POLICY RESEARCH WORKING PAPER 2131

Efficiency Wage and Union Effects in Labor Demand and Wage Structure in Mexico

An Application of Quantile Analysis

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In this study of Mexican firms, unions appear to bargain principally about employment rather than wages and firms appear to pay efficiency wages above market clearing to reduce turnover. Since minimum wages are not binding, whatever labor market segmentation is observed arises endogenously, and is not due to union- or government-induced distortions.

The World Bank
Latin America and the Caribbean Region
Poverty Reduction and Economic Management Sector Unit
May 1999

Summary findings

Applying quantile analysis to detailed firm-level data from Mexico, Maloney and Ribeiro study determinants of demand and wages for two classes of labor.

Unions appear to have a strong impact on how much unskilled labor is employed but not on wages. This suggests an extreme example of "efficient bargaining" rather than the more common "monopoly union" behavior. The impact on productivity is, by definition, negative, but unions could also be said to be forcing firms to use "appropriate technology" (less capital and more workers), increasing the total amount of labor employed in the economy. The only impact on wages appears for the tenth (lowest) quantile of unskilled workers, suggesting that unions prevent workers from being paid too far below the median for their skill level.

Maloney and Ribeiro identify significant efficiency wage effects where firms pay above market clearing to prevent labor turnover both in labor demand and in the wage equations. Since minimum wages are not binding and the union impact on wages is small, this suggests that whatever segmentation exists emerges endogenously and is not due to union- or government-induced distortions.

Maloney and Ribeiro offer the first use of quantile analysis to analyze labor demand at the firm level, and one of the first uses of correct standard errors in two-stage least-squares quantile regression.

This paper — a product of the Poverty Reduction and Economic Management Sector Unit, Latin America and the Caribbean Region — is part of a larger effort in the region to understand the functioning of developing country labor markets. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Tania Gomez, room I8-102, telephone 202-473-2127, fax 202-522-2119, Internet address tgomez@worldbank.org. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/html/dec/Publications/Workpapers/home.html. The authors may be contacted at wmaloney@worldbank.org or ribeiro@vortex.ufrgs.br. May 1999. (43 pages)

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* We thank Carlos Arango, Omar Arias, Gustavo Gonzaga, Daniel Hamermesh and Lyn Squire for helpful comments and to Tania Gomez for vital assistance. We are also grateful to the Mexican National Institute of Statistics, Geography and Information (INEGI) for the use of the data. INEGI is in no way responsible of any incorrect manipulation of the data or erroneous conclusions drawn from it. The views expressed here are those of the authors only, and should not be associated with the World Bank and its member countries. Contacts: wmaloney@worldbank.org, ribeiro@vortex.ufrgs.br

I. Introduction.

The evidence to date suggests that both union power and efficiency wage behavior may have large effects on the structure and dynamics of labor markets. The literature documenting their effect on wages, in particular, is vast. However, as Blanchflower et. al. (1991) note, the impact on employment of unions has received relatively little study, and that of efficiency wages has attracted even less. Further, as Nickell and Wadhwani (1991) argue, the existence of both phenomena simultaneously complicates efforts to distinguish between competing models of union behavior.[1] Their work and that of Hendricks and Kahn (1991) are among the very few that analyze employment determination in the presence of efficiency wages and two types of union bargaining: the "right to manage" (RTM) or "monopoly union" type where unions attempt to set the wage but let firms choose the level of employment, and the "efficient bargaining" (EB) type where unions bargain over both (Oswald 1991 and Layard and Nickell 1990). Using a large panel from the UK manufacturing sector, Nickell and Wadhwani find no evidence of union influence on employment and mixed evidence of efficiency wage effects. Hendricks and Kahn find EB effects in their study of the demand for police in the US.

This paper builds on this work in two ways. First, it approaches these issues using quantile analysis that more completely characterize the distributions of wages and labor demanded than can be done using the conditional mean based linear regression approaches (OLS, 2SLS) that are standard. Despite assumptions of identical agents, in fact the samples may show substantial heterogeneity and large differences in the impacts of regressors across

[1] For discussions of the theory of efficiency wages see Stiglitz (1974), Krueger and Summers (1988), Phelps (1994) and Weiss (1990). For a review of the literature on union impacts, see Lewis (1986).

quantiles. For example, union power might be expected to impinge more strongly among those who receive a relatively high wage given their human capital. But, alternatively, unions may put a floor under the wage such that workers whose productivity is very low given their nominal human capital and leave the rest of the wage distribution market determined. Efficiency wage effects would probably also be expected to be most prevalent among those paid "above the market" given their human capital. The results show the power of this technique to uncover differences that would ordinarily go undetected. The paper offers the first use of quantile analysis in firm level analysis of labor demand and the first use of correct standard errors in two stage least square quantiles.

Second, it analyses Mexico, a country with unique institutional, economic and political characteristics that make it an important case study to add to the literature for two reasons. First, we may observe union behavior that, although theoretically plausible is contrary to that commonly found. The manufacturing sector studied here is heavily unionized: 18% of firms have no union representation, and the rest have a median unionization rate of 70%. However, the massive Labor Congress (CT) which embraces the Confederation of Mexican Workers (CTM), the Revolutionary Federation of Workers and Peasants (CROC), the Federation of Government Workers (FSTSE) and roughly 38 other labor organizations has had a longstanding and close relationship with the governing Revolutionary Institutional Party (PRI). Particularly since 1987 with the inception of the *Pacto Social*- a joint agreement of labor, business and the government to promote price stability- unions have closely coordinated wage demands with national stabilization objectives. This has made possible extreme downward flexibility of wages during recent

crises and may have curtailed union power along this dimension.[2] In addition, it can be argued that in the absence of unemployment insurance, employment enters more heavily in union objective functions than in the industrialized countries. The particular constraints and elements of union utility may give rise to EB outcomes with implications for the structure of wages, and the overall level of employment distinct from those generally anticipated. It also may permit a test of the assertion (see Nickell and Wadhwani, Layard and Nickell among others) that the wage-employment relation may slope upward.

Second, the Mexican labor market is well suited to testing for efficiency wage effects. Though a longstanding literature explains dualistic LDC labor markets by government or union interference in the wage setting process,[3] Mexico's minimum wage was not binding in the period we study (Bell 1997), and if unions focus primarily on employment, then the wage structure and whatever dualism is observed may be emerging endogenously through efficiency wage effects. The existence of a large non-unionized sector permits isolating such effects whose manifestations can sometimes be indistinguishable from the outcomes of union bargaining. Further, since the Mexican Constitution prohibits firing of workers except in extreme circumstances we are arguably testing for one particular variety of efficiency effect arising from the prevention of turnover (Stiglitz 1974).

The data set we work with is exceptionally rich. It permits conditioning on numerous dimensions of firm heterogeneity as well as offering some that may conceivably be associated with efficiency wage effects. It provides evidence on the dynamics of unionized firms and

[2] Though in November of 1997, the New Union of Workers (UNT, .7-1.5 million workers) split from the CTM largely over what was perceived to be excessive responsiveness to government initiatives, across the period analyzed here some analysts have seen a decline in union influence both within the PRI and overall. This discussion partly based on Collier and Collier (1991) and Brooks and Cason (1998).

their behavior in the use of three inputs: unskilled and skilled labor and, to a lesser degree, capital. Disaggregating labor promises an improvement over the vast majority of efficiency bargain papers as we may avoid a composition bias in the demand for labor due, for example, to the substitutability of types of workers. Further, we can go beyond the standard (static) labor demand literature with worker types (e.g. Hamermesh, 1993 and references therein)[4] that has not allowed for the possibility of employment decisions occurring along a contract curve as in the EB solutions instead of the standard labor demand curve.

The paper is organized as follows. The following section presents the theoretical background and the testable implications. The third section discusses quantile analysis. The fourth presents the data set used in the paper and the fifth the empirical results. The last section concludes with a summary of results.

IIa. Analytics: (Overview)

Efficiency Wages:

The extensive literature on efficiency wages provides a rationale for firms to *voluntarily* pay wages above the market clearing level. One common variant of these models arises from the difficulty of monitoring individual workers and the lack of any penalty from being caught "shirking" - any activity, or lack thereof, that might be detrimental to the firm. If wages are market clearing, a worker fired for shirking can simply get another job at the same wage. However, if all firms pay higher than market clearing wages, unemployment will be

[3] See, for example, Harris and Todaro(1970) See Esfahani and Salehi Isfahani (1989) as an example of modeling LDC dualism in an efficiency wage context.
[4] Hamermesh also points out the clear advantages of using microdata and the dearth of such studies.

created in the economy that creates a disincentive to being laid off and hence to shirking. [5]

Since, in many Latin American countries, workers can be fired only with difficulty, the "turnover" variant of efficiency wage models is probably more appropriate: firms must invest resources in workers when they are hired, perhaps through training or through the process of recruitment, that will be lost if the worker leaves. Hence, it is worthwhile for firms to pay higher wages and raise the opportunity cost of leaving.

Interviews with Mexican entrepreneurs in the survey used here support this view. Roughly 30% stated that the resignation of recently trained workers was a problem. This is almost certainly an understatement for two reasons. First, "recently" may not capture the relevant period of return on the investment in the worker. Second, if the firm is already paying the optimal efficiency wage to prevent workers from leaving, it will not report excessive turnover as a problem. Of those reporting frequent resignations after training, 58% do something to raise the total well-being of the worker after training, 28% raise remuneration without promoting the worker, and 40% take measures that increases the wage of the worker, including promotions (see Appendix I).

The efficiency wage argument is particularly compelling in LDCs where firms may absorb a larger share of education costs due to poorly functioning education systems. Thus, firms will be very concerned about preventing workers they train from moving to another firm. In addition, in countries where self-employment (formal or informal) are considered desirable destinations, it is possible that workers enter formal salaried work to accumulate

[5] As Marquez and Ros (1990) noted, and has been confirmed by later studies, wages of similar workers rise with firm size, much as they do in industrialized countries. Further, Marquez (1990), Abuhadba and Romaguera (1993) and Schaffner (1998) find efficiency wage effects in the patterns of wage differentials that are strong and highly correlated among Chile, Venezuela, and Brazil and the U.S.. This suggests that the conditional wage dispersion (wages adjusted for human capital) and rigidities may be emerging endogenously and are not due to

skills and financial capital, and then quit to open their own business.

Both theories imply that the offers workers can get outside the firm (the outside wage), as well as the probability of being able to get a job at that wage (the hiring rate) should be important to determining the wage that is set in the firm, as well as to the quantity of labor hired.

Union Bargaining.[6]

The most common view postulates that unions maximize utility, which may be a function of both the wage received by union members and the level of employment, subject to a constraint representing combinations of the two that firms are willing to pay, the labor demand curve. In the "Right to Manage" view unions would identify the level of the wage that maximizes their utility, and firms simply set the level of employment.

However, if the firm is a monopolist or oligopolist and earns excess profits, then both unions and firms may be better off by coming to a bargain that pushes them off the labor demand curve. Figure 1 traces out a series of iso-profit curves- combinations of the wage and level of employment such that the firm earns the same level of profits. A lower curve implies a higher rate of profits. The apex of each curve is necessarily cut by the labor demand curve: the firm maximizes profits subject to any given wage, that is, it chooses the level of employment that puts it on the highest iso-profit curve possible. Point P represents one such point. As the wage rises or falls, the firm's optimal level of hiring traces out the labor demand curve, the locus of all apexes of iso-profit curves. Employment either below or above the profit maximizing level (100 at W_o) necessarily implies that the firm earns fewer profits and is

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either government or union intervention.

[6] Graphs taken from and discussion based on Borjas (1996).

thus on a higher iso-profit curve. Therefore the iso-profit curves must slope downward on either side of the intersection with the labor demand curve.

As point M in figure 2 shows, a better deal for both workers and firms can be negotiated than that at "Right to Manage" equilibrium at point M. Here, the union's utility curve is tangent to the demand curve, but not to the iso-profit curve of the firms. Thus, the willingness of workers and firms to trade off employment for wages is not equal, and the equilibrium is not efficient. Two alternate and more efficient bargains where the two curves are tangent can easily be seen, both of them off the labor demand curve. First, at point R, Unions reach a higher level of utility, U_R compared to U_M while firms are earning the same level of profits. Alternately, at Q, unions are no worse off while firm profits are higher. Which bargain, R, Q or perhaps Q', where both are better off, are "efficient bargains" and lie on the contract curve. The contract curve is the set of efficient bargains ranging along the line PZ from P, where workers have no bargaining power and take the market wage W* and the firm takes all profits, π^*, to Z where π_Z represents the level of profits below which the firm would go out of business, and the union captures all of the monopoly rents. This iso-profit curve also suggests that the maximum wage workers could ever gain would be W_z and then only if it cares very little about employment.

These bargains along PZ, however, are clearly not efficient from a production point of view: at any bargain except P, more workers are being hired than the firm would hire in the absence of a union, E*. This "featherbedding" is a way of transferring firm profits to workers through the creation of unnecessary positions, rather than wages. The final equilibrium clearly depends then on the goals of the union as captured in the shape of its utility function, that jointly with the firm's iso-profit functions determines the contract curve, and the union's

relative bargaining strength, which determines the position of the final bargain along the contract curve.

Both union objectives and bargaining power in Mexico may be different from those in industrialized countries for a variety of reasons. First, like much of Latin America during the 1980's and early 90's, job growth has been slow relative to population growth. Second, as is the case with most of its neighbors, Mexico has no system of unemployment insurance and employment stability may be more highly valued than wages. Third, since the post-revolution inception of the Institutionalized Revolutionary Party (PRI) in 1929, the major unions have had a longstanding and close relationship with the government. Particularly since 1987 with the inception of the *Pacto*- a joint agreement of labor, business and the government to promote price stability- unions have closely coordinated wage demands with pacto guidelines. These factors taken together may lead to an emphasis on employment creation, relative to pushing up wages in the union utility function.

The next section details how empirically it is possible to determine whether the type of bargaining occurring as well as if efficiency wage effects are important.

IIb. Analytics (detail):

Broadly following Nickell and Wadhwani and Layard and Nickell we postulate a firm facing a downward sloping product inverse demand curve $d(\,)$ with shift term, σ. Its real revenue function

$$R(N,\Omega,e,\sigma) = F(N,\Omega,e)d(F(.),\sigma) \quad R_1 > 0, R_2 > 0, R_3 > 0$$

is a function of the labor it hires, N, the stock of other factors including capital, management ability, technology, Ω, and also efficiency wage effects on the productivity of labor, *e*. Among these is the ratio of the inside wage, *W*, to the expected alternative outside wage, $E(W_a)$. Firms bargain with a union whose utility

$$u = U(W, E(W_a), N) \quad U_1 > 0, U_2 < 0, U_3 > 0$$

depends on the wage, the expected outside wage, and employment. In the "right to manage" model the union bargains for a level of *W*, and lets the firm choose the level of employment. However, if the union cares about employment as well, then its utility is maximized over both *N* and *W* and the outcome is determined jointly in an "efficient bargain" with the firm. In this case, the firm moves off the demand curve it would face in the RTM scenario and onto the contract curve.

The result of a standard Nash bargaining model yields a system of equations, both for employment and the wage. The firm solution is a system of equations for labor demand and wages of an (implicit) form such as

$$N = N(W, E(W_a), Z_2, e, \theta_N)$$

$$W = W(E(W_a), Z_2, e, \theta_W)$$

that reflect the compound effects of the two utility functions, as well as union bargaining power over employment, θ_N and the wage, θ_w. Z_2 contains variables that determine the position of the labor demand relation, such as Ω and σ. The expected outside wage enters both through the union utility function, and efficiency wage effects.

Several empirically testable predictions derive from the Nickell and Wadhwani and Layard and Nickell framework which are testable with the Mexican data:

a. If unions bargain solely over the wage, then union power will be captured entirely in the wages paid by the firm and free-standing proxies for union power should have no effect in labor demand functions. Alternatively, if unions also bargain over the level of employment, the union proxy should enter positively in the demand equation. In the extreme case that unions do not bargain over the wage, but only employment, the union terms should be insignificant in the wage equation.

b. Since the workers' alternative, the expected outside real wage adjusted for the probability of getting a job, enters both in the firm's calculation of the optimal efficiency wage as well as the union utility function, its predicted sign and magnitude are ambiguous in cases where union power is present.[7] To avoid this problem, we will work with both unionized and non-unionized sectors to search for efficiency wage effects.

c. The sign of the employment/wage elasticity depends on whether unions have more power bargaining over employment or over wages.

d. As union power over employment determination θ rises, the elements of Z_2 (Ω, and σ) should lose influence in the labor demand equations.

We are particularly concerned with how these effects vary across a heterogeneous sample. Most obviously, if unskilled workers are represented by unions more than the skilled, we may observe different union and efficiency wage effects for each group. However the quantile analysis detailed below also allows us to investigate whether these factors impinge differently across the conditional distribution within these two samples.

[7] Nickell and Wadhwani argue that the appearance in the demand function of outside wages indicates the presence of efficiency wages unless unions both bargain over employment and more importantly, have a non-standard objective function, with the sign depending on the size of the standard employment-wage elasticity.

III. Empirical Methodology

Conditional mean regression estimators, such as Ordinary Least Squares, are traditionally used to estimate the relations such as those posited above. Minimizing the squared sum of errors allows estimating the values of the parameters that predict the mean of the dependent variable, conditional on a set of explanatory variables chosen. However, if the sample is not completely homogeneous, such techniques may hide differential effects of the regressors across the distribution that may be a critical part of the story being told. Further, if there are large outliers, or the distribution of the disturbances is non-normal, conditional mean estimators may be inefficient and often biased.

These concerns can be reduced somewhat by estimating the conditional median regression where half the errors lie above, and half below the fitted curve. Quantile analysis, introduced in Koenker and Bassett (1978), extends this analysis to estimating curves where approximately τ% of the errors will be negative and (100-τ)% of the errors will be positive.[8] If the errors are i.i.d., slicing the distribution at different quantile levels has little effect on parameter estimates and little information is lost in a single measure of the conditional central tendency, such as the parameters generated by OLS or median regression. However, figure 3 shows that asymmetries or heteroskedasticity in the distribution of errors may lead to substantially different estimates of the impact of the variables under study.

The problem of estimating an equation with endogenous explanatory variables under quantile analysis was addressed successfully by Powell (1983). A two stage method, where a least square regression is run on the first stage and median regression on the second as in 2SLS, was shown to generate consistent estimates with asymptotically normal distributions

under weaker assumptions than least squares. This special case of a two-stage quantile regression (2SRQ) was generalized for any quantile by Chen and Portnoy (1996).

In all the empirical work below, we present results of the quantile analysis at τ= 50 (the conditional median regression) completely, τ= 10 where 10% of the deviations lie below the estimated regression, and τ= 90 where 90% lie below. Appendix II presents the standard conditional mean regressions, whether OLS or 2SLS for reference. In all cases they are very close the median regression.

Correct Standard Errors for Two Stage Regression Quantiles

Standard errors estimates for regression quantiles have been studied in Buchinsky (1995) for models with exogenous regressors. Based on a Monte Carlo study, the author recommends the use of the *design matrix bootstrap*, as this method is valid under many forms of heterogeneity (heteroscedasticity), with a small reduction in efficiency in *iid* samples, compared to other methods. As in our model we cannot reject *apriori* heterogeneity (confirmed by LS based heteroscedasticity tests), so we choose this method to estimate the covariance matrix of the regression parameter vector.

The method amounts to sampling pairs (y_i^*, x_i^*) in a regression model $y_i = x_i'\beta + u_i$ to generate a pseudo sample of the data and obtaining an estimate b^* of β. The process is repeated B times and the B estimates of β are used to construct the covariance matrix. The pseudo sample can be of size n, the original sample size, as in this paper, and B should be large enough to guarantee a small sample variability of the covariance matrix. We chose

[8] The technique has generally been applied to estimating returns to education, (Buchinsky 1994).

B=200, based on the literature. The use of the design matrix bootstrap method for models with endogenous regressors can be argued for using the results of Freeman and Peters (1994) on bootstrapping 2SLS models and the analogy principle of estimation in Mansky (1988). In the present case, the covariance matrix for the labor demand equations were obtained sampling the triplets (y_i^*, x_i^*, z_i^*), where z_i is the vector of instruments, or exogenous variables in the system and x_i includes the endogenous explanatory variables. Both first and second stage regressions are then run to obtain the estimates of the parameter vector β for each of the B samples.

IV. Data:

We employ *the Encuesta Nacional de Empleo, Salarios, Tecnologia y Capacitacion* (ENESTYC), the National Survey of Training, carried out by the Mexican Official Statistics Institute (*Instituto Nacional de Estadistica, Geografia e Informatica*, INEGI) for the year 1992 which contains detailed information on firms specific variables relating to employment, technology, capital stock, etc. A 1995 Survey was also available that had the advantage of collecting data on share of the work force unionized at the firm level. However, it lacked information on the human capital of the work force and because the period it spanned contained the Tequila crisis in December 1994 and the beginning of the ensuing recession, we work primarily with what may be considered a more "normal" period of relative prosperity.

Variables:

Core Variables:

Wages and Employment: Following Roberts and Skoufias (1997) and others the wage and labor stock of skilled ($W_S$and N_S, respectively) and unskilled labor ($W_U$and N_U, respectively) are derived as weighted averages of subcategories within each. The weights for constructing the labor variables are the full wage (wage, social security and other non-wage benefits) per worker that capture the relative "marginal product" of each subclass. This generates a compound measure of "efficient units" of skilled or unskilled labor with the least productive subclass of labor as the numeraire in each.[9] The wage is then the total payments to the subclasses of labor divided by the labor measure, which, in practice is simply the wage of the numeraire subclass. The average schooling of the unskilled is about half of the skilled workers.

Value Added (Value Add.)*:* the value of total 1991 output minus the expenses in materials and energy in million Pesos.

Human Capital Variables:

Schooling (School and School2): Average years of schooling of the employed workers in each skill level in the firm, where the years of schooling were obtained from 7 levels.

Experience(Experience and Experience2): Average tenure in the firm of workers within each sub-class of labor.

[9] This approach is arguably preferable to simply assuming that each subclass of workers has identical productivity in the aggregation. In the skilled category are found directors (*directivos)*, Professionals (*profesionista)*, Technical workers (*tecnicos)*, Administrative Employees (*empleados administrativos)* and Supervisors (*supervisores)*. Among the Unskilled are professional workers *(obreros profesionales)*, specialists (*especializados)* and general workers (*general)*.

As Dickens and Katz note, the most thorough test for efficiency wages are those that are able to cross individual level human capital variables with plant level characteristics and control for both. We are able only to control for the mean level of schooling in the plant and the mean tenure of each category of workers within the plant. Though not a good measure of individual experience, the latter is a good proxy for the accumulation of firm specific human capital and arguably better than the potential experience variable (age-education) found in many articles (see, for example, Lam, and Schoeni 1991).

Union and Efficiency Wage Variables:

Union Density (Union): The 1995 ENESTYC tabulates union density (ratio of firm employees affiliated to a union) by individual firm while the 1992 only tabulates a dummy for the presence of unionization in the firm. Under the assumption that union structure changes little over two years, we assign a value of zero to the union density variable if the 1992 dummy is zero and the median sectoral value from the 1995 survey if the 1992 dummy is unity.

Outside(alternative) wage (Wa): Log of the median sectoral wage, at the 4-digit industry level.

Hiring rate(Hiring): In the cross sectional context, the aggregate unemployment rate employed by Nickell and Wadhwani is not useful[10]. We instead use the sectoral hiring rate (number of hires over level of employment in the sector), as a measure of the probability of finding a job if you leave (with your skills). This is more consistent with a labor turnover view of efficiency wages.

[10] The cross-section nature of the data and the impossibility of identification of the firm's regional location precludes the use of an regional average wage, or typical informal sector earnings.

Quality Control (Qual. Con.): dummy for firms that have quality control of output.

Productivity after Training (Training): dummy for firms that indicated increases in productivity after implementing training programs.

Two size and eight sectoral dummies.

Shift parameters in Z_2

Capacity Utilization (Cap. U.): average capacity utilization as reported by the firm in 1991.

Productivity: labor productivity measured as output per unit of labor. [11]

Capital Labor Ratio (K/L): Log of the ratio of the reported value of capital stock over labor force.

Corporate: dummy for firms that belong to a corporation with multiple branches.

Foreign: dummy for firms with more than 50% foreign ownership.

Age (Age and Age2): age of the plant in years.

Export: dummy for firms with 10% or more of sales to other countries.

Automated: percentage of capital stock value of automated machinery.

Competiveness: dummy for firms that identify their product as "competitive" against imports.

Research and Development (R & D): dummy for firms with positive R&D expenses in 1991.

Technology Acquisition (Tech.): dummy for firms with positive expenses in technology acquisition in 1991.

Observations with missing, incomplete, or zero entries for employment, output or capital stock were dropped. We also only include privately owned firms and those with over 16 employees.[12]

[11] To avoid a division bias in the productivity coefficient we use previous year productivity, as in Borjas (1980). Dropping this variable from the regressions does not change the results noticeably in general.

Table 1 presents the summary statistics of the variables employed. A few general observations seem important. First, mean schooling of "unskilled" workers is half of those identified as "skilled," and the mean unskilled experience is slightly smaller than that of skilled workers, possibly due to higher turnover. Second, only 17,8% of the firms do not have their workers associated with a *central sindical* (union) so there are roughly five times the number of observations in the union sample than the non-union sample. This can make comparisons of the significance of effects occasionally ambiguous. Within the union sample, the mean unionization rate is 55%. Third, Mann-Whitney tests show that the unconditional distributions of most variables differ between the unionized and unionized samples.[13] This suggests that the two samples differ in fundamental ways and perhaps should not be combined during the analysis.

Va. Empirical Results: Wage Equations

By contrast to the standard competitive model where firms take wages as given, the framework above makes it clear that wages and employment are determined jointly and hence constitute a system of equations to be estimated. However, standard wage equations with employment omitted can be thought of as a reduced form and can be estimated using one step estimators such as least squares or median regression. Broadly following Dickens and Katz(1987) and Nickell and Wadhwani we estimate the log linear approximation

$$w_{s,u} = W_{\mathbf{a}}\gamma_{wa} + \mathbf{e}\gamma_e + \gamma_u u + \mathbf{h}\gamma_h + \mathbf{x}\gamma_x + \varepsilon_w$$

[12]Micro firms (up to 15 employees), are extremely underrepresented in the sample and their heterogeneity cannot be captured with the sample weights provided. INEGI has a specific survey of micro firms that is probably better suited to their analysis.

where $\mathbf{w}_a$ is a vector of proxies for the expected alternative wage, **e** a vector of other possible efficiency wage related variables, u, the union power measure, **h** a vector of human capital variables, **x** the vector of firm related characteristics, including those in Z_2.

1. General Results

Tables 2.1-2.2 present the quantile results for the non-union and union groups respectively. In all cases, the regressions are significant at the 0 % level. The pseudo-R^2 of the median regression specifications explains 29% of the variance for skilled unionized, 11.5% for those unskilled, and for the non-unionized sample 37.8% and 15.6% respectively.[14]

Several of the shift variables enter with expected signs and magnitudes although others are more ambiguous. The impact of productivity on wages in both samples is of comparable size as in the literature (Wadhwani and Wall 1991) although it enters insignificantly for skilled non-union workers and of significantly larger coefficient for non-union unskilled. Among union firms, productivity is insignificant at the 10th quantile suggesting that for this part of the distribution, union power may possibly delink productivity from wages. Exporters pay significantly more to skilled union workers in the 10th quantile and unskilled union in the 50th and 90th quantile, although the indicator of product competitiveness is never significant in any regression suggesting that greater openness does not obviously depress wages. Foreign firms pay skilled workers less across all quantiles and unskilled workers significantly more in the 90th quantile. R& D enters positively at the median only for non-unionized skilled workers, technology purchases enter strongly and of the predicted sign only in the unionized

[13] Standard equality of mean and variances tests were not employed as the unconditional distributions are clearly non-normal.

[14] Pseudo R^2 defined as squared correlation between original and fitted observations. The standard version based on the decomposition of total variation between fitted and residual values is not correct for quantile

sector (with the exception of the 90th quantile), indicating that union firms use more productive technology. K/L enters positively for non-union unskilled workers at the 90th quantile. Automated never enters significantly.

These results are similar to those from the OLS regressions presented in Appendix 2. Appendix figures A1.1-A1.4 show that the predicted relation between wages and employment is very similar in both cases.

2. Union Effects

The union and non-union samples were run separately for two reasons. First, we are interested in isolating efficiency wage effects that, as in the case of the outside wage, are sometimes hard to disentangle from union effects. Second, there may be serious problems of selection bias in measuring union premia. In preliminary regressions, we find that a union dummy in the combined sample suggests that firms with unions pay 15.2% more to skilled workers and 9.25% more than non-union firms and the continuous union density variable enters positively and significantly as well. However, it is very difficult to know whether unions cause wage differentials, or whether unions are more likely to be found in certain types of firms who also pay higher wages. As an example, schooling enters significantly across all sub-samples, but experience enters only in the union sample. The average union worker with five years of experience would make roughly 12% more than his non-union counterpart and the unskilled perhaps 8%. Constraining the experience coefficient to be equal across sub-samples could give rise to differentials of the magnitudes of the union dummies. If the differing coefficients represent rigidly enforced seniority base promotions or wage hikes, then

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analysis.

the differential might legitimately capture union power (see Borjas 1996). However, if firms use production techniques that require more on-the-job training and also make them more prone to unionization, then the differentials capture legitimate differences in human capital rather than union power.

As mentioned earlier, Mann-Whitney tests show that the unconditional distributions of most variables differ between the unionized and non-unionized sample, and Chow tests for the equality of the coefficients between union and non-union firms strongly reject at the 1% level, consistent with the view that union and non-union firms may be fundamentally different. As a strategy that partially alleviates the selection bias problem, we test for the impact of union power *within* the sample of firms with unions.

In a very surprising result, the free-standing union term virtually never enters significantly as would be predicted by traditional right to manage models.[15] The labor demand regressions in the next section will cast doubt on the obvious interpretation that unions have no power. But the quantile regressions also reveal a story hidden to standard techniques. For the upper quantiles, there is no impact on unskilled wages. However, for the 10^{th} quantile a strong and positive coefficient emerges on the union density term while the human capital variables that are important for the other quantiles largely disappear. An interpretation is that workers who earn little *given measured human capital,* are helped by unions. If for example, a worker's unobserved characteristics, such as reliability and diligence, dictate a low wage relative to those who, on paper, appear similar, unions will push them toward the average for their class. *To the degree that this measures distortion in the wage distribution, it appears to*

[15] This contrasts with the findings of Panagides, A. and H.A. Patrinos (1994). However, their finding of union impact on wages probably arises from the fact that they could not control for firm size or other charateristics.

be confined to the 10th quantile. Overall, union density does not appear to have a major impact on unskilled wages.

A striking result is the strong *negative* impact of union density on skilled wages, precisely the opposite effect found in the combined regression. This may be due to more successful unskilled worker bargaining over firm rents (distributed in forms other than wages), or it may be related to a desire to reduce the wedge between skilled and unskilled remuneration for equity reasons.

3. Efficiency Wage Effects

Outside wages enter for all union worker types and most quantiles, skilled non-unionized workers at the median and the 10th quantile for unskilled non-union. The significance of the outside wage in both the union and non-union samples, although less strikingly, suggests that its influence is more than simply a reference for union bargaining. Further, the magnitude of the impact for unskilled workers at the 10th quantile is double that for the union sector and almost double for skilled workers at the 50th. For both samples, at the 90th quantile, outside wage effects drop dramatically in significance and magnitude for skilled workers. A possible interpretation is that workers paid well given their human capital are likely to receive a larger share of total remuneration and the efficiency wage premium in unobservable non-wage benefits.

Somewhat counterintuitively, the hiring rate enters with unexpected sign although insignificantly in all but the unionized skilled worker sample at the 50th and 90th quantiles. Whether training had been undertaken that was perceived as productivity enhancing has the predicted sign for non-union skilled workers and high wage unskilled non-union workers.

Inter-industry wage differentials (Krueger and Summers 1988) as captured by sectoral dummies are not very strong in most sectors after controlling for human capital variables in *firms,* contrary to much of the literature. On the other hand, firm size effects, are strongly present as in Schaffner (1998). For both union and non-union firms, apparently similar skilled workers in small firms of between 16 and 100 workers make roughly 50% less in wages and benefits than they would in a firm of over 250. In the event that this is in fact, due to efficiency wage considerations arising, perhaps from difficulties of monitoring, the implicit segmentation emerging *endogenously* among formal enterprises is very large.

Vb. Empirical Results: Labor Demand

The data allow the estimation of system of skilled and unskilled labor demand functions and hence the examination of unions' impact on the substitutability of factors and the allocative efficiency of firms. We estimate log-linear approximations to both equations.

$$n_{s,u} = \mathbf{w}\beta_w + \beta_q q + \mathbf{w_a}\beta_{wa} + \beta_u u + \mathbf{x}\beta_x + \varepsilon_n$$

$n_{s,u}$ is the log of labor demand for skilled (N^S) or unskilled labor (N^U), $\mathbf{w}$=log(W^S, W^U) the vector of log own and cross wages[16] q, log firm output, $\mathbf{w_a}$ the vector of proxies for own and cross-expected alternative outside wages (log outside wages and the sectoral hiring rates), **u** the measure of union bargaining power, **x** the vector of other firm characteristics.

Ideally, the labor demand equation would be estimated using instruments for wages due to possible measurement error, random productivity shocks, and the fact that unions may

[16] As in Roberts and Skoufias we do not have a measure for the capital services price. We use the corporation dummy as well as the level of automated machinery and firm size dummies to differentiate the firms on their opportunity costs of capital services.

bargain over both wages and employment simultaneously.[17] However, good instruments prove difficult to find. We are not working with panel data and, as the previous section suggests, the most complete model for the unskilled wage explains relatively little of the variance. The results, as Roberts and Skoufias found for Colombia, were counter-intuitive.[18] Output should be considered endogenous also, due to measurement error (current output different from the output used in the decision making of the firm) and the presence of unobserved firm specific shocks that affect output and employment. This is confirmed by Durbin-Hausman-Wu (Davidson and MacKinnon, 1993) tests. With more success we instrument using the capital stock (and its square), capacity utilization levels and other firm specific technology variables. Chow tests for the equality of coefficients between union and non-union firms for skilled and unskilled workers respectively reject at conventional significance levels. Again, it is clearly not appropriate to combine the samples and we report separate regressions for each group.

1. General Results

Tables 3.1 and 3.2 present the results from a static labor demand equation for the non-unionized and unionized sectors respectively. The regressions are broadly consistent with standard factor demand theory (see, for example, Chambers 1988 and Hamermesh) and other empirical studies. Own-wage elasticities strongly suggest a downward labor demand relation

[17] Hours composition bias (Hamermesh) does not seem to be a problem in our data as the majority of firms did not change the number of weekly and daily shifts across a six month period in 94-95, during the tequila crisis.
[18] In both union and non-union firms using OLS, we have an upward sloping demand curve for skilled labor. In the former a flat demand curve for unskilled workers appeared with "wrong" signed outside wage effects for both (yet consistent with the wrong insignificant inside wages coefficients). The large union effect was maintained for unskilled. Hiring rates never entered significantly. The (naive) R^2 for unskilled fell from .68 to .15. We attribute the results to the unavailability of good instruments (hinted by the non-rejection of Durbin-Hausman-Wu tests for unskilled workers) and present only the results with non-instrumented wages and lagged output.

in both sectors. Output elasticities are statistically similar in both samples, as expected by theory under the hypothesis of a homothetic technology. Their small magnitude suggests that firms are operating in the downward sloping part of the long run average cost curve, as in a monopolistic competition model. Cross-wage effects are zero for all median regressions.[19] Morishima elasticities of substitution between types of labor are in the 60-35% range, and if we assume that total labor costs are half that of the capital services (10% of the capital stock) the capital-unskilled elasticity of substitution labor seems to be around 0.5 and nearly twice that of the capital-skilled labor, as in the references in chapter 3 of Hamermesh.[20]

Estimating the relation across quantiles adds additional information. Perhaps unsurprisingly, firms who have a large workforce after adjusting for the variables in the regression show higher output elasticities and hence smaller scale economies across all sub-samples operating closer to the long run minimum of the average cost curve. This is most striking for the case of non-union skilled workers where the 10^{th} quantile has an output elasticity of .22 which rises to .58 in the 90^{th} quantile. Figures A2.1-2.4 in the appendix illustrate what these differences imply for the employment trajectory for each quantile level. The 90^{th} quantile employ vastly more additional workers for an additional unit of output than the firm at the conditional median and this appears particularly to be the case for unskilled labor where the distribution appears far less symmetric than is the case for skilled workers.

[19] Both labor types seem to be substitutes for capital, with the cross price unskilled labor-capital elasticity larger in absolute value than the skilled-capital elasticity. Roberts and Skoufias results suggest also monopolistic competition and skilled and unskilled workers have negative cross price elasticities, i.e., they are complements.
[20] Morishima elasticities of substitution measure how much the *ratio* of factor used, rather than simply the amount of one factor, changes with respect to one of the factor prices. In unionized firms, the ratio of labor types mean wage costs is close to one and about 0.85 for non-union. We use the fact that factor demands are homogeneous of degree zero in prices to obtain the capital elasticities.

Less obviously, these firms with lower economies of scale also show higher elasticities of substitution. For skilled workers, own elasticities quadruple and double for non-union and union firms respectively across the quantile range and also substantially increase for unskilled workers although less dramatically. This, increase across quantiles can be seen in appendix figures A2.1-2.4. No clear pattern emerges for cross elasticities across quantiles.

Several of the proposed demand shift variables enter significantly and of expected sign. Capacity utilization, as a measure of factor usage is positive in all regressions although clearly significantly so only for unskilled at the 50^{th} quantile for non-unionized and for the 10^{th} in the both the unionized groups and 50^{th} for the unskilled. The virtual absence of any significant effect among skilled workers with the exception of a counterintuitive negative effect for the 10^{th} quantile in the union sample suggests skilled labor hoarding. Exporting firms hire roughly 15-20% more unskilled and perhaps 0- to 4% more skilled workers (never significant) as would be expected given that 82% of these firms engage in some maquila work that is particularly labor intensive.

Foreign firms tend to hire more workers, relative to national although only statistically significantly so across all quantiles of the union skilled sample. Older union firms have more skilled workers although not significantly more unskilled. Whether the firm is part of a large corporation enters positively for all groups for at least the lower quantile, and not for the upper quantile.

2. Union Effects

Although the previous section suggested that there were no union effects on wages, union density has a strong positive effect on the level of unskilled employment across all quantiles. This suggests a unique example of efficient bargaining where unions accept the market wage, but cause firms to move off the demand curve to hire more labor. The regressions suggest that across all quantiles, for each 1% of the work force that is unionized, unskilled employment appears to increase by roughly 2.5%. Despite this, we find little reduction in the magnitude of the shift terms, such as capacity utilization, foreign ownership, and membership in a larger corporation as the analytical overview suggests should happen, and the clear downward sloping demand relation is preserved. This suggests that the position on the contract curve may not be "too far" from the demand curve. However, estimates of the impact of unions on productivity (not shown) confirm the intuition that there is a significant adverse effect arising from the additional labor hired.

Somewhat counterintutively, the regressions for skilled workers find a *negative* union effect, although one that is only remotely significant is the top quantile where a 1 point rise in the percentage unionized leads to a roughly equal equivalent fall in the number of skilled laborers. This might suggest that, among firms with conditionally high levels of employment, unions represent primarily unskilled workers and "crowd out" those more skilled. Alternatively, perhaps when unions seek to organize, they pick firms with conditionally large labor forces, but within this group choose those with relatively more unskilled workers.

As might be expected, union firms have statistically significant, although not substantially smaller own wage elasticities that might suggest slightly less flexibility in the allocation of unskilled workers. However, the pattern is reversed for skilled workers and the

large employment firms appear to be driving this result. For conditionally small firms, the union sample for unskilled labor has a higher point estimate than that of the non-union sector and at the median, there is no noticeable difference.

The presence of unions has little impact on output elasticities. A firm with 10% higher output is likely to hire roughly 4% more skilled. This is not necessarily surprising since a greater hiring rate of workers by unionized firms occurs on top of a larger base, leaving the elasticity virtually unchanged.

In sum, unions appear to concentrate their efforts on featherbedding, but it is not obvious that they reduce flexibility in allocating factors. It also appears that unions have the effect of reducing the dispersion of elasticities across quantiles.

3. Efficiency wage effects.

There is evidence of efficiency wage effects in the demand functions as well. As Nickell and Wadhwani show, the expected outside wages and hiring probabilities can enter in the demand function in the unionized sector even when there are no efficiency wage effects because unions may use them for reference. However, the outside wage, and the probability of hiring enters strongly for unskilled non-union workers. In the union sector, the hiring rates are significant at the median for the skilled but outside wages are, in general, either counter-intuitive or insignificant.

Focusing on the non-union sector, the quantile regressions suggest that the outside wage effects are fairly consistent across quantiles-unimportant for skilled workers and of similar magnitudes and significant for unskilled. No clear story emerges from the coefficients on hiring rates.

VI. Conclusion

Two provocative findings emerge from this paper. First, Mexican unions do not seem to show "right to manage" behavior and their impact on wages appears relegated to putting a floor under the conditionally least well paid workers (10^{th} quantile). Nonetheless, they do greatly increase the quantity of unskilled workers hired and appear to "crowd out" skilled workers in what appears to be an extreme form of Efficient Bargaining. The impact on productivity is, by definition negative, but the flip side may be that unions are forcing firms to use "appropriate" technology that uses relatively less capital and more unskilled workers. As Layard and Nickell have noted, the general equilibrium effects on the overall level of labor employed in the economy are clear: if unions bargain over employment as well as wages, as seems to be the case here, employment in the union sector should be higher, under a smaller than unity elasticity of substitution, as also seems to be the case here. It is therefore possible that far from reducing the level of employment by rationing workers into the informal sector, Mexican unions may be preserving low skilled jobs, at the cost of smaller wages.[21]

The second important finding is that there appears to be strong evidence of efficiency wage effects. A tentative conclusion would be therefore, that whatever segmentation is observed, defined as equivalent workers earning different wages, is more likely to be emerging from the efficiency wage effects than from union effects. This would suggest that, even in the absence of minimum wages or union power, substantial segmentation will remain in Mexico as well as other LDCs.

[21] For an analysis of the differential impact on labor markets of economic reform under different types of union behavior, including the "featherbedding" found here, see Devarajan, Ghanem and Thierfelder (1997).

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Table 1 – SUMMARY STATISTICS

	Non-Union (n=731)					Union (n=3,421)				
Variable	Mean	Std.Dev.	Min	Median	Max	Mean	Std.Dev.	Min.	Median	Max
Foreign	0.331	0.471	0.000	0.000	1.000	0.198	0.398	0.000	0.000	1.000
Age	17.036	13.414	1.000	12.000	99.000	25.188	16.123	1.000	23.000	99.000
Cap. U.*	75.104	19.339	5.000	80.000	100.000	74.479	18.102	1.000	80.000	100.000
Exporter	0.438	0.496	0.000	0.000	1.000	0.241	0.427	0.000	0.000	1.000
R & D	0.334	0.472	0.000	0.000	1.000	0.383	0.486	0.000	0.000	1.000
Tech.	0.454	0.498	0.000	0.000	1.000	0.508	0.500	0.000	1.000	1.000
Qual. Cont.	0.988	0.110	0.000	1.000	1.000	0.997	0.057	0.000	1.000	1.000
Corporate*	0.252	0.434	0.000	0.000	1.000	0.257	0.437	0.000	0.000	1.000
Union						0.680	0.074	0.477	0.703	0.854
Ws	9.422	0.907	5.991	9.573	11.352	9.827	0.726	5.849	9.909	12.110
Ns	1.587	1.011	0.000	1.444	6.685	1.973	0.956	0.000	1.890	6.472
Wu	7.765	0.754	5.758	7.744	10.134	7.983	0.688	5.659	8.032	11.160
Nu	3.449	1.342	0.000	3.466	8.964	3.842	1.135	0.000	3.809	8.606
School- S*	11.962	2.120	3.000	12.150	18.500	12.150	1.708	4.909	12.233	17.843
School –U	6.603	1.497	3.000	6.450	12.000	6.873	1.321	3.000	6.783	12.000
Experience-S	5.495	3.385	0.294	4.483	25.640	6.631	4.000	0.065	5.663	32.927
Experience-U	4.124	3.787	0.000	3.000	38.000	5.817	4.864	0.000	4.118	40.000
Value Add.*	8.274	1.717	1.792	8.343	14.878	9.250	1.597	1.386	9.263	15.072
Productivity- S	6.686	1.204	1.068	6.750	12.472	7.277	1.116	0.372	7.328	13.008
Productivity-U	4.824	1.441	-0.508	4.797	10.811	5.408	1.241	-2.635	5.435	10.659
Wa-U	7.837	0.210	6.742	7.899	8.189	7.847	0.193	6.742	7.825	8.189
Wa-U	9.563	0.325	7.784	9.578	10.182	9.641	0.293	7.784	9.708	10.182
Automated*	12.726	23.325	0.000	0.000	100.000	11.837	22.601	0.000	0.000	100.000
Log(K)	7.716	1.980	2.303	7.690	14.526	9.021	2.000	1.609	9.131	15.735
Log K/Nu	3.186	1.838	-2.896	3.232	9.573	4.013	1.666	-3.626	4.191	10.125
Log K/Ns	4.342	1.635	-0.984	4.397	10.978	5.040	1.514	-1.686	5.194	10.877
Hireing-U	7.512	3.972	0.322	6.628	15.240	6.857	3.468	0.322	6.052	15.240
Hireing-S.	1.079	0.512	0.000	1.043	2.641	1.199	0.602	0.000	1.091	2.641
Training	0.211	0.408	0.000	0.000	1.000	0.236	0.425	0.000	0.000	1.000
Competitive	0.512	0.500	0.000	1.000	1.000	0.631	0.483	0.000	1.000	1.000

Source: author's calculation from ENESTYC '92. Large, medium and small firms only (from 16 employees on).
* - Mann-Whitney test does not reject equality of distributions between union and non-union samples. See variable definitions in text.

Table 2.1: Quantile Wage Regressions-Non-Union

	Skilled						Unskilled					
	10%		50%		90%		10%		50%		90%	
	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e
Constant	4.00	(3.13)	1.49	(2.07)	7.37 b	(3.76)	-0.22	(3.72)	4.45 b	(2.20)	4.24 a	(2.30)
Productivity	0.02	(0.06)	0.04	(0.04)	0.04	(0.05)	0.09 b	(0.05)	0.12 b	(0.04)	0.09 b	(0.04)
Wa	0.22	(0.34)	0.57 c	(0.20)	-0.02	(0.36)	0.80 a	(0.43)	0.30	(0.28)	0.31	(0.29)
Hireing	-0.14	(0.25)	-0.09	(0.12)	0.18	(0.15)	-0.02	(0.02)	-0.01	(0.02)	0.01	(0.01)
School	0.46	(0.30)	0.41 c	(0.14)	0.32 b	(0.14)	0.25	(0.18)	0.29 b	(0.13)	0.44 c	(0.17)
School2	-0.02	(0.01)	-0.01 b	(0.01)	-0.01 a	(0.01)	-0.02	(0.01)	-0.02 b	(0.01)	-0.03 c	(0.01)
Experience	-0.04	(0.06)	-0.03	(0.05)	0.01	(0.04)	-0.02	(0.03)	-0.01	(0.02)	0.01	(0.02)
Experience2	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
R&D	0.03	(0.17)	0.17 b	(0.08)	0.07	(0.10)	-0.03	(0.15)	0.13	(0.12)	0.11	(0.08)
Tech.	0.05	(0.14)	0.07	(0.08)	0.03	(0.10)	-0.05	(0.17)	0.03	(0.11)	-0.08	(0.08)
Foreign	0.19	(0.13)	0.15 b	(0.07)	0.11	(0.12)	0.00	(0.12)	0.04	(0.08)	0.40	(0.13)
Training	-0.06	(0.15)	-0.04	(0.08)	-0.13	(0.10)	0.06	(0.12)	0.00	(0.13)	0.13	(0.12)
Corporation	0.61 c	(0.24)	0.30 b	(0.13)	0.21	(0.15)	0.01	(0.17)	0.08	(0.15)	0.26	(0.15)
Foreign	-0.19	(0.18)	-0.19	(0.11)	-0.07	(0.12)	0.10	(0.13)	0.03	(0.10)	-0.03	(0.12)
Exporter	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Automated	0.13	(0.13)	-0.10	(0.07)	-0.10	(0.10)	0.06	(0.11)	-0.04	(0.08)	0.03	(0.08)
Competitive	-0.17	(0.31)	0.00	(0.34)	0.31	(0.27)	0.06	(0.70)	-0.27	(0.23)	0.07	(0.20)
Qual.Cont.	0.01	(0.04)	0.00	(0.02)	0.01	(0.03)	-0.03	(0.03)	-0.03	(0.03)	0.00	(0.03)
K/L	-0.29	(0.34)	0.08	(0.16)	0.22	(0.15)	-0.09	(0.23)	0.12	(0.14)	0.34 b	(0.16)
Sector 32	-0.65	(0.41)	0.16	(0.22)	0.16	(0.31)	0.21	(0.26)	0.15	(0.15)	0.11	(0.20)
Sector 33	0.20	(0.31)	0.05	(0.19)	0.18	(0.26)	-0.09	(0.36)	0.23	(0.21)	0.61 b	(0.29)
Sector 34	0.09	(0.37)	0.29 a	(0.18)	0.32	(0.20)	-0.34	(0.27)	0.11	(0.19)	0.44 b	(0.21)
Sector 35	0.06	(0.44)	-0.14	(0.29)	0.41	(0.29)	-0.07	(0.44)	-0.14	(0.19)	0.05	(0.22)
Sector 36	0.26	(0.48)	0.15	(0.23)	0.46	(0.34)	-0.15	(0.31)	-0.34	(0.29)	-0.33	(0.43)
Sector 37	-0.15	(0.32)	-0.01	(0.15)	0.31	(0.19)	-0.25	(0.36)	0.11	(0.15)	0.11	(0.11)
Sector 38	-1.17 a	(0.68)	-0.81	(0.72)	0.21	(0.46)	-0.66	(0.72)	-0.12	(0.36)	0.32	(0.45)
Sector 39	-0.88 c	(0.22)	-0.65 c	(0.13)	-0.56 c	(0.14)	-0.40 b	(0.17)	-0.34 c	(0.11)	-0.41 c	(0.11)
Medium	-0.13	(0.16)	-0.13	(0.09)	-0.07	(0.11)	-0.10	(0.14)	-0.12	(0.12)	-0.17	(0.12)
Small	-0.26 b	(0.12)	-0.48 c	(0.10)	-0.29	(0.18)	-0.50 b	(0.21)	-0.46 c	(0.10)	-0.70 c	(0.20)
R2	0.37		0.38		0.36		0.12		0.16		0.13	
Wald (27df)	231.84 c		346.45 c		133.70 c		54.20 c		139.70 c		151.88 c	

Note: Sample Sizes:Non-Union n=731, Union n=3422. Median Chow tests for equality of union and non-union coeff. (27d.f) 80.57 (c) skilled, 75.11 (c)(unskilled). Wald is a Chi-Square test of regression significance. a Sig. at 10%, b 5%, c 1%. R2=squared correlation between actual and predicted.

Table 2.2: Quantile Wage Regressions-Union

	Skilled						Unskilled					
	10%		50%		90%		10%		50%		90%	
	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e
Constant	-0.40	(1.85)	3.25 b	(0.87)	7.67 c	(1.07)	2.32	(1.53)	2.28	(1.20)	2.83 b	(1.48)
Productivity	-0.01	(0.03)	0.03 b	(0.01)	0.08 c	(0.02)	0.03	(0.03)	0.03 c	(0.01)	0.07 c	(0.02)
Wa	0.45 c	(0.14)	0.32 c	(0.07)	0.19 b	(0.09)	0.45 b	(0.18)	0.48 c	(0.14)	0.53	(0.15)
Union	-0.88 b	(0.39)	-0.90 c	(0.25)	-0.99 c	(0.32)	0.83 b	(0.41)	0.25	(0.25)	0.31	(0.30)
Hiring	-0.09	(0.06)	-0.08 b	(0.03)	-0.08 a	(0.05)	0.00	(0.01)	0.00 c	(0.01)	0.00 b	(0.01)
School	0.90 c	(0.18)	0.59 c	(0.07)	0.17 a	(0.09)	0.21 a	(0.11)	0.30 c	(0.06)	0.24 a	(0.10)
School2	-0.03 c	(0.01)	-0.02 c	(0.01)	-0.01 b	(0.00)	-0.01	(0.01)	-0.02	(0.01)	-0.01 c	(0.01)
Experience	0.06 c	(0.02)	0.02 c	(0.01)	0.01	(0.01)	0.01	(0.01)	0.02	(0.01)	0.02	(0.01)
Experience2	0.00 b	(0.00)	0.00 b	(0.00)	0.00 a	(0.00)	0.00	(0.00)	0.00 a	(0.00)	0.00 b	(0.00)
R&D	0.00	(0.05)	-0.02	(0.03)	0.03	(0.04)	-0.04	(0.06)	-0.02 c	(0.03)	-0.01	(0.04)
Tech.	0.14 b	(0.06)	0.12 c	(0.02)	0.03	(0.04)	0.13 c	(0.05)	0.12 a	(0.03)	0.13	(0.04)
Foreign	0.00	(0.05)	0.02	(0.03)	0.05	(0.05)	0.05	(0.06)	0.01	(0.03)	-0.07	(0.04)
Training	0.05	(0.06)	0.02	(0.02)	0.00	(0.04)	0.06 a	(0.06)	0.06	(0.03)	0.04	(0.05)
Corporation	0.26 c	(0.06)	0.15 c	(0.03)	0.14 c	(0.04)	0.02	(0.06)	0.03	(0.04)	0.07	(0.05)
Foreign	-0.21 c	(0.06)	-0.05 a	(0.03)	-0.10 c	(0.03)	-0.05	(0.06)	0.02	(0.03)	0.04 b	(0.05)
Exporter	0.00 b	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00 b	(0.00)	0.00 c	(0.00)
Automated	0.01	(0.05)	-0.03	(0.02)	0.00	(0.03)	-0.03	(0.05)	0.01	(0.03)	-0.02	(0.04)
Competitive	-0.07	(0.15)	0.18	(0.21)	0.21	(0.15)	-0.07	(0.44)	0.41	(0.27)	0.36	(0.51)
Qual.Cont.	0.02	(0.02)	0.02 a	(0.01)	0.02	(0.01)	-0.03	(0.02)	0.00	(0.01)	-0.03	(0.02)
K/L	-0.15	(0.10)	-0.03	(0.06)	0.05	(0.07)	-0.07	(0.09)	-0.02	(0.05)	-0.07	(0.07)
Sector 32	0.12	(0.21)	0.07	(0.07)	0.09	(0.08)	0.12	(0.15)	0.11	(0.08)	0.05 b	(0.10)
Sector 33	-0.02	(0.09)	0.00	(0.06)	0.13	(0.08)	0.11	(0.14)	-0.02	(0.09)	0.05	(0.09)
Sector 34	0.10	(0.08)	0.08	(0.05)	0.09	(0.06)	0.19 b	(0.09)	0.01 c	(0.06)	0.04	(0.08)
Sector 35	0.08	(0.12)	0.11 b	(0.06)	0.02	(0.09)	-0.10	(0.17)	0.01 c	(0.07)	0.10	(0.17)
Sector 36	0.10	(0.18)	-0.07	(0.06)	-0.01	(0.12)	0.03	(0.13)	-0.12	(0.08)	-0.15	(0.12)
Sector 37	0.05	(0.08)	0.06	(0.04)	0.09	(0.05)	0.07	(0.08)	0.02	(0.06)	0.01	(0.08)
Sector 38	-0.25	(0.26)	0.04	(0.20)	0.11	(0.08)	0.07	(0.14)	0.07 b	(0.12)	0.03 c	(0.16)
Sector 39	-0.94 c	(0.07)	-0.62 c	(0.04)	-0.58 c	(0.05)	-0.39 c	(0.06)	-0.28	(0.05)	-0.34	(0.05)
Medium	-0.30 c	(0.06)	-0.22 c	(0.03)	-0.22 c	(0.04)	-0.13 b	(0.06)	-0.04 c	(0.03)	-0.13 c	(0.04)
Small	-0.25 c	(0.05)	-0.33 c	(0.04)	-0.52 c	(0.07)	-0.56 c	(0.06)	-0.56 c	(0.04)	-0.76 c	(0.06)
R2	0.28		0.29		0.26		0.11		0.11		0.11	
Wald (28 df)	597.40 c		1372.5 c		468.78 c		145.78 c		413.71 c		280.59 c	

Note: Sample Sizes:Non-Union n=731, Union n=3422. Median Chow tests for equality of union and non-union coeff. (27d.f) 80.57 (c) skilled, 75.11 (c)(unskilled). Wald is a Chi-Square test of regression significance. a Sig. at 10%, b 5%, c 1%. R2=squared correlation between actual and predicted.

Table 3.1: 2SRQ Demand Regressions- Non-Union

	Skilled						Unskilled					
	10%		50%		90%		10%		50%		90%	
	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e
Constant	0.14	(1.81)	0.05	(1.86)	-0.58	(2.68)	-2.08	(5.46)	2.39	(2.27)	3.80	(3.66)
Value Add.	0.22 b	(0.09)	0.39 c	(0.07)	0.58 c	(0.11)	0.38 c	(0.10)	0.40 c	(0.07)	0.54 c	(0.12)
Ws	-0.08	(0.07)	-0.22 c	(0.06)	-0.36 c	(0.10)	-0.14	(0.11)	-0.01	(0.06)	-0.11	(0.10)
Wu	0.04	(0.04)	-0.03	(0.04)	-0.10	(0.09)	-0.46 c	(0.12)	-0.63 c	(0.05)	-0.74 c	(0.09)
Wa-s	-0.18	(0.24)	-0.05	(0.19)	0.13	(0.35)	-0.98 b	(0.44)	-1.07 c	(0.26)	-0.93 c	(0.40)
Wa-u	0.06	(0.34)	0.14	(0.31)	0.21	(0.49)	1.95 b	(0.71)	1.64 c	(0.43)	1.52 c	(0.52)
Hiring-s	0.21 a	(0.13)	0.24 c	(0.09)	0.19	(0.16)	-0.41	(0.27)	-0.11	(0.12)	-0.01	(0.19)
Hiring-u	0.00	(0.01)	-0.02 b	(0.01)	-0.01	(0.02)	0.04	(0.02)	0.02 a	(0.01)	0.04 b	(0.02)
Cap.U.	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.01 c	(0.00)	0.00	(0.00)
Corporate	0.24 b	(0.11)	0.06	(0.10)	0.18	(0.13)	0.41 a	(0.23)	0.20 a	(0.12)	0.10	(0.13)
Foreign	0.04	(0.12)	0.05	(0.11)	0.13	(0.15)	0.19	(0.22)	0.17	(0.14)	-0.07	(0.18)
Training	0.08	(0.08)	0.05	(0.07)	0.06	(0.11)	0.10	(0.15)	0.09	(0.07)	0.20	(0.16)
Age	0.01	(0.01)	0.00	(0.01)	-0.02 a	(0.01)	0.02	(0.02)	0.00	(0.01)	-0.02	(0.01)
Age2	0.00	(0.01)	0.00	(0.01)	0.04 a	(0.02)	-0.04	(0.04)	0.00	(0.01)	0.03	(0.02)
Exporter	0.02	(0.08)	0.07	(0.08)	0.06	(0.11)	0.10	(0.17)	0.26 b	(0.11)	0.24	(0.13)
Automated	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Qual.Cont.	0.05	(0.48)	-0.21	(0.29)	-0.19	(0.43)	1.04	(0.91)	0.29	(0.41)	0.45	(0.42)
R&D	0.07	(0.07)	0.08	(0.06)	0.09	(0.10)	-0.03	(0.17)	-0.03	(0.08)	0.09	(0.14)
Tech.	0.04	(0.07)	-0.06	(0.06)	-0.18	(0.13)	0.06	(0.16)	-0.02	(0.08)	-0.14	(0.11)
Sector 32	0.24	(0.17)	0.20	(0.12)	-0.01	(0.20)	-0.38	(0.45)	-0.11	(0.16)	-0.17	(0.27)
Sector 33	0.25	(0.16)	0.16	(0.13)	0.76 b	(0.36)	0.11	(0.34)	0.03	(0.19)	0.52	(0.43)
Sector 34	0.40 b	(0.20)	0.31 a	(0.18)	0.36	(0.35)	-0.77 a	(0.43)	-0.83 c	(0.25)	-0.63	(0.37)
Sector 35	0.20	(0.19)	0.08	(0.14)	-0.15	(0.22)	-0.67	(0.40)	-0.51 c	(0.21)	-0.49	(0.30)
Sector 36	0.37	(0.44)	0.22	(0.25)	0.33	(0.38)	0.05	(0.51)	0.35	(0.25)	0.09	(0.34)
Sector 37	0.44	(0.31)	0.50 a	(0.29)	0.14	(0.55)	0.20	(0.44)	0.00	(0.25)	0.22	(0.54)
Sector 38	0.42 b	(0.17)	0.33 c	(0.12)	0.26	(0.18)	-0.58	(0.41)	-0.33 b	(0.17)	-0.34	(0.27)
Sector 39	-0.13	(0.31)	0.17	(0.26)	0.20	(0.45)	-0.55	(0.46)	-0.59	(0.38)	-0.21	(0.48)
Small	-0.56 c	(0.18)	-0.70 c	(0.16)	-0.52 a	(0.27)	-1.44 b	(0.29)	-1.25 c	(0.16)	-1.08 c	(0.30)
Medium	-0.26 b	(0.12)	-0.48 c	(0.10)	-0.29	(0.18)	-0.50 b	(0.21)	-0.46 c	(0.10)	-0.70 c	(0.20)
R2	0.59		0.62		0.59		0.68		0.71		0.68	
Wald(28 df)	534.04 c		1135.34 c		436.21 c		631.38 c		1365.22 c		593.50 c	

Note: Sample Sizes:Non-Union n=731, Union n=3422. Median Chow tests for equality of union and non-union coeff. (28d.f) 36.23 (b), 130.89 (c) (unskilled).

R2 is the squared correlation between actual and second stage fitted. Wald is a chi-square test of regression significance. a sig at 10%, b 5%, c 1%.

Instruments for Output:capital stock, its square, sector dummies and interactions and technology variables.

Table 3.2: 2SRQ Demand Regressions-Union

	Skilled						Unskilled					
	10%		50%		90%		10%		50%		90%	
	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e	coef	s.e
Constant	0.56	(0.93)	1.75 b	(0.85)	4.11 c	(1.46)	1.28	(1.58)	3.73	(0.90)	5.82 b	(1.54)
Value Add.	0.42 c	(0.03)	0.46 c	(0.03)	0.53 c	(0.04)	0.35 c	(0.04)	0.40 c	(0.03)	0.43 c	(0.04)
Ws	-0.23 c	(0.03)	-0.34 c	(0.03)	-0.51 c	(0.04)	-0.04	(0.04)	-0.02	(0.03)	-0.03	(0.03)
Wu	0.08 c	(0.02)	0.02	(0.02)	-0.04	(0.03)	-0.58 c	(0.03)	-0.62 c	(0.02)	-0.64 c	(0.03)
Wa-s	-0.19 a	(0.11)	-0.04	(0.10)	-0.18	(0.17)	0.31 b	(0.15)	0.08 c	(0.10)	0.25 b	(0.12)
Wa-u	0.05	(0.16)	-0.07	(0.15)	0.17	(0.27)	-0.17	(0.26)	-0.15 c	(0.17)	-0.49 a	(0.27)
Union	-0.19 a	(0.11)	-0.27	(0.33)	-0.95	(0.48)	2.45 c	(0.53)	2.59 c	(0.38)	2.98 c	(0.53)
Hiring-s	0.11 a	(0.06)	0.10 b	(0.05)	0.06	(0.06)	-0.07	(0.07)	0.08	(0.04)	0.12	(0.08)
Hiring-u	0.00	(0.01)	0.01 a	(0.01)	0.01	(0.01)	0.01	(0.01)	0.00 a	(0.01)	0.00 b	(0.01)
Cap.U.	0.00 b	(0.00)	0.00	(0.00)	0.00	(0.00)	0.01 c	(0.00)	0.00 c	(0.00)	0.00	(0.00)
Corporate	0.04	(0.04)	0.07 b	(0.03)	0.08	(0.06)	0.10 b	(0.04)	0.06 a	(0.03)	0.01	(0.06)
Foreign	0.12 b	(0.05)	0.17 c	(0.04)	0.20 c	(0.06)	-0.04	(0.06)	-0.01	(0.05)	0.09	(0.06)
Training	0.01	(0.04)	-0.02	(0.03)	-0.04	(0.05)	-0.04	(0.04)	-0.03	(0.03)	-0.01	(0.04)
Age	0.00	(0.00)	0.01 b	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Age2	0.00	(0.00)	-0.01 a	(0.00)	0.00	(0.01)	0.00	(0.01)	0.01	(0.00)	0.01 b	(0.01)
Exporter	0.03	(0.05)	0.03	(0.03)	0.06	(0.05)	0.17 c	(0.05)	0.23 b	(0.04)	0.26 c	(0.06)
Automated	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00 a	(0.00)	0.00	(0.00)	0.00	(0.00)
Qual.Cont.	-0.11	(0.26)	-0.08	(0.23)	0.10	(0.35)	0.12	(0.22)	0.15	(0.33)	-0.26	(0.53)
R&D	0.09 b	(0.04)	0.03	(0.03)	0.03	(0.05)	0.00	(0.05)	-0.03	(0.03)	-0.05	(0.05)
Tech.	-0.02	(0.04)	-0.01	(0.03)	-0.05	(0.04)	-0.02	(0.05)	-0.05	(0.03)	-0.02	(0.05)
Sector 32	0.06	(0.08)	0.10	(0.06)	0.04	(0.11)	0.06	(0.09)	0.23	(0.07)	0.21 b	(0.09)
Sector 33	0.33 c	(0.09)	0.26 c	(0.08)	0.03	(0.13)	0.19	(0.11)	0.13	(0.08)	0.06	(0.12)
Sector 34	0.17 a	(0.10)	0.36 c	(0.09)	0.19	(0.14)	-0.12 a	(0.13)	0.04 c	(0.09)	0.12	(0.13)
Sector 35	0.30 c	(0.08)	0.33 c	(0.06)	0.11	(0.11)	-0.04	(0.11)	0.00 c	(0.06)	0.04	(0.11)
Sector 36	0.46 c	(0.10)	0.44 c	(0.07)	0.23 b	(0.11)	0.23 b	(0.09)	0.11	(0.08)	0.06	(0.09)
Sector 37	0.35 c	(0.11)	0.28 c	(0.08)	0.10	(0.14)	-0.04	(0.10)	-0.02	(0.11)	0.03	(0.14)
Sector 38	0.35 c	(0.07)	0.39 c	(0.06)	0.25 b	(0.12)	0.06	(0.11)	0.16 b	(0.06)	0.34 c	(0.11)
Sector 39	0.03	(0.14)	0.09	(0.12)	-0.12	(0.28)	-0.03	(0.14)	0.01	(0.13)	-0.01	(0.12)
Small	-0.44 c	(0.08)	-0.53 c	(0.08)	-0.65 c	(0.12)	-1.30 c	(0.10)	-1.09 c	(0.07)	-1.08 c	(0.10)
Medium	-0.25 c	(0.05)	-0.33 c	(0.04)	-0.52 c	(0.07)	-0.56 c	(0.06)	-0.56 c	(0.04)	-0.76 c	(0.06)
R2	0.62		0.63		0.62		0.67		0.68		0.67	
Wald (29df)	1967.53 c		3803.92 c		1951.86 c		3204.40 c		4210.45 c		3651.45 c	

Note: Sample Sizes:Non-Union n=731, Union n=3422. Median Chow tests for equality of union and non-union coeff. (28d.f) 36.23 (b), 130.89 (c) (unskilled).

R2 is the squared correlation between actual and second stage fitted. Wald is a chi-square test of regression significance. a sig at 10%, b 5%, c 1%.

Instruments for Output:capital stock, its square, sector dummies and interactions and technology variables.

Appendix 1: Measures to Confront the Problem of Recently Trained Workers Who Resign, %

	Total	Large	Medium	Small	Micro
Increase wages	23.1	7.1	7.6	9.5	29.2
Increase other remunerations	4.6	17.5	17	14	0.1
Promote those trained	12.7	39.6	32.8	24.3	6.1
Reduce the # of those trained	8.4	0.2	1.3	1.3	11.5
Reduce the training offered	0.2	0.5	0	0	0.3
Give non-monetary recognition	8.5	12.8	9.8	7.3	8.4
None	33.5	15.5	26.1	35	34.7
Don't know	1.2	2.3	0.7	5.2	0
Others	7.8	3.9	4.1	3.2	9.7

Source: 1992 ENESTYC

Appendix 2: OLS Estimates

Table A2.1 – WAGE EQUATIONS

	Non-union				Union			
	Skilled		Unskilled		Skilled		Unskilled	
Prd	0.036	(0.028)	0.097	(0.025) a	0.036	(0.012) a	0.039	(0.012) a
Lwa	0.384	(0.156) a	0.388	(0.204) b	0.300	(0.057) a	0.433	(0.086) a
Union	---	---	---	---	-0.865	(0.210) a	0.236	(0.197)
Hirr	-0.002	(0.090)	-0.014	(0.010)	-0.065	(0.029) a	-0.002	(0.004)
Sch	0.424	(0.081) a	0.235	(0.103) a	0.571	(0.058) a	0.238	(0.055) a
Sch2	-0.016	(0.003) a	-0.017	(0.007) a	-0.022	(0.002) a	-0.014	(0.004) a
Exp	-0.021	(0.023)	0.000	(0.015)	0.027	(0.007) a	0.018	(0.006) a
Exp2	0.001	(0.001)	0.000	(0.001)	-0.001	(0.000) a	-0.001	(0.000) a
R_d	0.121	(0.065) b	0.004	(0.064)	0.010	(0.025)	-0.035	(0.026)
Tech.	0.030	(0.063)	0.078	(0.061)	0.097	(0.024) a	0.135	(0.026) a
P.train.	0.197	(0.067) a	0.110	(0.065) b	0.024	(0.025)	0.001	(0.026)
Corp	-0.038	(0.081)	-0.008	(0.079)	0.028	(0.026)	0.067	(0.028) a
Forg.	0.327	(0.096) a	0.127	(0.093)	0.179	(0.030) a	0.025	(0.032)
Export.	-0.123	(0.074) b	0.012	(0.073)	-0.108	(0.026) a	0.024	(0.028)
Auto	0.001	(0.001)	0.001	(0.001)	0.001	(0.000) b	0.000	(0.001)
Cmptl	-0.013	(0.055)	0.026	(0.054)	-0.008	(0.022)	-0.003	(0.023)
Qual.ctr.	0.083	(0.248)	-0.193	(0.242)	0.094	(0.186)	0.238	(0.197)
LogK/L	0.001	(0.019)	-0.026	(0.018)	0.016	(0.008) b	-0.014	(0.008) b
Sect_32	0.046	(0.110)	0.072	(0.101)	-0.008	(0.043)	-0.028	(0.042)
Sect_33	-0.018	(0.143)	0.094	(0.126)	0.063	(0.068)	0.075	(0.069)
Sect_34	0.129	(0.134)	0.200	(0.156)	0.072	(0.056)	0.103	(0.063)
Sect_35	0.162	(0.124)	0.059	(0.132)	0.116	(0.044) A	0.061	(0.047)
Sect_36	0.142	(0.194)	-0.006	(0.183)	0.079	(0.060)	0.078	(0.061)
Sect_37	0.226	(0.233)	-0.192	(0.227)	-0.011	(0.065)	-0.068	(0.064)
Sect_38	0.035	(0.102)	0.107	(0.110)	0.085	(0.038) A	0.065	(0.042)
Sect_38	-0.503	(0.256) b	-0.045	(0.250)	0.031	(0.090)	0.117	(0.094)
Medium	-0.132	(0.077) b	-0.085	(0.075)	-0.229	(0.025) A	-0.091	(0.026) a
Small	-0.702	(0.083) a	-0.349	(0.082) a	-0.676	(0.032) A	-0.335	(0.033) a
Const.	2.912	(1.500) b	3.943	(1.643) a	3.523	(0.680) A	3.082	(0.732) a
R^2	0.3987		0.1692		0.2895		0.1191	
F – test	17.26 a		5. 30 a		49.43 a		16.39 a	

Note: Sample sizes: Non-union n=731, Union, n=3,422. Chow tests for equality of union and non-union coeff.(27d.f.) 86.66 a (skilled), 42.37 a (unskilled). a-significant at the 5% level, b-significant at the 10% level.

Table A2.2 – LABOR DEMAND EQUATIONS – 2SLS								
	Non-union				Union			
	Skilled		Unskilled		Skilled		Unskilled	
Lq *	0.441	(0.039) a	0.493	(0.049) a	0.480	(0.018) a	0.405	(0.019) a
Lws	-0.252	(0.038) a	-0.082	(0.047) b	-0.379	(0.019) a	-0.024	(0.020)
Lwu	-0.057	(0.036)	-0.636	(0.045) a	0.037	(0.016) a	-0.591	(0.017) a
Lwas	-0.044	(0.174)	-1.028	(0.219) a	-0.091	(0.073)	0.195	(0.079) a
Lwau	0.094	(0.255)	1.423	(0.320) a	-0.002	(0.121)	-0.244	(0.132) b
Union	---	---	---	---	-0.417	(0.243) b	2.689	(0.264) a
Hirrs	0.237	(0.078) a	-0.154	(0.098)	0.081	(0.033) a	0.067	(0.036) b
Hirru	-0.008	(0.009)	0.036	(0.011) a	0.008	(0.004) a	0.001	(0.004)
Capu	-0.001	(0.001)	0.004	(0.002) a	-0.001	(0.001) b	0.003	(0.001) a
Corp	0.154	(0.068) a	0.190	(0.086) a	0.080	(0.025) a	0.059	(0.027) a
Forg	0.068	(0.082)	0.124	(0.104)	0.155	(0.029) a	0.010	(0.032)
Age	0.002	(0.005)	-0.003	(0.006)	0.004	(0.002) a	-0.003	(0.002)
Age2	0.004	(0.007)	0.003	(0.009)	-0.002	(0.002)	0.008	(0.003) a
Export	0.056	(0.064)	0.233	(0.081) a	0.068	(0.026) a	0.234	(0.028) a
Auto	0.001	(0.001)	0.001	(0.001)	0.000	(0.000)	0.000	(0.000)
Qual.ctr.	-0.215	(0.209)	0.253	(0.263)	-0.060	(0.176)	0.048	(0.192)
R_d	0.073	(0.055)	-0.001	(0.070)	0.042	(0.024) b	-0.039	(0.026)
Tech.	-0.064	(0.054)	-0.020	(0.068)	-0.016	(0.023)	-0.027	(0.025)
Sect_32	0.200	(0.106) b	-0.115	(0.134)	0.075	(0.045) b	0.182	(0.049) a
Sect_33	0.344	(0.120) a	0.161	(0.151)	0.228	(0.065) a	0.163	(0.071) a
Sect_34	0.370	(0.148) a	-0.647	(0.186) a	0.292	(0.065) a	0.010	(0.071)
Sect_35	0.056	(0.114)	-0.456	(0.143) a	0.283	(0.049) a	-0.025	(0.053)
Sect_36	0.268	(0.164)	0.166	(0.207)	0.370	(0.058) a	0.150	(0.063) a
Sect_37	0.368	(0.199) b	0.064	(0.250)	0.253	(0.061) a	0.016	(0.067)
Sect_38	0.361	(0.101) a	-0.331	(0.128) a	0.371	(0.046) a	0.177	(0.050) a
Sect_38	0.057	(0.223)	-0.319	(0.280)	0.100	(0.088)	0.003	(0.096)
Medium	-0.396	(0.076) a	-0.528	(0.095) a	-0.339	(0.030) a	-0.612	(0.033) a
Small	-0.611	(0.109) a	-1.207	(0.136) a	-0.524	(0.050) a	-1.129	(0.054) a
Const.	0.484	(1.538) a	3.789	(1.934) b	1.986	(0.690) a	3.212	(0.752) a
R^2	0.6518		0.6872		0.6339		0.6918	
F –test	46.77 a		59.47 a		210.25a		269.56 a	
DHW	32.52 a		19.68 a		72.44 a		151.53 a	

Note: Sample sizes: Non-union n=731, Union, n=3,422. Chow tests for equality of union and non-union coeff.(26d.f.) 36.23 b (skilled), 130.89 a (unskilled). a-significant at the 5% level, b-significant at the 10% level. * Instruments for output: capital stock, its square, sector dummies and its interactions and technology variables.

Figure 1: Relationship Between Iso-Profit Curves and the Labor Demand Curve

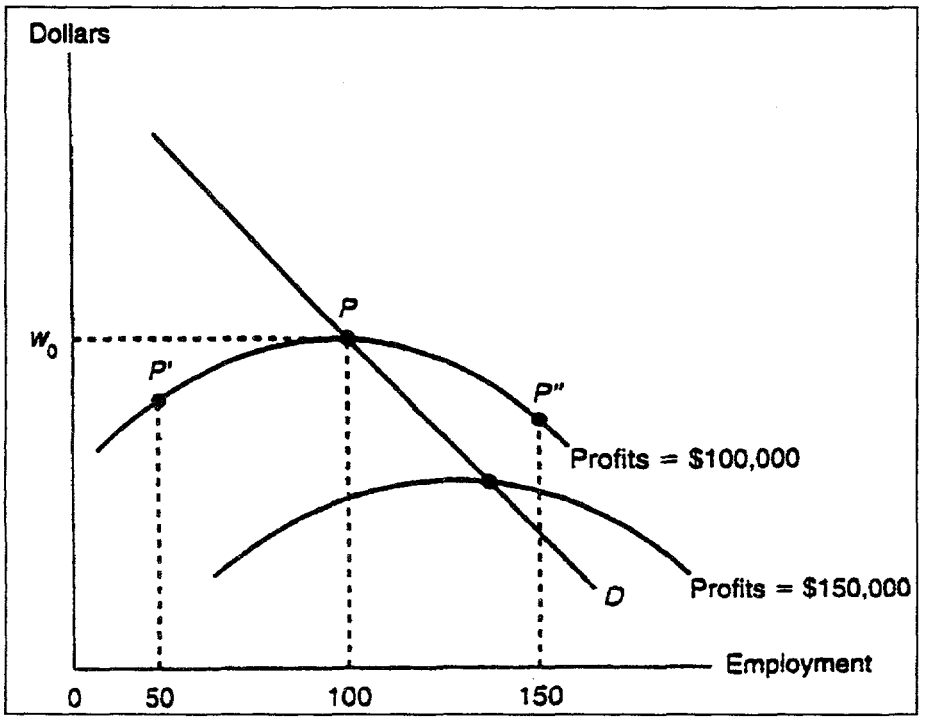


Figure 2: Bargaining Solutions Between Unions and Firms

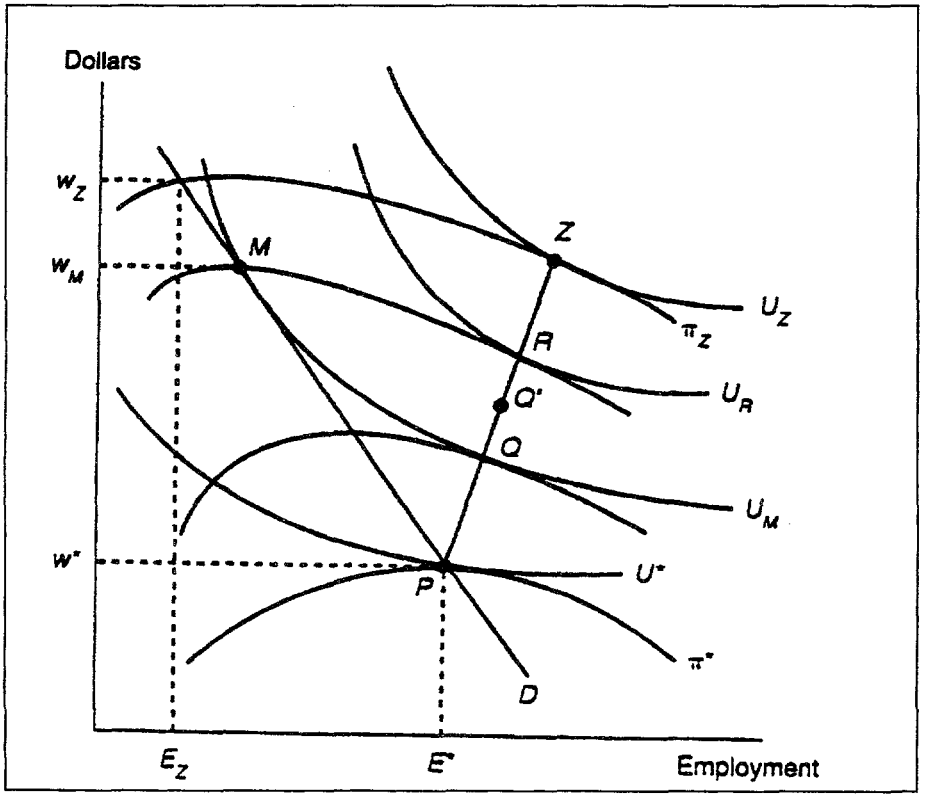


Figure 3: Quantile Regression

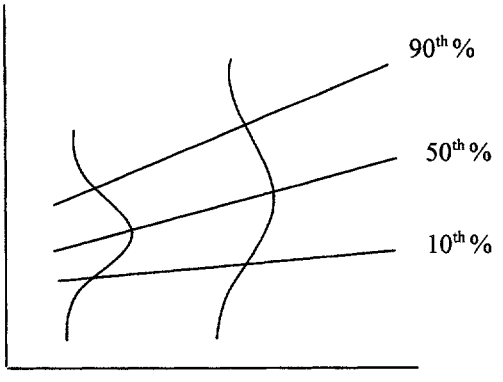


Figure A1.1 - Labor Demand - Non-union Skilled

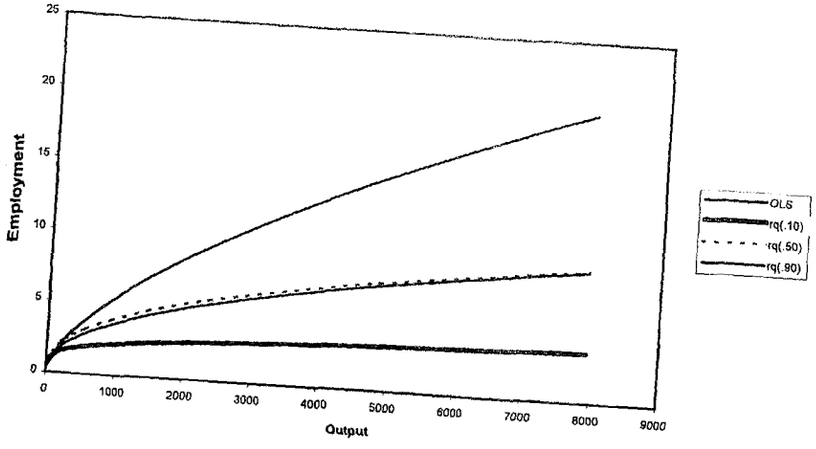


Figure A1.2 - Labor Demand - Union Skilled

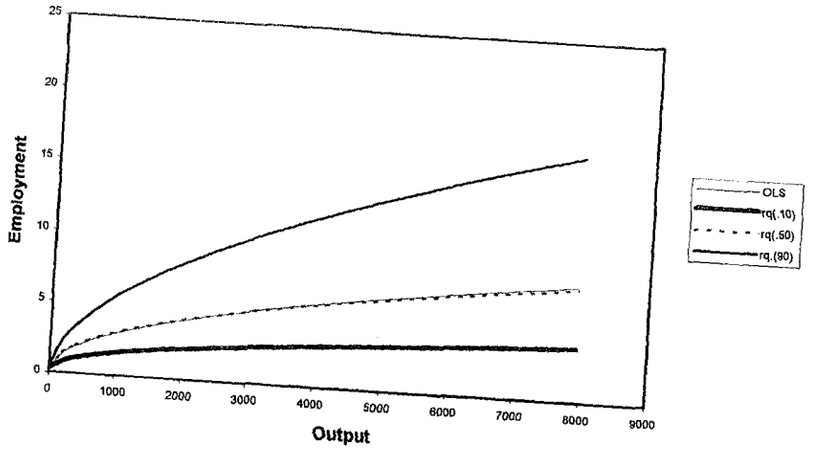


Figure A1.3 - Labor Demand - Non-union Unskilled

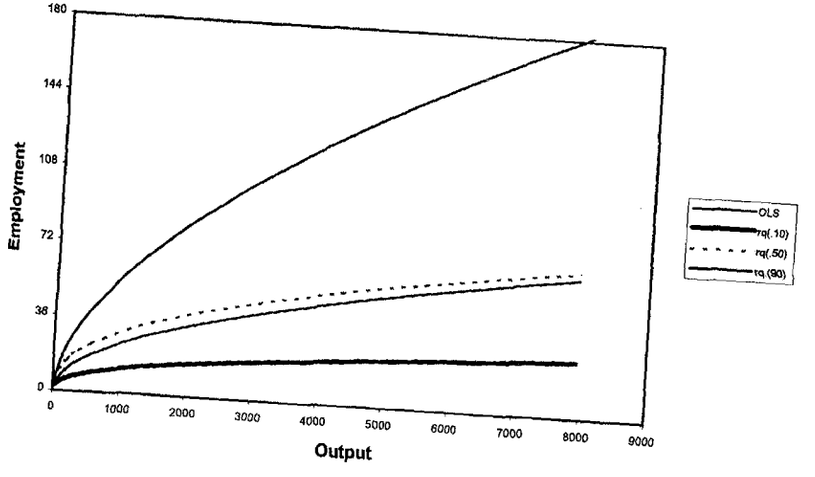


Figure A1.4 - Labor Demand - Union Unskilled

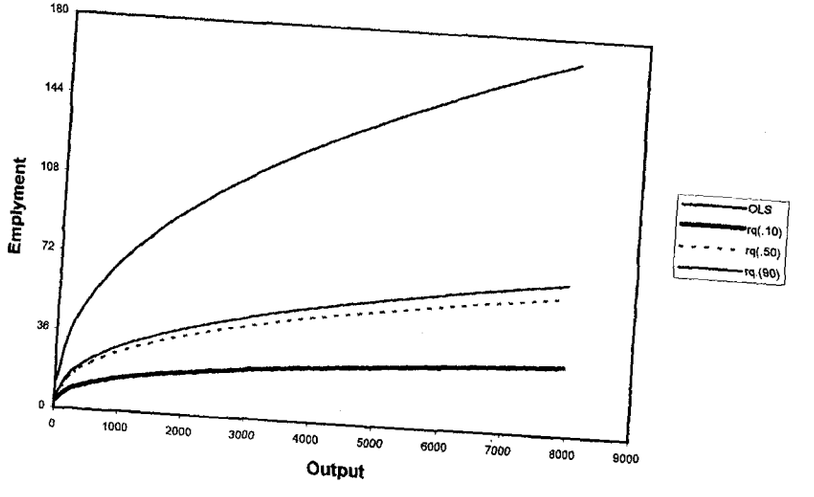


Figure A2.1 - Labor Demand - Non-union Skilled

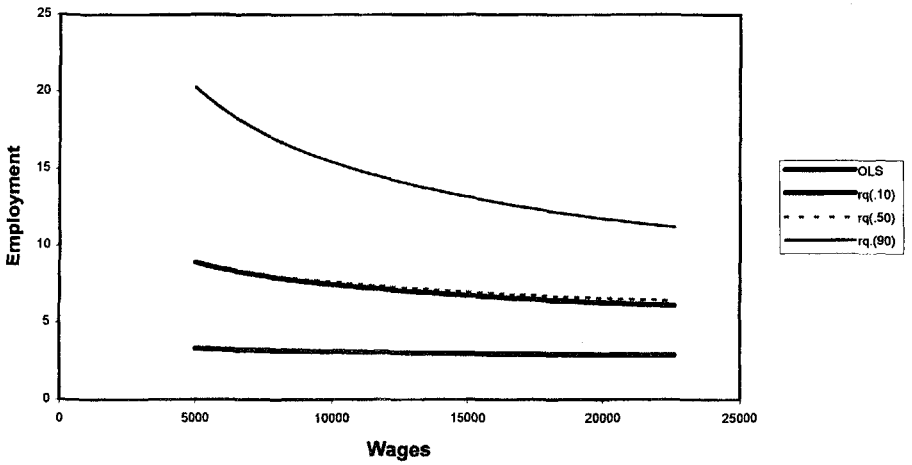
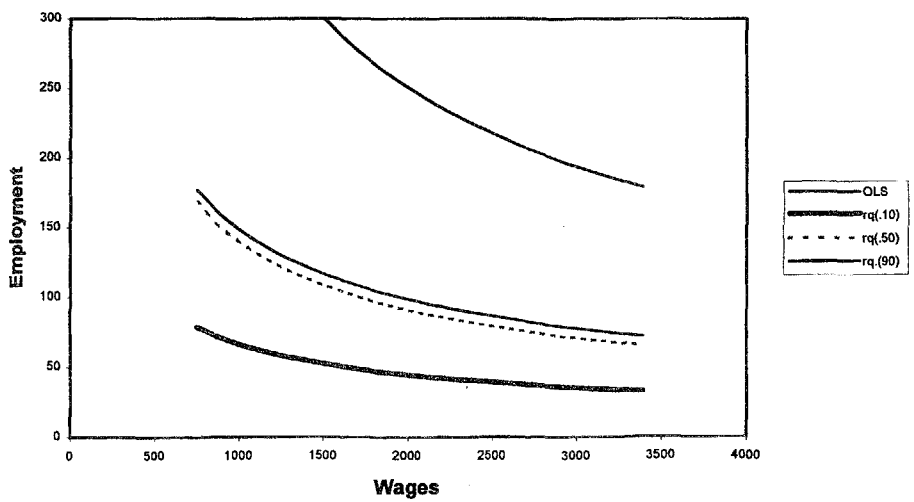


Figure A2.2 - Labor Demand - Union Skilled

Figure A2.3 - Labor Demand - Non-union Unskilled

Figure A2.4 - Labor Demand - Union Unskilled



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