THE EFFECT OF UNIONISM ON
WORKER ATTACHMENT TO FIRMS

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ABSTRACT

This study uses several data sets on individual workers to analyse the impact of unionism on the length of attachment between workers and firms. It finds that unionism substantially raises tenure and reduces probabilities of separation. The increase in worker attachment to firms resulting from unionism is not due largely to monopoly wage increases nor to reductions in employer-initiated separations nor to unionization of more stable workers, but rather to changes in worker behavior induced by unionised work settings. Among the work place conditions that appear to raise tenure with a firm are the presence of grievance systems and specific work rules like seniority.

These findings provide some support for the 'exit-voice' model of the union and for the traditional industrial relations view of unionism as a complex institution which causes wide-ranging changes in the job market. They suggest that modern empirical research on trade unionism which currently focuses almost exclusively on estimating monopoly wage effects, should be extended to analyse the non-monopoly wage voice or industrial jurisprudence impacts of unions. Unions have monopoly wage effects, but they also have more subtle, potentailly socially beneficial economic effects that deserve attention.

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The nature and length of the attachment between workers and enter-
prises is one of the most important aspects of the work relation in
modern industrial economies. Workers with long job tenure and relatively
permanent status in firms are treated differently and behave differently
than short term or temporary employees. Tenure[1] in a firm is an important
determinant of wages, fringe benefits, promotions, layoffs, and quits.
It differentiates persons in the internal labor market from those in
the external markets and workers likely to have firm specific human
capital from those without such capital. In the unionized sector,
work rules relating to seniority make length of attachment between workers
and firms a key factor in the economic well-being of employees.

Despite widespread recognition of the importance of tenure in the
labor market and of the particular significance of seniority in unionized
settings, empirical work on the impact of unionism on the length of
attachment between workers and enterprises has been relatively sparse.
The labor turnover literature has concentrated on the effect of specific
human capital on turnover and has been limited to analysis of aggregate
manufacturing data, which provides only weak evidence on the behavior of
individuals and covers only one-fifth of the labor force. While several
analysts have found an inverse relation between unionism and quit rates in
the aggregate data, others have not, leading to what some regard as
inconclusive results.[2] The bulk of the economic literature on unions deals
with union wage effects and not with the impact of the institution on
nonwage variables like tenure with a firm.

What is the relation between unionism and tenure? Does trade unionism
increase length of attachment between firms and employees and, if so, by
what routes or mechanisms?

This study examines these important questions using newly available data files on individuals, which contain information on their job tenure and union status, among other things. Section one examines the theoretical reasons for expecting unionism to increase job tenure. Section two develops the "waiting time" statistics and econometrics needed to analyze tenure and its converse, separations. Section three describes the data sets under study and presents the basic econometric analysis of the effect of unionism on tenure and separations. Section four analyzes the routes by which unionism influences the variables. The paper concludes with a brief discussion of the implications of the analysis for understanding the economic effects of unionism.

There are three basic findings:

1. Trade unionism is significantly positively related to the length of attachment between workers and firms, making union work forces much more likely to be relatively "permanent" than nonunion work forces.

2. Unionism influences the length of attachment by reducing the quit rate of workers, not by reducing the layoff or discharge rate of firms.

3. The impact of unionism on worker quit behavior is not due primarily to union wage gains nor to selectivity of more stable workers but to actual changes in behavior induced by union work settings. Some of these changes may be attributed to the grievance/arbitration system and some to inverse seniority layoff rules.

Overall, by raising the length of attachment between workers and firms, unionism appears to alter the operation of the labor market in an important way that is often neglected in standard studies of union monopoly wage gains.

I. Unionism and Job Tenure

Because employment is a two-sided arrangement, dependent on the

decisions of firms and workers, spells of job tenure result from the _joint_
behavior of employers, who decide whether or not to retain a worker, and
employees, who choose to stay or go. The basic principal for maintaining
the employment relation is that neither side can do better in the outside
market or, given uncertainty, that neither expects to do better. Let
W = compensation at the current enterprise, including nonpecuniary
components of pay; A = compensation at alternative jobs, also including
nonpecuniary rewards; and MP = marginal product at the enterprise. Then
the employment relation will be maintained in period t when:

(1) $MP_t \geq W_t \geq A_t$

If $A_t > W_t$, the worker can do better elsewhere and will break the relation
by quitting. If $W_t > MP_t$, the employer loses money by keeping the worker
and will lay him or her off. If there are no costs involved in altering
the contract, so that the wage rises or falls within the bounds of A_t and
MP_t, the relation will continue as long as $MP_t \geq A_t$, that is, as long as
the social value of the arrangement exceeds the social cost. If, as
seems reasonable, decisions to leave are essentially irreversible,
the terms in (1) are best thought of as representing the present values
of the relevant variables.

Trade unionism can be expected to influence the benefits and costs
of the length of spells of employment in three distinct ways.

First, in the context of the standard monopoly model of unionism,
union-induced increases in wages and related pecuniary rewards are likely
to raise the benefits to employees of staying on the job and thus to
lower worker-initiated separations. Since union wage gains have been
found to be sizeable (see Lewis) and high wages are likely to reduce
quits significantly, the "monopoly wage" route of union impact on job
tenure may be quite potent. To the extent that union wage increases
reduce employment, the union work force is likely to be smaller but more

stable than otherwise comparable nonunion work forces.

Second, unionism creates distinctive "voice" mechanisms for resolving industrial relations problems that can also be expected to lower worker-initiated separations. Perhaps the most important such institution is the grievance/arbitration system, which offers dissatisfied workers who might consider quitting an alternative means of expressing discontent and possibly changing undesirable work conditions. Nearly all (99%) major U.S. collective bargaining contracts provide for grievance and 95% provide for arbitration (U.S. Department of Labor, 1977, p. 94). The potential impact of grievance/arbitration on length of attachment to an employer is clear: workers who believe they have been unfairly treated or who believe their supervisors erred in interpreting work rules will seek a solution through the grievance procedure before invoking the drastic remedy of quitting. If the grievance is successful, the incentive to quit will be removed. Even if it is not and the aggrieved ultimately leaves, the delay in the quit decision during the grievance procedure will raise average spells of tenure.[3]

The regular process of collective negotiation of labor contracts can also be expected to reduce exit behavior. Workers wanting new conditions who, in the absence of a bargaining alternative, might have quit will instead seek first to obtain the particular changes through bargaining. If some of the worker demands are met, quits are likely to be lower than would otherwise be the case. For work conditions and rules that are "public" to the enterprise, where standard public goods arguments suggest that enterprises have great difficulty in eliciting true worker preferences, considerable mobility would be needed for these conditions and rules to be provided. Here the role of unionism in obtaining and aggregating preferences might produce the desired arrangements more efficiently, surely with lower mobility in the market.

Union "voice" may also reduce worker-initiated separations by creating particular work rules and conditions of employment (which may or may not be costly to employers, once unionism is "in place") that are desired by workers, particularly what industrial relations experts call the industrial jurisprudence system. Under this system many work place decisions are made on the basis of negotiated rules, for instance seniority, as opposed to supervisory judgment (or whim). By straightforward application of compensating differential arguments, if workers desire these conditions and if they are provided largely by unions, then with pay and other pecuniary benefits held fixed, separation rates should be lower for union workers.

Third, unionism may affect employer-initiated separations, discharges and layoffs. Discharges are likely to be more expensive in union settings due to explicit rules protecting job rights and the possibility of protesting discharges through the grievance system. The tendency of arbitrators to view discharge of senior employees as an extreme penalty in discipline cases to be used only as a last resort reduces the chance of dismissal in an organized plant.

The effect of unions on layoffs, however, is more complex. On the one hand, union-induced increases in wages may cause unionized establishments to go out of business, reducing average spells of tenure among the organized. On the other hand, unionized firms have inverse seniority layoff rules and seniority recall rules which lead to extensive use of temporary layoffs and recalls over the business cycle (Medoff), maintaining employment relations. Whether the net of union effects on discharges, permanent layoffs and temporary layoffs is to increase or reduce employer-initiated separations and thus job tenure is unclear.

In addition to the behavioral impacts of unionism outlined above,

union workers may accrue more job tenure than other workers for very differ-
ent "selectivity" reasons. If, as seems reasonable, unions organize workers
or firms that are innately more stable, unionised employees will have longer
spells of job tenure than nonunion employees in the absence of any changes
in behavior. Such selectivity in organization is likely if workers view
unionisation as a longterm investment, which pays off for those with rela-
tively permanent careers in an establishment but which is unlikely to be
worth the organizing effort for those with short-term employment expectations.
The selectivity effect differs fundamentally from the behavioral effects.
If it is the sole cause of differences between union and nonunion workers,
then unions have no real impact on behavior but merely sort out more and less
stable workers. It is clearly important to control for the potential impact
of selectivity bias in any analysis of union effects on tenure.

Empirical efforts to estimate the effect of unionism on job tenure
must control for other important economic variables likely to influence
lengths of spells of employment: investments in skills that are
specific to an enterprise; complementarities in production and the
"tendency for men with particular qualities to move towards those
employers who can best make use of their qualities" (Hicks, p. 37),
particularly in team settings; costs of mobility on the workers
side and of recruitment and training on the employers side.
Considerable effort has gone into measuring some of these factors and into
estimating their effect on rates of separation, though not on job tenure
itself (see Parsons). For purposes of the present study, these variables
are treated as controls to isolate the impact of unionism.

II Statistical Issues

From the perspective of probability theory, job tenure is best

viewed as a "waiting time" variable whose length depends on the probability P that an employment relation ends in a given period and the probability 1-P that it is maintained in the period. In this section I review briefly some of the basic statistics of waiting time relations and consider their relevance for econometric analysis of the effects of unionism. There are three technical issues: the functional form of tenure equations and of their counterpart, separation equations; differences between completed and incomplete spells of tenure; and the problem of differentiating behavioral effects from selectivity.

Functional form

The appropriate functional form for an equation explaining tenure depends on the specific probability model and "hazard function" governing the probability that an employee separates from a job in a given period.

The simplest and most manageable model assumes that each individual/ job has a constant probability of separation (P) in a given period, dependent on the economic forces described earlier, but not on accrued tenure. With a constant probability P and a discrete time model, the probability of accruing t years of tenure is:

(2) $P(T = t) = P(1-P)^t$

a geometric distribution with mean $(1-P)/P$ and standard deviation $(1-P)/P$. The continuous equivalent of (2) is the exponential, with density function:

(3) $f(t) = P \exp(-Pt)$

and a mean and standard deviation of $1/P$, where P is the separation rate.

The dependence of P on a set of economic variables (X_i) can be represented by a linear probability function or, more properly because P is bounded by 0 and 1, by the logistic function:

(4) $P = 1/(1 + \exp \sum_i B_i X_i)$

The logistic can be estimated by a maximum likelihood search procedure.

Given (3) and (4) the expected value of tenure conditional on the
X's and on an error term in the equation for P is an exponential function:

(5) $E(T|X_i,\mu_i) = \exp -\sum_i B_i X_i + E(\mu_i)$

where $E(\mu_i) = 0$.

Equation (5) can be estimated by maximum likelihood. Since, however,
one cannot be sure that P is independent of past tenure nor logistic in form,
it may be more reasonable to evaluate the effect of variables on tenure in
regression analysis by taking a linear function:

(6) $T = -\sum_i B_i X_i + \mu_i$

The linear equation can be viewed as a first order Tayler series approximation
to the exponential or to more complex forms.

When P depends on the level of cumulated service, the geometric
or exponential forms are no longer appropriate. The functional form of
the tenure equation will depend on the link between past tenure and
the probability of separation, which can be quite complex. The principal
tool for analyzing tenure in this case is the hazard function. The hazard
function h(x) is a conditional density measuring the probability or
frequency of separations conditional on past tenure:

(7) $h(x) = f(x)/(1-F(x))$

where $f(x)$ is the density function, $F(x)$ is the cumulative distribution
and $1-F(x)$ is the so-called survival function. Equation (7) makes the
probability of separation a function of tenure: when $h' > 0$, the probability
is an increasing function of tenure; when $h' < 0$, it is a decreasing
function; when $h' = 0$, tenure has no effect on the probability, giving the
exponential function. The geometric and exponential distributions have,
as noted, constant hazard functions, which makes their mean levels of tenure
depend directly on the probability of separation. Distributions with
increasing or decreasing hazard functions do not, unfortunately, generate
simple equations linking tenure to explanatory variables.[4] To evaluate

the impact of variables on tenure in such distributions, linear equations
(e.g. (6)) or logarithmic (log $T = -\Sigma B_i X_i$) equations can be estimated, on the
assumption that those forms are first-order Taylor's series approximations to
more complex functions. To obtain insight into the shape of the hazard function
itself--the extent to which tenure affects the probability of separation--
it is best to estimate the separation equation (4) with past tenure
included as an independent variable, rather than to infer shapes from
the tenure equations.

Incomplete vs. Completed Spells

Surveys of individuals typically ask persons the number of years of
job tenure at a point in time and thus contain information on incomplete
spells of tenure rather than on the completed spells that are the
dependent variable of renewal theory. In general, the mean of the distribution
of incomplete spells will not equal the mean of the completed spell distribution.
On the one hand, since spells are not complete, tenure will increase as
time proceeds, which implies that the mean incomplete spell will be
smaller than the mean completed spell. On the other hand, at any point in time
longer spells are more likely to be represented in a sample than shorter spells,
raising the mean of incomplete spells.   Only in the case of a constant
(memory-less) separation propensity such as in the binomial or geometric
distributions do the two biases cancel out, making the mean of the incomplete
spell equal the mean of the completed spell. When, as one would expect,
the separation rate _drops_ as tenure rises (h' < 0), the mean of the
incomplete spell distribution will exceed that of the completed spell distribution,
leading to an overstatement of the average duration of spells of job tenure.

The fact that the distribution of incomplete spells does not generally have the same mean as the distribution of completed spells does not, however, imply that it is incorrect to analyze incomplete spells. With a stationary stochastic process generating separations, both the incomplete and completed spell distributions embody the same information. They are simply different representations of the particular stochastic process and can be readily transformed from one to the other.[5] Whether one wishes to focus on the incomplete spell distribution or the distribution of completed spells is a matter of choice.

In this study I examine lengths of incomplete tenure among persons rather than lengths of completed spells. Average tenure refers to the average length of years an individual has been with an employer at a point in time, not the length of an average completed spell. Inferences about completed spells can be made from estimates of separation equations or, alternatively, from the analysis of incomplete spells, given the appropriate transformation between them.

Selectivity vs. Behavioral Effects

As pointed out in section I, relations between unionism and job tenure obtained in cross-sectional data can be interpreted either as a result of the influence of unions on behavior or as a result of the organization of innately more stable employees. The easiest way of differentiating between these two effects and isolating the behavioral aspect of unionism of concern is to examine longitudinal data on the behavior of the same person over time. With information on the same person over time one can

compare the person's behavior when he is unionized and when he is not. By comparing the same person in the two situations, one eliminates the unobserved personal propensity to be a stable worker and thus isolates the behavioral impact of unionism.

The use of longitudinal data to control for unobserved personal factors can be most readily demonstrated with a linear probability model of the worker's quit decision. Let Q_{it} = 0-1 dummy variable which measures whether the ith person quits in period t; UN_{it} = 0-1 dummy variable for whether or not the person is a union member; h_i = unobserved personal characteristics which raises the propensity to quit; and e_{it} be a residual uncorrelated with unionism. For simplicity, the effect of other variables will be ignored, implying that the coefficients and error terms are partial with respect to other variables. Then the linear probability representation of the quit decision is:

$$(8) \quad Q_{it} = -aUN_{it} + h_i + e_{it}$$

When union workers are innately more stable, $E(UN_{it} \, h_i) < 0$, which biases the least squares regression estimate of $\underline{a}$ toward a negative value, potentially leading to the erroneous inference that unionism reduces quits when in fact $\underline{a}$ may be 0. With data on several time periods, the effect of h_i can be eliminated by including in the regressions individual constants which will pick up the personal propensity to quit. In the linear model this is equivalent to taking deviations from means for all the variables. With data on two periods, the analysis simplifies to a simple difference equation:

$$(9) \quad Q_{it} - Q_{it-1} = -a(UN_{it} - UN_{ut-1}) + e_{it} - e_{it-1}$$

Since the h_i terms have been eliminated in (9), there is no problem in estimating the effect of unionism by least squares.

A comparable procedure using the logistic form (4), which is more appropriate for the analysis of probabilities, has been developed by Gary Chamberlain. His procedure essentially involves estimation of multinomial logistic equations in which dependent variables relate to the pattern of quits over time, and the independent variables are, as in the linear case, deviations from means (or first differences in the two period case).

In ensuing empirical work I estimate the effect of unionism on tenure and quit probabilities with standard cross-section models and then use Chamberlain's fixed effect conditional logit model to evaluate the importance of behavioral as opposed to selectivity factors in the observed relations.

III Econometric Analysis

This study uses data from three longitudinal surveys of individuals to estimate the effect of unionism on lengths of attachment between workers and firms: the Michigna Panel Survey of Income Dynamics (PSID); the National Longitudinal Survey (NLS) of Mature Men; and the National Longitudinal Survey (NLS) of Younger Men.[6] The PSID covers the entire population while the NLS surveys deal with men aged 45-59 in 1966 and men aged 14-24 in 1966. The longitudinal surveys have the advantage of providing two types of information on attachment behavior: retro-spective information from questions on job tenure; and longitudinal information on actual quits or separations over time. Since the data relate to individuals, it provides much better information about the attachment of workers to firms than the average industry turnover figures used in earlier studies.

The dependent variables

Figure 1 graphs the distribution of tenure in the three data sets over several years and gives the means and standard deviation of tenure. In the PSID survey, the means and standard deviations are calculated from

Figure 1: Mean, Standard Deviation and Frequency Distribution of Tenure

	Michigan PSID	NLS Older Men	NLS Younger Men
Year of Survey	1969	1967	1967
Mean (S.D.)	8.8(8.1)	15.0(13.9)	1.4(1.3)

Frequency

Years of tenure

| 17% | 25% | 22% | 21% | 15% |
| <1 | 1-3 | 3-10 | 10-20 | 20+ |

| 11% | 16% | 13% | 13% | 14% | 34% |
| <1 | 1-5 | 5-10 | 10-15 | 15-20 | 20+ |

| 57% | 37% | 5% | 1% |
| <1 | 1-5 | 5-10 | 10-15 |

1970
8.8(8.0)

1968
15.6(14.5)

1969
1.6(1.5)

Frequenty

Years of tenure

| 18% | 25% | 23% | 20% | 14% |
| <1 | 1-3 | 3-10 | 10-20 | 20+ |

| 6% | 19% | 13% | 12% | 13% | 36% |
| <1 | 1-5 | 5-10 | 10-15 | 15-20 | 20+ |

| 52% | 40% | 7% | 1% |
| <1 | 1-5 | 5-10 | 10-15 |

1971
8.6(8.0)

1969
15.9(14.7)

1971
2.2(2.5)

Frequency

Years of tenure

| 19% | 26% | 24% | 18% | 14% |
| <1 | 1-3 | 3-10 | 10-20 | 20+ |

| 10% | 16% | 13% | 11% | 13% | 39% |
| <1 | 1-5 | 5-10 | 10-15 | 15-20 | 20+ |

| 43% | 43% | 13% | 1% |
| <1 | 1-5 | 5-10 | 10-15 |

1973
8.8(8.1)

1971
15.9(13.8)

Frequency

Years of tenure

| 19% | 24% | 26% | 17% | 14% |
| <1 | 1-3 | 3-10 | 10-20 | 20+ |

| 9% | 18% | 14% | 10% | 11% | 37% |
| <1 | 1-5 | 5-10 | 10-15 | 15-20 | 20+ |

Source: Michigan Panel Survey of Income Dynamics Data Tape; National Longitudinal Surveys for Men Aged 45-59 in 1966 and Men Aged 14-24 in 1966.
(In the PSID the figures cover <1 1/2 years, 1 1/2 to 3 1/2 years; 3 1/2 to 9 1/2 years; 9-19 1/2 years; and 19 1/2 years plus

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grouped data with observations given the midpoint of the group.[7] In the NLS

survey, the means and standard deviations are calculated from actual years

and the data grouped for the purposes of displaying the distribution.

The figure reveals considerable attachment of workers to firms in

the United States. In the PSID Survey, mean tenure is on the order of

9 years, which implies that the probability of separation would be about

11% per annum. About one-third of the population is employed with the

same employer for over 10 years and 14-15% employed with the same employer

for over 20 years. In the older male NLS survey, mean levels of tenure are of

course higher, on the order of 15 to 16 years, with a marked concentration

of persons at the upper end of the distribution. Over one third of the

older men had been with their current employer 20 or more years and over

half had attained 15+ years of tenure. Among this group a rather large

number would appear to be more or less permanently attached to their

employers. In the younger male NLS survey, the figures show, as might be

expected, relatively low levels of tenure: a mean in 1967 of

just 1.4 years and a mean in 1971 of 2.2 years. In this case, however,

this is too little time to achieve tenure to provide much information

about the overall distribution.

Reasons for breaks

Attachment between workers and firms can be broken by employees

via quits, or by employers via discharges or permanent layoffs due

to plant closure or related economic factors which require reductions in

employment. Table 1 examines the distribution of reasons for the termination of

employment relations in the PSID and NLS data sets. In each data set quits are a

Table 1: Rates of Separation Between Workers and Firms

	Worker Initiated			Employer-Initiated			
	Total	Quit	Other	Total	Layoff	Discharge	Plant Closing
NLS Older Men							
1966-71	20.7	20.7	--	10.6	10.0	0.6	c
1968-69	7.7	7.7	--	4.5	4.5	c	c
1969-71	10.8	10.8	--	7.4	7.2	0.2	c
NLS Younger Men							
1972-75	20.3^d	20.3	--	7.8	6.8	1.0	c

	Total	Quit	Other	Total			Plant Closing
Michigan PSID							
1968-69	8.4	7.0	1.4	2.1	1.4		0.7
1969-70	8.4	7.7	0.7	2.7	1.6		1.1
1970-71	7.5	6.5	1.0	3.7	2.5		1.2
1971-72	6.7	5.9	0.8	3.5	2.4		1.1
1972-73	8.1	7.4	0.7	2.9	2.0		0.9
1973-74	8.9	8.3	0.6	2.6	1.6		1.0

[a]Excludes from numerator and denominator persons who retired. Excludes from numerator persons with reasons for leaving given as not available.

[b]Includes left employer, reason not available (2.8% in 1966-71).

[c]Included in Layoff.

[d]Excludes from numerator several small categories, such as quit to go to school.

Source: National Longitudinal Survey of Men, Codebook Reference No. 2575, 2476, 1598. Due to differences in questions and coding data are not entirely consistent across periods.

NLS Male Codebook, Reference Numbers 4205, 4207

Michigan Panel Survey of Income Dynamics. Tape codes and indices for variables, "What happened to previous job."

much more common cause of changes in jobs than are employer-initiated
separations. In the older male NLS about 2/3rds of the changes from 1966 to
1971 are attributable to quits; in the younger male NLS sample, 72% of
the changes result from worker-initiated quits. The figures on the PSID
are somewhat more difficult to read because of an ambiguous 'other'
category, which consists of breaks due to military service and other
unspecified causes. With "other" included under worker-initiated changes,
breaks due to employees leaving their employer are from 3 to 4 times as
important as employer-initiated changes. With "other" excluded, the differ-
ences range from 1.5 to 3.5 to one. All told, the data show that termination
of tenure depends primarily on worker-initiated decisions.

Establishment turnover data for manufacturing tell a similar story,
once temporary layoffs are removed from the published layoff rates. From
1967 to 1976 quits averaged 2.2% per month in the BLS turnover figures
while layoffs averaged 1.4%. Given that about 68 percent of layoffs are
temporary (See Lilien), the permanent layoff rate is only 0.4% per month,
which makes quits five times as important. Other separations, including
retirement, averaged 0.9 percent, so that quits constituted nearly 2/3rds of
permanent separations (=2.2/(2.2+.4+.9)).

The tendency for a typical worker to cumulate considerable job tenure
and for quits to be the prime form of breaking employment relations are
important facets of the job market, indicative of the nature of employment
contracts and remuneration schemes.

Determinants of tenure

Estimates of the effect of unionism and other (control) variables
on job tenure were made using three functional forms, the linear, loglinear

and exponential. The exponential was clearly dominated by the other forms in terms of fit, presumably because the hazard function depends on past tenure.[8] Accordingly, I focus on the other two forms.

Table 2 presents the coefficient and standard errors obtained from linear and loglinear regressions of tenure on a measure of unionism, a 0-1 dummy variable for whether or not the work place is governed by a collective bargaining agreement, log earnings, selected personal character-istics and "other controls," notably dummy variables for occupation, industry, region, and residence in an SMSA. Inclusion of earnings in the equations holds fixed the effect of unionism on tenure due to monopoly wage gains, and thus limits the union variable to reflecting the nonwage effects of the institution. It also provides a potentially stronger control for the "quality" of workers then is given by other variables.

The personal, institutional and various control variables are essentially exogenous to tenure, and thus are properly treated as right-hand side variables. Wages, which should increase the desire of workers to remain with a firm but which can have the opposite effect on the desire of employers to keep workers, cannot be so viewed. Wages are surely also influenced by tenure, creating simultaneity problems. Since essentially the same variables that affect wages can be expected a priori to affect tenure, there is no obvious way to identify the line of causality. The extent to which the coefficients on wages and the coefficients on unionism in the tenure equation are biased due to simultaneity can, however, be estimated by considering the possible magnitudes of the impact of wages on tenure and of tenure on wages. Tenure is usually found to raise wages by 2% to 3% in a cross-section, giving a coefficient of .02 or .03 in a log earnings equation. This implies coefficients on wages in a tenure equation due to the reverse direction of causality ranging from 33 (=1/.03) to 50(1/.02). Since

Table 2: Regression Estimates of the Effect

of Unionism and Other Variables on Job Tenure,

Michigan PSID, NLS Older Male and NLS Younger Male Data Sets

	Michigan PSID (3730 obs.) 1972		NLS Older Male (1772 obs.) 1969		NLS Younger Male (1741 obs.) 1969	
	Linear	Log Linear	Linear	Log Linear	Linear	Log Linear
Independent Variables			Coefficients and Standard Errors			
Union	1.55(.27)	.31(.04)	2.96(.57)	.32(.07)	.24(.10)	.13(.05)
Ln Earnings	1.66(.22)	.37(.04)	2.13(.57)	.15(.07)	.21(.13)	.14(.06)
Retirement Plan			4.71(.56)	.63(.07)		
Age	.33(.01)	.05(.004)	.44(.06)	.03(.01)	.21(.02)	.10(.01)
Race (1=black)	.08(.29)	.08(.05)	1.73(.65)	.23(.08)	-.33(.11)	-.16(.05)
Sex (1=male)	.93(.33)	.02(.05)				
Years of Education	-.08(.04)	-.01(.01)	.07(.09)	.01(.01)	-.07(.02)	-.03(.01)
Number of Dependents	.10(.06)	.04(.01)	1.04(.80)	.18(.09)	.04(.04)	.02(.02)
Numbers of Other Controls						
Constant	1	1	1	1	1	1
Occupation Dummies	8	8	7	7	7	7
Region Dummies	3	3	3	3	3	3
Industry Dummies	5	5	9	9	9	9
SMSA Dummy			1	1	1	1
Summary Statistics						
R^2	.35	.33	.23	.23	.21	.23
SEE	6.59	1.07	9.81	1.14	1.71	.79

Source: NLS Older Male, NLS Younger Male, Michigan PSID Survey Tapes

any reasonable impact of wages on tenure would be much lower, simultaneity would appear to bias upward the coefficient on wages in the tenure regressions.[19] Moreover, since unionism is positively related to tenure and positively related to wages, the inclusion of tenure without adjusting for simultaneity will bias downward the coefficient on unionism in the equation.[10] Failure to adjust for the simultaneity problem thus creates a _more_ stringent test of the influence of unionism on tenure.

In the older male NLS data set an additional measure of compensation, the presence of a retirement plan at the work place, is included in the regressions. Since unionism is likely to be positively associated with the existence of a pension plan and pension plans should increase attachment to the firm, it is important to control for such a factor if one is to isolate the nonmonopoly wage impact of unionism on attachment.

There are two basic results in Table 2. First, even with log of earnings in the equation unionism obtains sizeable and highly statistically significant coefficients in all three samples in both the linear and loglinear forms. In the Michigan PSID sample the coefficient in the linear regression is 1.6, implying that unionized workers have over 1 1/2 years more tenure than otherwise comparable nonunion workers, while the coefficient in the loglinear form shows an approximate one-third differential. In the older male NLS sample, where the average level of tenure is higher than in the PSID, the linear regression coefficient on unionism is correspondingly higher, while the loglinear regression coefficient is comparable to that obtained in the PSID. In the younger male NLS sample, on the other hand, the effect of unionism in both linear and loglinear forms is markedly smaller, though still significant.[11] To the extent that earnings variables capture the full union monopoly wage, the results imply that _unionism increases lengths of employment_

spells between workers and firms in ways that go beyond raising wages.
Whether this involves the "voice" routes of impact, selectivity, or other
factors remains to be seen.

The second important result pertains to the magnitude of the estimated
coefficients on unionism relative to the magnitude of the estimated
coefficient on earnings. Despite the likely upward bias in the coefficient
on earnings and downward bias in the coefficient on unionism due to simul-
taneity, the coefficients are of roughly comparable magnitudes, even in the
younger male NLS sample. This implies that an increase in wages on the
order of 100+% is needed to increase tenure by as much as the move from
nonunion to union status, The union impact on attachment is, according to
the estimates in Table 2, very large.

With respect to other variables in the analysis, the most important
variable in all of the calculations is, of course, age, which raises tenure
substantially. Not surprisingly, being male also raises tenure noticeably.
Being black reduces tenure in the younger male NLS sample but raises
tenure in the PSID and older male NLS samples. The absence of a marked
black disadvantage in tenure is surprising in light of extensive contro-
versy regarding the conflict between seniority and affirmative action. It
suggests that there is no great racial disparity in accrual of tenure
(and thus of seniority benefits) which would make formal seniority systems
a major deterrent to black economic advancement.[12]

The coefficients on years of schooling in the regressions are small or
negative, which might appear to run counter to the common assumption that general
human capital (= education) is positively correlated with specific human capital
and thus is positively related to tenure. Because the regressions control
for age rather than years in the job market, however, such an inference

would be erroneous. Indeed, holding years since leaving school fixed, the calculations imply a positive effect of schooling on tenure, with a coefficient roughly equal to the coefficient on age. As years since leaving school equals age minus years of schooling minus a constant, the coefficient on education can be obtained from:

(10) $\hat{a}$ Age + $\hat{b}$ Years of Schooling = $\hat{a}$ [Age - Years of Schooling]

+ ($\hat{b}$ + $\hat{a}$) Years of Schooling

The large coefficients on age ($\hat{a}$) in table 2 imply that while more educated persons have less tenure than less educated persons of the same age, they have significantly more tenure than less educated persons with the same years since leaving school.

Finally, the industry and occupation "controls" listed at the bottom of Table 2 reveal very different patterns of attachment of workers to employers in different job markets. In terms of occupations, the regression coefficients (not recorded in the table) show that managers and craftworkers tend to accrue the most tenure while service workers, laborers, clerical and sales employees have the least. The strong occupational dimension of tenure may reflect the importance of differences in specific training, complementarity with capital, or institutional rules. In terms of industries, the regressions show that workers accrus (all else the same) greater tenure in durable and nondurable manufacturing, while in all but the young male NLS, they also accrue more in transportation and less in construction, communication and utilities, services and trade. Since the analysis has controlled for the (observed) personal characteristics of workers, the patterns presumably result from the employer side of the market, for both institutional and technical reasons.

The substantial coefficients obtained on the occupation and industry dummy variables raise the possibility that unionism and the other

determinants of tenure may have different effects on different types of workers and in different markets. To see whether there are important differences across markets and subgroups, separate loglinear tenure regressions were estimated in the Michigan PSID sample for persons divided by sex, occupation and industry. The results of the estimates, summarized in table 3, reveal sizeable differences in the impact of unionism on tenure in the different groups. Taking the male/female comparisons first, columns 1 and 2 show a much greater coefficient on unionism for men, which could be taken to result from male dominance of unions that makes unions more attuned to the desires of male workers. Among the three occupations considered--professionals, operatives and clericals--unionism raises the tenure of operatives and clericals more than the tenure of professionals. The industry calculations also reveal substantial differences in the impact of unionism, with unionism having a markedly larger impact in manufacturing than elsewhere. The coefficients on wages also vary by occupation and industry, being larger for operatives and clerical workers than for professionals and being larger in trade and manufacturing than in services.

The different coefficients obtained on the union variable across groups provides general support for the view that trade unionism is a complex institution, whose impacts vary depending on economic and other circumstances. In section IV an attempt is made to use the different magnitudes of the union effect across industries to make inferences about the mechanisms by which unionism increases job tenure.

Econometric problems

To what extent might the results in tables 2 and 3 be distorted by measurement error of key variables or omission of important variables? Might the finding of a strong union effect on tenure be erroneous?

There are two potential problems with the calculations which could

Table 3: Regression Estimates of the Effect of Unionism and Other Variables on Job Tenure in Different Markets, Michigan PSID, 1972

	Male (3067)	Female (697)	Profession-als (493)	Operatives (734)	Clerical (504)	Service (491)	Trade (532)	Manufactur-ing (1045)
	Group (Number of Variables)							
Mean Tenure	8.31	6.66	7.78	7.42	6.75	7.90	6.95	8.52

Coefficients and Standard Errors in Log Linear Regressions

Independent Variables								
Union	.34(.05)	.15(.12)	.16(.15)	.30(.09)	.51(.12)	.12(.18)	.18(.13)	.34(.07)
Ln Earnings	.38(.04)	.33(.09)	.29(.10)	.72(.10)	.61(.11)	.16(.09)	.52(.10)	.59(.08)
Age	.05(.001)	.05(.003)	.06(.004)	.06(.003)	.04(.004)	.05(.004)	.05(.004)	.05(.003)
Race(1=black)	.07(.05)	.17(.11)	-.53(.16)	.18(.09)	.21(.13)	.33(.16)	.52(.14)	-.02(.08)
Sex (1=female)	--	--	.17(.14)	-.03(.13)	-.02(.12)	.11(.15)	.22(.15)	-.21(.12)
Years of Schooling	-.01(.01)	.01(.02)	-.02(.02)	.01(.01)	-.04(.02)	.01(.02)	-.04(.02)	-.01(.01)
Number of Dependents	.05(.01)	-.03(.03)	.07(.03)	.02(.02)	.01(.03)	.04(.03)	-.02(.03)	.04(.02)

Numbers of Other Controls

Region Dummies	3	3	3	3	3	3	3	3
Industry Dummies	5	5	5	5	5	0	0	0
Occupational Dummies	8	8	0	0	0	8	8	8
Constant	1	1	1	1	1	1	1	1
Local Labor Market Condition Dummy Variables[a]	3	3	3	3	3	3	3	3

Summary Statistics

R^2	.35	.29	.37	.40	.33	.31	.34	.38
SEE	1.07	1.08	1.04	1.03	1.09	1.14	1.11	1.01

[a]Dummy variables for whether there is a shortage of workers in the SMSA, whether it is a high unemployment area, and whether the area wage is high.

Source: Michigan PSID data tapes

cause the estimated coefficients on unionism to be biased upward. First is the lack of information on fringe benefits (with the exception of the retirement plan variable in the older male NLS data set). Since fringes are likely to be higher under unionism and should raise tenure, omission or understatement of fringe benefits could result in a higher coefficient on the union dummy variable, distorting interpretation of that coefficient. The coefficient would reflect union monopoly wage effects on fringes as well as the nonmonopoly wage effects of concern. To obtain some notion of the magnitude of the bias, consider the least squares equation linking the partial regression coefficient on unionism with fringes fixed to the coefficients which do not partial for fringes:

$$(11) \quad b_{TU \cdot F} = (b_{TU} - b_{TF} b_{FU})/(1 - r_{FU}^2)$$

where $b_{TU \cdot F}$ = the coefficient from unionism in the tenure equation corrected for the omitted fringe variable

   b_{TU} = the estimated coefficient on tenure

   b_{FU} = the regression coefficient linking fringes to unionism

   b_{TF} = the regression linking tenure to fringes

   r_{FU} = the correlation of fringes and unionism

and where all the coefficients are partial with respect to the other variables in the model.

Available information about the likely magnitudes of the coefficients in (11) suggest only a moderate upward bias in the estimated effect of unionism, of at most 5%. For b_{FU} and r_{FU}, estimates in Freeman (1978a, table 3) indicate that, conditional on straight-time pay, industry dummies and other control variables, r_{FU} = .30 while b_{FU} = .11. An extremely high estimate of b_{TF} would be the coefficient obtained on log wages in the regressions: since fringes constitute no more than one-third of the wage bill, this implies that a dollar of fringes is three times as effective in reducing quits as a dollar of wages. With these estimates, the union coefficient in column 1 of table 2 (where wages have their greatest impact

relative to unionism) is reduced to 1.50, while there is virtually no impact

on the coefficients in other columns.[13]   Unless the magnitudes of the fringe-union-

quit coefficients are markedly off, correction for the omission of fringes

still leaves a sizeable union effect that is <u>not</u> due to monopoly compensation

gains, including fringes.

A second and more difficult problem relates to the lack of adequate

data on the options facing an individual which might induce a break in

employment. While we have information on wages in the current job, we

have only the crudest measures of potential wages in alternative jobs. If

union workers had <u>worse</u> opportunities in the market than other workers,

say because unions attracted less able persons, the coefficient on unionism

would be biased upward in the tenure regressions. If, on the other hand,

union workers were more able than otherwise comparable nonunion workers

(due, presumably, to selectivity of more able workers by high-paying firms)

the coefficient on unionism would be biased downard in the tenure regressions.

To obtain some notion of the direction and possible magnitude of the

bias, consider the equation linking the partial regression coefficient

of unionism on tenure, with alternative wage opportunities (W_A) as well as

current wages held fixed, to regression coefficients which do not partial

on alternative wages:

$$(12) \quad b_{TU \cdot WW_A} = b_{TU \cdot W} - (b_{TW_A \cdot UW})(b_{W_A U \cdot W})$$

where $b_{TU \cdot WW_A}$ = coefficient on unionism in the tenure equation holding

fixed wages and alternative wages

$b_{TU \cdot W}$ = estimated coefficients with alternative wages not held fixed

$b_{TW_A \cdot UW}$ = coefficient linking tenure to alternative wages, with unionism

and current wages fixed

$b_{W_A U \cdot W}$ = coefficient linking alternative wages to unionism, conditional

on current wages

The coefficient $b_{TW_A \cdot UW}$ should be negative , as persons with good alternatives

are unlikely to remain with a given employer and accrue tenure. Hence the

sign of the bias on the coefficient on unionism depends solely on $b_{W_A U \cdot W}$.

An estimate of $b_{W_A U \cdot W}$ can be obtained by regressing the ln wages of persons

who changed jobs in the Michigan sample on their previous wage and union

status and other aspects of the job for each year. While by no means

perfect, the relation between unionism and the wages obtained on the new

job provides at least a crude indication of whether or not unionized

workers who switch employers have better or worse opportunities than other

workers who switch employers. If the regression coefficient on unionism is

positive, then the argument that union workers have longer attachments because

they are less able than nonunion workers would be difficult to maintain. The

calculations yield the following estimate for 1969-1970: $b_{W_A U \cdot W} = .13(.05)$;

and comparable (somewhat lower) estimates for other years.[14] These figures

suggest that the estimates of the union effect in tables 2 and 3 are, if anything,

understated due to failure to control adequately for alternative opportunities.

Separations

The attachment between employees and firms can also be evaluated in

terms of the job separations which break spells of tenure. While separations

convey less information about the probability of attachment than job tenure,

(since separation relates to a single break in employment while tenure represents

decisions over extended time periods) analysis of separation in longitudinal

data has some advantages in evaluating the effect of unionism on attachment

of workers to firms. The probability of separation can be related to the

characteristics of an initial job, including wages and tenure, which

breaks the wage-tenure simultaneity problem. Second, it enables us to differ-

entiate between worker-initiated and employer-initiated breaks in the employ-

ment relation and thus to determine by which route unions influence tenure.

Third, with extended longitudinal files, we can isolate the behavioral effect

of unionism from the selectivity effect using the fixed effect model of section II.

Accordingly, the effect of unionism and other variables on the probability of separations was estimated using the three data sets under study. In the older male and younger male NLS data sets, the probability of separations from 1969 to 1971 was related to the relevant independent variables. To focus on persons quitting to take another job, the samples were limited to those employed in both 1969 and 1971. In the Michigan PSID, information on separations for the years 1966 to 1973 was grouped into a single pooled sample, in which each observation links changes from year t to t+1 to the characteristics of workers and jobs in t. The pooled sample contains 21,173 observations, with multiple observations on individuals (with differences in the number of observations per person due to deletions of certain persons over time).

The results of the calculations are given in table 4. The odd-numbered regressions exclude job tenure as an independent variable. The even-numbered regressions include tenure and thus provide estimates of the effect of unionism on the separation behavior of workers with the same levels of tenure. To the extent that past tenure results from different individual propensities to remain with an employer, inclusion of tenure in the regressions can be viewed as a means of controlling for individual differences and thus for effects of union selectivity of more stable workers.

The calculations confirm the significant effect of unionism on the attachment of workers to firms found in tables 2 and 3. In the older male NLS, the coefficient for unionism is highly significant, -.81 with tenure excluded and -.63 with it included. By contrast, the effect of ln wages on separations is insignificant and positive, contrary to expectations. In the Michigan PSID (columns 3 and 4) unionism is estimated to reduce separations with a logistic coefficient of -.41 (tenure excluded) and -.33 (tenure included). This compares to comparable effects on tenure of .31 from the loglinear calculations in table 2. The wage variable is also estimated to have a sizeable effect, also with a magnitude comparable to that obtained in table 2.

Table 4

Logistic Curve Parameters for the Effects of Variables on the Probability of Separation

	Older Male NLS		Michigan PSID		Younger Male NLS	
	1	2	3	4	5	6
Mean of separations	.11	.11	.12	.12	.54	.54

Coefficients and Standard Errors in Log Linear Regressions

Explanatory Variables						
unionism	-.81(.12)	-.63(.22)	-.41(.06)	-.33(.06)	-.20(.13)	-.26(.13)
ln wage	.08(.19)	.16(.21)	-.25(.04)	-.09(.04)	-.73(.18)	-.59(.17)
tenure		-.11(.01)		-.08(.01)		-.11(.03)
age	-.06(.02)	-.04(.02)	-.04(.07)	-.03(.002)	-.13(.02)	-.08(.03)
education	-.02(.03)	-.01(.03)	-.01(.01)	-.01(.01)	.01(.03)	-.01(.03)
sex (1=female)			-.13(.06)	-.19(.06)		
race (1=black)	-.37(.24)	-.22(.25)	-.35(.06)	-.31(.06)	-.01(.14)	-.14(.14)
number of dependents	-.17(.25)	-.01(.26)			-.09(.04)	-.12(.05)

Numbers of Other Controls

industry dummies	9	9	5[a]	5[a]	9	9
occupation dummies	6	6	8	8	6	6
region dummies	3	3	–	–	3	3
SMSA	1	1	–	–	1	1
measures of local labor conditions[b]	1	1	3	3	1	1
years of work experience					1	1
constant	1	1	1	1	1	1
year dummies			4	4		
dummy for poverty status[c]			1	1		
dummy for presence of retirement plan	1	1				
job satisfaction index[d]	1	1				

Summary Statistic

-Ln likelihood	514	464	7272	7088	1080	1076
Number of observations	1772	1772	21,173	21,173	1741	1741

[a]Industry dummies based on data from 1972 and later years. Prior to 1972 there were no industry questions; the 1972 data were used for earlier years.

[b]Dummy variables as described in footnote a, table 3.

[c]Dummy for persons in the Michigan Survey who were in the special poverty sample group.

[d]Measured as z-score (see R. Freeman, "Job Satisfaction as an Economic Variable," AER, May 1978).

Finally, in the younger male NLS computations unionism is also found to reduce

the probability of separating, while ln wages and the demographic factors

have comparable effects to those given in table 2.

All told the separation results appear roughly consistent with the

tenure results presented earlier.

Quits versus layoffs and discharges

The analysis thus far has examined the effect of unions on overall

separations, without differentiating between employer-initiated and worker-

initiated breaks in employment. Do unions reduce separations by lowering

quits or by affecting discharges and permanent layoffs?

Table 4 presents calculations designed to answer this important question.

It records the results of maximum likelihood estimates of the effect of

unionism and other variables on quits and other separations separately.

Columns 1-2 give the estimated coefficients on the two forms of separation

in the NLS. Columns 3-4 present the results of similar calculations for

the Michigan PSID for the period 1972-73. Significant differences in the

union impact are apparent in both data sets. Unionism reduces quits

substantially but has essentially no effect or a modest positive effect

on other separations. We conclude that the union impact on tenure operates

through workers' decisions rather than through the decisions of employers.

Selectivity vs. behavior

The analysis thus far has shown that unionism raises tenure and reduces

separations and that these effects are not due to union monopoly wage gains

nor to lower employer-initiated separations but rather to reductions in quit

rates. Is the reduction in quits, with wages held fixed, due to selectivity

of more stable persons by unions or is it due to actual changes in behavior

caused by the institution?

To analyze this question, I have estimated the fixed effects logis-

tic model discussed in section 2[15] using longitudinal data from the PSID.

Table 5

Logistic Curve Estimates of the Effect of Unionism and Other Variables
on quits and Other Separations

| | Older Men NLS 1969-1971[a] | | Michigan PSID 1972-1973 | |
	Quits	Other Separations	Quits	Other Separations
Mean of dependent variable	.04	.07	.09	.03

Coefficients and Standard Errors

Explanatory Variables

unionism	-1.93(.44)	.06(.26)	-.35(.16)	.11(.23)
ln earnings	.06(.28)	.09(.24)	-.88(.12)	-.84(.17)
tenure	-.16(.03)	-.08(.01)	-.07(.01)	-.06(.02)
age	-.09(.03)	-.01(.03)	-.03(.01)	-.01(.01)
race (1=black)	-.45(.38)	-.06(.03)	-.47(.16)	.20(.23)
sex (1=female)			-.41(.18)	-.46(.28)
education	-.02(.06)	-.01(.04)	.01(.02)	.03(.04)

Numbers of Other Controls

SMSA	1	1		
Region	3	3	3	3
Industry	9	9	5	5
Occupation	6	6	8	8
Measures of Local Labor Conditions[b]	1	1	3	3
Constant	1	1	1	1
Number of Dependents	1	1		

Summary Statistics

-Ln Likelihood	231	339	1029	508
Number of observations	1735	1735	3730	3730

[a]The mean of quits in the Old Men NLS was smaller than the mean of other separations because many quitters did not have other jobs by 1971. While not reported as retiring they may in fact have left the labor force.

[b]See table 3, footnote a.

Source: Older Male NLS, Michigan PSID data tapes
         Estimated with Maximum Likelihood Logistic Program

Since with individual constants in the equations, the behavior of persons who remain in their job over the whole period or who quit in each period is explained entirely by the constant, the sample drops from that used in table 2 to 1232 cases, consisting of 877 cases of a single quit, 276 cases of 2 quits, 67 cases of 3 quits, and 12 cases of 4 quits.[16]

The results of the calculations, given below, yield coefficients on unionism of comparable magnitude to those obtained earlier. This implies that essentially none of the estimated impact of unionism on quits is due to selectivity:

explanatory variable	Coefficient and standard error in fixed effect logistic model of quits
unionism	-.462 (.151)
wages	.128 (.104)
individual constants (= sample size)	1232

The union impact appears to operate by changing the behavior of the same person rather than by organization of innately more stable persons. In an organized work place a given individual is less likely to quit than in a nonorganized work place, wages held fixed.

Note, moreover, that while the coefficient on unionism is essentially unaffected by correcting for the omitted person factor, the coefficient on wages is significantly affected by the correction, going from significant negative to insignificant positive. The differential effect of the individual constants on the union and wage coefficients may reflect the fact that wages are more person related than unionism, which is much more of a social phenomenon.

IV. Routes of the Union Effect

The preceding analysis has yielded two basic findings: 1) Unionized

workers accrue greater tenure with employers than nonunion workers. 2) The greater tenure is not primarily the result of union wage gains, reduced employer-initiated layoffs or discharges nor of unionization of innately more stable workers. While it is tempting to attribute the unexplained union effect to the 'voice' and industrial jurisprudence components of unionism, the analysis has thus far proceeded by eliminating causal factors and has not provided any positive evidence of their impact on tenure, making any such attribution speculative.

This section seeks to provide some evidence that tenure is, in fact, positively influenced by the voice/industrial jurisprudence aspects of unionism. It examines the effect on job tenure of two union institutions, grievance/arbitration and seniority rules. Two types of evidence are evaluated: regressions linking differences in grievance/arbitration systems and seniority across unionized markets to the tenure of union workers; and information from personnel studies and industrial relations experts. While by no means definitive, the evidence suggests that grievance/arbitration and inverse seniority layoff rules contribute significantly to the union-tenure relation.

Grievance/arbitration and seniority

Table 6 presents evidence on the prevalence and characteristics of the two components of unionism to be studied. Lines 1 and 2 record the percentage of major collective bargaining contracts and the percentage of workers covered by those contracts having various types of grievance or arbitration clauses. Lines 3-5 record similar information regarding seniority rules.

Line 1 shows that while nearly all major contracts provide for grievance of disputes regarding the terms and application of the contract

there is significant variation in the breadth of grievance clauses, with some grievance clauses allowing for unrestricted coverage of issues while others have grievance clauses that limit the grievance process to disputes arising under specific contract clauses. A somewhat larger number of contracts and workers fall into the category of restricted grievance clauses. Information (not recorded in the table) on the distribution of the two types of clauses by industry shows, further, considerable industry variation, with some industries having primarily unrestricted clauses (chemicals, paper) and other industries having largely restricted clauses (petroleum, fabricated metals).[17]

Line 2 of the table shows that arbitration systems are also highly prevalent among unionized firms, with 96.1 percent of contract containing clauses providing for arbitration, 69.9% of which cover all grievable issues.

Seniority rules, consisting of competitive seniority, which governs the status of workers relative to others in layoffs, promotions, and related internal labor market decisions, and of benefit seniority, which relates benefits to length of services, are also common in the organized sector, especially in manufacturing (line 3). Competitive seniority is especailly important in layoff decisions, with over 96% of major collective contracts in manufacturing having provisions for layoff by seniority and 70% of major contracts outside of manufacturing also having such provisions (line 4). Most of the clauses make seniority the sole or primary factor in layoffs, usually with plantwide or subdivision scope.

Line 5 shows that seniority is a formal factor in promotion decisions in about 60% of major contracts, covering nearly 60% of workers, largely in manufacturing. Seniority provisions for promotion can be roughly divided into two types:

(a) "Strong" seniority clauses, which guarantee the senior worker the promotion if he or she is capable of meeting minimum or average standards for

Table 6: Grievance/Arbitration and Seniority Provisions

in Major Collective Bargaining Agreements

	Percent of Contracts	Percent of Workers
All Agreements	100.0	100.0
1. With Grievance Clauses[a]	98.8	98.5
With Grievance Clauses Covering All Disputes[a]	43.2	47.3
With Grievance Clauses Covering Restricted Issues[a]	55.6	52.0
2. With Arbitration Clauses[a]	96.1	96.5
With Arbitration Clauses Covering All Grievable Issues[a]	67.2	63.0
With Arbitration Clauses Excluding Some Grievances[a]	28.9	33.5
3. With Seniority System, All Industry	76.0	74.3
With Seniority System, Manufacturing	94.5	89.4
With Seniority System, Nonmanufacturing	58.7	54.8
3. With Seniority as Factor in Layoffs, All Industry	80.0	81.3
With Seniority as Factor in Layoffs, Manufacturing	96.9	95.6
With Seniority as Factor in Layoffs, Nonmanufacturing	59.1	63.9
Seniority as Sole or Primary Factor in Layoffs	57.3	47.6
Plantwide Scope of Seniority System	33.2	24.2
Subdivision Scope of Seniority System	20.9	13.4
Job Scope of Seniority System	15.4	9.5
5. With Seniority as Factor in Promotions, All Industry	60.1	59.4
With Seniority as Factor in Promotions, Manufacturing	78.4	76.0
With Seniority as Factor in Promotions, Nonmanufacturing	28.4	31.5
With "Strong" Seniority in Promotions	24.6	14.8
With "Weak Seniority in Promotions	23.9	31.7
6. Seniority as a Factor in Benefits:		
3 or More Weeks Vacation When Worker Has Specified Amount of Seniority		
Less than 1 year	0.1	0.0
1-2 Years	0.8	0.7
5 Years	12.7	12.5
10 Years	71.2	68.1
20 Years	94.7	94.3

[a]Figures for percent with grievance or arbitration clauses are taken from Bulletin 1957. Figures for type of coverage are based on distribution of contracts with grievance or arbitration from Bulletin 1425.

Source:
    lines 1,2: U.S. Bureau of Labor Statistics, Characteristics of Major Collective Bargaining Agreements, Bulletin 1957, tables 8.1 and 8.2, p. 94 for fraction with grievance and arbitration clauses.
   Coverage of grievance clauses, U.S. Bureau of Labor Statistics, Major Collective Bargaining Agreements, Grievance Procedures Bulletin 1425-1, table 1, p. 2 with unrestricted or covers all, defined as all disputes with no exclusions.
   Coverage of Arbitration, Arbitration Proceedures, Bulletin 1425-6, table 1, p. 7.

    lines 3-6: U.S. Bureau of Labor Statistics, Major Collective Bargaining Agreements,
      Line 3: Administration of Seniority, 1425-14, table 1, p. 32.
      Line 4: Layoff, Recall, and Worksharing Procedures, 1425-13, tables 8, 11, 14, pp. 53-55, with total figures from table 8 and distribution from tables 11, 14.
      Line 5: Seniority in Promotion and Transfer Provisions, 1425-11, talbes 1-2, pp, 36-37.
      Line 6: Paid Vacation and Holiday Provisions, 1425-9, table 5, p. 51.

the work. As an example of this form of contract, consider the following

clause:

> Job vacancies shall be filled on the basis of seniority,
> providing the employee has the physical fitness, knowledge,
> skill, and efficiency to perform the job." (American Can Co.-
> Glass Bottle Blowers, contract ending April 1968).

(b) "Weak" seniority clauses, which give the job to the senior

worker only if other qualifying factors are relatively the same, as

exemplified in the following:

> When there is an opening to be filled by promotion,
> employees in that division shall be considered on the basis
> of their seniority and job qualifications. When job qualifi-
> cations are approximately equal, then the employees with the
> greatest seniority shall be given the opportunity. Only in
> the event an employee with less seniority has superior job
> qualifications shall he be entitled to the promotion. (Cater-
> pillar Tractor Co.-IAM, contract ending Jan. 1968).

According to data in line 5, the weaker seniority clauses

cover many more workers than the stronger clauses, though the actual differ-

ence between their application is by no means clear. In many arbitration

cases, less senior workers must often be "head and shoulder" above more

senior workers to obtain a promotion even under the weaker provision.

Line 6 of the table presents some contract evidence on benefit

seniority. It records the percentage of workers with different levels

of seniority eligible for a vacation period of 3 or more weeks. The

fraction rises sharply, particularly between 5 and 10 years of seniority,

indicating the dependence of this benefit on job tenure. Nonunion companies

also tend to relate benefits to seniority.

The grievance and seniority clauses examined in table 6 differ across

less aggregate industries as well as between manufacturing and nonmanufacturing

as shown in the table. These differences provide a means of examining the

effect of these factors on job tenure. If unionism increases tenure by

providing grievance systems or seniority rules, organized workers in sectors

where grievance or seniority clauses are stronger should accrue

greater tenure than organized workers in other sectors. To test this

proposition, I added the following measures of the prevalence of grievance and seniority clauses in two-digit manufacturing and one-digit nonmanufacturing industries to the older male NLS and to the Michigan PSID tapes:

(1) The percentage of contracts in an industry with unrestricted coverage of issues in the grievance system

(2) The percentage of contracts in an industry with seniority clauses.

(3) The percentage of contracts which contain clauses governing layoffs (presumably relating to the role of seniority in layoffs).

These variables were obtained for 2-digit manufacturing and 1-digit nonmanufacturing industries from the Collective Bargaining Agreements Series of the B.L.S, as specified in the table notes.

Linear tenure equations for union workers were then estimated, with the new variables replacing the industry dummies used in previous calculations. To make sure that the calculations were not unduly influenced by the construction industry, which for technological reasons has high turnover and only limited use of grievance or seniority provisions, construction was deleted from the sample: its inclusion greatly strengthens the estimated impact of the contract variables. Because there are numerous other clauses that differ across industries, the regressions should not be interpreted to mean that addition of a particular clause will, in fact, alter attachment by the amount specified by the coefficient. The variables are merely indicators of practices.

Table 7 presents the coefficients on the contract variables. While crude, the estimates suggest that the selected rules and operating procedures influence the attachment between workers and firms. The coefficients in columns 1-3 for the older male NLS sample show that, introduced separately, each of the provisions is positively statistically significantly associated with tenure. The estimates in column 4 show that when entered as a group, grievance and layoff provisions have very sizeable and significant effects, while the coefficient on seniority drops to insignificance. The

Table 7: Regression Estimates of the Effect of Coverage of Grievance Clauses and of Seniority Provisions on the Tenure of Union Workers, Linear Tenure Equations

	Older Men NLS				Michigan PSID			
	1	2	3	4	5	6	7	8
Mean(S.D.) of tenure	18.5 (10.3)				9.2 (8.1)			
Coefficients and Standard Errors								
Contract Variables[a]								
Percentage of contracts with nonrestrictive grievance clauses	6.37 (2.15)			8.40 (2.19)	–.01 (1.52)			2.21 (1.63)
Percentage of contracts with layoff provisions		14.7 (4.9)		20.40 (8.28)		8.13 (2.32)		8.10 (3.88)
Percentage of contracts with seniority provisions			7.90 (3.47)	–.90 (5.77)			4.64 (1.56)	1.08 (2.57)
Numbers of Other Controls								
region dummies	3	3	3	3	3	3	3	3
years of schooling	1	1	1	1	1	1	1	1
age	1	1	1	1	1	1	1	1
occupation dummies[b]	6	6	6	6	6	6	6	6
log wage	1	1	1	1	1	1	1	1
retirement benefits dummy	1	1	1	1	1	1	1	1
race dummy	1	1	1	1	1	1	1	1
SMSA dummy	1	1	1	1				
constant	1	1	1	1	1	1	1	1
number of dependents	1	1	1	1	1	1	1	1
sex dummy					1	1	1	1
Summary Statistics								
R^2	.128	.128	.124	.146	.389	.389	.396	.400
Number of observations[c]	728				801			

[a] The mean and standard deviation of the independent variables were as follows:

	NLS	Michigan
percentage non-restrictive grievances	.45(.17)	.48(.15)
percentage with layoff	.96(.11)	.93(.12)
percentage with seniority	.94(.11)	.87(.16)

[b] There were no families or self-employed workers in the sample so the number of dummies affecting the calculations was 2 less than the number in the text.

[c] Note that construction has been eliminated as an industry in these calculations.

Source: NLS Older Male and Michigan PSID data tapes. Contract provisions from U.S. Bureau of Labor Statistics, Major Collective Bargaining Agreements Bulletin 1425-1, table 1, p. 2; Bulletin 1425-14, table 1, p. 32; Bulletin 1425-13, table 8, p. 53.

Michigan PSID results in columns 5-8 are roughly comparable, with one exception: the percentage of contracts with nonrestrictive grievance clauses has, by itself, an insignificant impact on tenure. In conjunction with the other variables, however, it obtains a substantial positive coefficient, indicating that the scope of the grievance system is related to accumulation of tenure. As far as these data go, the rules of structured labor markets appear to be important determinants of the attachment between workers and firms.

Limited information from other sources provides additional support for the view that the grievance system is an important route by which unionism increases years of tenure. First, there is direct evidence of a link between the existence of a grievance system and attachment of workers to firms from a personnel study by Sargent and Clauson, who compared turnover in hospitals with a written grievance system to turnover in hospitals without such a system. Their data show a year separation rate of .50 for hospitals with a grievance system compared to .81 for those without and a correlation between the 0-1 grievance variable and turnover of -.72. While absence of other control variables, notably wages, makes these relations suggestive rather than definitive, the significant relation between turnover and grievance procedure supports our interpretation of the evidence on the tapes for individuals.

The industrial relations literature provides further support for the argument that a grievance system reduces separations and raises job tenure. In a leading book on grievances, one arbitrator noted that because "in most nonorganized companies it is very difficult to appeal a supervisor's decision [due to lack of grievance machinery] . . . dissatisfied employees must either live with their frustrations or quit (Trotta, p. 105), the latter option reducing tenure in those firms. Labor-management legal consultants usually advise companies facing unionization drives to concentrate

on personnel policy issues relating to what would often be grievable issues in a union setting, suggesting that resolution of such problems is viewed as a major attraction of unions to workers. Similarly, studies of why workers join unions tend to find worker grievances with specific managerial policies a major factor in organization (Seidman, Landon, Karsh).

We conclude that the available evidence, while sparse, supports the notion that unionism increases job tenure through the "voice" and industrial jurisprudence routes of impact.

V. Conclusion

This study has examined the effect of unionism on one of the most important determinants of the labor market status of individuals, job tenure, defined as the length of attachment between workers and firms. The analysis has found that:

(1) The U.S. work force has accrued considerable job tenure, with average incomplete spells across the whole work force of about 8 years but with much higher levels for older men. Upwards of 25% of the work force and 60% of older male workers have accrued 10 or more years of (incomplete) tenure with a firm. The principal reason for breaks in tenure are worker-initiated changes in the form of quits, which are 2-3 times as important as layoffs and other employer-initiated changes.

(2) Trade unionism is associated with significantly greater job tenure and conversely with significantly lower probabilities of separation.

(3) The increase in worker attachment to firms resulting from unionism is not due largely to monopoly wage increases nor to reductions in employer-initiated separations nor to unionization of more stable workers bur rather to changes in worker behavior due to union work settings.

(4) While difficult to pin down, some of the union effect on tenure

appears due to grievance systems and specific work rules like seniority, which reflect in part the role of unionism as an institution of "voice" in the job market. To some extent at least increased tenure due to the voice and industrial jurisprudence mode of operation should be viewed as socially beneficial, reducing the costs of turnover and thus raising productivity.

These findings have important implications for understanding the economics of trade unions and for the direction of research on unions. They suggest that unions have sizeable non-monopoly wage effects on the job market which should be taken into account in any social evaluation of the institution. They provide some support for the traditional industrial relations view of unionism as a complex institution which causes wide-ranging changes in the job market. They suggest that modern empirical research on trade unionism, which currently focuses almost exclusively on estimating monopoly wage effects, should also analyze the non-monopoly wage voice or industrial jurisprudence impacts of unions. Unions have monopoly wage effects but they also have more subtle, potentially socially beneficial economic effects on the job market that deserve attention.

<div align="center">Footnotes</div>

[1] In this study tenure relates to years of employment with a particular firm. It does not refer to academic tenure.

[2] Pencavel and Brown-Medoff report significant coefficients on unionism in quit equations while Parsons and Burton and Parker do not. Stoikov and Raimon find different union effects depending on the other tneure variables included in their calculations. For a general assessment stressing the inconclusive nature of the results see Reynolds (p. 568). For an opposite one see Freeman (1979).

[3] For delays in quits to raise tenure there must be some _nonzero_ probability of redressing the grievance, so that the worker is willing to try the option and the length of employment must be finite, for otherwise delays will not affect the steady state solution. If, on average, the length of employment were initially, say 10 years, then a delay in quitting for, say 1/2 year, would reduce the quit rate from 10% to about 9 1/2%, raising tenure to 10.5 years in a steady state equilibrium.

[4] The complexity of some of the tenure equations can be seen in Mann, Shafer, and Singpurwaller.

[5] The equation linking the distribution of incomplete spells to the distribution of completed spells is given in Feller (p. 370).

[6] For a discussion of these surveys see U.S. Department of Labor, Research Monographs 15 and 16; Institute for Social Reserach (University of Michigan).

[7] Note that this biases downward the standard deviations of tenure in the Michigan PSID data set.

[14]These are based on 525 separations from 1969 to 1970. Comparable estimates

for other years give smaller coefficients on unionism:

$$b_{W_A U \cdot W}$$

	$b_{W_A U \cdot W}$
1970-71 (n = 473)	.04(.06)
1971-72 (n = 493)	.10(.06)
1972-73 (n = 590)	.11(.06)

where n = sample size, $b_{W_A U \cdot W}$ = regression coefficient linking wages on the

new job to unionism holding fixed wages on the previous job (and the other

characteristics of the previous job used as controls in table 2).

[15]For detailed discussion of the model see Chamberlain. For detailed discussion

of the application to the union-quit relation see Freeman (1978b).

[16]An alternative to the fixed effects model would be a random effects model in

which the person effects would be treated as random variables rather than as

constants. Such a model would provide a weaker test of the selectivity argument.

[17]See U.S. Bureau of Labor Statistics, Major Collective Bargaining Agreements

Grievance Procedures, Bulletin 1425-1, table 1, p. 2.

Bibliography

Brown, C. and J. Medoff, "Trade Unions in the Production Process, Journal of Political Economy, June 1978, 355-378.

Burton, J. and J. Parker, "Inter-industry Variation in Voluntary Labor Mobility," Industrial Labor Relations Review, Jan. 1969, 199-216.

Chamberlain, G., "Analysis of Covariance with Qualitative Data (unpublished paper, Harvard University, 1978).

Feller, W., An Introduction to Probability Theory and its Applications, vol. II (John Wiley & Sons, N.Y. 1971).

Freeman, R, "The Effect of Trade Unionism on Fringe Benefits" (NBER Working Paper No. 292), 1978a.

Freeman, R., "A Fixed Effect Logit Model of the Impact of Unionism on Quits," (NBER Working Paper No. 280), 1978b.

Freeman, R., "Why Do Unions Increase Job Tenure?" (unpublished paper, Harvard University, April 1979).

Griliches, Z. and V. Ringstad, Economics of Scale and the Form of the Production Scale (Amsterdam: North Holland, 1971).

Hicks, J.R., The Theory of Wages, (N.Y.: St. Martin's Press, 1963).

Institute for Social Research, A Panel Study of Income Dynamics, University of Michigan, 1968-1974.

Lewis, H.G., Unionism and Relative Wages (University of Chicago: 1963).

Lilien, D., "The Cyclical Pattern of Temporary Layoffs in U.S. Manufacturing," (Ph.D. Dissertation, M.I.T., 1977).

Mann, N, R. Schafer, and N. Singpurwaller, Methods for Statistical Analysis of Reliability and Life Data, (N.W.: Wiley, 1974).

Medoff, J., "Layoffs and Alternatives under Trade Unions in United States Manufacturing," American Economic Review, June 1979, pp. 380-395.

Oi, W., "Labor as a Quasi-fixed Factor of Production" Journal of Political Economy, Dec. 1962.

Parsons, C., "Models of Labor Market Turnover: A Theoretical and Empirical

    Survey," in R. Ehrenberg (ed.) Research in Labor Economics, Vol. 1, 1977.

Pencavel, J., An Analysis of the Quit Rate in American Manufacturing Industry,

    (Princeton, 1970).

Reynolds, L., Labor Economics and Labor Relations, sixth edition (Englewood

    Cliffs, New Jersey: Prentice-Hall Publishers), 1974.

Sargent, B., and D. Clawson, "The Effect of Selected Factors on Hospital

    Turnover Rates," Personnel Journal, Vol. 53, No. 1, Jan. 1974, 30-34.

Seidman, J., J. London and B. Karsh, "Why Workers Join Unions," The Annals

    of the American Academy of Political and Social Science, March 1957.

Stoikov, V. and R. Raimon, "Determinants of the Differences in Quit Rates

    Among Industries," American Economic Review, Dec. 1958, 1283-1298.

Trotta, M., Handling Grievances (Bureau of National Affairs: Washington, 1976).

U.S. Department of Labor, Bureau of Labor Statistics, Major Collective

    Bargaining Agreements, Bulletin 1425.

U.S. Department of Labor, Characteristics of Collective Bargaining Agreements,

    July 1, 1975, Bulletin 1957, 1977.

U.S. Department of Labor, Manpower Research Monograph No. 15, The Pre-Retirement

    Years.

U.S. Department of Labor, Manpower Research Monograph No. 16, Career Thresholds.