NBER WORKING PAPER SERIES

RIGHT-TO-WORK LAWS
AND THE EXTENT OF UNIONIZATION

Henry S. Farber

Working Paper No. 1136

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge MA 02138

June 1983

Right-to-Work Laws and the Extent of Unionization

ABSTRACT

It is a well known fact that the extent of unionization is lower in
states with Right-to-Work (RTW) laws. A framework is developed for deter-
mining whether RTW laws actually cause a decrease in the extent of unioni-
zation or whether they simply mirror preexisting tastes of workers against
unions. A set of empirical tests is proposed that can distinguish between
these explanations based on differences between RTW and non-RTW states in
the demand for union representation, the supply of union jobs relative to
that demand, and the observed union-nonunion wage differential. Data from
the Quality of Employment Survey and from the Current Population Survey
are utilized to implement the tests.

The results indicate that the demand for union representation is
significantly lower in states with RTW laws. At the same time no signi-
ficant difference is found on the basis of RTW laws in the supply of union
jobs relative to demand. It is also found that the observed union-nonunion
wage differential is slightly larger in RTW states. This pattern is con-
sistent with the hypothesis that RTW laws simply mirror preexisting pre-
ferences against union representation. In its entirety it is not consistent
with the hypothesis that RTW laws cause a decrease in the extent of
unionization.

A final interesting result is that it is found that the extent of
unionization in the south is lower even after controlling for the
presence of RTW laws in many of the states in that region. Further, it
is determined that this is due to a supply of union jobs in the south
that is more constrained relative to demand than elsewhere. This suggests
that there exist a set of institutional or economic factors in the south
that makes union organizing more difficult and expensive independent of
the existence of RTW laws.

Henry S. Farber
Department of Economics
Massachusetts Institute of Technology
E52-564
Cambridge, Massachusetts   02139

(617) 253-2678

I. Introduction

The well known lower extent of unionization in the south has often been argued to be a result of the prevalence in that region of Right-to-Work (RTW) laws which prevent unions from enforcing contracts that require workers to join or financially support a labor union as a condition of employment. Others have argued that RTW laws have no real effect but merely reflect preexisting preferences against unions. In this study the relationship between the existence of RTW laws and the extent of unionization will be examined with particular emphasis both on distinguishing between these competing hypotheses regarding the role of RTW laws and on understanding the role these laws play in causing the observed lower extent of unionization in the south.

As of 1976 RTW laws existed in the nineteen states, nationwide, listed in table 1.[1] Included in the states with RTW laws are ten of the sixteen states (plus the District of Columbia) in the southern region, listed in table 2, as defined by the U.S. Bureau of the Census. The facts that not all southern states have RTW laws and that RTW laws exist in a number of states outside that region are important in allowing the separate evaluation of regional factors and RTW laws as they affect the extent of unionization.

The preliminary evidence suggests that RTW laws and region have relationships with the extent of unionization that are independent of each other. Table 3 contains the proportion of the workforce unionized for a sample of nonmanagerial and nonsales workers outside the construction industry from the May 1977 Current Population Survey (CPS) broken down by region and RTW status. The results show that the extent of unionization is substantially lower both in RTW states (as

Table 1. States With Right-to-Work Laws - 1976

State	Year of Adoption
Alabama	1953
Arizona	1946
Arkansas	1944
Florida	1944
Georgia	1947
Iowa	1947
Kansas	1958
Mississippi	1954
Nebraska	1946
Nevada	1951
North Carolina	1947
North Dakota	1947
South Carolina	1954
South Dakota	1946
Tennessee	1947
Texas	1947
Utah	1955
Virginia	1947
Wyoming	1963

Table 2. The Southern Region - U.S. Census Definition

State	Right-to-Work Law
Alabama	yes
Arkansas	yes
Delaware	no
District of Columbia	no
Florida	yes
Georgia	yes
Kentucky	no
Louisiana	no
Maryland	no
Mississippi	yes
North Carolina	yes
Oklahoma	no
South Carolina	yes
Tennessee	yes
Texas	yes
Virginia	yes
West Virginia	no

Note: Louisiana enacted a RTW law in 1977. Given that the empirical analysis refers to 1977, Louisiana is considered not to have a RTW law.

Table 3. Extent of Unionization by Region and RTW status

Proportion of Labor Force Who Are Union Members

	RTW	Non RTW	All
South	.161	.273	.192
Non-South	.245	.371	.354
All	.188	.359	.305

Sample size by Region and RTW Status

	RTW	Non RTW	All
South	6241	2363	8604
Non-South	2812	17411	20223
All	9053	19774	28827

Note: Sample derived from the May 1977 CPS excluding managerial, sales, construction, and self-employed workers. Only employed workers are included in the sample.

opposed to non-RTW states) and in the southern region (as opposed to the rest of the United States). The more interesting result is that within the south the extent of unionization is substantially lower in RTW states than in non-RTW states. This also holds true outside the south. Thus, those who look to RTW laws as an explanation of the lower extent of unionization in the south may be on the right track. However, the figures in table 3 also imply that even after controlling for RTW laws the extent of unionization is substantially lower in the south than outside that region. This suggests that there are factors within the south which contribute to that region's lower extent of unionization independently of RTW laws.

In the next section three distinct explanations for the observed correlation between right-to-work laws and the extent of unionization are discussed. The first explanation is that RTW laws cause a "free rider" problem for the union which results in the provision of less unionization than would exist otherwise. Essentially, this suggests that the supply of union jobs will be constrained relative to demand in RTW states. The second explanation relies on the notion that RTW laws exist only where there is public/political sentiment that is not favorable to unionization. On this basis of this "tastes" hypothesis it has been argued that RTW laws are merely a reflection of lower worker demand for union representation and that the laws have no independent effect. The third explanation is that RTW laws weaken unions by preventing them from requiring that all workers on union jobs become members of the union. Because, by law, unions are allowed to discipline only workers who are members of the union, the union's ability to ensure that all workers will participate in a strike or

other job action may be reduced. The result may be a weakening of the bargaining position of the union so that it cannot deliver the services (e.g., higher wages) to the same extent that it could in the absence of the laws. This "strike enforcability" hypothesis will result in a decrease in demand for union representation. Note that the first and third explanations suggest that RTW laws have real effects on the extent of unionization, while the second explanation suggests that RTW laws only reflect nonunion preferences.

While earlier studies of the relationship between right-to-work laws and the extent of unionization (e.g.; Lumsden and Petersen, 1975; Warren and Strauss, 1979; Wessels, 1981; and Ellwood and Fine, 1983) all find the negative correlation noted in table 3, they disagree on which of the hypotheses described above is the correct explanation. Each of these studies attempts, using different techniques and diffferent data, to determine whether the negative correlation is caused by RTW laws or simply reflects nonunion tastes that result in RTW laws as well as less unionization. The Warren-Strauss and the Ellwood-Fine study find that RTW laws have a real effect on the extent of unionization while the others find that RTW laws have no real effect and merely reflect pre-existing tastes. What all of these studies have in common is that they rely solely on data on the extent of unionization or changes in the extent of unionization.

The set of empirical tests proposed in the next section can distinguish between these explanations based on differences between RTW and non-RTW states in the demand for union representation, the supply of union jobs relative to that demand, and the observed union-nonunion wage differential. The empirical analysis presented in

succeeding sections implements these tests using data that allow the identification of variations in the demand for union representation as distinct from the supply of union jobs. In addition data on the observed union-nonunion wage differential is analyzed.

In section III data from the May 1977 CPS are analyzed in the context of a simple probit model of the union status of workers in order to investigate in more detail the relationships between region, RTW legislation, and unionization. Consistent with earlier studies and with the evidence in table 3, it is found after controlling for individual characteristics and region that the probability of a worker being a union member is lower in RTW states. In addition, it is found after controlling for individual characteristics and the presence of RTW laws that workers in the south have a lower probability of being union members than do nonsouthern workers. In section IV the same data are used to provide evidence regarding union-nonunion wage differentials as they vary by region and RTW status. It is found after controlling for individual characteristics and region that the observed union-nonunion wage differential is slightly higher in RTW states.

In section V it is argued that the simple probit model estimated in section III is inadequate as an explanation of the union status of wokers and, more importantly, cannot distinguish between the competing hypotheses regarding the role of RTW laws. This is because it cannot distinguish between shifts in the demand for union representation and shifts in the supply of union jobs relative to demand. A model of the determination of the union status of workers, proposed by Farber (1983), which has the ability to distinguish between supply and demand

shifts based on the existence of queues for union jobs is developed. Two empirical specifications are proposed. One relies on single equation probit techniques but requires some rather strong assumptions. The other does not demand as strong a set of assumptions, but it requires the estimation of a trivariate discrete choice model.

In section VI data from the 1977 Quality of Employment Survey (QES), required to implement the queuing model of the determination of the union status, of workers are described. These data have an important piece of information regarding the preferences of nonunion workers for union representation which can be used to identify worker demand for union representation as distinct from their actual union status.

Section VII contains the results of the single equation estimation of the queuing model, and in section VIII the results of the trivariate estimation are presented. The results derived using both models suggest that the demand for union representation is lower in RTW states while the supply of union jobs relative to demand is not significantly related to the presence of RTW laws.

The final section contains a discussion of the implications of the analysis for the roles of RTW laws and region in determining the extent of unionization. While the results cannot completely distinguish between the three competing hypotheses regarding the correlation between RTW laws and the extent of unionization, the "tastes" hypothesis fits the data best and it is possible to rule out the pure "free rider" explanation. In addition, it is found that the lower extent of unionization in the south is due to a supply of union

jobs relative to demand that is lower than elsewhere even after controlling for the existence of RTW laws. No systematic differences in preferences for union representation between southern and nonsouthern workers are found after controlling for the existence of RTW laws. These results suggest that there are other institutional and economic factors in the south which constrain the supply of union jobs relative to demand and cause the lower extent of unionization in that region.

II. Why the Relationship between Right-to-Work Laws and Unionization?

The first explanation for the observed inverse correlation between RTW laws and the extent of unionization is that the laws permit free riders by allowing workers to enjoy the benefits of unionization without bearing any of the costs. Essentially, the argument is that, while unions in states with RTW laws cannot require membership or dues payments, they are not relieved of the requirement to fairly represent all workers in the bargaining unit without regard to membership, financial support, or the lack thereof. In addition, nonmembers who are working in jobs covered by a collective bargaining agreement are compensated at the rate negotiated by the union.[2] In more familiar terms, RTW laws forbid unions from levying taxes in order to finance the provision of workplace public goods. Unions in this circumstance must rely on voluntary tax payments. It is not likely that all workers will make the voluntary tax payments so that, while worker demand for union representation is unchanged, a union will supply less than the optimal quantity of union services.[3] This translates directly into a supply of union jobs which is more constrained relative to demand in RTW states than in non RTW states.

Given that workers vary in the benefit that they receive from union representation, it is interesting to consider which of the workers who would have been organized in the absence of an RTW law would still be organized in the presence of an RTW law. Two factors suggest that it will be those workers for whom the gain from unionization (e.g., increased wages) is largest. The first is that these workers would be most willing to support the union financially because they have more to lose if they are not organized. The second is that the union objective function, which is not defined explicitly here, is likely to be a function of the gain of its members so that the marginal benefit to the union of increased organization will be directly related to the benefit perceived by the marginal workers. Given these factors and holding the cost of unionization fixed, the union faced with a RTW law will not organize those workers for whom the gain is relatively small because there are no longer the guaranteed dues from these workers which are required to offset the costs of organization and administration. This result has an important empirical implication. To the extent that the benefit of unionization to a particular worker can be measured by the union-nonunion wage differential, the observed union-nonunion wage differential ought to be larger in RTW states.[4]

To summarize, the "free rider" hypothesis of the effect of RTW laws has a number of empirical implications. First, the supply of union jobs will be more constrained relative to demand in RTW states. Second, the demand for union representation will be no lower in RTW states, and it may even be higher due to the fact that workers may perceive that they can enjoy the benefits of union representation

without bearing the dues costs. Finally, it is expected that the observed union-nonunion wage differential will be larger in RTW states than in non-RTW states.

The second explanation for the observed inverse correlation between right-to-work laws and the extent of unionization is that workers in RTW states have a lower demand for union representation on nonpecuniary grounds. This "tastes" hypothesis suggests that RTW laws merely act as a proxy for unobserved preferences for nonunion employment on the part of workers. By this hypothesis, those workers who do become unionized in RTW states are those for whom the pecuniary advantages of unionization are sufficient to outweigh the nonpecuniary disadvantages. To the extent that the union-nonunion wage differential captures the pecuniary benefits of union representation, the tastes hypothesis suggests that the union-nonunion wage differential will be larger in RTW states.[5]

The empirical implications of the tastes hypothesis are threefold. First, it suggests that the demand for union representation ought to be lower in RTW states. Second, it suggests that the supply of union jobs relative to the demand ought to be unaffected by the presence of the laws. Finally, the union-nonunion wage differential ought to be larger in RTW states than elsewhere.

The final explanation for the inverse correlation between right-to-work laws and the extent of unionization is based on the notion that RTW laws weaken the ability of unions to deliver services, such as wage increases or an effective grievance machinery, to its members. This effect of RTW laws is a result of the fact that unions cannot discipline nonmembers even if they are employed on a job that is

covered by a collective bargaining agreement. The power to discipline workers is an important component of the union's ability to make the threat of a strike (or other legitimate job action) credible. A union member who refuses to honor a strike that is legitimately called by union leaders faces discipline at the hands of the union which can include financial penalties. In contrast to this, a worker who is employed on a job that is covered by a collective bargaining agreement but who is not a member of the union is not subject to any formal sanctions from the union. Thus, a union in a RTW state cannot make a credible strike threat unless it is sure that it has the overwhelming support of the covered workers while a union in a non-RTW state can make a credible strike threat without such overwhelming support.

Two points are worth making in regard to the enforcability of strikes or other job actions. First, note that this is another aspect of the free rider problem induced by RTW laws. Nonmembers can continue working and earning income during a strike, and, when the strike is over, they will share equally in the benefits through the union's duty of fair representation. Essentially, the nonmembers share in the benefits of the strike without bearing any of the costs.[6] The second point is that there may be very strong social sanctions in the workplace which provide the incentive for all workers, regardless of membership status, to support a strike or other job action. Such sanctions will obviate the need for formal disciplinary mechanisms on the part of the union, and the effect of RTW laws on the enforcability of strikes or other job actions will not be important.[7]

The importance of the strike threat to the union is that it in part determines the leverage that the union has in bargaining with the

employer. Other things equal, where the union cannot strike as readily the employer will be less willing to concede to the union. Thus, the relative inability of unions in RTW states to enforce the threat of a strike or other job action will result in a decreased ability to deliver benefits to workers in RTW states.

The empirical implications of the reduction in the ability of unions in RTW states to deliver benefits to workers are threefold. First, the demand for union representation will be lower due to the lower level of benefits. In addition, the reduction in the benefits of unionization will result in a decline in the supply of union jobs as unions recognize that the marginal benefit of organization is lower. However, the supply of union jobs relative to demand will not be affected systematically by the reduction in the ability of unions to deliver benefits. Finally, to the extent that wage gains from unionization capture the bulk of the benefits of unionization, the observed union-nonunion wage differential ought to be unaffected by the presence of RTW laws. This is because the cost to workers of union representation is not affected by the unenforcability of strikes or other job actions in RTW states so that, while fewer workers will desire union representation, those who do will be those who derive a level of benefit from union representation which is at least as great as the (unchanged) cost.

All three hypotheses outlined above have the empirical implication that the extent of unionization will be inversely related to the presence of right-to-work laws. Thus, on this grounds they are indistinguishable empirically. However, the three hypotheses have different sets of implications for the demand for union

representation, the supply of union jobs relative to demand, and the observed union-nonunion wage differential.[8] The "free rider" hypothesis suggests that demand will be unchanged by RTW laws, supply relative to demand will be reduced by RTW laws, and the union-nonunion differential will be increased by the presence of RTW laws. The "tastes" hypothesis suggests that RTW laws have no real effects but that they will be associated with a lower demand for union representation, a supply of union jobs relative to demand which is unaffected by the laws, and a larger observed union-nonunion wage differential. Finally, the "strike enforcability" hypothesis suggests that RTW laws reduce the demand for union representation, leave the supply of union jobs relative to demand unchanged, and leave the union-nonunion wage differential unchanged. Note that there is no reason to expect that these hypotheses are mutually exclusive so that if more than one of the hypotheses is valid then some combination of the hypothesized effects could be found.

A note of caution is that the interpretation of the results of the proposed test of the effects of RTW laws could be confounded if the ability of the union to negotiate benefits for its members is adversely affected by a decline in the extent of unionization in the relevant product market. Briefly, where the extent of unionization is lower there may be a greater threat of competition from nonunion labor employed by firms in the same industry. In this situation the potential decline in union labor demand associated with a given increase in wages will be larger, i.e., the elasticity of damand for union labor will be larger. The relevance of this potential problem is mitigated by the fact that a large fraction of unionized workers,

particularly in manufacturing industries, are employed by firms that sell in national product markets which implies that less unionization within RTW states does not have a differential effect on the ability of unions to provide benefits to members within RTW states. However, to the extent that the ability of unions to deliver benefits to workers within RTW states _is_ differentially affected through this mechanism, the "free rider" and the "tastes" hypotheses will both have the same implications described for the "strike enforcement" hypothesis in addition to the implications attributed to each hypothesis above. It would be difficult in this situation to distinguish between the three hypotheses.

III. Estimation of a Probit Model of the Union Status of Workers

Consider a model where the union status of a worker is determined by the value of an unobservable variable (y) which represents the propensity of a worker to be a union member. If y is positive then the individual will be a union member, and if y is negative then the worker will not be a union member. More formally let

(1) y=XB+e

where X represents a vector of individual characteristics that affect the probability of union membership, B is a vector of parameters, and e represents unmeasured factors affecting the probability of union membership. The probability that a worker will be a union member is

(2) Pr(U=1) = Pr(y>0) = Pr(e>-XB)

where U is a dummy variable that equals 1 if the individual is a union member and is zero otherwise. If it is assumed that e is distributed as a standard normal random variable then Pr(e>-XB) is a standard

normal cumulative distribution function (N) and the probability that a worker is a union member is

(3) Pr(U=1) = N(XB).

The probit likelihood function over a sample of workers for whom U and X are observed can be derived in a strightforward fashion from this relationship.[9]

A behavioral model which would have the form suggested by this simple probit model is one where y represents the difference between the utility that a worker receives as a union member and the utility he receives not as a union member and where the worker is free to choose his union status. In other words y represents the net benefit of union membership, and a worker will be a union member if the net benefit is positive.[10] It will be argued below that it is not possible to model the union status of workers as strictly the result of individual choice without consideration of the supply of union jobs and employer hiring criteria. For this reason it is preferable to think of the probit model specified here and estimated in this section as a "reduced form" relationship summarizing the partial correlations that exist in the data between union membership and other characteristics rather than as a precisely defined structural model.

Table 4 contains the means and standard deviations of relevant variables for a sample of 28827 workers from the May 1977 CPS. The table also contains means and statndard deviations for the associated union and nonunion subsamples. Managerial, sales, construction, and self-employed workers were deleted from the sample because the process of unionization for these workers is different from that for most of the remaining workers. For example, managerial workers are generally

Table 4. Means (Standard Deviations) of Data
Current Population Survey, May 1977

Variable	Description (Dichotomous variables =0 otherwise)	Combined Sample	Union Sample	Nonunion Sample
U	=1 if works on union job	.305	1.0	0.0
RTW	=1 if worker in RTW state	.314	.193	.367
South	=1 if worker resides in south	.298	.188	.347
South*RTW	=1 if South and RTW	.216	.114	.262
NW	=1 if nonwhite	.120	.136	.113
Fe	=1 if female	.432	.292	.494
Marr	=1 if married	.682	.749	.652
Marr*Fe	=1 if married female	.251	.176	.284
Man	=1 if industry is manufacturing	.333	.424	.294
Cler	=1 if occupation is clerical	.233	.134	.276
Serv	=1 if occupation is service	.131	.103	.143
Prof&Tech	=1 if occupation is professional or technical	.207	.164	.226
ln(Wage)	log of hourly earnings	1.55 (.472)	1.75 (.368)	1.47 (.485)
Ed	education in years	12.3 (2.87)	12.1 (2.86)	12.5 (2.87)
Age	age in years	36.6 (12.6)	38.9 (12.2)	35.6 (12.6)
Exp	labor market exper. (Age-Ed-6)	19.3 (13.3)	21.8 (13.2)	18.1 (13.3)
Sample size		28827	8804	20023

not protected by the National Labor Relations Act which governs organization among the majority of private sector workers, and construction workers differ from the majority of workers in that hiring by union employers in that industry is done through hiring halls controlled by the relevant craft unions. These sample selection criteria also make the sample comparable to the sample of workers from the 1977 cross-section of the Quality of Employment Survey used in later sections. Indeed, this comparability is the primary reason why the May 1977 CPS rather than a more recent CPS was selected. The union status variable is computed from the response to a question regarding whether or not the individual is a union member.[11] The base group for the dichotomous variables consists of white single males who live outside the south in a state without a right-to-work law and who work on a blue collar nonunion job in a nonmanufacturing industry.

Table 5 contains estimates of the probit model of union membership estimated over the sample described in table 4. The estimates in the first column allow South and RTW to have independent effects on the probability of union membership although the effect of RTW laws is constrained to be the same in all regions. The estimates in the second column relax this constraint by including the separate variable South*RTW. Given the extremely large sample size, it is not surprising that all of the estimated coefficients are significantly different from zero at conventional levels using asynptotic t-tests. With regard to the individual specific characteristics, the results are generally consistent with those derived in earlier studies. In particular, nonwhites and married males are more likely to be union members, while females and workers in non-blue collar occupations are

Table 5. Estimates of Union Membership Probit
Current Population Survey, May 1977

Variable	(1)	(2)
Constant	-.731 (.0578)	-.732 (.0578)
NW	.295 (.0250)	.297 (.0250)
Fe	-.168 (.0308)	-.168 (.0308)
Marr	.219 (.0252)	.219 (.0252)
Marr*Fe	-.153 (.0367)	-.154 (.0367)
Ed	.0176 (.00379)	.0173 (.00380)
Age	.0113 (.000696)	.0113 (.000697)
Cler	-.635 (.0241)	-.636 (.0241)
Serv	-.486 (.0271)	-.487 (.0271)
Prof&Tech	-.556 (.0286)	-.556 (.0286)
South	-.353 (.0226)	-.313 (.0308)
RTW	-.364 (.0218)	-.328 (.0282)
South*RTW	-----	-.0886 (.0449)
log L	-15938.8	-15936.9

n = 28827

Note: The numbers in parentheses are asymptotic standard errors.

less likely to be union members. It is interesting that older workers
are found to be more likely to be union members. This is consistent
with the notion that older workers prefer unions due to the fact that
they provide relatively more of the benefits, such as pensions, that
are valued by older workers.   However, earlier evidence using other
data (Farber and Saks, 1980; Farber, 1983) suggests that older workers
are less likely to prefer union representation.

In order to facilitate the discussion of the effects of region
and RTW laws on the extent of unionization, table 6 contains predicted
probabilities   and   differences   between   probabilities   of   union
membership for "standard" individuals living in states with and
without RTW laws and living in and out of the south.   These
probabilities are computed using the estimates in the second column of
table 5.   The approximate asymptotic standard errors of these
probabilities and differences, computed using a first order expansion
of the relevant function, are also presented.   The "standard"
individual is a 30 year old white single male with 12 years of
education who works in a blue collar occupation.

The important point to note from these results is that the
probability of union membership is lower in the south even after
controlling for the presence of RTW laws.   Similarly, RTW laws are
associated with a lower probability of union membership even after
controlling for region.   This suggests that there is more to the low
level of unionization in the South than can be accounted for by the
mere presence of RTW laws or any differences in the composition of the
labor force.   In addition, it suggests that there is more to the
inverse relationship between RTW laws and the extent of unionization

Table 6:
Predicted Probabilities of Union Membership and Differences
by RTW status and Region.

Probability of Union Membership

	non-RTW	RTW
Nonsouth	.427 (.00926)	.304 (.0119)
South	.309 (.0129)	.180 (.00777)

Differences in Probability of Union Membership
(row specification - column specification)

	Nonsouth non-RTW	South non-RTW	Nonsouth RTW	South RTW
Nonsouth non-RTW	---	.118 (.0110)	.123 (.0100)	.247 (.00703)
South non-RTW	---	---	.00530 (.0138)	.129 (.0116)
Nonsouth RTW	---	---	---	.124 (.0108)
South RTW	---	---	---	---

Note: The numbers in parentheses are approximate asymptotic standard errors derived from a first-order expansion of the relevant function around the estimated parameter values contained in the second column of table 5. All workers are 30 year old white single males with 12 years education who are working in blue collar occupations.

than can be accounted for by "anti-union" attitudes in the south or by differences in labor force composition in RTW states.

Another result is that, while the parameter estimates suggest that the relationship between RTW laws and the probability of union membership is marginally significantly different at conventional levels within the south as compared to outside that region, the predicted probability differences do not bear this out. In particular, the predicted difference between the probabilities of union membership outside the south for non-RTW states and RTW states equals .123. The same comparison within the south yields an almost identical probability difference of .129. Thus, it can be concluded that the overall relationship between RTW laws and the extent of unionization is virtually identical in the south and outside that region.

IV. Right-to-Work laws and the Union-Nonunion Wage Differential

The observed union-nonunion wage differential is an important component of the empirical tests outlined in section II to distinguish between the various competing explanations for the inverse relationship between RTW laws and the extent of unionization. In this section earnings functions are estimated using ordinary least squares (OLS) over the sample from the May 1977 CPS described in table 4.

In line with common practice consider an earnings function of the form

(4) $\ln(Wage) = XB + T_1RTW + T_2U + T_3U*RTW + e$

where X represents a vector of individual characteristics, B is a vector of parameters, the T_i are parameters, and e represents unmeasured factors that affect earnings. The parameter T_2 measures

approximately the proportional union-nonunion wage differential in non-RTW states, while the sum of the parameters T_2 and T_3 measures approximately the union-nonunion wage differential in RTW states. On this basis the quantity of interest, the difference in the observed union-nonunion wage differential between RTW states and non-RTW states, is simply T_3 which is the coefficient of U*RTW.

Estimates of the parameters of this earnings function are contained in the first column of table 7. The results indicate an average union-nonunion wage differential in non-RTW states of approximately 18.7 percent. The coefficient on the interaction of U and RTW is .0325, and it is significantly different from zero at conventional levels using a t-test. This suggests that the union-nonunion wage differential is slightly larger in RTW states.

It has been argued that the union-nonunion wage differential is not uniform across workers of different characteristics.[12] If this is the case then the earnings function contained in equation (4) is mis-specified because it allows for only a constant proportional shift in earnings on the basis of union status. The results derived on this basis regarding the relationship between RTW laws and the union-nonunion wage differential might be misleading. In order to investigate this potential problem, an unconstrained version of the earnings relationship can be derived by estimating separate functions over the union and nonunion subsamples. These functions will have the form

(5) $\ln(\text{Wage}) = XB + T_1 RTW + e.$

The difference between the estimated coefficients of RTW (T_1) for the two subsamples is a measure of the difference in the union-nonunion

Table 7. Estimates of Earnings Functions
Current Population Survey, May 1977

Variable	All	Union	Nonunion
Constant	.740 (.0146)	1.24 (.0246)	.625 (.0176)
Ed	.0429 (.00101)	.0335 (.00168)	.0466 (.00123)
Exp	.0224 (.000611)	.0185 (.00101)	.0234 (.000752)
Exp^2	-.000351 (.0000129)	-.000273 (.0000205)	-.000375 (.0000162)
NW	-.0352 (.00653)	-.0377 (.00975)	-.0361 (.00834)
Fe	-.212 (.00776)	-.238 (.0134)	-.191 (.00943)
Marr	.146 (.00675)	.0739 (.0102)	.175 (.00858)
Marr*Fe	-.151 (.00914)	-.0828 (.0159)	-.179 (.0111)
Man	.0355 (.00507)	-.107 (.00796)	.0861 (.00636)
Cler	.0870 (.00661)	-.0338 (-.0112)	.124 (.00810)
Serv	-.168 (.00738)	-.225 (.0121)	-.139 (.00907)
Prof&Tech	.226 (.00746)	.0406 (.0130)	.279 (.00903)
South	-.0317 (.00564)	-.0376 (.00983)	-.0297 (.00675)
RTW	-.0815 (.00609)	-.0481 (.00963)	-.0774 (.00659)
Union	.187 (.00542)	---	---
U*RTW	.0325 (.0108)	---	---
R-SQUARED	.440	.304	.433
n	28827	8804	20023

Note: The numbers in parentheses are asymptotic standard errors.

wage differential between RTW and non-RTW states.

The second and third columns of table 7 contain estimates of separate earnings functions for the union and nonunion subsamples respectively. The results are consistent with those derived in earlier studies in that the union earnings function is "flatter" than the nonunion earnings function in skill dimensions such as education and experience. This may reflect the standardization of wage rates often associated with labor unions. With regard to RTW laws, the coefficients on RTW are negative in both equations which suggests that earnings are generally lower in RTW states. However, the negative coefficient is smaller in the union equation than in the nonunion equation so that, as in the single equation model, the union-nonunion differential is larger in RTW states. The difference between the RTW coefficients is .0293 with a standard error of .0117. This difference is significantly different from zero at conventional levels although it is rather small in magnitude. It is comparable in size to the coefficient on U*RTW in the single equation formulation.

Overall, the evidence suggests that the union-nonunion wage differential is slightly larger in RTW states than in non-RTW states. A larger differential in RTW states is consistent with both the "free rider" hypothesis and the "tastes" hypothesis. It is not consistent with the pure "strike enforcability" hypothesis and the results found here can be considered as preliminary evidence against that hypothesis.

V. A Queuing Model of the Determination of the Union Status of Workers

In order to go further with the analysis of the effects of right-

to-work laws it is necessary to develop a model of union status which separately identifies the demand for union representation from the supply of union jobs.[13] It is argued here that the union status of workers is determined as the result of separate decisions by workers and by potential union employers. Workers decide whether they would prefer union or nonunion jobs based on the utilities that these jobs yield to them. At the same time, union employers decide which of the workers who want union jobs to hire given that workers differ in their productive characteristics and that these workers are compensated differently in the union and nonunion sectors. Essentially, union employers are assumed to hire the workers who enable them to produce at minimum cost.

This model is based on the presumption that union employers have some discretion in hiring as a result of the existence of queues for vacancies in existing union jobs.[14] These queues result from the facts that it is unlikely that dues and initiation fees completely offset the advantadges of unionization for all workers and that it is expensive to create new union jobs by organizing nonunion jobs.[15] More fundamentally, the queues result from a distinction, arising from the process of unionization, which must be drawn between the union status of workers and the union status of jobs. Nonunion jobs become unionized through organization of workers who hold them. This is a costly and uncertain process which can involve the holding of an election supervised by the National Labor Relations Board (NLRB).[16] These elections are often preceded by intense and closely monitered campaigns, and they may involve appeals by either or both sides to the NLRB regarding such issues as illegal campaign tactics and

determination of the appropriate bargaining unit. However, once the jobs are successfully unionized, their union status is preserved even if the workers who made the investment in organization leave.[17] In addition, new jobs created through expansion of unionized establishments are unionized by definition. Union employers can hire whomever they wish to fill any vacancies, but all new hirees will be covered by the collective bargaining agreement. In addition, if the union has negotiated a contract with a union shop provision and the establishment is not in a RTW state then the new employees will have to become union members. Thus, unless dues or initiation fees are sufficiently large, there will be workers who desire vacancies in existing union jobs but who are not willing to undertake investment in new unionization. For these workers the benefits of unionization are larger than the costs of union membership but smaller than the costs of organizing nonunion jobs. The results are queues for union jobs.

In order to identify separately the demand for union representation from the supply of union jobs, data from the Quality of Employment Survey (QES) on both the union status of workers and on the explicit preferences of nonunion workers for union representation are utilized. The crucial bit of information is the response elicited from nonunion workers as to whether or not they would vote for union representation (VFU) on their current job were a secret ballot election to be held. Analyzed appropriately, these data allow the identification of the demand for union representation of all workers and, combining this information with the information on union status, of the supply of union jobs relative to this demand.

The decision of an individual worker to demand union

representation is based on a comparison of the worker's utilities in the union and nonunion sectors. More formally, if M represents the difference between the worker's utility on a union job and his utility on a nonunion job, then the worker will desire a union job if and only if $M>0$. Given that workers are heterogeneous in their preferences for union representation to the extent that workers of different characteristics derive different amounts of pecuniary and nonpecuniary benefits from unionization, M will vary across workers. A convenient parameterization for the worker preference criterion as a function of individual characteristics is

(6) $M = XG_1 + u_1$

where X is a vector of observable individual characteristics, G_1 is a parameter vector, and u_1 represents unobservable individual characteristics which affect worker preferences for union representation. If a variable reflecting the RTW status of the state of residence of the worker is included in X then its coefficient will reflect the correlation of the demand for union representation with RTW laws after controlling for the other components of X.

If worker preferences for union representation were observable for all workers then, by assuming a particular distribution for the disturbance, the model could be implemented empirically in a straightforward fashion. If u_1 were distributed normally then a probit model of the type implemented in section III on union status would be appropriate. The problem is that with information soley on union status it is not known whether a nonunion worker did not desire a union job or desired a union job but was not hired by a union employer. This is the essence of the queuing problem. The auxiliary

information on VFU for nonunion workers available in the QES provides some help with this problem.

One approach to utilization of this information is to assume that all union workers desired union representation at the time that they were hired and that all nonunion workers who answered the VFU question affirmatively currently desire union representation. This provides one observation for each individual on their demand for union representation. Note that the timing is crucial here. For example, it is not correct to assume that all union workers currently desire union representation. They may desire that their job become nonunion but they are not willing to sacrifice the nonportable benefits of seniority to take a nonunion job elsewhere. The simple probit model can be implemented both by assuming that the disturbance (u_i) is time invariant and has a standard normal distribution and by measuring the X variables at the appropriate point in time.

In order to determine how the relative supply of union jobs varies, it is necessary to model the employer decision criterion regarding which workers to hire. This is the result of a comparison by the employer of the relative cost of producing using workers of differing characteristics, and hence differing productivities, in order to hire those workers who enable him to produce at least cost. The structure of compensation in the union sector relative to productivity combined with the distribution of workers who desire union representation relative to the supply of unionized jobs defines a threshold level of cost which represents the maximum that a union employer will be willing to pay for productivity adjusted labor. In this context a worker will be hired by a union employer only if his

productivity adjusted labor cost is less than this threshold. Note that the threshold is an inverse function of the supply of union jobs relative to demand.

In more formal terms, the criterion for a union employer in a given geographic or occupational labor market to hire a particular worker is that the productivity adjusted labor cost of that worker (C) be smaller than the threshold (K) in that labor market. Let $H=C-K$ represent the difference between union productivity adjusted labor cost and the threshold so that the union employer criterion for hiring a particular worker is that $H<0$. A convenient parameterization for this union employer hiring criterion as a function of individual characteristics (X) is

(7) $H = XG_2 + u_2$

where G_2 represents a vector of parameters and u_2 represents unobservable individual characteristics that affect the employer decision process. The factors that affect H reflect variation in the supply of union jobs across different geographic and occupational labor markets as well as variation in productivity adjusted labor cost of different workers. If a variable reflecting the RTW status of the state of residence of the worker is included in X then its coefficient will measure the relationship between the relative supply of union jobs and RTW laws after controlling for the other components of X.

If it was known for all workers in a sample which of them desired a union job then the model could be implemented in a straightforward fashion by estimating the probability that a worker who desired union representation is actually working on a union job. Essentially, this involves assuming a distribution for u_2 over the subsample of workers

who desire union representation. If this distribution were assumed to be a standard normal then the model would be probit model of union status estimated over the subample of workers who desired union representation. However, as discussed above, with information of union status alone it is not possible to determine which of the nonunion workers desired union representation but were not hired by nonunion employers. Once again, the information on VFU can help with this problem.

Clearly, union workers were hired by union employers at the time they started their present job. However, the information on VFU available for nonunion workers reflects current preferences for union representation rather than preferences at the time they started their current job. Once again the timing is critical. It is entirely possible that a worker who desired union representation at the time he started his current nonunion job may no longer desire union representation. Similarly, a nonunion worker may not have desired a union job at the time he started his current job but over time has changed his decision. Both the inability to be hired by a union employer and the fixed costs of job mobility for workers who have accrued seniority will prevent workers form moving in order to accommodate these preferences. In order to utilize the information on VFU in the context of this simple model, it is necessary to make the rather strong assumption that the response of nonunion workers to the VFU question reflects their preference for union representation at the time they started their present job as well as currently.

By making this assumption it is possible to "identify" the subset of workers who desired union representation at the time they started

their current job. This subset consists of all workers who either are working on a union job or who are working on a nonunion job and answered the VFU question affirmatively. Assuming that the disturbance (u_2) is distributed as a standard normal, the employer choice equation can be estimated over this subsample as a simple probit model.

There is a potential econometric problem with this relatively simple technique. This is that it is unlikely that the distributional assumption made for u_2 is valid. While it may be reasonable to assume that u_2 is distributed normally over the entire sample, the subsample is selected largely on the basis of worker preferences for union represention. These preferences are determined by the process summarized in equation (6), and it is likely the unmeasured factors affecting worker preferences (u_1) are correlated with the unmeasured facors affecting the employer selection criterion (u_2). Thus, the subsample of workers who desire union representation is selected on the basis of a variable which is correlated with the disturbance in the model, and, as a result, the distribution of u_2 will not be a simple normal. In fact, the distribution over the subsample will depend on all of the parameters of the worker preference model (G_1) in a complicated way.

While estimates of the two simple probit models derived above will be presented in section VII, the potential econometric problems along with the rather strong assumptions required to derive the appropriate subsample of workers for the employer selection estimation suggest that an alternative estimation strategy be considered. Assume that over the entire sample the unobserved components of the model (u_1

and u_2) can be assumed to be correlated for any particular individual but are distributed independently across different individuals. Assume further that these random variable have a standard bivariate normal distribution with correlation p_{12}.

The next step is to determine exactly what can be learned about worker and employer preferences from the data on union status and the response to the VFU question. Clearly, for union workers what is known on the basis of union status is that these workers desired union representation and were hired by a union employer at the time they started their current job. From equations (6) and (7) the probability that a worker will be unionized is

(8) $\Pr(U=1) = \Pr(M_0>0, H_0<0) = \Pr(u_1>-X_0G_1, u_2<-X_0G_2)$

where the "0" subscript dates the variables at the time of hire.

Similarly, for nonunion workers what is known on the basis of union status alone is that they either did not desire union representation at the time they started their current job or they did but were not hired by a union employer at that time. The probability of this event is simply $\Pr(U=0) = 1 - \Pr(U=1)$. However, for nonunion workers the response to the VFU question provides the additional information regarding whether the worker currently desires union representation. On the basis of the model derived above, a worker will answer the VFU question affirmatively if $M_c>0$ where, from equation (6),

(9) $M_c = X_cG_1 + u_3$

and where the "c" subscript refers to the current time. The disturbance term (u_3) represents unmeasured factors which at the current time affect worker preferences for union representation, and

is assumed to have a standard normal distribution which may be correlated with u_1 and u_2.

While current preferences for union representation, determined by M_c, are not observed for all workers, the joint probability that they are observed (U=0) and that the individual currently desires union representation (VFU=1) can be derived in a straightforward fashion as

(10) $\Pr(U=0,\ VFU=1)\ =\ \Pr(M_0>0,\ H_0>0,\ M_c>0)\ +\ \Pr(M_0<0,\ M_c>0)$

$$=\ \Pr(\ u_1>-X_0G_1,\ u_2>-X_0G_2,\ u_3>-X_cG_1)$$

$$+\ \Pr(u_1<-X_0G_1,\ u_3>-X_cG_1)$$

where the probability functions are derived from the standard trivariate normal distribution assumed for the disturbances. The first . term represents the joint probability that the worker desired a union job at the time he started his current job but was not hired by a union employer and that he currently desires a union job. The second term represents the joint probability that the individual did not desire a union job at the time he started his current job but currently desires a union job.

Analogously, the joint probability that current preferences are observed (U=0) and that the individual does not currently desire union representation (VFU=0) is

(11) $\Pr(U=0,\ VFU=0)\ =\ \Pr(M_0>0,\ H_0>0,\ M_c<0)\ +\ \Pr(M_0<0,\ M_c<0)$

$$=\ \Pr(\ u_1>-X_0G_1,\ u_2>-X_0G_2,\ u_3<-X_cG_1)$$

$$+\ \Pr(u_1<-X_0G_1,\ u_3<-X_cG_1)$$

where the first term represents the joint probability that the worker desired a union job at the time he started his current job but was not hired by a union employer and that he currently does not desire a union job. The second term represents the joint probability that the

individual did not desire a union job at the time he started his current job and still does not desire a union job.

Given the data from the QES on union status for all workers and on VFU for nonunion workers, the probabilities defined in equations (8), (10), and (11) can be used to define an appropriate likelihood function over the sample which accounts for all of the observed data. It can be thought of as a censored data model where the information on VFU is censored on the basis of union status which is an obviously related variable. The likelihood function derived here represents the standard approach to a problem of this sort in that the censoring process (union status determination) is specified jointly with the censored process (current worker preferences). Much efficiency is gained through this approach due to the fact that the parameters of the worker preference function (G_1) are common to both the union status determination model (U) and the current preference determination model (VFU). At the same time quite a bit of flexibility in preferences over time is built in due to the fact that the variables in X can change over time (e.g., age and seniority) and the fact that the unobservables that affect worker preferences at different points in time (u_1 and u_3) are different though correlation is allowed for.

In the next section the QES data are described before turning to the estimation, in section VII, of the two single equation probit models on worker preferences and employer hiring criteria. In section VIII the trivariate model is estimated. The two specifications yield similar results, and as a result the analysis of the results focuses on the estimates of the trivariate model due to its greater efficiency

and relative lack of restrictive underlying assumptions.

VI. The Quality of Employment Survey Data

The data used to implement the queuing model are from the 1977 cross-section of the Quality of Employment Survey (QES) developed by the Survey Research Center of the University of MIchigan. The QES contains data for approximately 1500 randomly selected workers (both union and nonunion) on their personal characteristics and job attributes.[18] The particular sample for use in this study was derived from the QES by selecting those workers for whom the survey contained valid information on the variables listed in table 8. As discussed above in relation to the analysis of the CPS data, self-employed workers; managers; sales workers; and construction workers were deleted from the sample due to the fact that the union status of these workers is determined by a different process than that outlined in the previous section. The remaining sample contains 915 workers. Table 8 contains descriptions of the variables used in the study as well as their means and standard deviations for the entire sample and the union and nonunion subsamples. The base group for the dichotomous variables consists of white nonsouthern unmarried male blue collar workers with twelve years of education who do not live a RTW state. On average, the 37 percent of the sample who are unionized are slightly older and are more likely to be male, married, nonwhite, nonsouthern, and in a blue collar occupation. In contrast to the membership criterion used with the CPS data, unionization is defined here as working on a job that is covered by a collective bargaining agreement. The means for the QES subsample contained in table 8 are comparable to the means for the much larger sample from the May 1977

Table 8. Means (Standard Deviations) of Data
Quality of Employment Survey, 1977

Variable	Description (Dichotomous variables =0 otherwise)	Combined Sample	Union Sample	Nonunion Sample
U	=1 if works on union job	.368	1.0	0.0
VFU	=1 if desires union represent.	---	---	.370
RTW	=1 if worker in RTW state	.336	.228	.398
South	=1 if worker resides in south	.353	.237	.420
NW	=1 if nonwhite	.137	.160	.123
Fe	=1 if female	.419	.329	.471
Marr	=1 if married	.640	.709	.600
Marr*Fe	=1 if married female	.198	.181	.208
Blue	=1 if occupation is blue collar	.415	.564	.317
Cler	=1 if occupation is clerical	.205	.116	.258
Serv	=1 if occupation is service	.156	.119	.178
Prof&Tech	=1 if occupation is professional or technical	.234	.211	.247
Ed<12	=1 if <12 years education	.223	.258	.202
Ed=12	=1 if =12 years education	.364	.374	.358
12<Ed<16	=1 if >12 & <16 years education	.212	.166	.239
Ed$\geq$16	=1 if $\geq$16 years education	.201	.202	.201
Age_c	age in years	36.8 (13.1)	38.2 (12.6)	35.9 (13.3)
Sen_c	firm seniority in years	6.90 (7.49)	9.48 (8.18)	5.40 (6.60)
Age_o	$Age_c - Sen_c$	29.9 (10.8)	28.7 (9.28)	30.5 (11.5)
Sample size		915	337	578

CPS contained in table 4.

The crucial bits of information for this study are data on the union status of the jobs held by the individuals and the response to the question, asked only of nonunion workers, "If an election were held with secret ballots, would you vote for or against having a union or employee association represent you?". This latter variable is the VFU measure referred to in the previous section, and it is the piece of information which is unique to this data set. It is interpreted here as the current preference of a worker for union representation on his current job. Thus, it holds all job characteristics fixed, including seniority, except those which the worker expects the union to affect. Fully 37 percent of the nonunion sample responded to this question in the affirmative so that there is substantial variation in the response.

VII. <u>Single Equation Estimation of the Queuing Model of Union Status</u>

The single equation probit version of the worker demand for union representation model was implemented by creating a dichotomous variable called DES, where DES=1 if the individual either was a union worker or was a nonunion worker who answered the VFU question affirmatively. The variable DES=0 otherwise. The probit relationship was derived from equation (6) under the assumptions that DES=1 if and only if M>0 and that u_1 has a standard normal distribution. The two variables that can change over time, age and seniority, are measured at the current time for nonunion workers and at the start of the job for union workers. This is consistent with the discussion of timing in the previous section. Note that by this definition the seniority

variable refers to nonunion seniority and that all union workers have zero nonunion seniority.[19]

The estimates of the probit model of worker preferences for union representation are contained in the first column of table 9. Because the focus of this study is on the relationships between union status, region and right-to-work laws and because the results from a similar specification have been discussed elsewhere (Farber; 1982, 1983), the discussion of the results will be confined to the South and RTW variables. The estimates suggest that workers in RTW states perceive a significantly lower probability of desiring union representation while, after controlling for the presence of RTW laws, workers in the south do not differ significantly from other workers in their preference for union representation.[20]

The results contained in the second column of table 9 pertain to a model which is identical to the first except that the RTW variable is omitted. These estimates are identical to those contained in the first column with the exception that it now appears that southern workers perceive a significantly smaller advantage than nonsouthern workers from union representation. This interpretation is clearly a result of bias due to the excluded RTW variable. It can be concluded that there are substantive differences in the demand for union representation within the south that are either caused by or are indicated by RTW laws.

With regard to the empirical tests of the effects of RTW laws, these results suggest that the demand for union representation is lower in RTW states. This is consistent with both the "tastes" and the "strike enforcability" hypotheses. It is not consistent with the

Table 9. Estimates of Single Equation Probits
Quality of Employment Survey, 1977

Variable	Pr(DES=1)	Pr(DES=1)	Pr(HIRE=1)	Pr(HIRE=1)	Pr(U=1)
Constant	1.07 (.170)	1.03 (.168)	.999 (.230)	.921 (.223)	.401 (.182)
NW	.839 (.151)	.840 (.150)	-.0749 (.154)	-.105 (.154)	.317 (.135)
Fe	.178 (.158)	.179 (.157)	-.212 (.197)	-.233 (.196)	-.257 (.160)
Marr	.190 (.144)	.204 (.143)	.322 (.173)	.292 (.171)	.266 (.136)
Marr*Fe	-.276 (.199)	-.328 (.197)	.0570 (.249)	.139 (.246)	-.128 (.199)
Ed<12	.0368 (.136)	.0442 (.135)	.0667 (.165)	.0699 (.164)	.0854 (.126)
12<Ed<16	-.170 (.121)	-.187 (.122)	-.142 (.163)	-.0968 (.163)	-.139 (.125)
Ed≥16	.0901 (.161)	.0988 (.161)	.0427 (.226)	.0484 (.223)	.141 (.171)
Age	-.0126 (.00426)	-.0129 (.00427)	-.0110 (.00584)	-.0103 (.00584)	-.0140 (.0047)
Sen	-.0846 (.00888)	-.0838 (.00880)	---	---	---
Cler	-.455 (.140)	-.437 (.139)	-.614 (.187)	-.643 (.183)	-.708 (.141)
Serv	-.166 (.146)	-.158 (.146)	-.610 (.175)	-.628 (.174)	-.524 (.138)
Prof&Tech	-.331 (.150)	-.320 (.151)	-.383 (.223)	-.352 (.221)	-.524 (.168)
South	-.0140 (.121)	-.232 (.0960)	-.477 (.155)	---	-.368 (.118)
RTW	-.357 (.121)	---	-.171 (.163)	-.475 (.128)	-.297 (.122)
log L	-503.0	-507.3	-327.3	-332.0	-543.3
Sample Size	915	915	551	551	915

Note: The numbers in parentheses are asymptotic standard errors.

"free rider" hypothesis. However, given the potential econometric and substantive problems with the simple probit analysis, a more detailed discussion will await the estimates from the trivariate model.

The single equation probit model of the union employer hiring function was implemented by creating a dichotomous variable called HIRE defined over the sample of workers for whom DES=1. This sample consists of the 551 workers who were either working on a union job or were nonunion but answered the VFU question affirmatively. The variable is defined so that HIRE=1 if the individual was a union worker (hired by a union employer) and HIRE=0 (not hired by a union employer despite a preference for union representation) otherwise. The probit relationship was derived from equation (7) under the assumptions that HIRE=1 if and only if -H>0 and that $-u_2$ has a standard normal distribution.[21] All of the variables in this model reflect conditions at the time of starting the current job so that implicit in this specification is that the current response to the VFU question is a valid indicator of preference for union representation at the start of the current job. By this definition seniority does not enter the model. The estimation using this sample is conditional in the sense that the sample is selected conditional on workers desiring union representation so that the computed probability is the probability that a worker is hired by a union employer <u>conditional</u> on desiring a union job.

The third column of table 9 contains estimates of the probit model of the probability of being hired by a union employer conditional on desiring a union job. The estimates suggest that workers in RTW states who desire a union job have a probability of

desiring union representation that is not significantly different at conventional levels from that in non-RTW states after controlling for individual characteristics and region. On the other hand, southern workers who desire union representation do have a significantly lower probability of being hired by a union employer. What this implies is that the supply of union jobs is more constrained relative to demand in the south than outside that region even after controlling for the presence of RTW laws which themselves show no correlation with the relative supply of union jobs.

The estimates in the fourth column of table 9 refer to a model which is identical to that contained in the third column with the exception that the South variable is excluded. In this specification the probability that a worker who desires a union job is hired by a union employer is estimated to be significantly lower in RTW states. This is strictly a result of the bias induced by the fact that the omitted South variable is correlated with the RTW variable. It can be concluded that there is a significant difference in the ability of workers to attain union employment in the south which is not attributable to the prevalence of RTW laws in the south.

With regard to the empirical tests of RTW laws, these results suggest that the relative supply of union jobs is no more constrained in RTW states than elsewhere. This is not consistent with the "free rider" hypothesis, but it is consistent with both the "tastes" hypothesis and the "strike enforcability" hypothesis. Once again, given the potential econometric problems and the strong assumptions required to implement the simple probit model, a more detailed discussion is postponed until after the presentation of the results

for the trivariate model.

A final note with regard to the single equation formulations concerns the estimates of simple probit model of union status, estimated over the entire sample from the QES and contained in the last column of table 9. These estimates are comparable to those derived for the CPS and contained in table 5. They illustrate the overall relationhip of region and RTW laws with the probability that a worker is unionized. The results are very similar to those dervied above using the CPS, with the exception of the negative coefficient on Age. The estimates suggest that the probability that a worker is unionized is significantly negatively related to both southern residence and residence in a RTW state. Overall, the demand and supply models estimated in this section imply that the inverse correlation between unionization and southern residence is due to relative supply constraints while the inverse correlation between unionization and RTW laws is due to lower demand in RTW states.

VIII. Simultaneous Estimation of the Queuing Model

Using the data from the QES described in section VI; the likelihood function derived from the probability statements in equations (8), (10), and (11); and the assumption that the disturbances have a standard trivariate normal distribution, the maximum likelkihood estimates of the parameters of the model can be derived in a relatively straightforward fashion. The parameters of the model consist of the elements of the two vectors, G_1 and G_2, and the three correlations (p_{ij}) between u_1, u_2, and u_3. The likelihood function and its derivatives consist of univariate, bivariate, and trivariate normal cumulative distribution functions which, while they

cannot be evaluated in closed form, can be approximated numerically to the required accuracy.

Some difficulty in convergence to a local maximum was encountered for some, though not all, specifications of the model. The difficulty seemed to be related to the fact that the likelihood function is exteremely flat in the dimensions defined by two of the elements of the correlation matrix of the errors, p_{12} and p_{23}. This flatness was noted and discussed by Farber (1983). The result was that for some specifications of the model the three by three correlation matrix tended toward singularity which suggests that for these specifications all of the parameters of the model are not identified. In order to ensure identification for all specifications and to allow comparability of estimates across the different specifications, a constrained version of the model was estimated where $p_{12} = p_{23}$. These are the results that are presented here regardless of whether or not the particular specification had convergence problems in the unconstrained version. It must be pointed out that the estimates of the constrained version of the model were substantively identical to the estimates of the unconstrained version and that the maximized log-likelihood value was in no case more than .2 lower for the constrained version. Of course, the standard statistical tests do not apply here due to the fact that the estimates of the unconstrained model are on the boundary of the parameter space. However, it does sugest informally that the constraint does not alter the substantive conclusions that can be drawn from the model.

The correlation constraint that was imposed has an interesting and reasonable substantive interpretation. Essentially, the

constraint is that the correlation between the error in the worker preference equation and the error in the employer hiring equation is time invariant. This suggests that the underlying stochastic structure can be written as an error components model with fixed effects. More formally, let

$$u_1 = f_1 + w_1$$

$$(12) \quad u_2 = f_2 + w_2, \text{ and}$$

$$u_3 = f_1 + w_3$$

where f_1 represents a time invariant unobserved factor affecting worker preferences for union representation and f_2 represents a time invariant unobserved factor affecting the employer hiring equation.[22] The components w_j represent random factors that are uncorrelated both with each other and with the f_i. This correlation structure is relatively flexible in that it allows for all of the u_j to be correlated without assuming perfect correlation or identity of any pair of errors. A potential weakness of this specification is that it does not allow for within period correlation that does not persist over time between the unobservables affecting worker preferences and the union employer hiring function.

The maximum likelihood estimates of the model are contained in the first two columns of table 10. The estimates in the first column, for G_1, refer to the worker preference for union representation function and the estimates can be interpreted directly as the effect of the relevant variable on worker preferences. With regard to the estimates of the parameters of the union employer hiring function (G_2), note that the underlying model of the union employer hiring equation (equation 7) is specified so that larger values of XG_2 imply

Table 10. Estimates of Trivariate Union Status Model
Quality of Employment Survey, 1977

Variable	G_1	$-G_2$	G_1	$-G_2$
Constant	.681 (.351)	1.12 (1.18)	.595 (.327)	1.24 (1.18)
NW	.788 (.175)	-.0805 (.755)	.784 (.176)	-.166 (.758)
Fe	.241 (.162)	-.255 (.380)	.250 (.161)	-.309 (.380)
Marr	.0968 (.143)	.304 (.223)	.109 (.140)	.310 (.243)
Marr*Fe	-.212 (.199)	.0836 (.365)	-.261 (.196)	.0750 (.402)
Ed<12	.0470 (.133)	.126 (.210)	.0489 (.130)	.139 (.226)
12<Ed<16	-.124 (.122)	-.121 (.218)	-.133 (.122)	-.137 (.235)
Ed$\geq$16	.172 (.164)	.0859 (.292)	.184 (.162)	.0614 (.319)
Age	-.0115 (.00459)	-.0129 (.0102)	-.0115 (.00451)	-.0126 (.0117)
Sen	-.0216 (.0177)	---	-.0213 (.0166)	---
Cler	-.450 (.161)	-.744 (.339)	-.428 (.151)	-.700 (.403)
Serv	-.147 (.161)	-.731 (.268)	-.132 (.155)	-.735 (.271)
Prof&Tech	-.426 (.163)	-.508 (.381)	-.415 (.159)	-.452 (.435)
South	-.0365 (.134)	-.560 (.250)	-.216 (.112)	-.692 (.234)
RTW	-.308 (.129)	-.211 (.306)	---	---
$-p_{12}=-p_{23}$	.162 (1.60)		.0254 (1.61)	
p_{13}	.809 (.326)		.776 (.305)	
log L	-892.8		-897.3	

Note: The numbers in parentheses are asymptotic standard errors. n=915

that the worker has a lower probability of being hired by a union employer. In order to make the interpretation of the parameters more natural, the estimates of G_2 are presented in the second column of table 10 with their signs reversed. In this way the estimates can be interpreted directly as the effect of the relevant variable on the ability to be hired by a union employer. In other words, a positive coefficient suggests that a worker with a larger value for the associated variable will be more likely to be hired by a union employer.

Once again the discussion will focus on the region and RTW variables. The estimates of the other parameters are virtually identical to those obtained by Farber (1983), and they are discussed in more detail there.

With regard to the region and RTW variables the results are substantively identical those obtained using the single equation probits in the previous section. Southern workers have preferences for union representation that are not significantly different from those of nonsouthern workers after controlling for the presence of RTW laws. At the same time worker preference for union representation is significantly lower in RTW states. On the supply side, the probability that a worker will be hired by a union employer is significantly lower in the south and it is not significantly affected by the RTW status of the state of residence.[23]

The estimates in the third and fourth columns of table 10 refer to a model which is identical to the first model with the exception that the RTW variable is omitted from both the worker preference and the employer hiring criterion relationships. The results are very

similar to those contained in the first two columns with the exception
that workers in the south appear to have a significantly lower
preference for union representation. This is due to the omitted RTW
variable which is correlated with the South variable. Using a
likelihood ratio test, the hypothesis that both RTW coefficients are
zero can be rejected at conventional levels of significance.[24]

IX. Implications for Right-to-Work Laws, Region, and Unionization

In order to examine examine the relationships of region and RTW
laws with the demand for and supply of unionization in more detail a
number of important quantities that can be derived from the model
estimated in the previous section must be defined. These include the
probability of a worker desiring union representation,

$$(13) \quad Pr(DES=1) = Pr(u_1 > -XG_1);$$

the probability that a worker will be hired by a union employer,

$$(14) \quad Pr(HIRE=1) = Pr(u_2 < -XG_2);$$

and the probability that a worker is unionized,

$$(15) \quad Pr(U=1) = Pr(DES=1, HIRE=1)$$
$$= Pr(u_1 > -XG_1, u_2 < -XG_2).$$

A final quantity, used to measure the supply of union jobs relative to
demand, is the probability of being hired by a union employer
conditional on desiring a union job. This is

$$(16) \quad Pr(HIRE=1|DES=1) = Pr(U=1)/Pr(DES=1).$$

Table 11 contains predicted probabilities, defined in equations
(13); (15); and (16), along with their approximate asymptotic
standard errors for the "standard" worker as they vary by region and
RTW status.[25] These probabilities are computed from the estimates

Table 11:
Predicted Probabilities and Differences in Probabilities: Demand, Supply, and Union Status by RTW status and Region.

Predicted Probabilities

	Pr(DES=1)	Pr(HIRE=1|DES=1)	Pr(U=1)
Nonsouth nonRTW	.632	.798	.504
	(.112)	(.135)	(.0538)
South nonRTW	.618	.608	.376
	(.109)	(.150)	(.0721)
Nonsouth RTW	.512	.743	.380
	(.113)	(.156)	(.0623)
South RTW	.500	.537	.267
	(.0963)	(.138)	(.0556)

Differences in Predicted Probabilities

	Pr(DES=1)	Pr(HIRE=1|DES=1)	Pr(U=1)
Nonsouth nonRTW -South nonRTW	.0138	.1902	.128
	(.0506)	(.0746)	(.0516)
Nonsouth nonRTW -Nonsouth RTW	.1205	.0550	.124
	(.0499)	(.0648)	(.0420)
Nonsouth nonRTW -South RTW	.135	.262	.238
	(.0503)	(.0681)	(.0409)
South nonRTW -Nonsouth RTW	.107	-.135	-.0043
	(.0881)	(.126)	(.0807)
South nonRTW -South RTW	.121	.0713	.109
	(.049)	(.0778)	(.0469)
Nonsouth RTW -South RTW	.0146	.207	.113
	(.0533)	(.0721)	(.0438)

Note: The   numbers in parentheses are approximate asymptotic standard errors derived from a first-order expansion of the relevant function, defined in equations 13-16, around the estimated parameter values contained in the first and second columns of table 10.   All   workers are 30 year old white single males with 12 years education and no seniority who are working in blue collar occupations.

contained in the first two columns of table 10. Also presented are the differences in the probabilities by region and RTW status along with the standard errors of the differences. These number allow the formulation of more precise and valid conclusions regarding the relationships between RTW laws, region, and the extent of unionization.

The demand for union representation is summarized by the probability that a worker desires union representation (Pr(DES=1)). This is significantly higher in non-RTW states than in states with the law. For the standard worker the difference in Pr(DES=1) associated with RTW laws is approximately twelve precentage points. This is approximately 20 percent of the level of this probability in non-RTW states. Thus, it is concluded that RTW laws are associated with a significantly and substantially lower demand for union representation.[26] No significant difference is found by region in worker demand for union representation.

Movements in the supply of union jobs relative to demand are summarized by movements in the probability that a worker is hired by a union employer conditional on desiring union representation (Pr(HIRE=1|DES=1)). No significant difference is found in this quantity between RTW states and non-RTW states. Thus, it is concluded that there is no significant association between RTW laws and the relative supply of union jobs.[27] However, the results indicate that workers in the south, regardless of the presence or absence of RTW laws, face a significantly more constrained relative supply of union jobs than do workers in the nonsouth. For the standard worker the difference in Pr(HIRE=1|DES=1) associated with region is approximately

twenty percentage points. This is approximately 25 percent of the value of this probability in nonsouthern states. Thus, the regional differences in relative supply are both significant and substantial even after controlling for the existence of RTW laws.

The relationships of region and RTW status with the ultimate outcome, the probability of being unionized (Pr(U=1)), are consistent with those found using the single equation probit model on both the QES sample and the CPS sample. Essentially, both southern residence and residence in a state with a RTW law are associated with a significantly and substantially lower probability of union representation.

What do these results suggest for the proposed empirical test of the role of RTW laws? The pattern is quite clear, and it is supported by the estimates derived using a variety of econometric specifications and data sets. Right-to-Work laws are associated with a substantially lower demand for union representation and a somewhat larger (approximately 3 percent) observed union-nonunion wage differential. At the same time the supply of union jobs relative to demand is no more constrained in RTW states than in non-RTW states.

This pattern of results is not consistent with the pure "free rider" hypothesis which would yield no difference in demand, a more constrained relative supply in RTW states, and a larger observed union-nonunion wage differential in RTW states. Only the latter is found.

The observed pattern of results is perfectly consistent with the "tastes" hypothesis which suggests that RTW laws have no independent effect but only mirror preferences of workers for nonunion employment.

This would account for the lower demand for union representation in RTW states as well as the lack of correlation with relative supply and the larger observed union-nonunion wage differential.

The final hypothesis concerns the "strike enforcability" explanation. This hypothesis implies both the negative correlation of RTW laws with the demand for union representation and the lack of correlation of RTW laws with the relative supply of union jobs. On the other hand, no systematic correlation of RTW laws with the observed union-nonunion wage differential is predicted by this hypothesis. The fact that a significant positive correlation was found would seem to rule out the "strike enforcability" hypothesis. However, the observed union-nonunion wage differential was found to be only slightly (3 percent), albeit significantly, larger in RTW states. This may well have some other explanation which would make the remaining evidence consistent with the hypothesis.[28] On this basis the "strike enforcability" hypothesis can only be tentatively ruled out.

Given the difficulty in drawing inferences regarding the real effects of any legislation (and RTW laws in particular) and the real possibility that some combination of the hypotheses considered here are at work, precise conclusions must be drawn extremely carefully. Nonetheless, the results found in this study are perfectly compatible with the hypothesis that the observed inverse correlation between RTW laws and the extent of unionization is due to workers in RTW states having a preference for nonunion jobs rather than to a direct effect of RTW laws. The results in their entirety are not compatible with either of the competing hypotheses, both of which imply that RTW laws

have a real effect on the extent of unionization.   In other words the results found in· this study, based on a careful examination of variations in the demand for union representation; the relative supply of union jobs; and the observed union-nonunion wage differential, suggest that there is no causal link between RTW laws and the extent of unionization.

This conclusion, when combined with the results found in this study regarding the correlation between region and the extent of unionization, sheds some (though not enough) light on the dilemma of the relative lack of unionization in the south.   The conclusion that RTW laws have no real effect suggests that these laws cannot be blamed for the low extent of unionization in the south.   At the same time it suggests that, since RTW laws are relatively common in the south, there is somewhat less demand for union representation in many states in that region.   However, this cannot be the entire explanation because the extent of unionization is significantly lower in the south even after controlling for the presence of RTW laws.[29] An additional factor seems to be a supply of union jobs which is significantly more constrained relative to demand in the south than outside that region. The implication is that there exist a set of factors in the south which make union organization more difficult and expensive than elsewhere (e.g., greater employer resistance) independent of the existence of RTW laws.   The mystery of the relative lack of unionization in the south remains to be solved, but the results derived in this study provide some important clues.

Notes

1) Louisiana passed a RTW law which became effective in 1977. The data used for the empirical analysis in this study refers to 1977. Given that there is likely to be a lag between the enactment of the law and any effects on the extent of unionization, for the purpose of this analysis Louisiana is considered not to have a RTW law. Indiana passed a RTW law in 1957 which was repealed in 1965.

2) Jones (1982) and Katz (1983) present evidence suggesting that the duty of fair representation required by law is not completely effective in practice. They find that union members who are covered by a collective bargaining agreement receive a higher wage than otherwise equivalent nonmembers who are covered by a collective bargaining agreement. Katz also analyzes the decisions of workers regarding whether to work on a nonunion job, work on a union job but not become a union member, or work on a union job and become a member.

3) Katz (1983) presents evidence from the May 1979 CPS that 13.3 percent of workers in right-to-work states who were covered by a collective bargaining agreement were not members of a labor union. In contrast to this only 7.5 percent of workers in non-RTW states who were covered by a collective bargaining agreement were not members of a labor union. This suggests that the magnitude of the free rider problem is more severe in RTW states. Note that even in non-RTW states there is a free rider problem if a union is unable to negotiate an appropriate union security clause with the employer.

4) Of course unions can influence the employment relationship in a large number of dimensions. For example, unions may affect wages, fringe benefits, turnover, mechanisms for handling disputes between workers and employers, hours, safety, promotions, and job security. Nevertheless, wages are a very important component of the compensation package, they have been the focus of much research, and they can be measured in a relatively straightforward fashion. See Freeman and Medoff (1979b, 1981) for recent summaries of the differences between union and nonunion jobs in a number of dimensions.

5) See note 4.

6) In some cases a struck employer will shut down his entire operation even if some of workers are willing to continue working. However, in other cases a struck employer does his best to continue operations and is quite happy to utilize any workers who are willing to continue working.

7) These same social sanctions may operate in a weaker fashion in enforcing universal membership in the union in covered establishments. To the extent that this is true, the general free rider problem caused by RTW laws will not be important. However, the evidence presented in note 3, regarding the relatively high proportion of nonmembers in covered employment in RTW states, suggests that at best these social sanctions mitigate the free rider problem without eliminating it.

8) Given the large literature on "correcting" the union-nonunion wage differential estimated using ordinary least squares for selectivity bias, it is interesting to note that the empirical tests proposed here require <u>uncorrected</u> estimates of the differential. It is recognized that the workers who are unionized in RTW states are in part self-selected on the basis of relative earnings, but the results of this self-selection process are exactly what the tests are based on. The difference in approach is due to the difference in goals between the pure wage studies and this study. While this study attempts to analyze the effects of RTW laws, the wage studies generally have as their goal the measurement of the <u>effect</u> of unions on wages of particular workers as distinct from the union-nonunion wage differential. See Ashenfelter and Johnson (1972), Lee (1978), Schmidt and Strauss (1976), and Freeman and Medoff (1981) for discussions of selectivity bias correction in the context of estimating the effects of unions on wages.

9) The normalization that the variance of e equals one is required to fix the scale of B, and it is a standard assumption in implementing discrete choice models of the sort proposed here.

10) Models of this sort have been implemented by Lee (1978) and by Schmidt and Strauss (1976).

11) Since the terms and conditions of employment are determined by collective bargaining coverage rather than by union membership, it might be more reasonable to concentrate on that measure here. However, information on coverage is not available in the May 1977 CPS. It is available in the QES and will be used in analyzing those data. See notes 2 and 3 for related points. Freeeman and Medoff (1979a) present an analysis of data from various sources which highlight the distinctions between membership and coverage.

12) See, for example, Bloch and Kuskin (1976); Freeman (1980); and Abowd and Farber (1982).

13) The analysis in this section is adapted from the model developed by Farber (1983).

14) This analysis is not applicable to industries, such as construction, where hiring is controlled by the union through a hiring hall. Workers in such industries have been excluded from the theoretical and empirical analyses throughout.

15) Raisian (1981) investigates the issue of the magnitude of union dues relative to the union-nonunion wage differential.

16) The particular set of institutions described here refer to private sector nonagricultural and nonmanagerial workers in the Unites States who are covered by the National Labor Relations Act (NLRA). Organization of workers not covered by the NLRA proceeds along different, but equally costly and uncertain, lines.

17) It is possible for union jobs to revert to nonunion status through a NLRB-supervised decertification election. However, these are relatively rare and can safely be ignored in this analysis. For example, according to the NLRB (1979), during fiscal 1979 7266 certification elections involving 538,404 workers were officially decided while only 777 decertification elections involving 39,538 workers were officially decided.

18) See Quinn and Staines (1979) for a detailed description of the survey design.

19) The interpretation of the nonunion seniority variable is complicated by the possibility that workers with a lot of nonunion seniority may have that seniority because of an unmeasured predisposition toward nonunion employment rather than nonunion seniority being an independent causal factor in determining worker preferences for union representation.

20) Given the nonlinearity in the normal probability function, references to statistical significance of probability differences on the basis of the standard error of a single coefficient estimate are not strictly correct. All of the claims made here have been verified using a first order approximation to the relevant function computed for a "standard" worker as a basis for computing the correct standard errors for inferences about probability differences. Some of these probabilities with estimated standard errors are presented below in the context of the trivariate model in order to investigate the magnitude of the effects of region and RTW laws.

21) Note that the signs are reversed so that the results can be interpreted naturally as a larger value of $-H$ yields a larger value of $Pr(HIRE=1)$. Thus, the estimated parameters are $-G_2$. This is due to the fact that $Pr(HIRE=1)$ is an inverse function of H as defined in equation (7).

22) Recall that u_1 and u_3 represent unmeasured factors that affect worker preferences for union representation with the former at the time the worker started his current job and the latter at current time.

23) It is important to note that this is not the probability of being hired by a union employer conditional on desiring a union job, but it is the probability of being hired by a union employer for the randomly selected worker. The relevant conditional probability will be computed and discussed below.

24) The relevant test statistic is $-2(-897.3-(-892.8)) = 9.0$. This is distributed as chi-square with two degrees of freedom. The critical value of this distribution at the .025 level is 7.38.

25) The standard worker is a 30 year old white single male with 12 years education who is working in a blue collar occupation and who has no seniority.

26) While the results are not presented here, the model was reestimated including variables for the interaction between South and RTW in both XG_1 and XG_2 in order to account for the possibility that RTW laws may be different in the South than elsewhere. The results were virtually unchanged, and the hypothesis that the two parameters associated with the interaction variables are zero cannot be rejected at any reasonable level of significance. Neither the magnitude nor the statistical significance of the estimated coefficients was affected in any meaningful way by the interaction variables.

27) The results with regard to relative supply are unaffected by the inclusion of variables for the interaction between South and RTW. See note 26.

28) Such an explanation might be that either the "tastes" hypothesis or the "free rider" hypothesis have some amount of validity without being the dominant factor.

29) The evidence cited in note 26 makes it clear that this cannot be the result of RTW laws in the south being associated with more antiunion feeling than is associated with RTW laws generally.

References

Abowd, John M. and Henry S. Farber. "Job Queues and the Union Status of Workers," Industrial and Labor Relations Review 35, no. 3 (April 1982).

Bloch, Farrell E. and Mark S. Kuskin. "Wage Determination in the Union and Nonunion Sectors," Industrial and Labor Relations Review 31, no. 2 (January 1978): 183-92.

Ellwood, David T. and Glen Fine. "Effects of Right-To-Work Laws on Union Organizing," Harvard mimeo (January 1983).

Farber, Henry S. "The Demand for Union Representaion," Working Paper No. 295, Department of Economics, M.I.T. (February 1982).

_____. "The Determination of the Union Status of Workers," Econometrica (1983) forthcoming.

_____ and Daniel H. Saks. "Why Workers Want Unions: The Role of Relative Wages and Job Characteristics," Journal of Political Economy 88, no. 2 (April 1980): 349-69.

Katz, Lawrence. " Union Status and the Union-Nonunion Wage Differential: The Issue of Membership vs. Coverage," M.I.T. mimeo (January 1983).

Freeman, Richard B. "Unionism and the Dispersion of Wages," Industrial and Labor Relations Review 34, no. 1 (October 1980): 3-23.

_____ and James L. Medoff. "New Estimates of Private Sector Unionism in the United States," Industrial and Labor Relations Review 32, No. 2 (January 1979). (a)

_____. " The Two Faces of Unionism," The Public Interest 57 (Fall 1979): 69-93. (b)

_____. "The Impact of Collective Bargaining: Illusion or Reality?" In Stieber, McKersie,and Mills, eds., U.S. Industrial Relations 1950-1980: A Critical Assessment. Madison, Wisc.: Industrial Relations Research Association, 1981.

Jones, Ethel B. "Union/Nonunion Differentials: Membership or Coverage?" Journal of Human Resources 17, No. 2 (1982): 276-285.

Lunsden, Kieth and Craig Peterson. "The Effect of Right-To-Work Laws on Unionization in the United States," Journal of Political Economy 83, No. 6 (December 1975): 1237-48.

National Labor Relations Board. Annual Report, 1979. Washington: Government Printing Office, 1979.

Quinn, Robert P. and Graham L. Staines. The 1977 Quality of Employment Survey: Descriptive Statistics with Comparison Data From the 1969-70 and the 1972-73 Surveys. Ann Arbor, Mich.: Institute for Social Research, 1979.

Raisian, John. "Union Dues and Wage Premiums," U.S. Department of Labor mimeo (August 1981).

Warren, Ronald L. and Robert P. Strauss. "A Mixed Logit Model of the Relationship Between Unionization and Right-To-Work Legislation," Journal of Political Economy 87, No. 3 (June 1979): 648-55.

Wessels, Walter J. "Economic Effects of Right-To-Work Laws," Journal of Labor Research 2, no. 1 (Spring 1981): 55-76.