PENSIONS, UNIONS
AND IMPLICIT CONTRACTS

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ABSTRACT

This paper analyzes the relation of pension coverage and key plan characteristics to measures of union membership and strength, and to related interactions. The large and significant relationships which are found cannot be explained by, and are often inconsistent with, predictions obtained by extending the major explanations for the existence of pensions to allow for union monopoly effects. The findings support some (but not other) explanations in which the impetus for pensions arises more directly from the behavior of unions, and suggest that behavioral and related policy analyses of pensions should be conducted separately for the union and nonunion sectors.

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I. Introduction.

Over half of older workers are currently eligible for pensions when they retire. Any detailed examination of the almost bewildering array of provisions in actual pension plans quickly reveals that these plans are far from monolithic. Simple tabulations, and regression analyses using data from firm reports on pensions, show a strong relation of union status to pension coverage and to plan characteristics (Kotlikoff and Smith, 1983; Freeman, 1985; and Ippolito, 1985). In this paper, the relation between unions and plan characteristics forms the basis for tests of the available theories of pensions, both those in which unions play a special role and those in which they do not. Our findings suggest that despite the potentially important influence of plan characteristics on retirement, mobility and work effort, economists have yet to isolate a behavioral model of pension plan determination which can fully account for the observed variation in plan characteristics.

In the absence of a behavioral explanation for pensions which is consistent with the empirical evidence, we are in a poor position to evaluate the effects of major legislative initiatives regulating pensions and retirement behavior. Many of the behavioral models would lead us to expect that firms and unions will adjust pension coverage and plan characteristics in response to regulations and legislation, such as those affecting vesting, mandatory retirement, treatment of benefits for separated but vested employees, loading of benefits, actuarial returns for early retirement, and rules regulating funding, plan termination and pension insurance. Yet the likely adjustments suggested by alternative behavioral models may be quite different.

This paper has two broad goals. One is to assess further the union-nonunion differences in pensions, analyzing them in a multivariate setting

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where a full set of demographic and labor market information is available, while considering more systematically the form that these union influences may take. Toward this end, we are using a unique data set, the 1983 Survey of Consumer Finances (SCF). It is based on a national random sample of individuals, but for those in the survey who indicated they were covered by pension plans, detailed information about their pensions was obtained from their employers. In addition, along with a systematic analysis of interaction effects, we are including among the union variables a measure of the proportion of the workers in the industry who are organized. This measure of union strength, which frequently is included in union wage analyses, typically is ignored in pension equations. (See, however, Ippolito, 1985.)

A second goal of the paper is to use the estimated relations between measures of union influence and plan characteristics to narrow the set of explanations for pensions. A surprisingly large number of theoretical explanations may account for the disproportionately high coverage by pensions in the union sector. Some of these explanations are obtained by extending models explaining why pensions exist in the first place to allow for union monopoly effects, while others specifically focus on union goals and/or firm reactions to unions. By comparing predictions from these models as to union-nonunion differences in plan coverage and characteristics with actual outcomes, it is possible to cast doubt on a surprising number of the explanations for pensions and for the union-pension relation, or at least on their use as the sole explanation for these outcomes.

The organization of the paper is as follows. The next section discusses the predictions of several hypotheses for the effect of unions on

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pension plan characteristics. Section III discusses the empirical
specification and the data set employed in the study. The following
section presents the empirical results and considers their implications for
the various hypotheses considered in Section II. A final section contains
a brief discussion of conclusions and implications.

II. Predictions From Implicit Contract Models And Models Of Union
Behavior For Union-Nonunion Pension Differentials.

This section discusses the predictions of each of eight theories for
the impact of unions on five specific pension characteristics. Table 1
summarizes these predictions, with one row for each theory and one column
for each characteristic. It is apparent from cells in the table that some
theories generate stronger predictions for the union-pension relations than
do others. Thus our analysis will more severely tests some theories than
others.

The first characteristic, coverage, indicates simply whether unions
would result in more or fewer individuals being covered by a pension at
all. Plan type refers to whether unions would result in an increase in the
proportion of pensions which are defined benefit (DB) or defined
contribution (DC). The third column indicates whether plans covering union
workers would be more likely to have age and service requirements to
collect normal retirement benefits or requirements which depend only on
age. Formula refers to whether union plans are favored to have benefits
explicitly depending on a formula in which pay appears (FAP), or whether
benefits are independent of pay (i.e., pattern plans). The last column
indicates whether the plans of union workers are more or less likely to be
integrated with Social Security, wherein an amount related to potential
Social Security benefits is subtracted from the basic pension benefit or a

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smaller factor is used to compute the pension benefit for income below the Social Security tax base or a related figure, and a larger factor is used for earnings above the specified income.

According to the human capital explanation for pensions, the firm and the worker are sharing the returns to specific human capital. Defined benefit pensions are a convenient mechanism for tilting the age-compensation profile so as to provide the worker with appropriate incentives not to switch employers and thereby sacrifice the specific human capital. With pensions, the worker is in effect compensated below his potential productivity at alternative employers in the early years of the implicit contract and above that productivity in the later years. The compensation downturn induced by the pension at the age of normal retirement is necessary to terminate the contract when the debt is repaid. Because unions increase the overall level of compensation, the resulting wage differential already provides a substantial incentive for the individual not to quit and thus reduces the need for defined benefit pensions to reduce turnover (Freeman, 1980a and 1985). Because defined benefit plans load a much greater proportion of benefits towards later years of employment than do defined contribution plans, they present a risk to the worker from turnover that appears to exceed the investment risk from defined contribution plans. Thus the "prediction" from the human capital model is that defined benefit plans should be less common where there are unions, as indicated in row 1 in the table.

In the shirking hypothesis (Lazear, 1979, 1983), defined benefit plans are again used to tilt the age-compensation profile and terminate the implicit contract at an appropriate age. The purpose of the contract is to discourage shirking by threatening dismissal of any worker caught shirking, which would in turn deny the worker the opportunity of working in the later

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years and earning a compensation that would be higher than productivity. In this scenario, unions have offsetting effects. The union wage premium by itself provides some penalty to workers who are terminated for shirking, but unions also make it more difficult to dismiss workers for any reason, including shirking. In order to maintain the incentives to avoid shirking, unionized firms are less inclined to have defined benefit plans if the former effect dominates and more inclined if the latter effect dominates. The net effect is thus unclear, as reflected in the blank second row in the table.

An adverse selection model developed by Parsons (1983) is based on a deterioration in the health and productivity of some workers. Large firms are assumed unable to distinguish fully which workers are affected, and hence they must pay the same compensation to all workers they perceive as equal. The more productive workers then find work in other firms or in self-employment where they can better be compensated according to their true productivity, resulting in a process of adverse selection that may at some age result in the collapse of the demand for older workers by larger firms. Unions exacerbate the problem by making it more difficult for firms either to adjust compensation or to fire those in ill health, even if they can observe productivity. Defined benefit plans, with their attendant incentives to retire at the normal retirement age, are one strategy for avoiding the adverse selection problem by inducing all older workers to leave the firm at some given age. Accordingly, unionized firms should be more likely to have defined benefit plans so as to alleviate the problems of adverse selection. Moreover, since the problem is age related, the requirements for normal retirement in these plans should be related strictly to age rather than to a combination of age and service.

The pension underfunding theory, developed by Ippolito (1985), is based on the firm's reaction to the presence of a union. Firms are assumed to employ specific physical capital with a value outside the firm that is low. In this setting, it may be to the advantage of a majority of union workers to stage a "holdup" and appropriate through excessively high wages a portion of the quasi-rents in fact due to the specific physical capital. To induce investment in the firm, an implicit contract is arranged whereby workers are paid, in part, in the form of underfunded pensions with a value that diminishes if the workers do stage a holdup and force the firm out of business. Defined benefit plans are required if the plans are to be significantly underfunded. Moreover, with current insurance arrangements, the back loading of benefits under defined benefit plans creates a cost to the worker from plan termination. The theory does not appear to yield determinate results as to the expected effects of a union presence on the other pension plan characteristics considered in the table.

The next two rows in the table contain the two major elements of the "union voice" explanation for pensions. The first of these is the median voter model of the union, in which unions press for provisions which favor the median union worker rather than the marginal worker, where the former is more likely to be an older, high seniority worker and the latter a young worker. (Freeman, 1980b; Freeman and Medoff, 1984). In the context of pensions, the important fact is that the median worker has substantially longer tenure, and hence is more likely to be with the firm until retirement, than the marginal worker. Relative to the marginal worker, the pension of the median worker is enhanced by a defined benefit plan with a final average pay formula and Social Security offsets. These provisions allow the median worker, in effect, to capture some of the pension contributions made by individuals from the same cohort who do not stay

until retirement, especially if the real wage profile is rising (Freeman, 1985, p. 105).[1] Finally, a long tenure median worker prefers age and service requirements for normal retirement, providing the worker with the option of retiring with full benefits at an earlier age than a late entering older worker. Requiring the (relatively) short tenure older worker to wait later until collecting full benefits, or to incur an actuarial penalty in order to begin collecting benefits at the same age, reduces the value of those benefits, again permitting the median worker to capture some of the pension contributions made by others, this time those made by (relatively) short tenure older workers.

The next line of the table considers an egalitarian model in which the object of the union is to treat all workers as nearly equally as possible.[2] Pensions in this case would be defined benefit pattern plans (or possibly defined contribution plans with equal dollar per hour contributions per worker), which would preclude the pensions from further magnifying wage differentials among workers. A uniform age for normal retirement would imply pensions of equal value per year of service for all workers regardless of the age at which they joined the firm.[3] Table 1 also indicates that the egalitarian version of the union voice model would predict that unions would favor Social Security integration. With pattern plans, Social Security offsets result in larger pension payments to lower wage workers, thus tending to equalize total compensation among those with comparable service. Note that this is contrary to the standard view of Social Security integration, which treats it as making benefits less equal, and which is correct for FAP but not pattern plans.

The "intergenerational transfer" theory, based on the ideas of Weiss (1985), asserts that defined benefit plans may be a means by which those in

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the union at the time the pension is formed capture at least a part of the

monopoly rent that future union members would otherwise be able to obtain.

Particularly if past service credits (for service before the plan starts)

are involved, the original plan members receive benefits which are largely

financed by future plan participants rather than by themselves, much as

happened with the Social Security system.[4] If the object of the plan is to

transfer roughly equal amounts to each original plan member of a given age,

then a pattern plan without Social Security offsets would be appropriate,

as indicated on the seventh line of the table. However, a complete

analysis of this model would require further attention to trade-offs

between median voter and egalitarian motivations analogous to those noted

in the discussion of the elements of the union voice model.

The final theory considered in the table is one discussed by Mincer

(1983). In this theory, the number of workers and hours per worker enter

the production function separately, and firms optimize considering fixed

costs per worker and variable costs per hour worked. If a union succeeds

in raising the wage rate, the firm is induced to shift along its production

frontier and employ more workers for a shorter average workweek. In an

effort to counter such an effect, which reduces the union premium received

by each worker, the union attempts to shift some of compensation to items,

such as paid health insurance, which are fixed costs per worker independent

of hours worked. Pension plans can also serve this purpose, but only if

they are pattern plans and do not have Social Security offsets.

The predicted relations in Table 1 do not exhaust the explanations for

a union-pension relation, or for the plan characteristics that are

systematically affected by unions. Income taxes are a fundamental part of

any explanation for pensions. Thus the existence of union rents would lead

to the expectation of a positive union coverage relation, and a positive

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relation between unions and pension generosity. Moreover, unions reduce the risk to individuals that the firm will renege on the implicit contract. Therefore, under a number of the theories examined above, unions increase the attraction of deferred payment schemes and reduce the compensating differential associated with such plan features as an implied promise to revise the nominal parameters of pattern plans or to adjust postretirement benefits for cost of living increases.[5] In addition, our discussion has ignored the various risks affecting the expected values of pension plans of different types (Green, 1985), and has ignored issues created by imperfect capital markets and heterogeneity (Nalebuff and Zeckhauser, 1985), important issues which, in some respects, may have different implications in union and nonunion environments. Also ignored are union political considerations. Union leaders who believe they can fool their membership may prefer ad hoc over automatic cost of living increases, or pattern over salary related benefit formulas, creating the impression of a busy union leadership, while on the membership side, the public good aspects of union solidarity may limit the extent to which pension benefits will be targeted on particular groups of union members.

Despite the omissions, the predictions in Table 1 provide a useful beginning for an analysis of union-nonunion differentials in pension coverage and plan characteristics. In viewing the empirical results, it should be borne in mind that a number of the hypotheses are not mutually exclusive, and that our discussion has not integrated the various theories to analyze their joint implications. Hence a particular outcome that is inconsistent with a particular model does not necessarily mean that the model is incorrect, but rather that the opposing influences of other models must be stronger with respect to that outcome.

III. The Empirical Specification And The Data.

Symbols and definitions for the dependent and explanatory variables are listed in Table 2. Using those symbols, the probabilities relating pension and wage outcomes to explanatory variables (X) may be written as

$$Pr(P, W, T, M, Rq, F, Ss \mid \underline{X})$$

An individual is considered to be covered by a pension plan if he or she so indicates, or indicates that he or she will be covered by a pension upon continued employment for the current employer.[6]

Not all combinations of the dependent variables are relevant. For instance, plan characteristics are relevant only if the individual does have a pension plan. Similarly, age and service requirements for normal retirement are usually of interest only for defined benefit plans. Therefore, the estimates break up the probability given above into a conditional probability chain with three elements, as follows:

$$Pr(P, W \mid \underline{X})$$

$$Pr(T, M \mid P=yes, W, \underline{X})$$

$$Pr(Rq, F, Ss \mid P=yes, W, T=DB, M, \underline{X})$$

The second probability is estimated only for those with pensions, and the third only for those with defined benefit pensions.[7] In each case, the estimates are for a general functional form of the relationship between the probabilities of the dependent variable combinations and the conditioning variables.[8]

The analytical technique used to fit these equations is discrete multivariate analysis, a technique which is not only ideally suited for

analyzing qualitative data, but has an important advantage in the context
of this study of facilitating the analysis of interaction effects.
Relevant test statistics for significant interactions involving the union
or unionization variables are reported at the bottom of Table 3. In
discrete multivariate analysis, the central statistic is G^2, which is -2
times the log-likelihood function:

$$G^2 = -2 \sum_{i=1}^{n} f_i \log(f_i/p_i),$$

where p_i is the probability predicted by the model for a combination of
values from the actual data, f_i is the corresponding observed frequency,
and i runs over all possible combinations of variables. Estimating an
additional effect (or interaction) will tend to reduce G^2, and the
significance of the effect is inferred from the size of the reduction.[9]

The data set which forms the basis for the empirical analysis is the
1983 Survey of Consumer Finances (SCF). Detailed information was collected
for the respondent, who was either the head, or in the case of a married
couple, the person who knew the most about family finances, and for the
respondent's spouse. These are treated as independent observations. In
addition, for those who indicated that they were covered by a pension,
there is a survey of their employers which provides further detail on the
provisions of the pension plan. The employer was not told the name of the
employee. Accordingly, there is no specific information pertaining to
credited service or to the pension account for the individual. The portion
of the sample analyzed is restricted to private sector employees who were
not self employed.

The 4262 families in the SCF contain a total of 6998 respondents and
spouses. Of these, 3970 reported their main activity as working. The

other two major types of activities were being a housewife (1228

individuals) and being retired (1105 individuals). Of those whose main

activity was working, 1381 are excluded from the analysis because they

either were self employed or were not private sector employees, and 11

because they did not report union status, leaving 2578 individuals.[10]

Information on pensions is available from both the individual and the firm

for 967 individuals within that sample.[11]

IV. Empirical Results.

Table 3 presents the central empirical results. The first column

describes the pension characteristics of the population. Thus, 60.1% of

the sample had pensions and 33.1% did not, with the remainder falling in

the "don't know" category. Column 2 is derived from two sets of

simulations, both using the estimated parameters.[12] One set calculates the

distribution of pension characteristics which would result if every

individual in the sample were in a union, holding all other conditioning

variables in that simulation at the values actually observed for

individuals in the sample. The other set calculates the analogous

distribution which would result if no individuals in the sample were in a

union. Hence, the figure in column 2 of row 1 indicates that if everyone

in the sample were in a union, pension coverage would be 25.5 percentage

points higher than it would be if no one in the sample were in a union.

Column 3 indicates the results of a similar exercise comparing the

distributions of characteristics if everyone were in a high unionization

industry relative to the distribution if everyone were in a low

unionization industry. The fourth column compares the distributions if

everyone were in a union and in a high unionization industry versus if

everyone were not in a union and were in a low unionization industry.

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Column 5 reports on the results of simulations in which we ask what the
distribution of pension coverage and plan characteristics would be in the
absence of unions. In these simulations, all individuals are placed in the
nonunion and low unionization categories. In addition, any conditioning
variables which are themselves outcome variables (such as the wage in the
plan type equation) are adjusted so as to reflect the indirect effect of
the absence of unions working through such variables.

The empirical results indicate that union membership and working in
high unionization industries increase the probability of pension coverage
very substantially.[13] They simultaneously increase the probability of
being in the higher wage categories. In comparing the actual percentage of
individuals covered by a pension (60.1%) with the percentage predicted if
there were no unions (52.5%), the bottom line is that, for the population
as a whole, unions and unionization appear to raise pension coverage by
about 8 percentage points, or fifteen percent above what coverage would
have been in the absence of unions.

Among those covered by pensions, unions and unionization appear to
increase both the probability of belonging to a multiemployer plan and of
having a plan of the defined benefit variety.[14] Among those having defined
benefit plans, unions and higher unionization increase the probability of
age and service (as opposed to age only) requirements for normal retirement
and reduce the probability of having benefits related to salary and of
having Social Security offsets. In almost all cases, that part of the
effect arising from union coverage is somewhat greater than the part
arising from working in a high rather than low unionization industry.

In comparing the empirical results of Table 3 with the predictions of
Table 1, predictions from two explanations as to why there are pensions at

all are contradicted by the data. The simple human capital explanation predicts that unions should have a negative effect on pension plans generally and defined benefit plans in particular, both contrary to actual findings. Also inconsistent with the data is the adverse selection model. This model makes a fairly strong prediction that unions should increase the frequency of age only requirements for normal retirement, but the evidence strongly suggests otherwise. Since it makes no definite predictions about the pension plan characteristics analyzed in this paper, the shirking hypothesis is not in actual conflict with the data. However, it is difficult to understand why unions have such strong negative effects on salary-based formulae and on Social Security offsets in the context of this hypothesis alone.

Among the explanations relying on union behavior, the median voter model incorrectly predicts that unions should favor final average pay plans, while the egalitarianism version errs by predicting that unions should favor simple age rather than age and service requirements for normal retirement. Both models predict, although weakly, an increase in Social Security offsets with unions, contrary to the evidence. Among the remaining explanations, the simple version of the intergenerational transfer theory, and the story in which unions attempt to use certain types of pensions to forestall shortened hours, appear to yield the predictions most in harmony with the estimates. Neither provides a convincing story of the strong union effects on age and service requirements, however. Finally, the underfunding hypothesis is consistent with the observed relation between unions and defined benefit pensions, but with no information on funding, we are unable to test the theory very strongly. (See, however, Ippolito, 1985.)

Two interaction terms involving the results for the union-pension

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coverage relation will be noted. First, there is a reinforcing effect of
union coverage and unionization on pension coverage. In an industry with
low unionization, union coverage is associated with a 17.4% higher pension
coverage, while in a high unionization industry it is associated with a
34.9% higher pension coverage. An alternative way of looking at
essentially the same information is that among those covered by a union
contract, those in highly organized industries will have a 19.9% higher
pension coverage rate compared to those in weakly organized industries,
while for nonunion workers the comparable figure is only 1.9% This
reinforcing effect between union coverage and unionization on pension
coverage is reflected in the fact that the combined effect (36.7%) is
substantially higher than the sum of the two separate effects (25.5% +
5.5%). A second important interaction is the negative interaction effect
of firm size and union coverage on pension coverage. For those in small
firms, union coverage is associated with a 42.7% increase in pension
coverage, while for those in large firms, the increase from union coverage
is 16.4%. Analogously, coverage is 35.8% higher among nonunion workers
employed in large rather than small firms, while union workers in large
firms have a 9.5% higher probability of being covered by a pension than do
union workers in small firms. Either belonging to a large firm or being
covered by a union contract will increase pension coverage substantially
relative to a nonunion member in a small firm, but both characteristics
combined will produce an effect only mildly larger than either one
separately.

V. Conclusions And Implications.

To summarize the empirical results: First, in a multivariate setting,
union coverage is found to bear a strong and direct relation to pension

coverage, and to a set of key plan characteristics. Second, union

strength, as measured by degree of unionization in the industry, also is

found to be systematically related to pension coverage and to plan

characteristics. Third, significant interactions are found between union

membership and union strength, especially in the pension coverage equation,

suggesting among other things that the impact of the union strength measure

affects union workers, but does not spill over in its effect on nonunion

workers. Fourth, the relations of pension coverage and plan

characteristics to such variables as firm size or industry are affected

systematically by unions.

Simulations of pension outcomes in the absence of unions imply that

pension coverage in private sector employment in the United States would

fall from 60.1% to 52.5%; the proportion of plans which are defined benefit

would fall from 72.1% to 59.9%; the fraction of defined benefit plans with

age and service requirements for normal retirement would fall from 63.0% to

55.4%; the fraction of defined benefit plans with benefits determined in

accordance with salary would increase from 82.9% to 95.3%; and the fraction

of defined benefit plans with Social Security offsets would increase from

47.9% to 52.7%.

Among the models which, when considered alone, generate predictions

for union-nonunion differences in pension plan characteristics that are in

conflict with the data are: a model which attributes pensions and their

characteristics to firm efforts to reduce turnover and loss of specific

capital, one which postulates that pensions are adopted because they are an

effective device for dealing with adverse selection in a union environment,

the median voter model of the union, and an egalitarian model of the union.

Among the alternative explanations for the union-pension relation, one

emphasized by Mincer, whereby pensions are used by unions to raise per worker as compared to per hour costs of union workers, and a simplified version of a model which would explain pensions as a device for transferring rents among generations of union members, are consistent with the largest number of union-nonunion differences in observed plan characteristics. Also basically not contradicted by the findings, but less severely tested, is a model which would explain pensions as a device for protecting quasi-rents on firm investments. The shirking model is not tested by these data at all.

Results from these empirical exercises do not mean that certain explanations for pensions can now be entirely ignored. Although an explanation for pensions may, when considered in isolation, generate predictions that are inconsistent with the data, the explanation may have some relevance when combined with others.[15] A number of combinations of the behavioral models considered above, including some that form the basis for more subtle explanations for pensions (e.g., Mincer, 1983 and Freeman, 1985), remain in the running. The job of explicitly integrating and testing these separate explanations for pensions will be difficult, but is essential for a full understanding of the labor market effects of pension, Social Security and retirement policies.

It is obvious from our empirical finding that the effect of unions on pensions cannot be ignored, and that the expediency of including in a pension equation a dummy variable for coverage by a union contract, or even a set of variables reflecting union strength as well, is likely to reflect inadequately the full influence of the union. The process of pension determination in the union sector appears to be sufficiently different from that in the nonunion sector that pension models, and especially structural explanations, should be tested separately for the

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union and nonunion sectors.

A particularly fruitful area for further research is the intergenerational transfer model. That model is both consistent with the data and provides a vehicle for integrating a number of the explanations for the union-pension relation which have partial validity. Moreover, the intergenerational transfer model is extremely interesting from a public policy viewpoint. For example, if pensions in the union sector are a device for redistributing union rents from future to current generations of union members, then pension losses from plan termination when monopoly rent disappears, say due to import competition, would be interpreted in a very different light from pension losses due to abrogation of an implicit contract on the part of the firms.

1. Although a final average pay plan would be most advantageous to the
    marginal worker in the context of rising real wages, with a flat wage
    profile a pattern plan would be equally advantageous, at least if
    nominal benefits are frozen at the time of separation. Systematic
    information on the treatment of benefits for separated but vested
    employees is not provided in the SCF, or in other major surveys.
    Those pension experts we conferred with felt that most commonly, the
    nominal benefit is frozen at separation.

2. Freeman's discussion of the union voice model, as it applies to
    pensions, involves a blend of these two models (1985, pp. 105-107).
    As noted in the conclusion, the evaluation of these separate elements
    of the model need have no implication for the validity of a model in
    which they are joined. Freeman does not, however, provide a formal
    mechanism for reconciling outcomes when the influences of these two
    models conflict.

3. With age and service requirements, a long tenure worker is able to
    retire without actuarial penalty at an earlier age than a short tenure
    worker, and the fact the long tenure worker will receive benefits for
    more years would imply that the total value of his pension benefits
    per year of service is greater.

4. If this explanation is true, studies of union-nonunion differences in
    compensation which estimate the value of nonwage compensation from
    information on the contribution of the firm to pension funds (e.g.,
    Rice, 1966, Gustman and Segal, 1972, Solnick, 1978, Freeman, 1981,
    1985, and Alpert, 1982) could turn out to be misleading. For a
    related discussion and evidence, see Allen and Clark (1986).
    Moreover, the desirability of underfunding plans, the question of
    ownership of plan assets and the relation of underfunding to stock
    prices could all have a very different interpretation from the
    conventional one if pensions represent the vehicle for redistributing
    union monopoly rents.

5. To illustrate, Allen, Clark and Sumner (1986, p. 132) find, for the
    period 1973 to 1979, that collectively bargained plans had post-
    retirement increases that were almost twice as high as those in plans
    that were not collectively bargained.

6. In the sample to be described below, 6.4% of union members and 12.8%
    of nonunion members indicated that they were covered by more than one
    plan or by a plan with multiple parts. In the case of multiple
    coverage, the variable indicating plan type refers to the entire plan.

7. Due to limitations of the computer program calculating the estimates,
    the third probability is estimated for two groups of dependent
    variables. One group includes the F (formula type) and Ss (an
    indicator of Social Security integration) variables, and the other
    includes the Rq (plan requirements) variable. This strategy should
    not affect any of the estimates reported below because interactions
    among these dependent variables are not analyzed in the table, and
    because this equation is the last of the probability sequence. A

variable for the availability of early retirement is also included as
a dependent variable in the second group (along with Rq), but since
almost all firms reported that early retirement was available, the
results involving this variable are not very informative and hence are
not reported in the table.

8.   Among the explanatory variables, one may question the inclusion of
an age variable; however, the results are similar when the equations
are reestimated without age as a right hand side variable. One may
also argue that industry averages for such variables as education,
race, and sex should be included among the explanatory variables.
While this would increase the computational burden of the discrete
multivariate algorithm considerably, it is relatively easy to test an
analogous proposition, namely, whether the presence or absence of the
unionization variable changes the size of the effects of education,
race, and sex on pension coverage and pension characteristics. When
the analysis for pension coverage and wages is redone, this time
excluding the unionization variable, the size of the effects of these
other variables generally changes by only a small amount.

9.   It may be shown that the discrete multivariate algorithm maximizes
exactly the same likelihood function as does the standard multinomial
logit algorithm, and hence the two sets of estimates must be
equivalent (Haberman, 1978). Under the hypothesis of no true effect,
an additional estimated effect will yield a ΔG^2 which has a χ^2
distribution with the degrees of freedom equal to the number of
additional independent parameters introduced by the effect. If the
ΔG^2 is above the appropriate critical point on the χ^2 distribution,
the effect (or interaction) is deemed to have a significant impact on
the dependent variable. Thus, the ΔG^2 statistic tests the joint
significance of a group of dummy variables defining the categories of
an explanatory variable. Whenever higher order interactions are
significant, so are the associated main effects. For previous
examples of the application of this technique to analyze economic
problems, see Gustman and Steinmeier (1981 and 1984).

10.   Although no explicit screen is applied to eliminate part-time workers
from the sample, requiring the main activity to be working could be
expected to have a similar effect.

11.   Our report to the Department of Labor (Gustman and Steinmeier, 1986)
presents a detailed comparison of the descriptive statistics from the
SCF with information from the 1983 CPS as presented in Andrews (1985)
and in Oi and Raisian (1985). The matched employer data on plan
provisions are compared with figures from the Labor Department's Level
of Benefits Survey (descriptive statistics are presented in Hatch et
al., 1982) and with 1977 data from the Department's EBS-1 file, as
summarized in Kotlikoff and Smith (1983). In most cases the data
match. When they do not, discrepancies frequently appear to reflect
the different dates of surveys, especially in light of the decline in
unionization between survey dates. Another source of discrepancy is
the difference between surveys in which household members are
included. The SCF includes one adult or a couple from each household.
In contrast, the family unit in the CPS may include a number of
secondary earners. However, there are some discrepancies between the

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SCF data and those from the EBS-1 file pertaining to union-nonunion differences in plan characteristics which are not readily attributable to either of these causes.

12. In the estimates and simulations, all main effects are left in, whether significant or not. We also include significant higher order interactions between the dependent variable(s) and the explanatory variables.

13. For individuals with the characteristics of union workers, Freeman finds, using CPS data, that union membership increases the probability of pension coverage by 22%, and for those with nonunion characteristics by 26% (1985, Table 4.2). Our estimate of the impact of union coverage on pension coverage of 26% appears to be consistent with these results, but is only two thirds of the estimated combined impact of union coverage and unionization.

14. Note that there is some ambiguity in the question that was asked pertaining to plan entity. Individuals were asked "Does the pension plan include people who work for other employers than your own?" An individual who observes former fellow employees who are vested in the firm's pension plan because of their past employment, but who are currently working for another firm, may answer yes to this question even if the plan is not a multiemployer plan. Kotlikoff and Smith (p. 6) report that 38.6% of union members are in multiemployer plans, and calculations from their Table 4.1:11 suggest that 3% of nonunion workers are in multiemployer plans. The comparable figures from the SCF are 28.6% and 18.2% respectively. With regard to plan type, Ippolito (1985, Table 4), using a different specification, found that "unionized participants have a 30 percentage point lower probability of being covered solely or primarily by a defined contribution plan". (p. 637)

15. Note also that even though some of the behavioral explanations examined above may not, by themselves, explain pensions, they may be relevant for explaining other dimensions of wage and employment policy which are designed to encourage early exit from the firm.

Table 1

Expected Effects of Unions on Pension Characteristics

	Pension Characteristics				
	Coverage	Plan Type	Age/Service Require-ments	Formula	Social Security Integration
Explanations for Provisions:					
Human Capital	−	DC			
Shirking					
Adverse Selection	+	DB	Age Only		
Pension Underfunding	+	DB			
Union: Median Voter	+	DB	Age and Service	FAP	+
Union: Egalitarianism	+	DB	Age Only	pattern	+
Union: Intergener-ational Transfers	+	DB		pattern	−
Union: Opposition to Shortened Hours	+	DB		pattern	−

Table 2: Variable Definitions[*]

Symbol   Definition

Dependent Variables:

F   Type of formula: final average pay (FAP) or pattern

M   Single or multiemployer plan

P   Coverage by a pension plan, as reported by the individual

Rq   Requirements for normal retirement: age requirements only, age
           and service requirements, or service requirements only

Ss   Whether or not the plan has a Social Security offset

T   Plan type: defined benefit, defined contribution, or both

W   A categorical wage variable with limits defined to divide the
           sample into quarters, as follows: W1 < $4.60,
           $4.60 $\leq$ W2 < $7.78, $7.78 $\leq$ W3 < $12.69, and $12.69 $\leq$ W4

Explanatory Variables:

A   Age: five categories are defined as: A1 < 25, 25 $\leq$ A2 < 35,
           35 $\leq$ A3 < 45, 45 $\leq$ A4 < 55, 55 $\leq$ A5)

Ed   Level of education--college graduate, some college, high school
           graduate, and less than high school

Mf   Manufacturing: whether or not the individual's industry is in
           manufacturing

Oc   A set of three categorical variables indicating whether the
           occupation is blue collar, white collar managerial or other
           white collar

Ra   Race: white or nonwhite

Sx   Sex: male or female

Sz   Firm size: whether or not the firm has 100 or more employees

Un   Coverage by a union contract on the job or not

Uz   A variable based on data developed by Freeman and Medoff (1979),
           classifying the three digit industry of employment according to
           degree of unionization. The categories, which divide the
           sample into thirds are: Uz1 < 7%, 7% $\leq$ Uz2 < 31%, and
           31% $\leq$ Uz3

[*] In addition, there is a separate NA category defined for all variables
     except F, Rq, Ss, and T, which are reported by the firm, and Un and Sx.

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Table 3

Partial Relation Of Union Membership And Unionization
To Probabilities Of Pension Outcomes: Estimated From Firm Responses

	Fraction Of Population In Category	Union Contract (Yes -No)	Unioniz- ation (High- Low)	All Unions -No Unions	Simulated Fraction With No Unions
Pension Coverage and Wage					
Pension Coverage (Self Reported)					
Covered	.601	.255	.055	.367	.525
In Large Firms		.164			
In Small Firms		.427			
Not Covered	.331	-.234	-.034	-.307	.388
In Large Firms		-.139			
In Small Firms		-.411			
Wage (Self Reported)					
Low	.223	-.136	.009	-.135	.239
Medium Low	.223	-.014	-.081	-.101	.273
Medium High	.222	.091	.075	.185	.163
High	.223	.025	.038	.029	.233
Plan Characteristics for Those with Pensions					
Plan Entity (Self Reported)					
Multiemployer Plan	.192	.116	.037	.144	.154
Single Employer Plan	.682	-.085	-.040	-.109	.698
Plan Type (Firm Data)					
Defined Benefit	.721	.150	.098	.239	.599
Defined Contribution	.147	-.127	-.005	-.130	.206
Both	.132	-.022	-.093	-.109	.194
Plan Characteristics for Those with Defined Benefit Plans					
Age and Service Requirements (Firm Data)	.630	.149	.112	.302	.554
Benefits Related to Salary (Firm Data)	.829	-.200	-.045	-.192	.953
Social Security Offset (Firm Data)	.479	-.339	.008	-.284	.527

Table 3 (continued)

Interactions With Union Membership And
Unionization Significant at the 95% Level

Interaction	ΔG^2	d.f.		Interaction	ΔG^2	d.f.
Sz Un P	10.60	4		Mf Un T	14.61	4
Oc Uz P	29.87	14		Uz M T	21.53	12
Un Uz P	15.57	6		Mf Uz Rq	12.41	1
Oc Uz W	54.61	28		Un Uz Rq	13.60	3
Mf Uz W	20.75	4		Un M Rq	4.62	2
Un Sx W	19.80	4		Un M F	14.90	2
Mf Uz M	15.75	2		Mf Uz Ss	26.33	1
Un Uz M	19.52	6		Uz A Ss	24.78	12
Un Ed M	14.62	6				

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