

Union-Nonunion Wage Differentials in the Developing World

A Case Study of Mexico

Alexis Panagides

Harry Anthony Patrinos

Overall, the union-nonunion wage gap is 10.4 percent. Unionized women and indigenous people earn more than their nonunion counterparts, and the collective bargaining strength of organized labor in the northern states is considerably weaker than elsewhere in the country.

The World Bank
Latin America and the Caribbean, Country Department II
Human Resources Operations Division
and
Education and Social Policy Department
March 1994



Summary findings

Union-nonunion wage differentials have been extensively studied by labor economists, but for lack of data on the developing world the study has been confined largely to the industrial world. This paper is one of the first attempts to empirically examine those differentials in a developing country.

Panagides and Patrinos find that union-nonunion wage differentials in Mexico have many of the same attributes and show many of the same patterns as those in industrial nations. But there are marked differences.

Based on a household survey in 1989, Panagides and Patrinos find that:

- Overall, the union-nonunion wage gap is 10.4 percent.
- Unions have a positive impact on the earnings of employed women and indigenous people.
- Organized labor in Mexico's northern states is considerably weaker in collective bargaining strength than it is elsewhere in Mexico.

This paper — a joint product of the Human Resources Operations Division, Latin America and the Caribbean, Country Department II, and the Education and Social Policy Department — is part of a larger effort in the Bank to investigate labor markets and labor market institutions in developing economies. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Ian Conachy, room S10-022, extension 33669 (35 pages). March 1994.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be used and cited accordingly. The findings, interpretations, and conclusions are the authors' own and should not be attributed to the World Bank, its Executive Board of Directors, or any of its member countries.

Union-Nonunion Wage Differentials in the Developing World:
A Case Study of Mexico

by

Alexis Panagides and Harry Anthony Patrinos /*

The World Bank
1818 H Street, N.W.
Washington, D.C. 20433

/* The views expressed in this paper are those of the authors and are not to be attributed to the World Bank. The authors wish to thank George Psacharopoulos, Anthony Yezer, Zafiris Tzannatos, Daniel Oks, Alejandra Cox Edwards and Amit Dar for comments on an earlier draft.

Introduction

Organized labor has long been an important phenomenon in the political, social and economic development of nations, as the relationships between labor, industry and the state have proved critical elements in the creation of modern economies and democracies. As a result of the efforts to better understand these relationships, the study of organized labor has become extensive. One particular area of interest in this study has been the influence of unions on wages. However, previous research was concentrated in developed countries, where the experience of organized labor has been longer and information more readily available.

In recent years the examination of union-nonunion wage differentials has increased dramatically, primarily due to the advent of increased computational power, the increased availability of micro-data and new econometric techniques (Hirsch and Addison 1985). Despite unprecedented analytical capability, with regards to the particular issue of union-nonunion wage differentials the literature largely ignores developing nations. Notable exceptions include Moll's study of South African unions (1993), Park's (1991) study of union-nonunion wage differentials in Korea and Standing's (1992) study of unions in Malaysia. The primary cause of this shortfall stems from the lack of adequate data (Nelson 1991). Although many economic surveys are completed each year in developing nations, few contain questions regarding unionization. The 1989 Mexican household survey upon which this paper is based fulfills this requirement. This data, coupled with growing interest in the Mexican labor market fueled by concerns over the North American Free Trade

Agreement (NAFTA), allows a rare and timely opportunity to examine union-nonunion wage differentials for an important developing country.

The purpose of the study is to measure the collective bargaining strength of Mexican organized labor as reflected by its effect on the wage structure, income inequality, and gender and ethnic wage differentials. The paper begins by describing the data upon which the empirical research is based and then discusses the method used in determining the union-nonunion wage differential. The following sections present the results of the empirical analysis. The empirical results discuss various wage equations, variations in the union wage gap, union influence on gender and ethnic wage determination and income inequality. The final section presents conclusions and identifies the need for further research.

Method

In recent years the econometric analysis of the union-nonunion wage differential has undergone considerable debate, much of it centering on the apparent endogeneity of union status in the wage equation (Duncan and Leigh 1985). Various simultaneous equation estimators have been devised in the attempt to mitigate the potential bias presented by union selectivity. Selectivity arises partly from the individual worker's choice of union status (Robinson 1989). However, these estimation techniques, though often ingenious, commonly yield implausible results and demonstrate substantial sensitivity to specification (see Ashraf 1990 for greater detail concerning methodological debate).¹ For these reasons, this paper

¹ Simultaneous equation techniques were attempted in this study, resulting in the above mentioned difficulties. The results are available from the authors upon request.

will rely on an ordinary least squares (OLS) based method to calculate the union-nonunion wage differential. Although OLS based methods are prone to the aforementioned bias, they are robust. Furthermore, though the nature of the bias induced by endogeneity is unclear (both in magnitude and sign), Lee found it to be upward and small (Lee 1978; see also Lewis 1986).²

Analysis of the wage differential in this paper will rely on the estimation of two separate OLS earnings equations, one for each sector. One advantage of this method, unlike single equation OLS methods employing a union dummy variable, is that it allows for differences in the earnings structure. Equation (1) represents the estimated wage equation for the union sector and equation (2) represents the equation for the non-union sector:

$$\ln W_{ui} = X_{ui}\beta_{ui} + v_{ui} \quad (1)$$

$$\ln W_{ni} = X_{ni}\beta_{ni} + v_{ni} \quad (2)$$

where $\ln W$ represents the log of hourly earnings, the X represents the vector of personal endowments, and β represents the vector of estimated regression coefficients. The subscripts u and n indicate the union and non-union subsample. The v represents the error term, while i the i th observation.

² Though Lewis (1986) was unable to determine the sign or magnitude in his exhaustive study of the union-nonunion wage gap literature, he did suggest that certain theoretical priors would preclude that union selectivity would overestimate the union-nonunion wage differential. Lee (1978) found that correcting for the bias reduced the estimated effect of unions on wages, but only by a modest two percentage points.

To estimate the mean logarithmic union-nonunion wage differential (or wage gap), equation (3) is constructed (Hirsch and Addison 1986). The unexplained differences in log hourly wage is equivalent to:

$$\bar{d} = (\beta_u - \beta_n) \bar{X} \quad (3)$$

The value of \bar{d} is converted to a percentage value by $(1 - e^{\bar{d}}) \cdot 100$, where e represents the exponential function (Halvorsen and Palmquist 1980). At values below 0.15, \bar{d} approximates a rate (for example, $\bar{d} = 0.104 \approx 10.4$ percent). The β_x ($x=u,n$) is the vector of estimated coefficients. The \bar{X} represents the vector of either union, nonunion or all workers' mean characteristics.

Equation (3) estimates that portion of the mean wage gap that is due to factors other than differences in mean characteristics. This aspect is critical to union-nonunion wage gap analysis since this "unexplained" portion comprises not only the influence of unobserved characteristics and potential wage discrimination on wage rates, but also, in the case of union analysis, the effectiveness of union organization in securing higher wage rates for its members above those offered in the nonunion sector. It should be mentioned that since the portion of the "unexplained" wage gap that accrues to union organization is not separated from the other aforementioned influences, the estimated wage gap reflects only the upper limit of union bargaining strength.

While the wage gap can be evaluated either at union or nonunion mean characteristics, this study employs all workers' mean characteristics. The use of all-worker means, $\bar{X} = (PX_u + (1-P)X_n)$, where P is the proportion of union observations, corresponds to asking the question: for a worker with average characteristics, what is the predicted wage differential between his/her working in the union and nonunion sectors (Hirsch and Addison 1986)?

To test the statistical significance of the wage gap the predicted union log hourly wage of nonunion workers is computed using the estimated union wage structure and nonunion characteristics (*predicted union lnW of nonunion worker* = $X_{ni}\beta_u + v_{ui}$). The estimated union wages and actual wages of nonunion workers are then tested for statistical difference employing a standard t-test.

Data

The data used in this analysis come from the 1989 household survey conducted by the the National Institute of Geographical Statistics and Information (*Instituto Nacional de Estadística Geografía e Informática*), known as the National Income and Expenditure Household Survey (*Encuesta Nacional de Ingreso-Gasto de los Hogares*). The survey covers 11,545 households and contains 57,332 individual observations. The geographical coverage includes each of the 31 Mexican states, representing 260 *municipios* (counties) and the Federal District. Each household is identified by the state and the *municipio* in which it is

located. The subsample upon which this report is based upon is comprised of 9,954 non-agricultural workers ranging from 16 to 65 years of age, with positive labor market earnings.

Although the data used in this paper does possess a variable indicating union status, it does fall short in regard to some issues relevant to union wage gap analysis. One shortcoming is the lack of detailed information on non-monetary remuneration. A study by Freeman (1978) found that union workers receive a higher proportion of compensation in nonpecuniary form than do nonunion workers. Therefore, it should be kept in mind that the wage gap may be greater than indicated since fringe benefits cannot be included in the analysis. Freeman's (1981) analysis indicates that previous estimates of the union wage differential understated the union compensation differential, but only by about two percent (Hirsch and Addison 1986).

Although the Mexican data do not allow for an adequate examination of nonpecuniary compensation, information on the incidence of health insurance coverage among workers is included. Not surprisingly, the percentage of those with health care coverage among the union subsample is significantly higher than the percentage with coverage in the nonunion subsample, at 86 and 56 percent.

The mean values for those variables used in the analysis for the entire sample, and for the union and nonunion subsamples separately, are listed in Table 1.

Table 1: Mean Sample Characteristics

Variable	Total	Union Subsample	Nonunion Subsample
Years of Schooling	8.4	9.7	7.9
Experience (years)	18.0	18.7	17.7
Hours Worked per Week	44.5	42.2	45.5
Education Level			
Primary	0.35	0.28	0.38
Secondary incomplete	0.29	0.28	0.30
Secondary complete	0.14	0.20	0.12
Tertiary	0.16	0.23	0.13
Industrial Sectors			
Extraction	0.02	0.05	0.01
Manufacturing	0.23	0.21	0.24
Utilities	0.01	0.02	0.01
Construction	0.10	0.04	0.12
Commerce	0.14	0.05	0.18
Transportation	0.05	0.06	0.04
Financial Services	0.02	0.03	0.02
Services	0.42	0.54	0.37
<i>Municipio</i> Indigenous Percent	2.90	3.01	2.86
Northern State Residence	0.23	0.19	0.24
Male	0.67	0.65	0.67
Union Membership	0.30	1.00	0.00
Log of Hourly Earnings	7.85	8.07	7.76
Actual Hourly Earnings (<i>pesos</i>)	3,522.60	4,076.63	3,298.56
Number of Observations	9,954	2,954	7,000

Source: INEGI (1989).

The union membership variable equals 1 for respondents answering in the affirmative to the question, *¿Está usted afiliado a alguna organización laboral o patronal?* (Are you affiliated with a workers' or employers' organization?). The union membership variable indicates that 30 percent of the entire sample claims union membership. This figure closely approximates previous estimates of the proportion of the Mexican labor force unionized in the late 1980s (Nelson 1991). The service sector possesses the majority of unionized labor. This is largely due to the survey's inclusion of the public sector in the service sector category. The average natural log of hourly earnings, defined as the natural log of gross weekly wage rate, including payments in-kind, divided by hours worked per week, reveals substantially higher wage rates among the union than in the nonunion subsample. It is primarily this difference that will be examined in this study.

The *municipio* indigenous percent variable and the northern state residence variables measure certain regional characteristics. The *municipio* indigenous percent variable controls for the concentration of the indigenous population and reflects the probability that a sampled individual is indigenous. Since a specific question concerning indigenous origin was not included in the survey, the percentage of indigenous people recorded for each *municipio* in the 1990 Census was substituted (INEGI 1990). The nonunion subsample *municipio* indigenous percentage average of 3.0 percent is slightly higher than the union subsample at 2.9 percent (for further discussion regarding this variable, see Psacharopoulos and Patrinos 1993).

One of the most dynamic areas of Mexico is the northern region bordering the United States. Due to the political and economic importance of this region, especially in light of NAFTA, the analysis controls for northern state residence. Northern state residence is defined by residence in one of the six states along the United States-Mexico border: Baja California Norte, Sonora, Chihuahua, Coahuila, Nuevo Leon and Tamaulipas. For the nonunion subsample, 23 percent of the observations were from these northern states, as opposed to 19 percent in the union subsample.

Empirical Findings

Union Membership

Table 2 presents the results of a multivariate logit model which expresses the probability of someone being a union member as a function of various characteristics such as education level, gender and so on. The reported coefficients are partial derivatives indicating the change in the probability of union membership relative to a unit change in one of the independent variables.

The probability of unionization increases until secondary schooling is completed, whereupon further education has no additional impact on the probabilities of union membership. Years of experience increases the probability of union membership, albeit at a slightly diminishing rate. The coefficient on northern state residence reveals that labor in the north is 4.6 percent less likely to organize than labor elsewhere in the country.

Unions do not seem to be biased against women or indigenous people in the selection process. The probability of union membership is lower for men than for women. This finding is not completely surprising in the context of the additional analysis below that reveals substantially lower union wage differentials (and thus lower union membership incentive) for men than for women. However, this finding is surprising in that it is counter to many studies in developed nations, where women are found to be significantly less likely to be union members than are men (Hirsch and Addison 1985). The difference in observations may partly be explained by the relatively smaller observed union wage gap differences between women and men in more developed countries. This point is discussed in greater detail below. The *municipio* indigenous percent variable is the only nonsignificant factor. Given the large wage incentive to enter the union sector discussed below, this nonsignificance is slightly surprising. Additionally, cultural factors may play a roll in the propensity of unionization among indigenous people.

Table 2: Determinants of Union Membership (Logit)

Variable	Marginal Effect (%)
Education level (residual = no education)	
Primary	25.30 ‡ (7.4)
Secondary Incomplete	39.52 ‡ (11.1)
Secondary Complete	54.08 ‡ (14.7)
Tertiary	54.63 ‡ (14.9)
Experience	2.09 ‡ (14.7)
Experience squared	-0.03 ‡ (10.0)
Northern State Residence	-4.55 ‡ (3.9)
Male	-3.50 ‡ (3.5)
<i>Municipio</i> indigenous percent	0.10 (1.7)
Constant	-3.69
N	9,939
Model Chi-square	758.35
Mean of Dependent Variable	0.297

Source: INEGI (1989).

Note: Numbers in parenthesis are *t*-values. ‡ indicates significant at the 99% level.

Union-Nonunion Wage Differential

To begin examination of the union-nonunion wage differential, two wage equations are estimated, one for each sector. The dependent variable is the log of hourly earnings, constructed by taking the log of the monthly wage rate divided by the hours worked per month $\{\ln(W/\text{hrs})\}$. The estimated equations including variables reflecting education, represented here as years of schooling splined into four dummy variables, experience (age-school-6) and its transformation. Additional independent variables include gender, geographical region, *municipio* indigenous concentration and industrial sector. Table 3 lists the results of the union and nonunion earnings equations estimates and the marginal contributions of the variables to the overall wage gap.

Table 3: Union and Non-union Hourly Earnings Functions

Variable	Sector		Marginal Contribution $\bar{X}(\beta_u - \beta_n)$
	Union	Nonunion	
Education level^a			
Primary	0.320 ‡ (3.8)	0.249 ‡ (6.8)	0.025
Secondary Incomplete	0.532 ‡ (6.1)	0.621 ‡ (15.5)	-0.027
Secondary Complete	0.882 ‡ (9.8)	0.961 ‡ (21.6)	-0.011
Tertiary	1.226 ‡ (13.6)	1.425 ‡ (32.3)	-0.031
Experience	0.038 ‡ (12.1)	0.055 ‡ (24.5)	-0.302
Experience squared	-0.001 ‡ (7.8)	-0.001 ‡ (19.5)	0.176
Northern State	0.123 ‡ (4.7)	0.258 ‡ (13.9)	-0.031
Male	0.063 (0.1)	0.161 ‡ (9.1)	-0.066
<i>Municipio</i> Indigenous Percent	0.001 (0.6)	-0.008 ‡ (7.8)	0.026
Industrial Sectors^b			
Industrial Manufacturing	-0.285 ‡ (5.6)	-0.275 ‡ (3.4)	-0.003
Utilities (electricity & water)	0.019 (0.2)	-0.239 (1.8)	0.003
Construction	-0.197 ‡ (2.8)	-0.362 ‡ (4.4)	0.016
Commerce	-0.283 ‡ (4.4)	-0.318 ‡ (3.9)	0.005
Transportation	-0.045 (0.7)	-0.212 † (2.4)	0.008
Financial Services	-0.034 (0.4)	0.075 (0.8)	-0.003
Services	-0.059 (1.2)	-0.322 ‡ (4.0)	0.107
Constant	6.967	6.757	0.210
Adjusted R ²	0.324	0.303	
N	2,793	6,907	
Adjusted Wage Gap			0.104‡

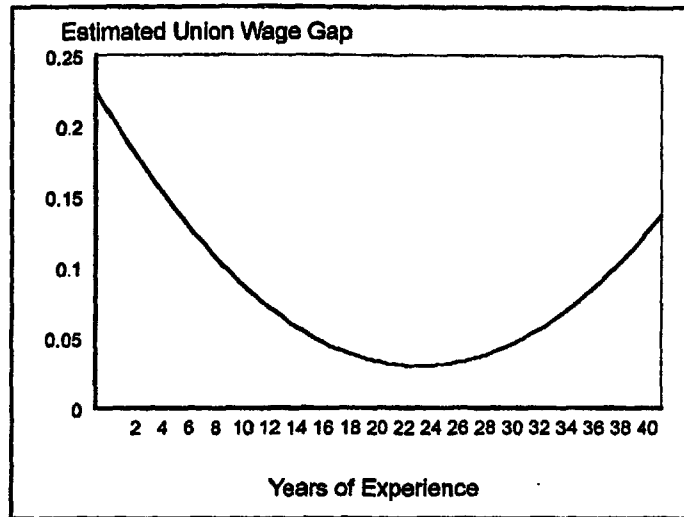
Source: INEGI (1989)

Notes: † significant at the 95% level. ‡ significant at the 99% level. ^a Residual is no education. ^b Residual sector is extraction. Numbers in parenthesis are *t* values. β is the estimated coefficient. u and n subscripts represent union and nonunion subsamples, respectively. \bar{X} is the full sample weighted variable mean.

As Table 3 indicates, educational attainment has a significant positive impact on earnings. However, the form of this impact differs between the two sectors. In the union sector, the returns to education profile is flatter than in the nonunion sector. In the union sector, the difference in returns to education between those with some primary schooling versus those with tertiary education is less than the corresponding comparison in the nonunion sector. The negative marginal contribution found among those with greater than primary education reflects a wage disincentive for those with more education to entering the union sector.

Other personal and regional characteristics such as experience, gender and *municipio* indigenous concentration also show marked differences between sectors. Returns to labor market experience are greater in the nonunion sector, contributing a 5.5 percent wage increase per year of labor market experience versus 3.8 percent in the union sector. The -0.302 marginal contribution of experience reveals that a large portion of the wage gap favoring the nonunion sector is due to the greater experience premiums in that sector than in union sector. Furthermore, as Figure 1 shows, the effect of experience on union-nonunion wage differences varies in a distinct 'U' pattern, as the differential initially decreases then eventually increases with greater experience. The minimum wage differential on the wage gap-experience profile occurs at around 23 years of experience.

Figure 1: Experience - Union Wage Gap Profile



Source: Estimated from results in Table 3.

The coefficients for gender and ethnicity reveal a significant difference between the union and nonunion sectors with regards to gender and ethnic wage differentials. In the nonunion sector, men enjoy a 17.5 percent wage advantage over women, whereas in the union sector the coefficient for gender is nonsignificant, highly suggestive of greater gender equality in the union sector than in the nonunion sector. Similarly, wage equality for indigenous people seems to be potentially greater in the union sector. The coefficient of the *municipio* indigenous percent variable in the nonunion sector equation reveals a -0.8 percent earning disadvantage for each percent of indigenous population within a *municipio*, whereas the same coefficient in the union sector equation is nonsignificant. Variations in the wage differential due to gender and indigenous probability are examined more closely in latter sections.

The dummy variable controlling for northern state residence reveals further differences between the union and nonunion sectors. The northern state variable shows greater wage gains accruing to northern state residence for those in the nonunion sector than in the union sector, at 29.4 versus 13.1 percent. The marginal effect reveals a -3.1 percent erosion of potential union bargaining strength. In the rapidly growing northern region of Mexico along the United States border, this disparity may be due to several factors. Among other reasons, it may reflect regional factors that are unfavorable to unions, namely, an unrestricted labor supply and/or highly competitive industries. Union-nonunion wage gaps are difficult to maintain where substitution by firms in production and consumers in consumption is most easy. A large labor supply fueled by heavy migration is likely to inhibit union bargaining power by enabling industry to more easily substitute union labor with nonunion labor. Thus the more elastic supply of labor in the northern border region may have much to do with explaining the reduction in the union wage gap (Fatemi 1988). Similarly, highly competitive industries forced to operate at or near cost also inhibit union bargaining power by diminishing room to negotiate wage increases. Demand effects may result in a shift away from more costly products from the union sector (assuming unions raise prices) to relatively less costly products from the nonunion sector. As long as labor supplies in the nonunion sector are not perfectly elastic, demand effects will put upward pressure on wages in the nonunion sector and thus mitigate the union wage gap (Hirsch and Addison 1986). However, as will be discussed in greater detail below, the difference in estimated coefficients is likely to be capturing the higher nonunion wage rates in the northern region compared to nonunion wage rates in the rest of the country. The union wage gap

estimated solely among northern states is -0.02, revealing a potential wage disadvantage in union membership.

The variables controlling for economic sector reveal increased inter-sectoral wage equality in the union sector than in the nonunion sector for the nation as a whole. Workers in all industries, except manufacturing, finance and utilities, improve their wage status, in relation to the omitted category (extraction), once unionized. In the union sector, the industry with the greatest wage disadvantage vis-à-vis the extraction industry is manufacturing, with a -33.0 percent wage disadvantage. It is interesting to note that the marginal contribution of industrial manufacturing, -0.3 percent, reveals a possible nonunion wage advantage. In the nonunion sector, services are the most disadvantaged, at -38.0 percent. However, in the union sector, services wage disadvantage is greatly reduced, at -6.0 percent, which is reflected in the substantial 10.7 percent marginal contribution to the overall union-nonunion wage differential.

The summation of the marginal contributions equals the overall union-nonunion wage differential. From the two estimated earnings equations, the wage gap (eq. 3) is measured at nearly 10.4 percent, indicating that while controlling for certain wage generating characteristics, those in the union sector earn 10.4 percent more in hourly wages than do those in the nonunion sector. This value is somewhat less than the average value of 14 percent derived by Lewis (1986) in his review of union-nonunion wage differentials in the United States covering the period 1967 to 1979. Furthermore, it is below the lowest average

yearly value of 0.11 observed during the same time span (Lewis 1986). Recalling the historical context of organized labor in Mexico during the 1980s, a period of particular difficulty induced by recession coupled with government austerity measures, this relatively smaller differential is not surprising (Middlebrook 1989).

The average wage differentials for individuals categorized by gender, experience and education are presented in Table 4. It is clear that working women enjoy a greater wage advantage in the union sector than do men of corresponding education and experience. As the earnings equations coefficient for gender would indicate, there is, on average, a 9.8 percentage point difference between male and female wage differentials. With regard to experience, the aforementioned 'U' pattern in the wage gap is clearly observed, as the differential first decreases, then increases with more experience. Furthermore, unionization tends to be most advantageous for those with less education. A clear trend of decreasing wage differentials exists as educational level increases. In the case of men with more than seven years of schooling and more than ten years work experience, unionization may actually be disadvantageous, indicating that men in this category earn more, on average, in the nonunion sector.

**Table 4: Average Wage Differentials (\bar{d})
by Gender, Experience and Education**

Gender	Experience (years)	Education (years)			
		0 to 3	3+ to 7	7+ to 12	12+
Male	0 to 10	0.21	0.18	0.05	-0.04
	10+ to 20	0.12	0.13	-0.03	-0.08
	Above 20	0.20	0.15	-0.01	-0.08
Female	0 to 10	..	0.27	0.15	0.11
	10+ to 20	0.26	0.20	0.11	0.09
	Above 20	0.33	0.26	0.14	0.09

Source: Estimated from above results in Table 3.

Notes: .. indicates small cell count.

The examination of the wage differential by the probability of being an indigenous person is listed in Table 5. Those living in *municipios* with more than a ten percent indigenous population experience greater wage advantages in the union sector than do those with similar education and experience in less indigenous *municipios*. For example, for those with 10 to 20 years experience, and 7 to 12 years of schooling, the union-nonunion wage differential is nearly 31 times higher for those in more indigenous areas than in less indigenous areas.

**Table 5: Average Wage Differential (\bar{d})
by Indigenous *Municipio* Category, Experience and Education**

Ethnicity ^a	Experience (years)	Education (years)			
		0 to 3	3+ to 7	7+ to 12	12+
Non-indig.	0 to 10	0.20	0.18	0.07	0.0
	10+ to 20	0.14	0.13	0.01	-0.05
	Above 20	0.21	0.17	0.03	-0.05
Indigenous	0 to 10	..	0.52	0.35	..
	10+ to 20	0.37	0.41	0.31	..
	Above 20	0.43	0.40	0.31	..

Source: Estimated from results in Table 3.

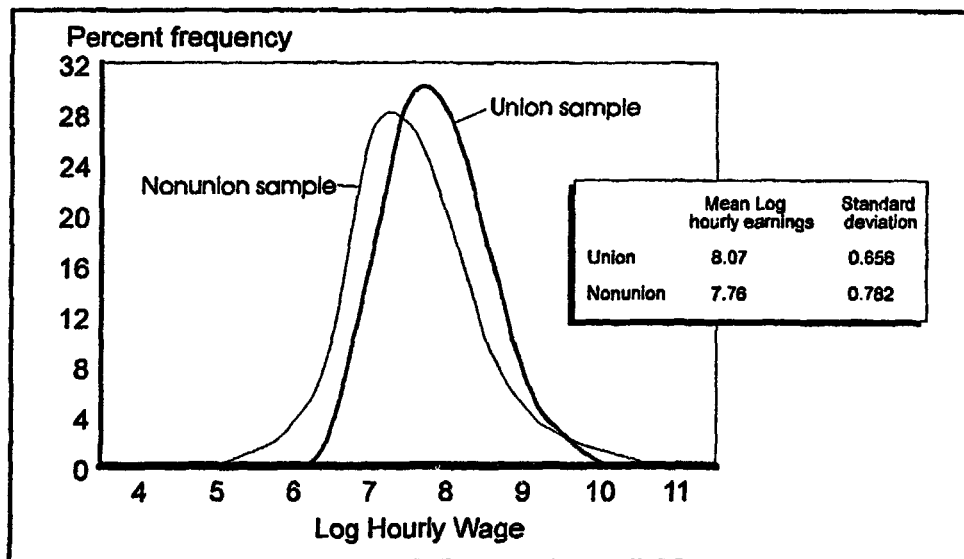
Notes: .. indicates small cell count. ^a Non-indigenous indicates *municipios* of 10 percent and under indigenous population. Indigenous indicates *municipios* of over 10 percent indigenous.

Wage Dispersion and Income Inequality

This section compares wage dispersion and income inequality between union and nonunion workers for the entire sample and by gender and ethnic subsample. The results confirm much of the previous research on this issue in that wages in the union sector tend to be less dispersed and that income equality tends to be higher. Furthermore, indigenous people and women receive higher earnings in the union sector for a given set of characteristics.

The dispersion of log hourly wage in the union and nonunion sector is illustrated in Figure 2. The union dispersion curve lies to the right of the nonunion curve, reflecting the higher log hourly mean wage of 8.07 versus the nonunion log hourly wage mean of 7.76, a statistically significant difference. Furthermore, the union wage distribution is more peaked, revealing less dispersion than the distribution of nonunion wages. The difference between the standard deviation of the log hourly wage in the union sector (0.656) versus the nonunion standard deviation (0.782) is also statistically significant.

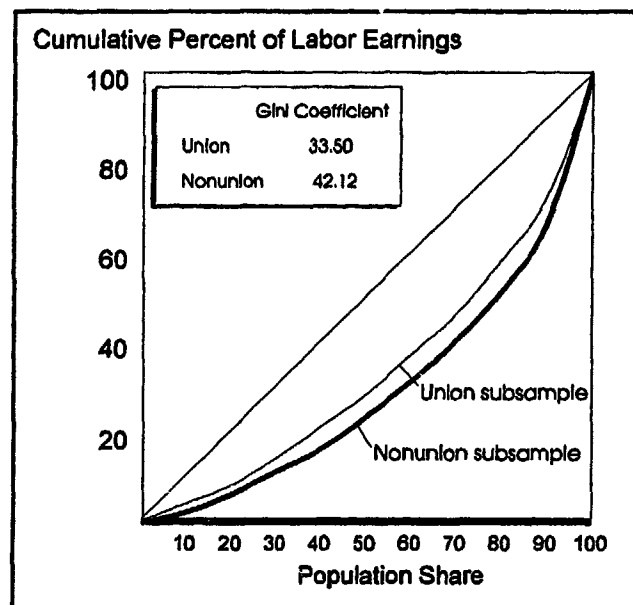
Figure 2: Distribution of Log Hourly Wages for Union and Nonunion Sectors



Though organized labor in Mexico may not command very large wage differentials, it has been effective in altering the wage structure, as evidenced by the earnings equations. With the reduced wage dispersion the concomitant effect of increases in wage equality among workers is observed. The Lorenz curve diagram (Figure 3) illustrates substantial differences

in the Gini coefficients for both sectors. In the nonunion sector, the estimated Gini coefficient is 42.1, a lower value than typically observed in Latin America, largely due to the fully employed nature of the subsample (Psacharopoulos et al. 1993). In the union sector the Gini coefficient is greatly reduced to 33.5.

Figure 3: Lorenz Curves for Union and Nonunion Subsamples



Wage Discrimination

A number of studies of the union-nonunion wage differential have examined the potential mitigation of wage discrimination by organized labor. Though several studies have found union influence on ethnic wage discrimination, such studies have rarely found a sizable union impact on gender wage discrimination. A recent study in the United Kingdom and Lewis' (1986) review of wage differential literature in the United States both found the union

mark-up nearly the same for both men and women (Main and Reilly 1992; Lewis 1986). However, regarding ethnic wage discrimination, Lewis (1986) found strong evidence of a 0.05 to 0.10 wage gap difference between the total population and non-whites, indicating a larger union mark-up for non-whites. The benefits of unionization among indigenous people is observed in a recent study in Canada, where unionization was found to give indigenous workers a slight earnings advantage over non-Indians (Patrinos and Sakellariou 1992).

The examination of potential union mitigation of discrimination in this study finds that, unlike other studies based on developed nations, organized labor in Mexico plays a very strong role in reducing wage discrimination against employed women and indigenous people. The diminution of gender and ethnic discrimination is evidenced by the previously discussed differences in gender and ethnic variable parameters between the two full sample earnings equations in Table 3. Regarding gender, the difference in parameters between the union and nonunion sector reveals a negative marginal effect on the overall wage gap, indicating a greater union mark-up for women than for men. Analysis conducted on only the nonunion sector finds that 59.2 percent of the log hourly wage differential between men and working women is unexplained (controlling for endowment differences), whereas in the union sector, the log hourly earnings between genders is not statistically different.³ This analysis serves as strong evidence of the reduction and possibly the elimination of gender wage discrimination by organized labor in Mexico.⁴

³ Results available from authors upon request.

⁴ Note that this analysis only compares the union wage differential among working women. The reduction in gender wage discrimination by unions for all women, employed and unemployed, once accounting for selectivity, may differ.

Ethnicity plays a significant role in wage determination in the nonunion sector. The estimated *municipio* indigenous percent variable coefficient of -0.8 indicates that for each percentage point increase in the probability of a sampled individual being indigenous, the expected wage drops by 0.8 percent. Thus, for someone living in a seventy percent indigenous *municipio* his/her expected wage drops by a substantial 56 percent compared to someone living in a *municipio* with no indigenous people. In contrast, in the union sector the probability of being indigenous is statistically nonsignificant with regard to wage determination. In addition, the difference in estimated parameters for *municipio* indigenous percent reveals a greater union mark-up for those living in indigenous areas. Analysis conducted on only the nonunion sector finds 52.9 percent of the wage differential between those in less indigenous areas (less than 5 percent indigenous *municipios*) and those in more indigenous areas (above 20 percent indigenous *municipios*) can not be accounted for when controlling for endowment differences. Similar to differences in earnings by gender, in the union sector, the log hourly earnings between more and less indigenous areas is not statistically different. When compared to the aforementioned discrimination against indigenous people in the nonunion sector, the lack of statistical difference in earnings between indigenous and nonindigenous areas in the union sector serves as a strong indication that unions help to substantially reduce and possibly eliminate wage discrimination against indigenous people.

Northern Border

Nowhere do the relations between the United States and Mexico play a more significant role than they do in the border region between the two countries. The cross-border economic integration of this region proved a critical element in the debate over free trade. In the review of NAFTA, one of the most politically sensitive issues facing the United States and Mexico has been the labor issue. Much of the debate has been fueled by supposedly low Mexican wage rates, often a tenth of comparable wage rates in the United States, and the popular assertion that Mexican labor is reluctant to organize (Weintraub et al. 1991). Because of the increasing economic and political importance of the northern border, this section takes a closer look at this dynamic region.

Though overall wage rates in Mexico are considerably lower on average than wage rates in the United States, distinct regional variations in the wage rate in Mexico vary the degree of wage rate difference between the two nations. Analysis in regional wage variations in Mexico reveal that the northern border enjoys substantially greater wage rates than the rest of the country. Table 6 examines average hourly wages by region and union membership.

**Table 6: Union & Nonunion Hourly Wages (1989 pesos)
by Region**

	Region		
	North	Other	Total
Union	4,352	3,996 ‡	4,065 ‡
Nonunion	4,068 †	3,036	3,283
Total	4,137 †	3,321	3,506

Source: INEGI (1989)

Notes: † indicates statistical different at the 99% level from 'other' region. ‡ indicates statistical different at the 99% level from nonunion sector.

Hourly wages examined only by region show a considerable hourly wage advantage in the northern states, as previously noted (Table 3). Hourly wages examined only by union status, when not accounting for differences in worker quality, reveal a considerable wage advantage for union members. However, when hourly wages are examined by both union status and region, there is a revealing disparity. The mean hourly wage level in the northern region between the union and nonunion sector is only 6.98 percent, which, when controlled for endowment differences between the two sectors, amounts to the aforementioned -2.1 percent union wage gap. In the rest of the country, the mean wage rate difference between the two sectors is 31.6 percent or a much greater wage gap of 14.1 percent, when accounting for worker differences. This evidence seems to further substantiate the weaker position of unions in the northern region vis-à-vis the rest of the country. This assertion is further supported by the observed -2.3 percent probability of union membership in northern states found in the above union status logit analysis. This evidence suggests that Mexican labor in the northern states is less likely to organize and when organized is weaker in comparison to organized labor in the rest of the country.

To further examine the northern region, union and nonunion sector wage equations are estimated for only those observations in the northern states. Table 7 lists the two wage equations and the marginal contribution of various characteristics upon the overall wage gap. Examining the differences between the equations, it is interesting to note that in the union sector, with the exception of tertiary education, schooling makes no significant difference on hourly wage levels, indicative of the extent to which unions standardize rates of pay, reducing wage dispersion by permitting less individual variation in wages for workers. In the nonunion sector, the usual earnings-education profile is observed; that is, wages increase monotonically with education. Gender is nonsignificant in the union sector, and *municipio* indigenous percentage is nonsignificant in both sectors, most probably due to the small indigenous presence in the northern region.

**Table 7: Union and Non-union Hourly Earnings Functions
Northern States**

Variable	Sector		Marginal Contribution $\bar{X}(\beta_u - \beta_n)$
	Union	Nonunion	
Education level^a			
Primary	0.224 (0.53)	0.214 † (2.19)	0.004
Secondary Incomplete	0.465 (1.09)	0.584 ‡ (5.54)	-0.039
Secondary Complete	0.703 (1.64)	0.901 ‡ (7.88)	-0.027
Tertiary	1.080 † (2.52)	1.289 ‡ (11.34)	-0.032
Experience	0.053 ‡ (6.62)	0.063 ‡ (12.46)	-0.170
Experience squared	-0.0008 ‡ (5.08)	-0.001 ‡ (10.58)	0.095
Male	0.088 (1.57)	0.151 ‡ (3.86)	-0.042
<i>Municipio</i> Indigenous Percent	0.017 (1.23)	-0.006 (0.96)	0.024
Industrial Sectors^b			
Industrial Manufacturing	-0.0006 (0.005)	-0.196 (1.11)	0.054
Utilities	0.167 (0.873)	-0.527 (1.80)	0.007
Construction	0.191 (1.04)	-0.343 (1.89)	0.051
Commerce	-0.072 (0.48)	-0.217 (1.22)	0.024
Transportation	0.484 ‡ (3.17)	-0.152 (0.75)	0.023
Financial Services	0.245 (1.33)	0.117 (0.56)	0.003
Services	0.312 † (2.58)	-0.293 (1.67)	0.225
Constant	6.742	6.964	-0.222
Adjusted R ²	0.292	0.214	
N	541	1,652	
Adjusted Wage Gap			-0.021

Source: INEGI (1989)

Notes: † significant at the 95% level. ‡ significant at the 99% level. ^a Residual is no education. ^b Residual sector is extraction. Numbers in parenthesis are *t* values. β is the estimated coefficient. u and n subscripts represent union and nonunion subsamples, respectively. \bar{X} is the full sample weighted variable mean.

The variables controlling for industrial sectors reveal some interesting differences between the union and nonunion sectors and the northern region and the rest of the country. In the nonunion sector there is no statistically significant difference in wage rates between industrial sectors, whereas in the union sector the transportation and service industry wage rates are significantly different from the omitted extraction sector. The greater inter-industry wage dispersion of the union sector compared to the nonunion sector observed in the northern region differs from the greater nonunion inter-industry wage dispersion commonly observed in empirical analysis, including the earlier full sample analysis in this study (see Table 3).

Conclusions

The estimated union-nonunion wage gap, based on a subsample of 9,954 Mexican workers from a 1989 household survey, is about 10.4 percent. By international standards, specifically OECD countries, this is a low value and may suggest the relative weakness of organized labor in Mexico at the time of the survey. An exhaustive survey of the literature in the United States estimated an overall union-nonunion wage gap of around 14 percent over the period from 1967 to 1979. In none of the 12 years surveyed did the yearly average fall below 11 percent (Lewis 1986). A historical understanding of organized labor in Mexico supports the assertion that organized labor experienced difficult times in promoting the interests of its membership throughout most of the 1980s. However, the estimated 10.4 percent earnings advantage does indicate the existence of some bargaining strength, possibly

indicative of a recovery of organized labor's collective bargaining capacity, due in part to the improving economic situation of the country in the latter part of the decade.

The union wage gap varies considerably by personal, regional and sectoral characteristics. Personal characteristics, such as years of labor market experience, gender and ethnicity play an important role in determining the union-nonunion wage gap. Empirical analysis finds that workers with little or no work experience and workers with considerable work experience, women and indigenous people benefit to a greater extent in terms of hourly wages when employed in the union sector than when employed in the nonunion sector. Regional characteristics, most notably residence in northern states, are also important factors in wage gap determination. The northern region's estimated wage gap of -2.1 percent indicates a considerable diminution of union collective wage bargaining strength in this highly dynamic region, whereas the union wage gap in the rest of the country is estimated at a considerably higher 14.1 percent. Among industrial sectors, the variation in the wage gap is most pronounced in the services sector where a strong wage incentive exists in favor of union membership.

Organized labor in Mexico, as elsewhere, is found to have a strong influence in reducing wage dispersion. The concomitant of reduced wage dispersion - greater income equality, is also observed in the union sector where the estimated Gini coefficient is nearly 9 points below the nonunion sector's Gini coefficient, 33.5 versus 42.1.

Organized labor has a very strong influence in reducing gender wage discrimination and wage discrimination against the indigenous population. This study finds significant indications of greater wage discrimination against women in the nonunion sector, whereas in the union sector, average wage rates have no statistically significant difference between genders. The same is found true for native people. Where wage discrimination against native people is high in the nonunion sector, it is almost absent in the union sector, as evidenced by the lack of a significant statistical difference in hourly wages between indigenous and nonindigenous people.

This paper has attempted to measure the union-nonunion wage gap which should be differentiated from the more elusive (or more difficult to estimate) union wage gain. Where the union wage gap is essentially the difference in wages a worker would receive in the union sector versus the nonunion sector, the union wage gain is the difference in wages that would be observed in an economy in the presence of unions versus wages in the absence of unions. Therefore, though organized labor may at different times and in different regions not induce substantial wage gaps, it may have a substantial effect in increasing overall wage rates in general (both in the union and nonunion sector). This point is noted as a caveat in that the estimated wage gaps presented here should not be taken as the full measure of organized labor's effect on the Mexican wage structure, since the mere presence of unions can have a significant effect on wage rates and employment standards elsewhere in the economy.

It should also be noted that though unions do increase income equality and reduce wage discrimination, this parity may be at the cost of factor efficiency and subject to specific definition of equity. If one deems a decrease in wage inequality to a minimum as equitable, then it can be strongly argued that unions enhance equity among firms and perhaps the economy as a whole. However, if one perceives equity as compensation based on merit and effort, than the union standardization of wages and strict seniority rules regarding wages and benefits may seem inequitable (Hirsch and Addison 1986). The stage of a country's political and economic development is likely to influence preferences and policy choices in this respect.

The debate over the effect of unions on the overall economic efficiency of a nation is ongoing. Whether organized labor is conducive to national growth and the success of adjustment programs forwarded by international lenders, among others, has recently been addressed in an article by Freeman (1993), wherein he states, "Many economists see unions in developing countries as Peronist-style organizations that reduce efficiency at the enterprise level and produce populist inflationary macro-strategies. Some unions may fit this vision in some countries in some time periods; but the evidence of the late 1980's rejects it as a broad generalization" (Freeman, 1993: 404-405). He goes on further to add, "At the macro level, studies on the relation between unionism and adjustment in a variety of developing countries (Horton et al., 1991) have found that 'weakening of the unions...does not seem to be sufficient to ensure recovery', making it doubtful that 'launching into a wholesale advocacy of dismantling such institutions' is justifiable (see also Nelson, 1991)." (Freeman 1993: 405).

Though studies have shown that while unions have modest wage effects and reduce the growth of employment, consistent with standard analysis, they are also associated with lower turnover, greater worker training, increased benefits and higher productivity (Standing 1992). Surveying studies examining the net effect of unions on productivity, Sapsford and Tzannatos (1993) found that, though by no means unanimous, the weight of available evidence suggests that union workers are more productive than their nonunion counterparts in manufacturing. Moreover, the productivity differential between union and nonunion labor may be sufficiently large to offset the estimated union-nonunion wage differential (Ehrenberg and Smith 1991).

Due to the fundamental importance of organized labor in national economies, potential democracies and the role of the civil society, a greater effort should be placed in the accumulation of relevant data in the future in order to fill the analytical gaps that exists concerning unions in the developing world. The results of this paper reveal that though organized labor does effect the national wage structure in much the same way it does in the developed world, differences do exist. In the case of Mexico, these differences serve as valuable insights into the functioning of the labor markets in the developing world.

References

- Duncan, G. and D. Leigh. 1985. "The Endogeneity of Union Status: An Empirical Test." Journal of Labor Economics 3:20-34.
- Ehrenberg, R.G. and Smith, R. S. 1991. Modern Labor Economics. New York: Harper Collins.
- Freeman, R. B. 1980. "Unionism and the Dispersion of Wages," Industrial and Labor Relations Review 34:3-23.
- Freeman, R. B. 1981. "The Effect of Unionism on Fringe Benefits." Industrial and Labor Relations Review 34:489-509.
- Freeman, R. B. 1993. "Labor Markets and Institutions in Economic Development." American Economic Review 83:2.
- Halvorsen, R. and R. Palmquist. 1980. "The Interpretation of Dummy Variables in Semilogarithmic Equations." Journal of Human Resources 17:72-93.
- Hirsch, B. T. and J. T. Addison. 1986. The Economic Analysis of Unions: New Approaches and Evidence. Boston: Allen & Unwin Inc.
- Horton, S., R. Kangur and D. Mazumdar. 1991. "Labor Markets in an Era of Adjustment: an Overview," Policy Research Working Paper No. 694. Washington D.C.: World Bank Economic Development Institute.
- Instituto Nacional de Estadística Geografía e Informática (INEGI). 1992. XI Censo Nacional de Población y Vivienda, 1990. Mexico, D.F.
- Lee, L. 1978. "Unionism and Wage Rates: A Simultaneous Equations Model with Qualitative and Limited Dependent Variables." International Economic Review no. 7.
- Lewis, H. G. 1986. Union Relative Wage Effects: A Survey. Chicago: University of Chicago Press.
- Main, B. and B. Reilly. 1992. "Women and the Union Wage Gap." Economic Journal 102:49-66.
- Middlebrook, K. J. 1989. "The Sounds of Silence: Organized Labour's Response to Economic Crisis in Mexico." Journal of Latin American Studies 21:195-220.
- Moll, P. G. 1993. "Black South African Unions: Relative Wage Effects in International Perspective." Industrial and Labor Relations Review 46, 2:245-261.

- Nelson, J. M. 1991. "Organized Labor, Politics, and Labor Market Flexibility in Developing Countries." The World Bank Research Observer 6, 1:37-56.
- Park, Y. 1991. "Union/Nonunion Wage Differentials in the Korean Manufacturing Sector." International Economic Journal. 5, 4:79-91.
- Patrinos, H. A. and C. Sakelleriou. 1992. "North American Indians in the Canadian Labour Market: A Decomposition of Wage Differentials." Economics of Education Review 11, 3:257-266.
- Psacharopoulos, G. and Patrinos, H. A. (eds.) 1993. Indigenous People and Poverty in Latin America: An Empirical Analysis. Latin America and the Caribbean Region Technical Department, Regional Studies Program No. 30. Washington, D.C.: The World Bank.
- Psacharopoulos, G. 1993. Poverty and Income Distribution in Latin America: the Story of the 1980s. Latin America and the Caribbean Region Technical Department, Regional Studies Program No. 27. Washington, D.C.: The World Bank.
- Robinson, C. 1989. "Union Endogeneity and Self-Selection." Journal of Labor Economics 7,1:106-112.
- Sapsford, D. and Tzannatos, Z. 1993. The Economics of the Labor Market. London: Macmillan.
- Standing, G. 1992. "Do Unions Impede or Accelerate Structural Adjustment? Industrial versus company unions in an industrialising labour market." Cambridge Journal of Economics. 16:327-354.
- Weintraub, S. 1991. "Industrial Integration Policy: U.S. Perspective." In Weintraub (ed.), U.S.-Mexican Industrial Integration: the Road to Free Trade. Boulder: Westview Press.

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS1249	Competitiveness and Environmental Standards: Some Exploratory Results	Piritta Sorsa	February 1994	P. Kokila 33716
WPS1250	Explaining Miracles: Growth Regressions Meet the Gang of Four	William Easterly	February 1994	R. Martin 39026
WPS1251	Excise Taxes	John F. Due	February 1994	C. Jones 37699
WPS1252	On the Dangers of Decentralization	Rémy Prud'homme	February 1994	TWUTD 310C~
WPS1253	Can Competition Policy Control 301?	J. Michael Finger K. C. Fung	February 1994	M. Patena 37947
WPS1254	What Are OECD Trade Preferences Worth to Sub-Saharan Africa?	Alexander J. Yeats	February 1994	J. Jacobson 33710
WPS1255	Intrahousehold Resource Allocation: An Overview	Lawrence Haddad John Hoddinott Harold Alderman	February 1994	P. Cook 33902
WPS1256	World Fossil Fuel Subsidies and Global Carbon Emissions in a Model with Interfuel Substitution	Bjorn Larsen	February 1994	C. Jones 37699
WPS1257	Old-Age Security in Transitional Economies	Louise Fox	February 1994	E. Vincent 82350
WPS1258	Decentralizing Infrastructure: For Good or for Ill?	Richard Bird	February 1994	WDR 31393
WPS1259	The Reform of Fiscal Systems in Developing and Emerging Market Economies: A Federalism Perspective	Robin Boadway Sandra Roberts Anwar Shah	February 1994	C. Jones 37754
WPS1260	When Is a Life Too Costly to Save? Evidence from U.S. Environmental Regulations	George L. Van Houtven Maureen L. Cropper	February 1994	A. Maranon 39074
WPS1261	A Political-Economy Analysis of Free Trade Areas and Customs Unions	Arvind Panagariya Ronald Findlay	March 1994	N. Artis 37947
WPS1262	Flexibility in Sri Lanka's Labor Market	Martin Rama	March 1994	P. Cook 33902
WPS1263	The Effects of Barriers on Equity Investment in Developing Countries	Stijn Claessens Moon-Whoan Rhee	March 1994	F. Hatab 35835

Policy Research Working Paper Series

Title	Author	Date	Contact for paper
WPS1264 A Rock and a Hard Place: The Two Faces of U.S. Trade Policy Toward Korea	J. Michael Finger	March 1994	M. Pateña 37947
WPS1265 Parallel Exchange Rates in Developing Countries: Lessons from Eight Case Studies	Miguel A. Kiguel Stephen A. O'Connell	March 1994	R. Luz 34303
WPS1266 An Efficient Frontier for International Portfolios with Commodity Assets	Sudhakar Satyanarayan Panos Varangis	March 1994	D. Gustafson 33732
WPS1267 The Tax Base in Transition: The Case of Bulgaria	Zeljko Bogetic Arye L. Hillman	March 1994	F. Smith 36072
WPS1268 The Reform of Mechanisms for Foreign Exchange Allocation: Theory and Lessons from Sub-Saharan Africa	Eliana La Ferrara Gabriel Castillo John Nash	March 1994	N. Artis 38010
WPS1269 Union-Nonunion Wage Differentials in the Developing World: A Case Study of Mexico	Alexis Panagides Harry Anthony Patrinos	March 1994	I. Conachy 33669
WPS1270 How Land-Based Targeting Affects Rural Poverty	Martin Ravallion Binayak Sen	March 1994	P. Cook 33902
WPS1271 Measuring the Effect of External Shocks and the Policy Response to Them: Empirical Methodology Applied to the Philippines	F. Desmond McCarthy J. Peter Neary Giovanni Zanalda	March 1994	M. Divino 33739
WPS1272 The Value of Superfund Cleanups: Evidence from U.S. Environmental Protection Agency Decisions	Shreekanth Gupta George Van Houtven Maureen L. Cropper	March 1994	A. Maranon 39074