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# FACULTY WORKING PAPERS

DECLINING USE OF DEFINED BENEFIT PENSION PLANS:  
IS FEDERAL REGULATION THE REASON?

Robert L. Clark  
Stephan F. Gohmann  
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Working Paper No. 119

April 1988



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## I. Introduction

The increasing incidence of pension coverage has been one of the major developments in employee compensation during the twentieth century. The pension coverage rate among private employees increased from 25 percent in 1950 to over 50 percent in 1984. Throughout this period of growth and development, most workers have been covered by defined benefit plans that promise specified life annuities to all workers who attain vested status in their plans. Ippolito (1986) estimates that of the 38.5 million active participants in 1984 with primary pension coverage, 31.3 million or 81.3 percent of participants were covered by a defined benefit plan.

During the early post-war years when pensions were spreading rapidly through the economy, there was relatively little regulation concerning the administration and funding of defined benefit plans. At the same time, options for defined contribution plans were limited and employee contributions were taxed as income. In this regulatory environment, most large and medium sized firms provided defined benefit pension plans to their employees. Available evidence indicates that these plans were adopted as part of implicit, long-term employment contracts that lowered labor costs and increased worker productivity. The implication is that under the prevailing system of taxation and regulation, defined benefit plans were the most efficient method of providing retirement income to workers.

Since 1974, the federal government has instituted a series of pension regulations and tax modifications that have sharply increased the cost of providing pensions and limited the abilities of firms to alter worker behavior through the use of pension penalties. Because of the nature of the two types of plans, these increased costs have fallen more heavily on defined benefit

plans. At the same time, new forms of defined contribution plans have been introduced and direct employee contributions are now tax-free subject to maximum contribution limits.

Following these regulatory changes, there has been a tendency for greater use of defined contribution plans and a reduced reliance on defined benefit plans to provide primary pension coverage. This paper documents this trend using data from the 5500 tax reporting forms from 1977 (the first year that the data are available on computer tapes) to 1983. The primary objective of the analysis is to examine the causes of the shift toward greater use of defined contribution plans. The results indicate that the increased incidence of defined contribution plans is not due to changes in the industrial structure of the economy or demographic characteristics of the workforce. Instead, the declining use of defined benefit plans is the result of changes in the decision process by which firms determine which plan type they wish to offer their workers.

## II. Declining Use of Defined Benefit Plans

The decline in the use of defined benefit plans is examined using the 5500 tax reporting forms that all firms with more than 100 participants are required to file annually; smaller plans are not required, but may choose to file these forms. For this analysis, plans are first sorted into primary and supplemental plans. The sample is then restricted to only primary pension plans as determined by the Department of Labor. Because the data set contains a small and probably nonrepresentative sample of small plans, the sample is restricted to primary plans with more than 100 participants.

Table 1 shows that the total number of primary pension plans with more than 100 participants filing 5500 forms rose from 22,620 in 1977 to 34,935 in 1983. This increase represents the net creation of new pension plans and any changes in the number of plans required to file these forms. Although the number of defined benefit plans increased from 17,463 to 24,589, they fell as a proportion of all primary plans from 77.2 to 70.4 percent. By contrast, the number of defined contribution plans more than doubled and these plans increased from 22.2 to 28.7 percent of all primary plans. The absolute number of active participants in defined benefit plans increased from 22.4 million in 1977 to 27.6 million in 1983. However, the proportion of participants in defined benefit plans declined from 88.5 percent in 1977 to 81.9 percent of all participants in 1983. These data indicate that the growth in the number of defined benefit plans and the number of participants covered by these plans slowed markedly in the early 1980s.

The more rapid growth in defined contribution plans has occurred throughout the economy. Table 2 shows the distribution of plans across industrial sectors of the economy. In 1977 defined benefit plans accounted for over 80 percent of primary plans in manufacturing, transportation and communications, and mining while they represented less than 60 percent of primary plans in wholesale and retail trade. Over the six-year period, defined benefit plans declined as a percent of all primary plans in each of the industrial classifications shown in Table 2.

One further indication of the trend toward greater use of defined contribution plans is revealed by examining the effective date of all primary plans filing 5500 forms in 1983. Table 3 shows that of the plans still in effect in 1983, over 80 percent of plans started prior to 1960 were defined

benefit plans. Since 1960 the proportion of new defined benefit plans has steadily declined. Among primary plans started after the passage of the Employee Retirement Income Security Act (ERISA) in 1974, only half are defined benefit plans. Although numerous factors may have influenced this trend, data in this section certainly suggest that regulatory changes may have altered the incentives of workers and firms to select defined benefit pension plans. There is a noticeable decline in the use of defined benefit plans prior to the adoption of ERISA. Together these data imply that the price of writing implicit employment contracts that include a defined benefit plan rose during this period and as a result fewer such contracts are being adopted.

### III. Federal Regulation of Private Pensions

Since 1974 Congress has enacted a series of new regulations governing the adoption and administration of employer pension plans. These new regulations have increased the cost of maintaining defined benefit pension plans. Increased reporting standards have raised the administrative costs of defined benefit plans. Pension insurance and funding standards have increased costs and reduced the flexibility of employers in the administration of these plans. Regulations reducing vesting standards and requiring wage and service accruals past the normal retirement age limit the ability of employers to institute pension incentives to modify worker behavior to reduce quits or increase retirements.

The major legislative initiatives affecting pension regulation are briefly reviewed below to identify their primary effects on the choice of a plan type.

1. Employee Retirement and Income Security Act of 1974.

ERISA instituted annual reporting requirements in the form of the 5500 reporting forms and mandated insurance premium payments for defined benefit plans to the Pension Benefit Guaranty Corporation (PBGC) of \$1 per participant. Vesting requirements were established, including the most widely adopted full vesting after 10 years. Eligible workers aged 25 or over with at least one year of service generally had to be allowed to participate in a pension plan. Minimum contribution requirements for defined benefit plans were revised so that the minimum contribution was the cost of benefits earned that year plus amortization of the past service liability. A maximum benefit level was set for defined benefit plans along with maximum contribution levels for defined contribution plans.<sup>1</sup>

2. Economic Recovery Tax Act of 1981.

This legislation made employee voluntary contributions to pension plans tax deductible and thereby increased the desirability for some types of defined contribution plans.

3. Tax Equity and Fiscal Responsibility Act of 1982.

This act reduced the maximum annual benefit under a defined benefit plan and the maximum annual contribution under a defined contribution plan.

4. Deficit Reduction Act of 1984.

This act placed certain restrictions on 401(k) plans and continued the limit on maximum benefits and contributions.

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<sup>1</sup>Ippolito (1988) provides a detailed assessment of the differential impact of ERISA on defined benefit and defined contribution plans.



5. Retirement Equity Act of 1984.

This act reduced the maximum age for pension plan participation from 25 to 21. The act also set limits on what represented breaks in service and how maternity and paternity leave was to be viewed. Pension plans were required to provide a joint survivorship benefit unless waived by the spouse.

6. Consolidated Omnibus Budget Reconciliation Act of 1986.

This act increased the annual premium per participant payable to the PBGC to \$8.50.

7. Amendments to the Age Discrimination in Employment Act of 1986.

These amendments required employers to continue to award wage and service accruals when employees remain on the job past the normal retirement age. These amendments also outlawed the use of mandatory retirement at any age for most jobs.

8. Tax Reform Act of 1986.

This act lowered maximum contributions to 401(k) plans and limited use of Individual Retirement Accounts. Vesting requirements were reduced so that workers receive 100 percent vesting after five years or an alternative graded vesting formula may be used. Additional taxes were placed on lump sum distributions and workers with very high pensions. Penalties were placed on early withdrawals by workers and on firms receiving excess assets from plan terminations.

9. Pension Protection Act of 1987.

This act raised the per capita payment to the PBGC to \$16 and required additional payments for underfunded plans. It also placed new limits on overfunding plans and access to excess funds in the event of plan termination.

These regulations have reduced to firms the benefits of offering defined benefit plans while simultaneously increasing the administrative and reporting cost of these plans. In contrast to the considerable effects on the cost and benefits of maintaining a defined benefit plan, the regulations have had much less impact on defined contribution plans because most defined contribution plans have full funding and a relatively short vesting time. In addition, changes in the tax code accompanying the regulatory changes have increased the options for providing defined contribution plans.

This review illustrates that pension regulation was not a one-time change associated with ERISA. Instead, firms have faced an evolving regulatory process that has resulted in annual changes in acceptable pension rules. As a result, firms have had to modify their plans frequently. The cost associated with these modifications includes the higher costs associated with the new plan and payments to actuaries and lawyers to rewrite plans to conform to the new regulations. Thus, firms with existing defined benefit plans or those considering introducing new plans must consider the cost of expected future changes in regulation when they are deciding which plan type to select.

#### IV. Selection of Plan Type

To investigate the regulatory impact on the use of defined benefit plans, a model of the plan choice decision is developed. This model is tested in the next section using the 5500 data for 1977 - 1983. Probit estimates are used to consider the importance of regulatory changes on the reduced use of defined benefit plans.

### Defined Benefit Plans and Implicit Contracts

Defined benefit pension plans can be used as part of an implicit employment contract to modify worker behavior. The mechanism of this contract is that workers pay for a benefit contingent on their remaining with the firm until retirement; however, if they quit or are fired prior to retirement, they will receive a much lower benefit (the leave pension). This leave pension is based on the vested benefit to which the worker is legally entitled. Bulow (1982) develops a model to evaluate legal pension wealth based on the worker's current earnings and years of service. Under an explicit or single-period contract, the worker pays only for this legal benefit and suffers no loss in pension wealth with job changes.

Ippolito (1986) argues that pensions are more appropriately viewed as part of an implicit contract in which the employee agrees to work at a specified level of effort for the firm until retirement. Under such a contract, the worker pays for a pension based on expected final earnings (the stay pension). This stay pension will be larger than the leave pension and the difference represents a capital loss in pension wealth that the worker loses with premature job separation.

A simple example will illustrate the nature of this contract. Assume that the worker survives to retirement with certainty and that the pension benefits are paid in a lump sum (B) at retirement date R. The benefit to which a worker is legally entitled if he leaves the firm is based on the formula

$$B_1 = a \cdot S \cdot Y(t), \quad (1)$$

where  $Y(t)$  indicates earnings at time  $t$ ,  $S$  represents years of current service, and  $a$  is a constant reflecting plan generosity. At time  $t$  ( $t < R$ ), the stay pension is

$$B_s = a \cdot S \cdot Y(R), \quad (2)$$

where  $Y(R)$  is projected final earnings. Upon leaving the firm prior to retirement, the worker is entitled to receive only the legal benefits based on formula (1). These benefits will be less than the stay pension based on formula (2) as long as  $Y(t) < Y(R)$ . Discounting benefits at  $R$  back to time  $t$  at an interest rate  $i$  gives the worker's pension wealth at time  $t$ . The loss in pension wealth associated with a job change is the difference in the wealth values of the stay pension and the leave pension,

$$CL = a \cdot S \cdot [Y(R) - Y(t)] e^{-i(R-t)}.$$

The existence of this capital loss will reduce voluntary worker quits and increase worker effort to avoid involuntary terminations. Both of these responses will tend to reduce labor costs.

Firms can also use defined benefit pensions to modify worker retirement behavior. Prior to becoming eligible for benefits, workers increase the value of their pension wealth with continued work. This gain in pension wealth is referred to as pension compensation. Pension compensation based on the leave pension rises rapidly in both absolute terms and as a percent of total compensation with increased job tenure. This increase is due to higher earnings, increased service, and reduced time until retirement. After eligibility, pension compensation drops sharply because the worker must now give up current pension benefits to continue to work (Kotlikoff and Wise 1985).



Firms can influence the magnitude of this decline by their choice of pension provisions. The drop in pension compensation after eligibility is a function of the age of eligibility, the continuation of wage and service accruals, actuarial adjustments, and maximum benefit formulas. Under certain conditions, pension compensation becomes negative with continued employment and pension wealth declines for workers who remain on the job. Of course, if firms wish to encourage workers to remain at work, they can offset the decline in pension compensation by increasing wages (Clark and McDermed 1986). Studies examining the economic effects of pensions tend to support the conclusion that pensions are part of an implicit contract used to modify worker behavior.

For the most part, companies do not use defined contribution plans to provide similar incentives for reduced job turnover, greater effort, and increased retirements.<sup>2</sup> Therefore, we should expect to observe firms with high turnover and monitoring costs as well as firms desiring fewer older employees in their workforces choosing defined benefit plans.<sup>3</sup>

#### Choice of Plan Type

From the firm's perspective the decision to offer pension coverage depends on the costs of providing the pension. From the worker's perspective the decision to accept a job with pension coverage depends on the net expected value of the job compared to other jobs that do not include pensions as part of the compensation package. In the following empirical study, plan choice probit

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<sup>2</sup>Firms could provide greater contribution rates for workers with more years of service. Even in this case, the worker fully owns the benefit accumulated to date. The prospect of receiving higher contributions in the future would be equivalent to tilting the age-wage profile (Lazear, 1979).

<sup>3</sup>A number of recent papers have argued that firms can achieve similar results by paying wages above the market clearing rate. These efficiency wages should increase employee effort, reduce turnover, improve morale, and help the firm hire better quality workers. Whether efficiency wages or pensions are better able to achieve these results is an unresolved issue.

functions are estimated for firms filing 5500 tax reporting forms. In the analysis, firm characteristics are used to estimate which factors explain firms' decisions to offer defined benefit plans.

An important distinction between defined benefit plans and defined contribution plans is that defined benefit plans can be used as part of implicit employment contracts to modify workers' behavior by giving them incentives not to quit and not to engage in activities that could lead to their dismissal. Firms with high training costs associated with firm-specific human capital will be more likely to select defined benefit plans so they can impose penalties on workers who leave. Firms with high costs of hiring and high monitoring costs also will tend to use defined benefit plans. In addition, firms can use defined benefit plans to alter retirement behavior. Lazear (1983) and Bulow, Scholes and Menell (1983) argue that pension benefits can be used as a form of severance pay through early retirement benefits. To capture some of the variance in these effects across the economy, industry dichotomous variables are included in all estimations of the choice of plan type.

In general, defined benefit plans tend to have higher regulatory costs per participant compared to defined contribution plans. However, larger defined benefit plans achieve some economies of plan administration and may be able to earn a higher rate of return on invested funds (Smeeding 1983, Mitchell and Andrews 1981). Thus, the relative costs of offering a defined benefit plan will fall with increases in the number of participants and therefore larger firms will be more likely to offer defined benefit plans. In addition, workers in larger firms have more opportunity for within-firm job advancement and diversification than similar workers in smaller firms. These opportunities

should reduce quit rates and increase the demand by workers for defined benefit plans.

Similar losses in pension wealth occur if the firm goes bankrupt with insufficient assets or breaks the implicit contract for any reason. This implies that the risk associated with defined benefit plans is also a function of the economic prospects of the industrial sector of employment and firm size, since smaller firms are more likely to go bankrupt (Brigham, 1985 and Dunne, et al 1988). Thus, workers choosing defined benefit plans are accepting risks associated with premature job separation. The magnitude of this capital loss is a function of the rate of growth of real wages, the rate of inflation, and workers' ages and life expectancies. This risk can vary by race and sex, and with joint survivorship options as well as marital status.

In a defined contribution plan, workers accept a rate of return risk that accompanies the investment of their pension assets. While similar to the risks that any investor incurs, the rate of return risk associated with defined contribution pension funds has one unique characteristic -- the fact that the pension investor has no independent control over the timing of the termination of the investment. For example, workers may be cashed out of their pensions if they change jobs or retire. Thus, work-related decisions may affect the expected value of the investments, since job termination may come at high or low values of the pension fund.

From a worker's perspective, a defined contribution plan therefore has an uncertain benefit value dependent upon the state of the pension account at retirement age. Risk preferences may differ systematically with demographic characteristics. In addition, differences in life expectancies by sex and

marital status imply different costs associated with the provision of identical annual benefits in defined benefits plans.

For employers, defined benefit plans contain risks associated with the rate of growth of earnings and the rate of return to pension investments. However, Ippolito (1986) argues that the market risk faced by employers is negligible over time. Unlike the worker, the firm is able to avoid much of the risk of market fluctuations because net gains will tend to offset net losses over cohorts of workers. Workers covered by defined benefit plans also face risks associated with uncertain final earnings and inflation that erode the real value of the promised benefits if there are no post-retirement increases in benefits. Bodie, Marcus, and Merton (1988) provide a comprehensive assessment of the different forms of risks associated with the two plan types.

From the worker's perspective, union membership provides an organization to monitor firm compliance with any implicit contract. The reduced probability of employer cheating on the contract makes workers more willing to accept defined benefit plans. Ippolito (1985) argues that firms may use underfunded defined benefit plans to make workers unsecured bondholders of the company. Underfunding tends to reduce union compensation demands and makes unionized employers more likely to want to offer a defined benefit plan.

#### V. Explaining the Decline in Defined Benefit Plans

The preceding discussion identifies certain factors that influence the selection of a plan type by firms. In this section, samples from the 5500 data of primary plans with 100 or more participants are used to estimate the effect of these factors on plan choice. Plans are first matched to firms and then the



firms are grouped into those having one or more primary defined benefit plan and those having no primary defined benefit plans. Multi-employer plans are eliminated from the analysis because these plans do not have information on the employment level of the firms in the multi-employer group. In addition, all firms in the construction industry and the agricultural sector are excluded.<sup>4</sup> Probit functions for plan choice are estimated for the remaining sample of firms. The dependent variable is equal to one for those firms having at least one primary defined benefit plan and zero for those with no primary defined benefit plans. The explanatory variables are employment of sponsoring firm, industry of plan sponsor, and the year the oldest plan was started. Unfortunately, the 5500 forms do not contain information on other key determinants of plan choice such as coverage by a collective bargaining agreement, average tenure of workers, and other demographic characteristics of the workforce.<sup>5</sup>

The means for variables used in the analysis are shown in Table 4 for all plans and by firm size for 1977 and 1983. The means show a decline in defined benefit coverage for all plans in the sample from 70.3 percent to 63.0 percent. The decline is observed for each size category; however, the decline is over twice as large for the smallest firms as compared to firms with 1,000 or more employees. The distribution of plans across industries shows that over 40 percent of the firms with pensions are in the manufacturing sector.

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<sup>4</sup>The construction industry is excluded because most of these plans are multi-employer.

<sup>5</sup>In a related paper (Clark, Gohmann, and McDermed), we have estimated plan choice using the 1983 5500 data matched to the CPS to determine average demographic characteristics within industry and firm size groupings. Estimates using these data provide general support for the implicit contract theory of defined benefit pensions. The inclusion of these demographic variables does not alter the findings reported in this paper.

The results from the estimated probit functions are reported in Table 5. The primary finding in these estimations relates to the variables concerning the date the oldest pension plan was instituted by the firm. The values show that firms starting their first plan after 1974 are 32 to 46 percent more likely to have all defined contribution plans than firms instituting plans prior to 1950. These post-ERISA plans are 15-20 percent more likely to be defined contribution plans than those started between 1950 and 1974. These estimates show that the probability of firms having defined benefit plans has continued to decline throughout the period 1975-1983. For example, firms that started their oldest existing plan between 1981 and 1983 are about 7 percent more likely to have all defined contribution plans than firms starting plans between 1975 and 1977. These findings strongly suggest that increased regulation during this period has resulted in declining use of defined benefit plans.

The estimates show that firm size is an important determinant of plan choice. Firms with employment of 500 - 999 workers have 10 - 12 percent higher probability of using defined benefit plans than firms with employment of 100 to 499 workers while firms with 1,000 or more employees are 15 to 25 percent more likely to adopt defined benefit plans. The results from Model 1 indicate that the wholesale and retail trade sectors are significantly less likely to use defined benefit plans than the omitted industry, which is mining. Other industries do not differ from mining in their use of defined benefit plans.

Further evidence of the determinants of the declining use of defined benefit plans is presented at the bottom of Table 5 using sample means and the probit estimates. The last row of the table show the probability predicted at the sample means of firms offering defined benefit plans for each year. These

values indicate that the probability of a firm offering defined benefit plans fell from 72.1 percent in 1977 to 65.1 percent in 1983. Likelihood ratio tests performed on a set of equations with only one post ERISA dichotomous variable indicate that the equations across these years are significantly different from each other.

These estimates also allow us to predict the probability of a firm having at least one defined benefit plan as a function of when the firm's oldest plan was started. For example, the probability that a large manufacturing firm initiating its oldest plan prior to 1950 has at least one defined benefit plan is 94.3 percent. During the years prior to ERISA, this probability falls to 88.9 percent for firms whose oldest plan was initiated between 1950 and 1959, to 85.4 percent for firms with plans starting between 1960 and 1969 and 82.3 for firms beginning plans between 1970 and 1974.

These values indicate a slight decline in the use of defined benefit plans prior to the passage of ERISA. However, after 1974 the probability of large firms in manufacturing adopting defined benefit plans drops markedly. The predicted probability of having a defined benefit plan for firms starting their oldest plans between 1975 and 1977 is only 71.3 percent. This declines to 66.7 and 64.2 percent respectively for firms starting plans between 1978 to 1980 and 1981 to 1983.<sup>6</sup> These results indicate a larger effect of pension regulation on plan choice than reported by Ippolito (1986, 1988). Differences may be attributable to our inclusion of data through 1983 while Ippolito's analysis uses data only through 1981. Also, his study focuses mainly on the

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<sup>6</sup>These results are derived using the 1983 estimates in the base model while setting the value of the variables for employment of 1,000 or more and manufacturing equal to one, all other variables are given zero values.

impact of ERISA while we consider the evolving regulatory environment between the mid 1970's and the mid 1980's.

Another way to examine these data is to estimate separate plan choice functions for firms based on when the oldest plan was started. In this analysis, plan choice is estimated as a function of firm size and industry. The predicted probability of firms having a defined benefit plan conditional on their oldest existing plan having been started prior to 1950 is 92.4 percent. For firms with plans started between 1950 to 1959 this value falls to 78.2 percent, and those firms whose plans were initiated between 1960 and 1969 had a predicted probability of 68.7 percent. Firms starting plans immediately prior to ERISA have a probability of using a defined benefit plan of 62.5 percent, whereas firms initiating plans in the post-ERISA period have predicted probabilities of having a defined benefit plan of approximately 45 percent. Once again, the analysis clearly indicates that controlling for firm size and industry, firms were less likely to adopt defined benefit plans in the post-ERISA period.

These results indicate that the trend toward greater use of defined contribution plans is the result of changes in the selection process itself. This finding is consistent with the expected response by firms to increased federal regulations of pensions. Earlier we hypothesized that regulatory impacts were greatest on small firms. If true, we should observe that most of the changes have occurred among smaller employers. To investigate this issue, the samples of firms are divided into three firm-size categories and plan choice equations are estimated for each group. The results are shown in Table 6. The industrial variables indicate that within each size category, firms in the two trade sectors are significantly less likely to offer defined benefit



plans. The results also contain the same pattern of increased likelihood of more recent plans to be defined contribution plans. The predicated probabilities at the sample means show that the likelihood of firms offering defined benefit plans declined in each of the three size categories between 1977 and 1983. As expected, the largest decline is for the smallest firms.

These results shown at the bottom of Table 6 indicate that for firms with 100 to 499 workers, the probability of having a defined benefit plan was 61.4 percent in 1977 but fell to 53.0 percent in 1983. Smaller declines are noted for each of the other two groups. Likelihood ratio tests indicate that the functions across years within each size group are significantly different for the small and middle sized firms. The likelihood ratio test was not significant for the large firms. These tests were performed on functions using only one post ERISA dichotomous variable. Similar tests reveal that the responses across size-of-firm categories are significantly different for each year.

## VI. Concluding Observations

This analysis has examined the reduced reliance of firms on defined benefit plans. Data from the 5500 reporting forms indicate a decline in the proportion of firms with 100 or more participants offering defined benefit plans from 77.2 percent in 1977 to 70.4 percent in 1983. This decline is shown to be true within each of the major industrial groups. Estimates of probit functions across the years and by firm size confirm the observations based on the means. Examination of predicted probabilities based on these equations and sample means show the reduced likelihood of firms offering defined benefit

plans. Further examination reveals a statistically significant trend toward reduced reliance on defined benefit plans.

These results suggest that firms and workers receive less value from implicit employment contracts, including a defined benefit pension in the 1980s than they did in earlier years. The most likely explanation for these changes is the continuing and almost annual revision in pension regulations. These changes have raised the cost of offering defined benefit plans relative to defined contribution plans. The added costs fall most heavily on small employers. These regulatory changes require plan modifications that may fundamentally alter the gains to offering pensions and also require annual payments to plan administrators to actually revise the plan. In the face of these continuing changes, it is not surprising that relatively more firms are opting for defined contribution plans.

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Table 1. Number of Primary Plans and Active Participants by Plan Type: 5500 Reporting Forms<sup>a</sup>

	Plans			Participants (millions)		
	1977	1980	1983	1977	1980	1983
Defined benefit	17,463 (77.2)	22,779 (74.8)	24,589 (70.4)	22.4 (88.5)	27.2 (87.2)	27.6 (81.9)
Defined contribution	5,011 (22.2)	7,441 (24.4)	10,031 (28.7)	2.6 (10.3)	3.7 (11.8)	5.7 (16.9)
Other <sup>b</sup>	146 (0.6)	240 (0.8)	315 (0.9)	.3 (1.2)	.3 (1.0)	.4 (1.2)
Total	22,620 (100.0)	30,460 (100.0)	34,935 (100.0)	25.3 (100.0)	31.2 (100.0)	33.7 (100.0)

<sup>a</sup>Numbers in parentheses represent percent of column totals.

<sup>b</sup>These plans include defined benefit plans with benefits based partly on balance of separate account of participant (code section 414(k)), annuity arrangements of certain exempt organizations (code section 403(b)(1)), custodial accounts for regulated investment company stock (code section 403(b)(7)), pension plan utilizing individual retirement accounts or annuities (described in code section 408) as the sole funding vehicle for providing benefits.

Table 2. Distribution of Plans by Industry<sup>a</sup>

	Defined benefit			Defined contribution		
	1977	1980	1983	1977	1980	1983
Agriculture	103 (72.5)	142 (68.3)	174 (61.3)	38 (26.8)	66 (31.7)	110 (38.7)
Mining	296 (82.0)	426 (78.2)	458 (69.8)	63 (17.5)	115 (21.1)	196 (29.9)
Construction	862 (75.1)	1,323 (68.5)	1,054 (61.3)	279 (24.3)	579 (30.0)	646 (37.6)
Manufacturing	8,849 (83.1)	12,119 (81.4)	12,539 (78.8)	1,759 (16.5)	2,719 (18.3)	3,328 (20.9)
Transportation, Communications	979 (81.4)	1,224 (80.7)	1,273 (75.3)	208 (17.3)	278 (18.3)	400 (23.7)
Wholesale trade	583 (56.7)	842 (54.7)	931 (52.2)	440 (42.8)	688 (44.7)	840 (47.1)
Retail trade	591 (52.5)	912 (51.5)	937 (45.4)	531 (47.2)	849 (47.9)	1,122 (54.4)
Finance, Insurance, Real Estate	1,525 (76.0)	1,888 (76.7)	2,138 (72.6)	471 (23.5)	558 (22.7)	791 (26.9)
Services	1,864 (75.2)	2,756 (68.8)	3,101 (62.1)	595 (24.0)	1,204 (30.0)	1,834 (36.7)

<sup>a</sup>Other primary plans are not shown in this table. Figures in parentheses indicate the percentage of plans in each industry.

Table 3. Distribution of Effective Date for Primary Plans by Plan Type: 1983 5500 Forms

	Number of Plans Started During Period <sup>a</sup>			Percent of existing plans started during period		
	DB	DC	Other	DB	DC	Other
Prior to 1940	269 (1.1)	10 (0.1)	2 (0.7)	95.7	3.6	0.7
1940-1949	1,846 (7.6)	198 (2.0)	13 (4.3)	89.7	9.6	0.6
1950-1959	5,016 (20.7)	1,008 (10.2)	32 (10.7)	82.8	16.6	0.5
1960-1969	7,799 (32.2)	2,372 (24.0)	59 (19.7)	76.2	23.2	0.6
1970-1974	4,061 (16.8)	1,782 (18.0)	48 (16.0)	68.9	30.2	0.8
1975-1979	3,358 (13.9)	2,691 (27.2)	82 (27.3)	54.8	43.9	1.3
1980-1983	1,876 (7.7)	1,822 (18.4)	64 (21.3)	49.9	48.4	1.7
Total	24,225 (100.0)	9,883 (100.0)	300 (100.0)	70.4	28.7	0.9

<sup>a</sup>Numbers in parentheses are percent of column totals.

Table 4. Sample Means: 1977 and 1983

	All Plans		Emp: 100-499		Emp: 500-999		Emp: 1,000 or more	
	1977	1983	1977	1983	1977	1983	1977	1983
Defined Ben.	.703	.630	.610	.529	.725	.658	.831	.796
Emp: 500-999	.181	.161						
Emp: 1,000 or more	.324	.302						
<u>Plan Started</u>								
1950-59	.225	.164	.208	.146	.221	.158	.253	.201
1960-69	.334	.282	.367	.292	.350	.280	.277	.265
1970-74	.192	.173	.211	.188	.192	.183	.162	.141
1975-77	.129	.127	.140	.139	.143	.131	.104	.102
1978-80		.088		.100		.090		.064
1981-83		.081		.089		.082		.068
Manufacturing	.474	.443	.487	.452	.425	.395	.483	.453
Transportation; Communications	.066	.055	.051	.046	.060	.051	.093	.074
Wholesale Trade	.066	.070	.089	.093	.068	.057	.032	.037
Retail Trade	.071	.079	.057	.069	.069	.089	.092	.092
Finance, Insurance and Real Estate	.140	.126	.157	.129	.137	.129	.116	.118
Services	.163	.204	.145	.188	.226	.263	.157	.199

Table 5. Defined Benefit Plan Choice Equations\*

	1977	1980	1983
Emp: 500-999	.102 <sup>c</sup>	.096 <sup>c</sup>	.121 <sup>c</sup>
Emp: 1,000 or more	.200 <sup>c</sup>	.222 <sup>c</sup>	.241 <sup>c</sup>
<u>Plan Started</u>			
1950-59	-.130 <sup>c</sup>	-.127 <sup>c</sup>	-.136 <sup>c</sup>
1960-69	-.161 <sup>c</sup>	-.171 <sup>c</sup>	-.199 <sup>c</sup>
1970-74	-.171 <sup>c</sup>	-.204 <sup>c</sup>	-.251 <sup>c</sup>
1975-77	-.319 <sup>c</sup>	-.347 <sup>c</sup>	-.388 <sup>c</sup>
1978-80		-.389 <sup>c</sup>	-.432 <sup>c</sup>
1981-83			-.453 <sup>c</sup>
Manufacturing	-.035	.003	.015
Transportation; Communications	-.010	.026	.018
Wholesale Trade	-.220 <sup>c</sup>	-.179 <sup>a</sup>	-.159 <sup>c</sup>
Retail Trade	-.349 <sup>c</sup>	-.305 <sup>c</sup>	-.300 <sup>c</sup>
Finance, Insurance and Real Estate	-.006	.047 <sup>a</sup>	.057 <sup>b</sup>
Services	-.023	-.022	-.028
Constant	.311 <sup>c</sup>	.295 <sup>c</sup>	.307 <sup>c</sup>
$\chi^2$	-6995	-9857	-11,717
Sample Size	12,620	17,460	20,299
<u>Predicted Probabilities (Percentages)</u>			
	72.1	69.7	65.1

\*The figures reported are derivatives of the probability function evaluated at the sample means. For dichotomous variables the entries indicate the change in the probability associated with a change in the variable from zero to one.

<sup>a</sup>Estimated coefficient is statistically significant at 10 percent level.

<sup>b</sup>Estimated coefficient is statistically significant at 5 percent level.

<sup>c</sup>Estimated coefficient is statistically significant at 1 percent level.

Table 6. Defined Benefit Plan Choice Equations: By Firm Size\*

	Emp: 100-499			Emp: 500-999			Emp: 1,000 or more		
	1977	1980	1983	1977	1980	1983	1977	1980	1983
<u>Plan Started</u>									
1950-59	-.123 <sup>c</sup>	-.106 <sup>c</sup>	-.080 <sup>c</sup>	-.068 <sup>a</sup>	-.112 <sup>c</sup>	-.209 <sup>c</sup>	-.135 <sup>c</sup>	-.120 <sup>c</sup>	-.142 <sup>c</sup>
1960-69	-.152 <sup>c</sup>	-.149 <sup>c</sup>	-.136 <sup>c</sup>	-.094 <sup>b</sup>	-.154 <sup>c</sup>	-.300 <sup>c</sup>	-.176 <sup>c</sup>	-.159 <sup>c</sup>	-.193 <sup>c</sup>
1970-74	-.164 <sup>c</sup>	-.168 <sup>c</sup>	-.171 <sup>c</sup>	-.105 <sup>b</sup>	-.223 <sup>c</sup>	-.355 <sup>c</sup>	-.171 <sup>c</sup>	-.195 <sup>c</sup>	-.272 <sup>c</sup>
1975-77	-.292 <sup>c</sup>	-.308 <sup>c</sup>	-.307 <sup>c</sup>	-.247 <sup>c</sup>	-.349 <sup>c</sup>	-.500 <sup>c</sup>	-.345 <sup>c</sup>	-.338 <sup>c</sup>	-.379 <sup>c</sup>
1978-80		-.341 <sup>c</sup>	-.348 <sup>c</sup>		-.382 <sup>c</sup>	-.556 <sup>c</sup>		-.399 <sup>c</sup>	-.409 <sup>c</sup>
1981-83			-.351 <sup>c</sup>			-.506 <sup>c</sup>			-.545 <sup>c</sup>
Manufacturing	-.062	-.045	.035	.053	.050	-.033	-.028	-.37	.010
Transportation; Communications	.023	.033	.072 <sup>a</sup>	.092	.017	-.112	-.075	.023	-.004
Wholesale Trade	-.257 <sup>c</sup>	-.230 <sup>c</sup>	-.135 <sup>c</sup>	-.082	-.092	-.201 <sup>b</sup>	-.175 <sup>c</sup>	-.114 <sup>b</sup>	-.151 <sup>c</sup>
Retail Trade	-.381 <sup>c</sup>	-.338 <sup>c</sup>	-.245 <sup>c</sup>	-.206 <sup>b</sup>	-.251 <sup>c</sup>	-.352 <sup>c</sup>	-.314 <sup>c</sup>	-.217 <sup>c</sup>	-.301 <sup>c</sup>
Finance, Insurance and Real Estate	.023	.046	.138 <sup>c</sup>	.087	.109 <sup>a</sup>	-.023	-.108 <sup>b</sup>	-.008	-.049
Services	-.076	-.084 <sup>b</sup>	-.042	.131 <sup>a</sup>	.079	.010	-.366	.000	-.028
Constant	.346 <sup>c</sup>	.331 <sup>c</sup>	.231 <sup>c</sup>	.247 <sup>c</sup>	.327 <sup>c</sup>	.550 <sup>c</sup>	.425 <sup>c</sup>	.373 <sup>c</sup>	.451 <sup>c</sup>
$\chi^2$	-3980	-5807	-7042	-1274	-1730	-1888	-1709	-2294	-2724
Sample Size	6,246	9,017	10,904	2,280	2,994	3,270	4,094	5,449	6,125
<u>Predicted Probabilities (Percentages)</u>									
	61.4	58.4	53.0	73.4	70.2	67.5	84.9	84.6	82.4

\*The figures reported are derivatives of the probability function evaluated at the sample means. For dichotomous variables the entries indicate the change in the probability associated with a change in the variable from zero to one.

<sup>a</sup>Estimated coefficient is statistically significant at 10 percent level.

<sup>b</sup>Estimated coefficient is statistically significant at 5 percent level.

<sup>c</sup>Estimated coefficient is statistically significant at 1 percent level.



