employer<sup>1</sup> multiple<sup>2</sup> 401(k) plans with 100 or more participants, 1987  
 (Percent)

Percentile	Cash	Long-term fixed-income	Equity	Real estate	Unallocated insurance contracts	Pooled funds	Other
0	38.8	64.4	45.0	98.2	66.9	51.5	68.7
10	39.4	20.6	6.6	1.5	1.1	10.0	10.4
20	4.9	4.8	5.6	0.1	1.6	6.7	4.1
30	3.4	3.7	7.1	0.0	1.4	4.5	2.3
40	2.4	2.1	8.9	0.0	2.6	3.9	1.9
50	2.2	2.3	6.4	0.0	1.7	3.2	1.0
60	2.5	0.7	5.1	0.0	2.8	1.7	0.8
70	1.8	0.7	3.1	0.0	3.5	2.5	2.2
80	0.5	0.5	2.2	0.0	3.6	1.8	2.0
90	0.9	0.1	2.2	0.0	3.7	2.0	2.1
100	3.2	0.2	7.8	0.1	11.2	12.6	4.4
Plans <sup>3</sup>	5,295						
Obs. <sup>4</sup>	1,837						

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>A multiple plan may be one of several plans.

<sup>3</sup>Total number of plans, weighted to represent population.

<sup>4</sup>Total number of observations.

Source: 1987 Form 5500 series reports filed with the Internal Revenue Service.

Table 17.16.  
 Asset allocation of single employer<sup>1</sup> defined benefit plans with 100 or more participants,  
 1981-87  
 (Percent)

	1981	1982	1983	1984	1985	1986	1987
Cash	10.2	10.8	8.6	9.1	9.2	10.8	11.3
Long-term fixed-income	14.4	15.6	16.2	14.6	16.3	16.2	16.7
Equity	19.2	18.4	19.9	18.8	25.5	22.6	22.9
Real estate	0.7	0.4	0.5	0.6	0.6	0.6	0.8
Unallocated insurance contracts	25.2	24.9	24.7	23.2	24.0	22.7	22.4
Pooled funds	23.6	23.3	23.7	28.1	23.0	21.2	20.4
Other	6.7	6.7	6.5	5.6	6.4	5.9	5.5
Total percent	100	100	100	100	100	100	100
Average total financial assets (millions)	13.1	13.9	17.6	19.6	20.4	25.8	28.8
Avg. total participants	1,206	1,180	1,222	1,435	1,350	1,309	1,378
Plans <sup>2</sup>	23,178 (21,217)	24,153 (22,327)	23,870 (22,507)	7,416 (7,407) <sup>3</sup>	23,013 (21,452)	22,905 (21,486)	20,376 (22,132)
Obs. <sup>4</sup>	5,793 (5,318)	5,911 (5,444)	5,230 (4,986)	5,510 (1,812)	5,693 (5,300)	5,831 (5,486)	6,306 (5,847)

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>3</sup>Beginning of year asset data was not punched for most 1984 Form 5500s.

<sup>4</sup>Total number of observations (number of observations used in asset percent calculations).

Table 17.17.  
 Asset allocation of multiemployer<sup>1</sup> defined benefit plans with 100 or more participants,  
 1981-87  
 (Percent)

	1981	1982	1983	1984	1985	1986	1987
Cash	18.4	19.7	17.0	20.1	17.5	15.5	15.5
Long-term fixed-income	25.5	25.9	27.1	26.6	28.9	29.1	29.3
Equity	13.9	12.4	14.7	15.1	14.9	17.0	18.6
Real estate	0.6	0.6	0.7	0.7	0.7	0.5	0.7
Unallocated insurance contracts	21.6	20.3	21.0	22.1	20.2	19.1	18.1
Pooled funds	9.1	9.5	8.9	6.6	7.9	8.4	8.2
Other	10.7	11.5	10.6	8.8	9.9	10.3	9.6
Total percent	100	100	100	100	100	100	100
Average total financial assets (millions)	21.9	23.5	30.9	33.9	32.8	48.8	
Average total participants	4,006	3,673	3,797	4,945	3,860	4,073	4,104
Plans <sup>2</sup>	2,154 (2,033)	2,311 (2,006)	2,208 (2,174)	2,274 (722)	2,240 (2,181)	2,105 (2,064)	2,058 (2,034)
Obs. <sup>3</sup>	2,154 (2,033)	2,133 (2,006)	1,657 (1,631)	729 <sup>4</sup> (722)	1,875 (1,826)	1,789 (1,755)	1,787 (1,809)

<sup>1</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>2</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>3</sup>Total number of observations (number of observations used in asset percent calculations).

<sup>4</sup>Beginning of year asset data was not punched for most 1984 Form 5500s.

Source: Form 5500 series reports filed with the Internal Revenue Service, selected years.

Table 17.18.  
 Frequency distribution of funding ratios<sup>1</sup> of single employer<sup>2</sup> defined benefit plans with  
 100 or more participants, 1981-87  
 (Percent)

Funding ratio	1981	1982	1983	1984	1985	1986	1987
0.4	5.9	5.0	4.8	5.3	11.6	5.8	6.0
0.8	6.7	6.6	5.8	5.0	5.6	9.0	10.4
0.9	2.4	2.6	3.1	2.1	1.9	4.4	5.7
1.0	3.2	3.1	2.9	2.8	3.5	5.6	7.2
1.5	21.8	20.1	22.9	20.9	21.8	32.0	34.9
2.0	27.3	24.6	28.4	25.7	24.9	25.8	23.0
2.5	16.7	18.2	16.7	19.2	16.4	10.6	7.6
3.0	16.0	19.9	15.5	19.1	14.4	6.9	5.2
Plans	20,536	20,649	21,172	20,444	20,462	20,413	19,430
Average single employer funding ratio	1.8	1.9	1.8	1.9	1.6	1.5	1.4
Average funding ratio of all plans <sup>3</sup>	1.7	1.9	1.7	1.7	1.6	1.5	1.4
Median funding ratio of all plans	1.7	1.7	1.7	1.9	1.6	1.4	1.3

<sup>1</sup>Funding ratio calculated from Schedule B actuarial data. See text for description.

<sup>2</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.

<sup>3</sup>Includes single employer plans, plans of controlled groups of corporations, multiple-employer noncollectively bargained plans, multiemployer plans, and multiple-employer collectively bargained plans.

Source: Form 5500 series reports filed with the Internal Revenue Service, selected years.

Table 17.19.  
 Frequency distribution of funding ratios<sup>1</sup> of multiemployer<sup>2</sup> defined benefit plans with 100  
 or more participants, 1981-87  
 (Percent)

Funding ratio	1981	1982	1983	1984	1985	1986	1987
0.4	9.9	5.5	5.4	6.1	8.1	3.6	3.0
0.8	9.1	6.5	7.0	4.7	4.6	6.6	8.2
0.9	5.0	3.5	4.9	2.9	2.8	6.0	7.0
1.0	5.0	4.9	4.9	3.9	5.3	7.3	8.5
1.5	29.6	30.7	33.9	32.2	32.6	46.3	54.7
2.0	20.2	21.6	24.3	28.4	29.9	22.6	13.9
2.5	11.0	13.0	12.0	12.8	11.8	5.1	2.2
3.0	10.4	14.4	7.6	8.9	5.1	2.6	2.5
Plans	1,653	1,749	1,905	1,965	1,951	1,902	1,760
Average multi-employer funding ratio	1.5	1.7	1.5	1.6	1.5	1.3	1.2
Average funding ratio of all plans <sup>3</sup>	1.7	1.9	1.7	1.7	1.6	1.5	1.4
Median funding ratio of all plans	1.7	1.7	1.7	1.8	1.6	1.4	1.3

<sup>1</sup>Funding ratio calculated from Schedule B actuarial data. See text for description.

<sup>2</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>3</sup>Includes single employer plans, plans of controlled groups of corporations, multiple-employer noncollectively bargained plans, multiemployer plans, and multiple-employer collectively bargained plans.

Source: Form 5500 series reports filed with the Internal Revenue Service, selected years.

Table 17.20.  
 Asset allocation of single employer<sup>1</sup> primary<sup>2</sup> defined contribution plans with 100 or more participants, 1981-87  
 (Percent)

	1981	1982	1983	1984	1985	1986	1987
Cash	23.9	24.0	22.9	24.1	22.7	21.0	20.2
Long-term fixed-income	17.4	15.3	14.8	11.5	12.6	12.6	11.6
Equity	21.7	21.5	24.1	23.3	24.4	22.8	21.4
Real estate	1.3	1.0	1.1	1.0	0.9	0.7	0.8
Unallocated insurance contracts	9.3	10.6	10.5	13.8	14.0	14.8	15.8
Pooled funds	17.5	16.8	17.1	17.9	16.9	19.5	22.2
Other	8.9	10.8	9.5	8.3	8.5	8.6	8.0
Total percent	100	100	100	100	100	100	100
Average party-in-interest investment	7.6	8.5	8.1	9.7	9.9	8.7	6.5
Average total financial assets (millions)	2.6	2.9	3.7	3.9	3.8	4.0	3.4
Average total participants	424	427	507	486	541	506	364
Plans <sup>3</sup>	8,420 (7,409)	9,566 (8,310)	10,182 (8,873)	11,046 (4,329)	12,489 (10,898)	14,118 (12,483)	12,354 (10,684)
Obs. <sup>4</sup>	1,151 (1,003)	1,200 (1,053)	1,265 (1,103)	1,538 (571)	1,953 (1,716)	2,005 (1,803)	6,823 (6,097)

<sup>1</sup>Includes single employer plans, plans of controlled groups of corporations, and multiple-employer noncollectively bargained plans.



<sup>2</sup>Primary plans are reported for 1981-1986, sole plans for 1987. See text for discussion.

<sup>3</sup>Total number of plans, weighted to represent population (number of these plans used in asset percent calculations).

<sup>4</sup>Total number of observations (number of observations used in asset percent calculations).

Source: Form 5500 series reports filed with the Internal Revenue Service, selected years.

Table 17.21.  
 Asset allocation of multiemployer<sup>1</sup> primary<sup>2</sup> defined contribution plans with 100 or more participants, 1981-87  
 (Percent)

	1981	1982	1983	1984	1985	1986	1987
Cash	43.4	46.8	40.2	53.4	42.0	35.4	36.4
Long-term fixed-income	12.1	11.5	15.2	12.2	18.4	19.5	20.8
Equity	3.2	3.9	3.9	4.0	3.1	4.0	5.2
Real estate	0.0	0.0	0.1	0.1	0.1	0.1	0.3
Unallocated insurance contracts	16.7	11.9	18.6	11.3	14.8	16.8	16.1
Pooled funds	6.7	8.8	7.2	4.4	6.4	7.0	7.7
Other	17.9	17.0	14.8	14.5	15.2	17.0	13.6
Total percent	100	100	100	100	100	100	100
Average party-in-interest investment	0.3	0.2	0.5	0.2	0.5	0.8	0.3
Average total financial assets (millions)	3.1	3.0	4.5	7.8	7.2	9.4	9.2
Average total participants	1,435	1,152	1,324	1,772	1,454	1,627	1,641
Plans <sup>3</sup>	383 (315)	600 (505)	547 (508)	625 (244)	581 (542)	682 (634)	721 (674)
Obs. <sup>4</sup>	383 (315)	432 (373)	377 (350)	244 (244)	497 (464)	548 (510)	746 (689)

<sup>1</sup>Includes multiemployer plans and multiple-employer collectively bargained plans.

<sup>2</sup>Primary plans are reported for 1981-1986, sole plans for 1987. See text for discussion.

<sup>3</sup>Total number of plans, weighted to represent population (number of these plans used in

asset percent calculations).

\*Total number of observations (number of observations used in asset percent calculations).

Source: Form 5500 series reports filed with the Internal Revenue Service, selected years.

Table 17.22.  
Pension plan holdings of government and corporate bonds, 1981-87  
(Percent of total financial assets)

	1981	1982	1983	1984	1985	1986	1987
Single employer defined benefit <sup>1</sup>							
govt.	6.4	8.3	9.6	9.2	10.6	10.9	10.5
corp.	7.1	5.6	6.1	5.0	5.2	5.0	5.8
Single employer defined contribution <sup>2</sup>							
govt.	5.8	6.2	6.7	6.1	6.4	5.7	4.8
corp.	5.6	4.8	4.5	2.3	2.9	3.2	3.2
Multiemployer defined benefit <sup>3</sup>							
govt.	12.1	13.5	15.2	17.1	19.1	19.3	18.6
corp.	11.9	11.0	10.4	8.1	8.2	8.4	9.4
Multiemployer defined contribution <sup>4</sup>							
govt.	7.0	7.6	10.2	7.9	12.8	13.1	13.1
corp.	4.0	3.3	3.9	2.6	4.3	5.3	6.5
All entities <sup>5</sup>							
govt.	6.5	7.8	8.9	7.8	9.2	8.9	8.0
corp.	6.8	6.2	5.7	3.8	4.3	4.2	4.6

<sup>1</sup>See Table 17.11 for definitions, and for number of plans and observations.

<sup>2</sup>See Table 17.15 for definitions, and for number of plans and observations.

<sup>3</sup>See Table 17.12 for definitions, and for number of plans and observations.

<sup>4</sup>See Table 17.6 for definitions, and for number of plans and observations.

<sup>5</sup>See Table 17.1 for definitions, and for number of plans and observations.

Source: Form 5500 series reports filed with the Internal Revenue Service, selected years.