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POLICY RESEARCH WORKING PAPER

The Impact of Minimum Wages in Mexico and Colombia

Linda A. Bell

Comparative data from Mexico and Colombia are used to analyze the impact of minimum wages. In Mexico, low levels of compliance and ineffective levels of minimum wages imply negligible employment effects. In Colombia, where the minimum wage is closer to the average wage in the formal sector, the minimum wage has a significant impact on employment.

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Summary findings

There are diverging views about how minimum wages affect labor markets in developing countries.

Advocates of minimum wages hold that they redistribute resources in a welfare-enhancing way, and can thus reduce poverty, improve productivity, and foster growth. Opponents, on the other hand, contend that minimum wage interventions result in a misallocation of labor and lead to depressed wages in the very sectors — the rural and informal urban sectors — where most of the poor are found, with the effect of wasting resources and reducing the growth rate.

Data from Colombia and Mexico for the 1980s provide an opportunity to evaluate the impact of minimum wages. In Mexico in the 1980s, the minimum wage fell in real terms roughly 45 percent. By 1990, Mexico's minimum wage was about 13 percent of the average unskilled manufacturing wage.

During the same period, the minimum wage in Colombia increased at nearly the same rate, reaching

roughly 53 percent of the average unskilled wage.

Bell charts how the mandated minimum wage affected the demand for skilled and unskilled labor in both countries during that decade. She finds:

- In Mexico, minimum wages have had virtually no effect on wages or employment in the formal sector. The main reason: the minimum wage is not an effective wage for most firms or workers. In the informal sector, in turn, there is considerable noncompliance with the mandated minimum wage, especially among part-time and female workers. As a result, significant numbers of workers are paid at or below minimum wages.

- In Colombia, minimum wages have a much stronger impact on wages, judging from their proximity to the average wage and both cross-section and time series estimates. The estimates imply that the elasticity of low-paid unskilled employment with respect to minimum wages is in the range of 2 to 12 percent.

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The Impact of Minimum Wages in Mexico and Colombia

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Divergent trends in the real value of the legally imposed minimum wage in Mexico and Colombia in the 1980s provide a unique backdrop for evaluating the impact of minimum wages on developing economy labor markets. Whereas the minimum wage fell in real terms roughly 45 percent in the 1980s in Mexico, it increased at nearly the same rate in Colombia over an overlapping period of time. As a result, by 1990 the minimum wage stood at a level which was just 13 percent of the average unskilled manufacturing wage in Mexico and roughly 53 percent of the average unskilled wage in Colombia.

A review of the literature provides two clear and divergent views on the normative impact of minimum wages on labor markets in developing economies (Freeman, 1991). The advocate view holds that minimum wages redistribute resources in a welfare enhancing way, and as such have the potential to reduce poverty, enhance productivity, and foster growth. The distortionist view suggests that minimum wage interventions misallocate labor and lead to depressed wages where most of the poor are found-- in the informal urban sector and in the rural sector-- with the effect of wasting resources and reducing the rate of growth.

This paper charts the effect of the federal mandated minimum wage on labor market outcomes in Mexico and Colombia over the 1980s. Specifically, using unique panel data on formal sector manufacturing firms, the paper estimates the impact of minimum wages on the demand for skilled and unskilled labor in both countries. Important differences are found in the employment response of labor to minimum wages in the two countries. Specifically, substantial disemployment effects of minimum wages are found only in Colombia, where the impact is greatest on low skilled employment. In Mexico, in contrast, the disemployment impact of minimum wages is zero, at least using the firm level data for formal sector manufacturing establishments. The key explanation for this fact has to do with the relationship of the legally imposed minimum wage to the distribution of average unskilled wages across firms-- the minimum wage is very far to the left in the Mexico distribution and much closer to the mean in the Colombia distribution. Minimum wages are ineffective in the formal sector in Mexico and effective in Colombia.

Data from individuals is available in the case of Mexico to supplement the firm panel data. The individual data for Mexico show that the minimum wage has had an important effect on the unskilled

wage distribution in Mexico which is not picked up in average firm wages. The data also reveal considerable amounts of noncompliance with the federally mandated minimum wage especially among part-time and women workers, and predominantly in the informal sector. Reconciling differences in the two data sources focuses on the role of informal sector labor in the Mexican economy-- and suggests that estimates from the firm panel data may not capture the broader and more complete impact of minimum wages in Mexico.

I. Trends in Minimum Wages

A Simple Model of Minimum Wages

The simplest model of the minimum wage and its effect on employment focuses on a single competitive labor market with homogeneous workers, whose wage in equilibrium is below the legally set minimum wage. Incomplete coverage under the minimum wage gives rise to two diverse and segmented labor markets with two sets of wages and with different distributional and employment impacts of the minimum wage in both the covered and uncovered sectors. Application of this model to workers with heterogeneous skill is relatively straight forward (Welch, 1974; Gramlich, 1976; Mincer, 1976, among others).

In a developing country context it is more reasonable to think of there being three sectors of the labor market: (i) a large urban formal sector where coverage is complete and enforcement is present; (ii) a somewhat smaller urban informal sector in which coverage and enforcement are rare and incomplete, and; (iii) an uncovered rural sector. Although data restrictions often impose studying the impact of minimum wages in the formal sector of the economy, the impact of minimum wages on informal sector and rural wages is nontrivial, since it is in these sectors that most of the developing economy poor are found.

In fact an appeal to theory yields easily identifiable parameters for bracketing the effects of minimum wages outside of the formal economy. Assuming perfect mobility between sectors, Hamermesh (1993) formalizes the relationship between rural and urban wages as follows:

$$(1) W_r = u(W_o) + (1-u)W_m$$

where W_m is the legally enforced minimum wage which applies to the urban formal sector, W_o is the wage in the urban informal sector, W_r is the rural wage, and $(1-u)$ is the fraction of workers employed in the modern urban sector. Differentiating W_r with respect to the minimum wage yields (where E_m is modern sector employment):

$$(2) dW_r/dW_m = (W_m - W_o) dE_m/dW_m + (1-u)$$

and thereby highlights the key parameters of interest. From (2) it is easy to see that a higher minimum wage will have an ambiguous effect on rural wages. The minimum wage will be more likely to depress rural wages (i) the larger is the elasticity of demand for labor in the urban formal sector, (ii) the greater is the gap between wages in the formal and informal sectors, and (iii) the smaller is the urban formal sector. Although data are not available from which to analyze the impact of the minimum wage changes on rural sector wages directly, the three parameters at least provide a gauge for speculating on the broader impact of minimum wage policies in Mexico and Colombia.

The Data

Table 1 summarizes the behavior of wages and the national weighted minimum wage over the period 1984 to 1990 in Mexico.¹ Panels A and B of the table use information on monthly wages paid to workers from Mexico's Annual Industrial Survey of manufacturing firms over the period 1984-1990.² Panel C supplements this information using data from the Mexican Encuesta Nacional de Empleo for 1988, a household survey covering workers in both urban and rural Mexico.³

¹Minimum wages in Mexico are set regionally and may differ by occupation. Table 1 presents weighted averages based on these data.

²The Industrial Survey is of predominantly large firms in the formal sector. Data were provided by Mexico's Secretary of Commerce and Industrial Development (SECOFI).

³All of the tabulations and regression results from the 1988 Mexican Household data were performed and provided by Ana Revenga.

Several trends are clear from the table. First, the value of the real minimum wage has eroded in Mexico over the period 1984 to 1990. With the exception of 1985, the trend decline in the value of the real minimum is continuous over this period. Second, the ratio of the minimum wage to the mean wages of both blue and white collar workers has eroded as well, although not as rapidly as the minimum given sizable reductions in real wages for all groups of workers over this period. In 1984, the minimum wage represented 22 percent of the value of the average Mexican wage and 42 percent of the value of the average Mexican blue collar wage. By 1990 these ratios had declined to 13 percent and 31 percent respectively. Panel B of the table shows that consistent with the decline in the real value of the minimum wage and its relationship to average wages paid in Mexico, the share of firms paying average wages near the minimum has declined as well, and quite dramatically over this period. The relationship between wages and the minimum wage suggested by the Mexican household data in Panel C is different however, suggesting that significantly greater numbers of *individuals* as opposed to *firms* have been affected by minimum wage legislation. This is a potentially important difference to which I will return in the analysis that follows.

Table 2 summarizes minimum wage and wage trends using Colombia's Annual Industrial Survey, a survey of large manufacturing firms that is similar to the Mexican Survey, over a partially overlapping period of time.⁴ The data for Colombia show the opposite trend to that of Mexico over the 1980s, with rising real minimum wages, rising ratios of minimum to average wages, and greater shares of firms with wages in the range of the legislated minimum over the 1980s. In addition to differences in trend there are sizable gaps in magnitude in the two tables-- whereas 27 percent of firms in Colombia reported paying unskilled workers average wages that were below 1.5 times the Colombian minimum wage in 1987, only 10 percent of Mexican firms reported paying unskilled Mexican workers average wages in this range. Indeed, at no time was the impact of the minimum wage on firm wages in Mexico as great as it was in Colombia over the common period analyzed here.⁵

⁴Beginning in 1984 the Survey was restricted to firms with greater than 10 employees.

⁵Although the Mexican Household Survey Data give estimates of affected workers that are closer to the Colombian figures at least in 1988, they include informal as well as formal sector workers, and are not strictly comparable for this reason.

Information about firms that pay low average unskilled wages (and are therefore minimum wage constrained) and those that pay relatively high average wages (and are therefore likely to be unaffected by minimum wage changes) are presented for descriptive purposes for Colombia in Table 3. As a reasonable bracket on firms likely to be affected by minimum wage changes, the table contrasts the characteristics of firms paying wages below 1.5 times the minimum wage to those paying wages above this cutoff.⁶ The table reveals interesting differences between low and high wage firms in Colombia. Not surprisingly, the low wage firms are relatively young (the mean of age in 1977 is less than 2 years), small (with less than half the number of workers than unconstrained firms), and employ somewhat greater shares of unskilled workers. They are disproportionately located in one sector-- textiles and leather-- with high concentration as well in food and tobacco, and machinery and transportation equipment. Differences between the urban concentration of low and high-paying Colombian firms are insignificant.

Wage histograms detailing the distribution of firm and individual level wages from the three data sets are presented as a final backdrop from which to evaluate the impact of minimum wages in Figures 1-5. To the extent that minimum wages are effective, we should observe a notable spike in the distribution of wages at or near the imposed minimum wage. If minimum wages are not effective, or are effective but poorly enforced, then the spike in the distribution will occur to the right of the minimum wage in the first case, and will reveal sizable shares of subminimum firms or workers in the second case.

Figure 1 shows that the minimum wage has virtually no impact on the distribution of average wages reported by firms in Mexico, since the spike that does occur in the distribution does so significantly far to the right of the legally imposed minimum wage-- with the median Mexican unskilled wage 1.06 In points above the minimum wage in the 1990 chart. The table also reveals very little evidence of non-compliance with the minimum wage, since virtually no firms are identified as paying wages below the minimum wage. Figure 2 disaggregates the data somewhat, presenting blue collar wage distributions in low paying sectors and regions where the minimum might be likely to have its greatest impact. Although only a very small share of even the lowest paying firms are constrained by minimum wage legislation in

⁶This cutoff was arbitrarily chosen. There are insignificant differences in the means reported in Table 4 using 1.1, and 1.3 as alternative criterion.

the wages they pay workers, the figures reveal the existence of sizable industry and regional effects in Mexico, and suggest that at least in relative terms the impact of minimum wage legislation may be unequal across firms.

Wage distributions from the Mexican Household Survey in 1988 (Figure 3) contrast noticeably with the data from Mexican firms. Indeed, according to these distributions, wages in Mexico are closer to the legally enforced minimum-- the differences between the median and minimum wage is .66 ln points for male workers and .53 ln points for female workers in the formal sector, even though these medians reflect the wages of both high and low skilled workers. For female workers in the informal sector, by contrast, there is a virtual spike at the minimum wage (with just .09 ln points separating minimum and median wages), and evidence of a high degree of noncompliance.⁷ Figure 4 looks in greater detail at wages reported in the six largest categories of occupations in order to get a better gauge on the distribution of low skilled wages in relationship to the minimum wage and thereby for comparison with the firm level data. The data in this figure are restricted moreover to formal sector workers. As is clear from the figure, and in contrast to the data on firms, the minimum wage lies in close proximity to the average wage in the lowest skilled distributions.

A stylized fact of some importance and concern emerges from the comparisons of the firm and household data in Mexico-- namely, that the estimated impact of minimum wages on employment in Mexico will depend on the use of establishment versus household data. All else equal, the discrepancy between the two surveys suggests that estimates of minimum wage effects based on individuals are likely to exceed those based on firms, and suggests that the more thorough examination consider, whenever possible, both sets of data.

Figure 5 plots the distribution of average skilled and unskilled wages across firms from the Colombian panel data, and shows a spike in the distribution which is relatively close to the legally

⁷Minimum wage legislation in Mexico applies to all workers regardless of firm size.

imposed minimum wage (the median-minimum differential is .43 for unskilled workers and .50 for skilled workers).^{8,9}

II. Evidence on Wage Inequality

One consequence of the Heckman and Sedlacek (1981) model, which evaluates the effects of the minimum wage on workers with heterogeneous skill, is the prediction that wages of all workers able to retain covered sector employment following a real increase in the value of the minimum wage will rise in equal proportion to the minimum hike. This view contrasts with the experience of several countries including the U.S., where evidence suggests that minimum wages have disproportionately small effects on wages above the minimum (Grossman, 1983). If minimum wages have a larger impact on the wages of low paid workers, then an increase in the minimum wage (or an expansion in coverage) should compress wages among high and low paid workers, and therefore decrease measured wage inequality. Conversely, a fall in the real value of the minimum wage (or a narrowing of coverage) should result in a rise in wage inequality.

Abstracting from the effect of minimum on individual wages to consider their effect on firm average wages seems a reasonable extension of the theory. Reworked, the idea would be that firms that pay wages at the minimum would be more affected by real changes in the minimum wage than would firms paying wages far in excess of the minimum wage. One might logically reason that higher real minimum wages would cause a narrowing in differences between firms or industries because of this effect. Indeed, if this were the case, we should expect to see some evidence of rising inequality in the Mexican firm data and falling inequality in the Colombian firm data. All else equal,¹⁰

⁸ Of course the precise shares of affected workers will depend on the proximity of the firm's average wage to the minimum, the relationship between mean and median wages (the distribution), and the level of inequality in earnings (the standard error of wages within firm).

⁹ Histograms produced for apprentice and technician workers showed a spike that occurred considerably far to the left of the minimum wage line. Although both distributions spike to the left of the legally imposed minimum-- and might therefore warn of high levels of noncompliance among certain groups-- the excessively low average wages are most likely due to the relatively high use of part-time and part-year work among apprentice and technician labor, and idiosyncrasies in the data that do not permit for an adjustment in light of this fact.⁹

¹⁰ Alternatively, rising inequality may be the result of poor economic growth and the differential impact of recession on high and low paying firms.

the greatest impact should be on unskilled wages, since these averages will be closer to minimum wages.

Consider first the case of Mexico. Table 4 lists for Mexico various measures of wage inequality for unskilled, skilled, and aggregate employment in manufacturing firms from 1984 to 1990. As is clear from the table, wage inequality has risen somewhat within Mexico over this period, both across industries and across firms within industries. Although high and low paying firms are not uniformly distributed across Mexican states, there is little evidence of changing dispersion here.

Table 5 presents inequality measures using the Colombian data. The first thing to note is the greater equality of inter-industry wages among firms in Colombia. The data show moderate declines in inequality both within and across industry, although the equalizing effect is somewhat stronger among skilled workers. As in Mexico, the greatest effect is within industry, with little trend across regions.¹¹

In sum, patterns in wage dispersion in Mexico and Colombia are consistent with the view that minimum wages have their greatest impact on the earnings of workers, and perhaps firms, whose wages lie nearest to the minimum wage. Falling inequality in Colombia over a period of time that brackets a very severe recession is perhaps the more interesting stylized fact, because it is not easily explained by business cycle conditions.¹²

III. The Impact of Minimum Wages on Employment and Wages

Time Series Data

Given the largely national scope to minimum wage fixing in the U.S., time series studies have dominated the literature on U.S. minimum wages and their effect on wages and employment (for excellent summaries of these studies see Brown, Gilroy, and Kohen, (1982) and Hamermesh (1993)). A limited time-series of data are available in Mexico and Colombia that permit somewhat analogous tests to those

¹¹Both economies are highly corporatist, which might explain the dominance of within industry effects.

¹²If workers who hold high paying "good jobs" are more protected than marginal workers who hold "bad jobs" in a downturn then wage inequality should be counter cyclical. The work of Wachter (1970) on the interindustry wage structure confirmed this counter cyclicity when applied to the gap between union and nonunion wage differences. DiNardo and Lemieux (1994) suggest that the decline in union institutions, not supply and demand factors, is responsible for the rise in inequality in the U.S. in the 1980s.

conducted in the United States. Specifically, I estimate the following relationships in both countries over time:

$$(3) \ln(\text{wage})_t = \alpha_1 + \alpha_2 \ln(\text{min})_t + \alpha_3 \ln(\text{GNP})_t + \alpha_4 \ln(\text{price})_t + \alpha_5 \text{trend} + \varepsilon$$

$$(4) \ln(\text{emp/pop})_t = \beta_1 \ln(\text{min/avewage})_t + \beta_2 \ln(\text{GNP})_t + \beta_3 \ln(\text{price})_t + \beta_4 \text{trend} + \varepsilon$$

where min is the legally imposed minimum wage, min/avewage is the minimum wage deflated by an average (manufacturing) wage which may be weighted by coverage and is equal to the weighted national average wage in Mexico and the large cities minimum wage in Colombia,¹³ and real GNP (or the unemployment rate) is used to control for business cycle conditions and its affect on both wages and employment.

Table 6 presents the estimates from equations (3) and (4) using annual manufacturing data for Mexico and Colombia. The aggregate data show significant minimum wage effects in Colombia but not in Mexico over overlapping periods of data. The implied elasticities suggest that the increase in the relative value of the minimum wage in Colombia from 1977 to 1987 (roughly 15 percent) had the effect of reducing manufacturing employment by 5 percent over this period. This effect is similar in magnitude to that found in Puerto Rico (Castillo-Freeman and Freeman (1992)) and in the U.S. for young workers (Hamermesh (1993)).

Panel Data from Firms

The difficulties associated with evaluating the effects of minimum wages from a cross-section of firms are well known (Hamermesh (1993), Brown, Gilroy, Kohen (1982); Freeman (1979)). The biggest problem comes from the fact that most of the variation in the minimum wage variable-- typically

¹³Data limitations prevent weighting by coverage in either case, although this omission presents larger problems in the case of Columbia. Specifically, the fixed provision that subjects Columbian firms with assets greater than pesos \$200,000 to minimum wage laws has had the effect of extending minimum wage coverage, since inflation and devaluation have eroded the real value of this nominal target over time. The fact that smaller firms have increasingly become subject to minimum wage laws in Columbia suggests that the above equations may underpredict the true negative impact of minimum wages on employment/population ratios in Columbia over this period.

measured as the ratio of minimum to average firm wages-- comes from the variation in wage levels across firms, and not from variation in the minimum wage. Disentangling "minimum wage effects" from "firm wage effects" is difficult in this case. The existence of regional minimum wages in Mexico,¹⁴ and the dual structure of minimum wage payments in Colombia¹⁵ (with differentiation for large cities versus other areas) makes these countries appealing to study since there is greater measured variation in minimum wages. Panel data from manufacturing firms provide variation over time and a changing trend in the real value of the minimum wage in each country adds a further element of heterogeneity to the minimum wage variable.

In order to isolate the impact of the minimum wage on the employment of unskilled and skilled labor, I consider the firm conceptually as employing three types of labor, namely skilled, high paid unskilled, and low paid unskilled labor. Corresponding to each type of labor is a factor price-- the skilled wage, the unskilled wage, and the minimum wage, respectively. Following Hamermesh (1982) an appropriate specification of the effect of a minimum wage change on low paid unskilled labor must hold fixed for the effect of such a change on the higher paid tail of the unskilled distribution and on the wages of the more skilled. Assuming that the supply of each type of labor to the firm is perfectly elastic,¹⁶ firm employment (for either unskilled or skilled labor) is given as a function of the price of all inputs (including the minimum wage), and output prices (which is available at the 4-digit ISIC level and is comfortably thought of as an instrument for firm output). Specifically, we have:

$$(5) \text{ Employment} = f [\text{min}, p_l, p_k, p_m, p_e]$$

¹⁴Fourteen regional minimum wages were in place in Mexico in 1984, although this number has diminished through time as the Mexican government has gradually tried to equalize differences across regions. For example, by 1990 only five regional minimum were differentiated and enforced in Mexico.

¹⁵In Columbia the dual-minimum wage structure which differentiated between large cities and smaller cities and agricultural areas was replaced with a single minimum wage in 1985.

¹⁶Even with plant level data for the most unskilled workers this assumption is troublesome, although the existence of large urban informal sectors in most developing economies offers hope that it may be a better approximation to reality in a developing country context. Certainly for the unskilled and minimum wage labor (whose wages are set by fiat) the assumption seems most reasonable.

where \min is the legally mandated minimum wage which is lagged one year in most specifications,¹⁷ p_l represents the price paid to wage labor of varying types, p_k is a measure of the cost of capital (available in the Mexico data only), p_m is a raw materials price, p_e is an energy price (available in the Colombia data only), and ppi is an output price deflator for the ISIC at the 4-digit level.¹⁸ Generalizing equation (3) allows estimation of the following system of equations for skilled and unskilled labor:

$$(6') E_{US} = \alpha_1 + \alpha_2 \min/ppi + \alpha_3 P_{US}/ppi + \alpha_4 P_S/ppi + \alpha_5 P_K/ppi + \alpha_6 P_M/ppi + \alpha_7 P_e/ppi + \varepsilon_1$$

$$(6'') E_S = \gamma_1 + \gamma_2 \min/ppi + \gamma_3 P_{US}/ppi + \gamma_4 P_S/ppi + \gamma_5 P_K/ppi + \gamma_6 P_M/ppi + \gamma_7 P_e/ppi + \varepsilon_2$$

All variables estimated in logarithms. Less restrictive versions of the model that ignore the implicit homogeneity assumption implied by the output price deflation are presented as well in the results that follow.

Table 7 presents estimates of equations (6') and (6'') for Mexico. Ordinary-least squares estimates in columns (1) and (7) of the table for unskilled and skilled workers respectively yield large estimated gross elasticities of employment with respect to the minimum wage, but wrong-signed own-factor price elasticities for both skilled and unskilled employment. The estimates of cross-price elasticities from the unskilled regression are correctly signed, although the skilled estimates fail to provide evidence in favor of capital-skill complementarity. Industry, occupation, region, and year effects are highly significant in both OLS equations.

Columns (2)-(6) and (8)-(11) of the table present various estimates of the model controlling for within-firm variation in the response of employment to changes in factor prices. The fixed effects estimates abstract from differences in scale, technology, and various other factors that are likely to influence the speed and magnitude of factor share response in so large a cross-section of firms. The fixed-effects estimates for the basic model are presented in columns (2)-(4) of the table for unskilled workers,

¹⁷In both Mexico and Columbia, minimum wages are frequently revised throughout the year, and annual minimum wages may represent an average of multiple year revisions. In addition, even where minimum wages are not revised throughout the year, they may typically be announced (as was the case in Columbia) in mid-year.

¹⁸Factor price data are derived using quantity and value data on the purchase of the relevant factor.

and in columns (8) and (9) of the table for skilled workers. Own factor-price elasticities are the correct sign and reasonable magnitudes, although given a ratio of unskilled to skilled labor that averages near two in the Mexican data, they are not symmetric in estimated cross-price effects. The estimates show that minimum wages have no impact on the employment of either unskilled or skilled Mexican workers within firms--the coefficients are small, often wrong-signed, and statistically insignificant from zero in all cases. This is true in the case of both contemporaneous and lagged minimum wages.¹⁹ Columns (5)-(6) and (10)-(11) of the table relax the homogeneity condition imposed by looking at factor price ratios and focus instead on ln levels of factor prices. Sectoral output prices (at a 4-digit ISIC level) and the predicted value of sectoral output (at a 2-digit ISIC level)²⁰ are added alternatively as instruments for firm-level output. There is no notable impact of any of these changes on the estimates summarized above.

Table 8 estimates a similar set of employment equations for Colombian firms from 1981-1987. Earlier years were initially excluded from the panel because they did not provide information about factor prices other than labor. Data on the cost of capital were not available in the Colombian data although energy prices were.

Ordinary least squares estimates of the restricted model are presented in columns (1) and (9). Similar to Mexico, the OLS estimates produce wrong signed and significant own-factor price elasticities that contradict conventional wisdom.²¹ The fixed effects equations produce more sensible estimates of the relevant parameters. Own-price elasticities are correctly signed and of reasonable magnitude, and given a ratio of unskilled to skilled labor of roughly 2.5, they are roughly symmetric in estimated cross price effects. Consistent with theory, the results yield a significantly higher estimated own-price elasticity for unskilled labor. Energy and raw materials prices are estimated p-substitutes for high skilled labor; energy is an estimated p-substitute for low skilled labor as well and the relationship between raw materials prices and unskilled labor is less stable.

¹⁹Minimum wage data in Mexico are revised quarterly, and annual minimum wage are derived as averages of these quarterly figures. For this reason, the lagged minimum wage has greater economic content in an employment equation.

²⁰Predicted values of sectoral output at the two digit level are obtained from an auxiliary regression on sectoral output on output prices and industry dummy variables.

²¹This may be explained by, among other things, the existence of very sizable firm-size wage effects in both countries over this period.

The estimates in Table 8 strongly confirm the proposition that the minimum wage substantially affected employment in manufacturing firms in Colombia. The sizable minimum wage effects are robust across alternative specifications and using both lagged and contemporaneous minimum wage information. The elasticity of employment with respect to the minimum wage is in the range of .15 to .33 in the case of unskilled workers, and .03 to .24 in the case of skilled workers²², depending on lag structure and the exact specification of the other parameters. The firm panel data is therefore crudely consistent with the magnitude of effects implied by the time series estimates.

The estimated elasticities are presumably a lower bound on the true effect of minimum wages on low wage labor. If we take as a guide the fact that 27 percent of Colombian firms report wages within a range of 1.5 times the minimum wage, and as a crude approximation assume that roughly the same percentage of individuals are so affected, then the implied minimum wage elasticities for minimum wage labor may be as high as .55 to 1.22, depending on specification.²³ In any case, without more precise information, it is probably best to think of the two sets of estimates as bracketing the true effect of the minimum wage on low wage, low skilled Colombian labor. Together, they suggest that the roughly 10 percent rise in the real value of the minimum wage from 1981-1987 (Table 2) reduced low skilled low wage Colombian employment in the range of 2 to 12 percent over the period.

Alternative Specifications with the Colombia Data

Several relevant issues of design may weaken the Colombia firm level employment regression results. First, although a dual structure to minimum wage fixing with differential rates for large and small cities persists in Colombia through the 1984 period, by 1985 the country had established a single national minimum wage standard. This eliminates the valued heterogeneity in the minimum wage over the later period and makes interpretation of the minimum coefficient difficult at least over this range. If

²²The differences between the average wages of skilled and unskilled wages are relatively small in Colombia (a .07 ln point differential) which might explain the impact of minimum wages on the employment of this group.

²³This assumes implicitly that the distribution of wages is roughly normally distributed *within* firms (as it is across firms) and affected firms are no bigger than average size, as a lower estimate on the effect. In fact from Table 3 it is clear that affected firms tend to be the smaller firms, implying if anything a greater multiple effect.

minimum wages have the estimated effects on employment as described in the Table 8 regressions, then it would follow that a rise in the relative value of the large cities minimum wage should, *all else equal*, decrease large cities employment relative to small cities employment over time. Because a majority of firms in our sample are in large cities and because these firms tend to be larger and more stable, I focus on employment trends in this group relative to the minimum wage. Smaller firms located in small cities are less stable and the employment numbers show less of an interpretable trend over time.

Figure 6 plots the ratio of the large cities minimum to average wage, and the relative employment share of large cities to small cities for both unskilled (top panel) and skilled (bottom panel) employment over time. As is clear from the figure, there is an inverse relationship between the two series over time, which is especially strong for unskilled employment-- the group at or near the minimum wage and most likely to be affected by value changes. Although suggestive at best, the minimum wage plot is supportive of the interpretation given to the Table 8 regression results.

Second, although the theoretical model directs that all input prices other than wages be used in the employment equations, limiting ourselves to this restriction forces estimation over the 1981-87 subperiod since input price data are not available prior to that date for Colombia, and therefore does not capture the period of most rapid rise in the real value of the minimum wage. Table 8.A tests the robustness of the employment demand equations by moving away from the reduced form equations of (6') and (6'') in a variety of ways. In columns (1)-(4), I estimate the responsiveness of unskilled employment to minimum wages (columns 1-2) and lagged minimum wages (columns 3-4) over the period 1977 to 1987, omitting by necessity both materials and energy input prices. In both column (1)-- the restrictive specification-- and column (2)-- the unrestricted specification-- the effect of the minimum wage on employment is insignificantly different from zero. Lagged minimum wage effects are generally stronger and in the case where input price levels are used, the estimated minimum wage elasticity is of similar magnitude to the earlier estimates. These results, especially for contemporaneous minimum wage effects, conflict with and therefore challenge the earlier estimates, although the 1981-87 calculations reproduced from Table 8 and estimated in columns (5) and (6) without input prices *also* produce insignificant and muted coefficient estimates on the contemporaneous minimum wage variable. Presumably, input prices

are an omitted variable of importance to both the full period (1977-87) and sub-period (1981-87) contemporaneous regressions.²⁴

A third concern with the earlier interpretation is the parameterizing of the effects of minimum wage fixing on unskilled employment in Mexico. In arriving at an implied elasticity of unskilled employment with respect to the minimum wage in the range of -.55 to greater than -1.0, I have generalized about the distribution of affected *individuals* based on information about the distribution of *firms* that pay wages at or near the minimum. It may be equally reasonable to think of *all* unskilled workers as potential minimum wage workers and base calculations of impact on estimates that exclude the unskilled wage. Columns (5) and (6) of Table 8A re-estimate the basic employment equations from Table 8 omitting the unskilled wage. The coefficient estimates suggest implied minimum wage elasticities as high as .45, but much smaller than the distribution adjusted interpretation given to the coefficient estimates in the previous section.

As a final issue, columns (7) and (8) of the table balance the panel data by dropping firms missing data over the 1981 to 1987 period. Presumably this has the effect of isolating only the largest and most stable firms, and has the advantage of comparability with the Mexico data, which has been balanced by design. Given the existence of sizable firm-size wage effects in the Colombia data,²⁵ the balancing should reduce the estimated minimum wage elasticity. As is clear from the table, balancing the panel in this way reduces the number of observations by over 50 percent, and produces unstable coefficient estimates of the minimum wage impact on low wage employment.

The most serious threat to the estimated minimum wage elasticities from the original Table 8 regressions arises due to the fact that over the 1977-87 period -- the entire sample period covered by the Colombia data -- the contemporaneous effects of minimum wages on employment are statistically insignificant. However, the fact that input prices matter is not surprising given the Table 8 results and the likelihood of some correlation between input prices and the minimum wage, and in any case, the omission

²⁴Lagged minimum wage effects remain significant in the 1981-87 specifications omitting other input prices. Energy prices and materials prices are p-substitutes to unskilled labor and presumably are correlated positively with the contemporaneous minimum wage.

²⁵There is as much as a 60% firm-size differential between the top 1/5 sized firms and the bottom 1/5 sized firms in the Colombia data.

of input prices from the later period estimates in Table 8 has a similar dampening effect. In any case, a simple plot of relative minimum wage trends to relative employment trends is strongly suggestive of a negative relationship between unskilled employment and minimum wages over time. In sum, the empirical results indicate that minimum wage fixing has had a negative and significant impact on unskilled employment in Colombia, at least over the 1980s following and coinciding with a period when minimum wages were rising in relative importance.

IV. Minimum Wages and Labor Market Segmentation

Coverage under minimum wage laws was granted to all Mexican workers as part of the 1974 revised labor code irrespective of the size of the enterprise in which they work (Roberts, 1991). In theory, this should cover the 50.5 percent of urban wage earners who were employed in the informal sector in 1988. The wage histograms in figures 3 and 4 suggest otherwise, since they reveal large shares of individuals whose wages fall below the minimum wage. Because the urban informal sector is quite large in Mexico it is an important outlet for displaced formal sector workers and a major employer in Mexico. Understanding the characteristics of the employed in this sector is important for this reason. Using the household data to examine differences between formal and informal sector work and workers may help to verify the establishment level results.

Table 9 examines in detail the issue of noncompliance using 1988 Mexican Household Survey data. The incidence of non-compliance with the minimum wage-- defined here as the proportion of individuals reporting wages below the federally mandated minimum wage-- varies considerably according to whether the individual reports that he or she works in a formal sector private job (receives social security and works in a registered private firm) or not. As expected, non-compliance is far more prevalent in the informal sector than in the formal sector in all cases and for all categories of workers.

Despite large formal/informal sector differences, what may be most striking about the results in Table 9 is the degree of compliance that actually exists in the informal sector. Indeed, greater than 80 percent of full-time male informal sector workers earn wages in excess of the minimum wage, and nearly 60 percent of full-time female workers are so compensated. The numbers may reflect efforts to comply

with minimum wage laws in the informal sector; alternatively, they may be an unrelated consequence of the steady slide in the real value of the minimum wage in Mexico since the late 1970s.

Several other facts emerge from the Table 9 means. First, male full-time workers are unlikely to earn below minimum wages regardless of whether they work in the formal or informal sectors of the Mexican economy, and regardless of their occupation, region of work, or educational status. These data are therefore consistent with the firm level data in showing a weak impact of the minimum wage on male workers, since roughly 80 percent of the unskilled employed in the firm level data are male. Second, part-time workers are far more likely to be paid sub-minimum wages than are full-time workers. This is true for both the formal and informal sectors and is especially pronounced for female workers. Third, women are more likely to earn sub-minimum wages than are their male counterparts with comparable education, labor market status, and occupation. Fourth, sub-minimum wage workers are more likely to be found in lower paid occupations (laborers, salespersons, and service workers), although these differences seem to be more pronounced in the formal sector. In the urban informal sector sub-minimum wage earners are more evenly spread across-diverse occupations, and especially so for female and part-time workers. Fifth, non-compliance is higher in the (relatively poor) South than in the Federal District (which surrounds Mexico City) and the (relatively rich) North.

To what extent are the differences between the formal and informal sectors noted above the result of labor market segmentation? To what extent do they arise from differences in the characteristics of informal workers and informal jobs? In order to better understand the origins of formal and informal sector pay differences, I used the 1988 data and evaluated mean earnings differences after controlling for competitive factors commonly associated with these differences. Specifically, OLS equations were estimated linking \ln hourly income to a set of variables capturing characteristics of the individual (education and experience), and of the job (occupation, industry and region). A dummy variable was included for whether or not the individual was a formal sector worker. Two definitions of formal sector

status were used in alternative specifications with qualitative similar outcomes in each case.²⁶-- the more restrictive definition is used in the analysis that follows.

Given substantial differences in the patterns of formal and informal work according to gender and labor market status and in order to better characterize these differences, table 10 presents earnings equations for male and female full- and part-time workers considered separately. Column 1 shows an 11 percent advantage to formal sector work for male workers-- which is majority explained by differences in relative endowments of human capital (column 2). The column 3 results suggest that after controlling for occupation, industry, and region, formal sector workers earn roughly 4 percent more than comparable informal sector workers. Columns 4-6 show similar although much larger returns to formal sector work for part-time male workers.

Columns 7-12 complete the analysis for female full-time (columns 7-9) and part-time (columns 10-12) workers and demonstrate the much larger benefits of formal sector status for Mexican women. Specifically, women with formal sector work receive on average wages that are 52 percent higher than women with informal sector work-- an advantage more than twice that of males. Although most of this difference is explained by differences in the characteristics of formal and informal sector jobs, female workers in formal sector jobs receive 15 percent higher hourly pay than otherwise comparable workers in the informal sector.

One potential problem in interpreting the estimates above is the greater heterogeneity in the earnings and personal characteristics of informal sector workers. An important source of this heterogeneity originates in the self-employed workers (all of whom are by design in the informal sector), whose personal attributes and earnings as a group are highly unequal. For example, the standard error of ln hourly earnings for the self-employed is two-times as great as for all other workers, and 60 percent larger than the variation in non-self employed informal worker pay. As a group the self-employed have much greater variation in schooling levels and age, especially for female workers.²⁷

²⁶The less restrictive definition included all private sector workers receiving social insurance contributions; the more restrictive definition imposed as well the condition that workers report employment in private registered firms.

²⁷The standard error of the ln of earnings is .006 for male formal sector workers, .008 for male informal sector workers who are not self-employed, and .011 for male self-employed. Presented in the same order,

In any case, excluding the self-employed focuses more narrowly on differences among the wage earning population that constitutes the group affected by minimum wages, and yields an analysis more comparable to the analysis conducted for firms. In this vein, table 11 presents estimates of formal sector wage effects excluding the self-employed. It shows that formal sector differences are much larger, especially for male full-time workers, and more similar with respect to gender and labor market status. As a guide, the estimates suggest that formal sector workers earn an 18 to 27 percent premium for work in the formal sector (with greater returns for females).

While the household data provide no value based information on total compensation, they do provide discrete information about the nonwage benefits workers receive at their job. Specifically, individuals are asked whether they receive profit sharing payments, Christmas or other bonus, vacation leave, medical assistance, or housing credits in their current job. This information can be incorporated into the analysis in order to better understand whether the wage premiums estimated above are upper or lower bounds on the true compensation effects. Specifically, the data allow one to estimate the conditional probability of receiving each type of benefit (or a package of these benefits) controlling for characteristics of the individual (education and experience), and job (occupation, industry, and region of the country) and conditional on formal sector status. Probit estimates for each of the non-wage benefit items and packages of benefits (not presented here) all produced positive signed coefficients on the formal sector variable that were significant at greater than 99 percent confidence levels in all cases, suggesting that if anything, the large measured wage advantages estimated here may underestimate the true compensation advantage to formal versus informal sector work in Mexico.²⁸

If the sizable differences between formal and informal sector pay can be taken as long run effects, then the data provide evidence of a Mexican labor market that is segmented between high paying formal and informal sector jobs, since wages, non-wage benefits, and compliance with minimum wage laws are all lower in the informal sector. As modeled in Section I, the larger is the (skill-adjusted) gap between

the respective standard errors for schooling are .051, .044, and .066; for age they are .131, .151, and .187. For female workers the differences are much larger-- .007, .014, and .022 for ln income; .057, .062, and .101 for schooling; and .131, .219, and .292 for age.

²⁸The only exception to this pattern were the individual probit estimates for medical benefits, which yielded negatively and statistically significant coefficients on the formal sector dummy variable.

formal and informal sector pay (the greater is market segmentation), the more likely is it that effective minimum wage laws will result in a fall in rural sector wages. The fact that the urban informal sector has grown in Mexico (from 49.4 percent of urban employment in 1984 (Roberts, 1991) to 50.5 percent in 1988 (calculations here) reinforces the possibility of such an effect on rural wages.

In sum, detailed examination of the household sector data reveal interesting differences in pay between formal and informal sector workers, with the largest differences concentrated among part-time and female workers. The fact that very few male formal sector workers report wages at or near the minimum wage provide only weak validation for the firm level averages (in which more than two thirds of the unskilled workers are male), because they are based on both skilled and unskilled individual wages. In any case, the largest differences in the measured effects of minimum wages in the two data sets arise from the inclusions of lower paid informal workers in the household data.

V. Conclusions

This paper has used diverse data to examine the impact of minimum wage legislation on wages and employment in Mexico and Colombia. Divergent trends in the behavior of the real minimum wage in the two countries in the 1980s provides an interesting backdrop from which to study the effects of minimum wages. Indeed, the effects of minimum wages on the two economies in the 1980s reflect in some measure these divergent trends.

In the case of Mexico, minimum wages have had virtually no effect on wages or employment in the formal sector. The key explanation for this lies in the position of the minimum wage relative to the wages of formal sector workers-- the minimum wage is not an effective wage in either set of data for a majority of firms or workers. Concerning employment, the time series and more reliable panel data estimates both yield elasticities of low skilled employment with respect to the minimum wage which are statistically insignificant and near zero over this period.

Where the minimum wage is more likely to have had a notable effect is in the Mexican informal sector, where data suggest that significant numbers of workers are paid at or below minimum wages. Understanding better the impact of minimum wage laws over time on estimated formal and informal

sector differentials, as well as their effect on informal wages, would be a useful supplement to the analysis presented here.

By contrast in Colombia, where minimum wages have a much stronger impact on wages judging by their proximity to the average wage and the time series estimates, the effects of the minimum wage are far more pronounced. The estimates from firm-level panel strongly confirm the proposition that minimum wages have affected employment in Colombia. Given reasonable assumptions about the distribution of minimum wage labor across firms, the estimates imply a disemployment impact of minimum wages on low paid unskilled labor in the range of 2 to 12 percent over the period 1981-1987 in Colombia. The estimates that exclude the unskilled wage and therefore posit an effect of minimum wages on all unskilled workers imply a disemployment impact of minimum wages on low paid unskilled labor that falls in the lower half of this range.

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TABLE 1
The Minimum Wage in Mexico¹, 1984-1990

A. Minimum Wage Trends

Year	Minimum wages	Real minimum wages ² (1984=100)	Real wages (1984=100) ³	Min wage / mean (white collar wage)	Min wage / mean (blue collar wage) ⁴
1984	660	100.00	100.00	0.22	0.42
1985	1037	101.40	106.16	0.20	0.39
1986	1770	91.87	95.91	0.21	0.41
1987	3855	84.91	91.54	0.20	0.40
1988	7218	76.34	89.53	0.18	0.38
1989	8070	73.77	100.65	0.15	0.34
1990	9346	69.19	106.57	0.13	0.31
1991	10958	68.92	x	x	x
1992	12084	68.12	x	x	x

B. Share of Firms Affected, 1984-1989
 (percentage of firms with average wages as indicated)

Year	Blue Collar Wages, National			Blue Collar Wages, 3 Lowest Paying Industries ⁴		
	Below minimum	Below 1.5*minimum	Below 2.0*minimum	Below minimum	Below 1.5*minimum	Below 2.0*minimum
1984	1.91	14.35	39.02	2.97	21.19	54.65
1985	1.87	12.61	36.60	2.23	18.03	49.26
1986	0.89	10.06	35.03	0.92	15.98	52.23
1987	0.76	9.55	33.63	1.49	15.61	47.58
1988	0.59	8.75	32.74	1.30	13.94	46.65
1989	1.10	6.37	23.52	1.86	10.41	33.08

C. Share of Workers Affected, 1988 Household Survey Data
 (percentage of full-time, male workers with average wages as indicated)

Year	Formal Sector			Informal Sector		
	Below minimum	Below 1.5*minimum	Below 2.0*minimum	Below minimum	Below 1.5*minimum	Below 2.0*minimum
1988	2.16	24.18	48.02	16.48	44.74	62.94

¹ Daily minimum wages in pesos.

² Minimum wages deflated using producer price index in each year, based on 1984=100.

³ Annual wages deflated using producer price index in each year, based on 1984=100.

⁴ ISIC 31, 33, 39.

TABLE 2
The Minimum Wage in Colombia¹, 1977-1987

A. Minimum Wage Trends

YEAR	Minimum wages	Real minimum wages ² (1977=100)	Real wages ³ (1977=100)	Minimum wage / mean (skilled wage)	Minimum wage / mean (unskilled wage)	Minimum wage / mean (apprentice wage)
1977	62.92	100.000	100.000	0.317	0.464	0.789
1978	83.33	113.753	126.097	0.277	0.421	0.703
1979	115.00	124.888	121.819	0.343	0.479	0.764
1980	150.00	129.996	120.897	0.371	0.503	0.808
1981	190.00	131.597	120.141	0.373	0.513	0.771
1982	247.00	140.194	126.580	0.389	0.519	0.773
1983	308.70	148.826	134.652	0.382	0.518	0.753
1984	376.60	148.593	136.758	0.380	0.513	0.744
1985	451.92	141.467	132.619	0.385	0.507	0.714
1986	560.38	142.261	129.456	0.400	0.527	0.724
1987	683.66	136.548	126.638	0.395	0.523	0.731

B. Share of Firms Affected
(percentage of firms with average wages as indicated)

Year	Unskilled Wages			Apprentice Wages		
	Below minimum	Below 1.5*minimum	Below 2.0*minimum	Below minimum	Below 1.5*minimum	Below 2.0*minimum
1977	4.40	24.45	58.31	41.84	70.56	88.26
1978	3.26	15.17	47.71	35.92	62.61	82.42
1979	4.74	24.31	59.85	38.11	67.78	86.23
1980	4.28	27.13	64.38	41.20	72.10	89.19
1981	4.68	30.11	64.80	39.21	70.46	88.29
1982	4.57	31.38	67.61	36.21	70.97	87.95
1983	4.70	30.07	66.93	35.20	70.17	87.31
1984	3.11	27.38	68.59	34.62	68.40	86.55
1985	2.72	26.56	68.39	33.87	65.60	85.12
1986	3.74	29.08	71.52	32.05	64.67	84.16
1987	2.97	27.08	71.37	36.68	65.57	84.99

¹Daily minimum wages for large cities in pesos.

²Minimum wages deflated using producer price index in each year, based on 1977=100.

³Annual wages deflated using producer price index in each year, based on 1977=100.

TABLE 3
Mean Characteristics of Minimum Wage Firms in Colombia, 1987
 (standard errors in parentheses)

	Minimum Wage Constrained Firms ¹	Unconstrained Firms
Total employment	105.901 (7.574)	233.080 (7.177)
Share of unskilled	0.271 (0.002)	0.240 (0.001)
Food, Beverages, Tobacco (isic=31)	0.164 (0.009)	0.202 (0.006)
Textiles and Leather (isic=32)	0.406 (0.011)	0.221 (0.006)
Wood Products (isic=33)	0.059 (0.005)	0.054 (0.003)
Paper and Printing (isic=34)	0.041 (0.005)	0.081 (0.004)
Chem., Rubber, Plastics (isic=35)	0.090 (0.007)	0.135 (0.005)
Clay, Stone, Glass (isic=36)	0.050 (0.005)	0.059 (0.003)
Iron and Steel (isic=37)	0.009 (0.002)	0.017 (0.002)
Mach. and Transp. Equip. (isic=38)	0.161 (0.009)	0.210 (0.006)
Misc. Manufacturing (isic=39)	0.021 (0.003)	0.022 (0.002)
Start Year	75.140 (0.257)	70.545 (0.182)
Location in Big Cities	0.841 (0.009)	0.846 (0.005)
Location in Smaller Cities and More Rural Areas	0.159 (0.009)	0.154 (0.005)
Number of Firms	1853	5115

¹Firms paying average unskilled wages at or below 1.5 times the minimum wage; all other firms are classified as unconstrained firms.

TABLE 4
Wage Variation in Mexico 1984-1990¹
 (Standard deviation of ln wage as indicated)

A. Inter-Industry Variation in Wages²

Year	All Worker Wages	Blue Collar Worker Wages	White Collar Worker Wages
1984	0.1753	0.1419	0.1596
1985	0.1817	0.1518	0.1673
1986	0.1838	0.1447	0.1695
1987	0.1861	0.1425	0.1692
1988	0.2079	0.1595	0.1913
1989	0.2135	0.1622	0.1926
1990	0.2129	0.1588	0.1742

B. Intra-Industry Variation in Wages (All Workers) by 2-digit ISIC Codes³

Year	31	32	33	34	35	36	37	38	39
1984	0.3322	0.3637	0.2510	0.3729	0.3900	0.4336	0.3183	0.3261	0.3718
1985	0.3573	0.4413	0.3600	0.4345	0.4347	0.4346	0.4055	0.4051	0.3156
1986	0.3211	0.4148	0.2106	0.3313	0.3822	0.4130	0.2826	0.3165	0.2475
1987	0.3235	0.3792	0.2236	0.3627	0.3619	0.4345	0.3125	0.3312	0.2888
1988	0.3438	0.3960	0.2475	0.3498	0.4059	0.4458	0.3393	0.3395	0.3334
1989	0.3850	0.3922	0.3837	0.3801	0.4387	0.4811	0.3580	0.3984	0.3484
1990	0.4025	0.4253	0.3759	0.3677	0.4622	0.5130	0.3485	0.4334	0.3190

C. Regional (State) Variation in Wages⁴

Year	All Workers Wages	Blue Collar Workers Wages	White Collar Workers Wages
1984	0.1260	0.1032	0.1345
1985	0.1271	0.1010	0.1379
1986	0.1246	0.1023	0.1337
1987	0.1252	0.0988	0.1372
1988	0.1317	0.1057	0.1401
1989	0.1392	0.1097	0.1425
1990	0.1310	0.1019	0.1385

¹ Establishment Survey Data.

² Standard deviation of monthly wage across 3-digit ISIC industry.

³ Standard deviation of monthly wage across 2-digit ISIC industry.

⁴ Standard deviation of annual wage within detailed state code.

TABLE 5
Wage Variation in Colombia, 1977-1987¹
 (Standard deviation in ln wage as indicated)

A. Inter-Industry Variation in Wages²				
Year	Average Wage	Skilled Wage	Unskilled Wage	Apprentice Wage
1977	0.165	0.152	0.141	0.138
1978	0.156	0.136	0.145	0.144
1979	0.150	0.131	0.135	0.147
1980	0.135	0.113	0.121	0.167
1981	0.144	0.121	0.130	0.146
1982	0.146	0.116	0.129	0.147
1983	0.161	0.129	0.147	0.180
1984	0.158	0.137	0.139	0.162
1985	0.158	0.144	0.136	0.175
1986	0.161	0.146	0.136	0.166
1987	0.155	0.136	0.133	0.204

B. Intra-Industry Variation in Wages³									
Year	31	32	33	34	35	36	37	38	39
1977	0.507	0.381	0.342	0.415	0.518	0.612	0.470	0.505	0.444
1978	0.496	0.422	0.436	0.443	0.541	0.422	0.419	0.426	0.347
1979	0.447	0.377	0.335	0.419	0.478	0.391	0.468	0.389	0.316
1980	0.436	0.342	0.306	0.383	0.454	0.366	0.355	0.374	0.341
1981	0.439	0.343	0.304	0.357	0.464	0.420	0.440	0.360	0.346
1982	0.442	0.350	0.328	0.358	0.448	0.370	0.435	0.369	0.325
1983	0.449	0.327	0.301	0.391	0.449	0.372	0.445	0.373	0.347
1984	0.389	0.329	0.253	0.399	0.448	0.386	0.463	0.349	0.288
1985	0.467	0.327	0.274	0.397	0.476	0.373	0.411	0.351	0.356
1986	0.446	0.339	0.279	0.391	0.457	0.400	0.393	0.346	0.343
1987	0.412	0.354	0.310	0.369	0.419	0.380	0.383	0.344	0.325

C. Regional (County) Variation in Wages⁴				
Year	Average Wage	Skilled Wage	Unskilled Wage	Apprentice Wage
1981	0.279	0.170	0.268	0.263
1982	0.278	0.149	0.252	0.243
1983	0.296	0.346	0.293	0.236
1984	0.302	0.324	0.314	0.237
1985	0.293	0.340	0.279	0.215
1986	0.280	0.153	0.266	0.239
1987	0.281	0.354	0.250	0.259

1. Establishment survey data.

2. Standard deviation of monthly wage across 3-digit ISIC industry.

3. Standard deviation of monthly wage within 2-digit ISIC industry.

4. Standard deviation of annual wage within detailed county.

TABLE 6
The Effect of the Minimum Wage on Average Earnings and Employment-Population Ratios¹
Mexico and Colombia

	MEXICO, 1972-90			COLOMBIA, 1962-90			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	ln Wages	ln Wages	ln Emp/Pop	ln Wages	ln Wages	ln Wages	ln Emp/Pop
ln (Minwage) ²	.168 (.161)	.170 (.169)	-.182 (.165)	.373 (.161)	.441 (.166)	.064 (.141)	-.337 (.058)
ln Real GNP	.089 (.064)	.086 (.083)	.137 (.057)	-.123 (.077)	-.138 (.179)	.046 (.064)	.252 (.046)
ln GNP Deflator	.783 (.133)	.776 (.187)		.372 (.273)	.302 (.263)	.287 (.191)	
ln Wages (-1)		.006 (.097)				.611 (.109)	
Trend	-.032 (.017)	-.032 (.021)	.005 (.005)	.060 (.027)	.061 (.025)	.008 (.021)	-.028 (.005)
R ²	.999	.999	.805	.999	.999	.999	.755
SE	.046	.044	.051	.054	.045	.034	.052
AR (1)					.322 (.190)		.413 (.183)

1. Manufacturing sector employment and wage series for both Mexico and Colombia.

2. In wage regressions ln(minimum wage) is the ln of the urban national minimum wage for Mexico and the ln of the smaller cities minimum wage for Colombia. Ln(minimum wage) refers to minimum wages deflated by average manufacturing wages in the employment-population regressions in both countries.

TABLE 7
Employment Demand Regressions¹
Mexico Panel Data, 1985-1990
(Firm Fixed Effects unless otherwise noted)

Independent Variables ²	Unskilled Employment						Skilled Employment				
	(1) OLS	(2)	(3)	(4)	(5)	(6)	(7) OLS	(8)	(9)	(10)	(11)
ln Min (-1)	-1.519 (.135)	.016 (.038)		.025 (.069)	-.033 (.020)	-.027 (.020)	-1.080 (.147)	.053 (.043)	.008 (.076)	-.011 (.022)	-.007 (.022)
ln Min			.019 (.021)	-.011 (.072)					.058 (.080)		
ln W _S	.611 (.023)	.060 (.007)	.066 (.007)	.060 (.007)	.057 (.007)	.057 (.007)	.461 (.025)	-.160 (.007)	-.161 (.007)	-.152 (.007)	-.153 (.007)
ln W _{US}	.370 (.029)	-.131 (.008)	-.131 (.008)	-.130 (.008)	-.120 (.008)	-.128 (.008)	.893 (.032)	.056 (.009)	.055 (.009)	.051 (.009)	.051 (.009)
ln P _m	-.111 (.061)	-.029 (.019)	-.034 (.017)	-.028 (.019)	-.032 (.019)	-.015 (.019)	-.248 (.066)	.020 (.021)	.018 (.021)	.016 (.021)	-.028 (.021)
ln P _k	.779 (.111)	.010 (.035)	.002 (.025)	.012 (.037)	-.011 (.043)	-.016 (.043)	.069 (.121)	-.014 (.038)	-.024 (.041)	-.018 (.048)	-.021 (.048)
ln PPI					.070 (.018)					.048 (.020)	
ln Output						.003 (.001)					.002 (.001)
Industry	Y	N	N	N	N	N	Y	N	N	N	N
Occupation	Y	N	N	N	N	N	Y	N	N	N	N
Region	Y	N	N	N	N	N	Y	N	N	N	N
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R ²	.164	.024	.023	.024	.024	.024	.210	.035	.035	.034	.033

¹ Dependent variable equals ln unskilled employment in columns 1-5 and ln skilled employment in columns 6-10. All regressions are based on 13,951 observations.

² Factor price ratios (price divided by ppi) used in columns 1-3 and 6-8 regressions (ln min, ln W_S, ln W_{US}, ln P_m, and ln P_k). Columns 4-5 and 9-10 use factor price levels.

TABLE 8
Employment Demand Regressions¹
Colombia Panel Data, 1981-1987
(Firm Fixed Effects unless otherwise noted)

Independent Variables ²	Unskilled Employment							Skilled Employment						
	(1) OLS	(2)	(3)	(4)	(5)	(6)	(7)	(8) OLS	(9)	(10)	(11)	(12)	(13)	(14)
ln Min (-1)	-2.287 (.095)	-0.288 (.039)			-0.288 (.082)		-0.297 (.082)	-2.927 (.110)	-0.041 (.047)			-0.244 (.098)		-0.213 (.098)
ln Min			-0.149 (.041)	-0.305 (.098)		-0.333 (.098)				-0.030 (.049)	-0.208 (.118)		-0.178 (.117)	
ln W _s	1.007 (.013)	0.118 (.006)	0.116 (.006)	0.103 (.006)	0.103 (.006)	0.109 (.006)	0.109 (.006)	0.917 (.015)	-0.155 (.007)	-0.155 (.007)	-0.143 (.007)	-0.142 (.007)	-0.142 (.007)	-0.142 (.007)
ln W _{us}	0.331 (.016)	-0.365 (.007)	-0.368 (.007)	-0.364 (.007)	-0.364 (.007)	-0.360 (.007)	-0.360 (.007)	0.888 (.019)	0.037 (.009)	0.037 (.009)	0.042 (.008)	0.042 (.008)	0.042 (.008)	0.042 (.008)
ln P _e	-0.120 (.012)	0.01 (.005)	0.007 (.005)	0.020 (.005)	0.020 (.005)	0.024 (.005)	0.024 (.005)	-0.046 (.014)	0.022 (.006)	0.021 (.006)	0.008 (.006)	0.008 (.006)	0.008 (.006)	0.008 (.006)
ln P _m	0.771 (.094)	0.329 (.043)	0.203 (.044)	-0.032 (.021)	-0.033 (.021)	0.139 (.012)	0.139 (.012)	1.014 (.109)	0.180 (.051)	0.170 (.053)	0.132 (.025)	0.132 (.025)	0.168 (.015)	0.168 (.015)
ln PPI				0.177 (.017)	0.177 (.017)						0.037 (.021)	0.036 (.021)		
ln Output						0.003 (.001)	0.003 (.001)						0.004 (.001)	0.004 (.001)
Industry	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N
City	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R ²	.274	.075	.074	.078	.078	.076	.076	.316	.020	.020	.021	.021	.021	.021

¹ Dependent variable equals ln unskilled employment in columns 1-7 and ln skilled employment in columns 8-14. All regressions are based on 40,144 observations. In columns 1-5 and 8-12 all independent variables weighted by producer price index.

² Factor price ratios (factor price divided by ppi) used in columns 1-3 and 8-10 regressions (ln min, ln W_s, ln W_{us}, ln P_m, and ln P_e). Columns 4-7 and 11-14 use factor prices levels for all independent variables except those measuring the minimum wage (ln min and ln min(-1)).

TABLE 8A
Robustness Tests of Employment Demand Regressions for Unskilled Only
Colombia Data
(Firm Fixed Effects)

Independent Variables ¹	(1) 1977-87 No Alt. Factor Price	(2) 1977-87 No Alt. Factor Price	(3) 1977-87 No Alt. Factor Price	(4) 1977-87 No Alt. Factor Price	(5) 1981-87 No Alt. Factor Price	(6) 1981-87 No Alt. Factor Price	(7) 1981-87 No Skilled Wage	(8) 1981-87 No Skilled Wage	(9) 1981-87 Balanced Panel	(10) 1981-87 Balanced Panel
ln Min	-0.010 (.009)	-0.023 (.041)			0.022 (.020)	-0.080 (.022)	-0.445 (.042)	-0.340 (.101)	.259 (.064)	-.554 (.153)
ln Min (-1)			-.017 (.010)	-.127 (.041)						
ln W _s	0.120 (.004)	0.042 (.003)	.120 (.004)	.052 (.003)	0.124 (.006)	0.112 (.005)	0.046 (.006)	0.024 (.006)	.107 (.009)	.094 (.009)
ln W _{us}	-0.339 (.005)	-0.292 (.005)	-.347 (.006)	-.303 (.005)	-0.370 (.007)	-0.365 (.006)			-.470 (.012)	-.465 (.011)
ln P _e							0.005 (.005)	0.016 (.005)	.031 (.007)	.027 (.007)
ln P _m							0.157 (.045)	-0.234 (.021)	-.065 (.067)	-.143 (.061)
ln PPI		.262 (.005)		.271 (.006)		0.180 (.009)		.077 (.018)		.138 (.026)
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R ²	.076	.065	.081	.071	.078	.078	.015	.015	.100	.099
N	63,396	63,396	63,396	63,396	40,144	40,144	40,144	40,144	18,673	18,673

¹ Factor price ratios (factor price divided by ppi for ln min, ln W_s, ln W_{us}, ln P_m, and ln P_e) used in columns 1,3,5 and 7 implied by homogeneity constraint. Columns 2,4,6,and 8 use factor prices levels.

TABLE 9
Evidence of Non-Compliance with the Federal Minimum Wage in Mexico, 1988^{1,2}
 (percent of urban workers earning less than the daily minimum wage of 7,218 Mexican pesos)

A. Non-Compliance by Occupation								
	Formal Sector				Informal Sector			
	Male		Female		Male		Female	
	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time
Professionals	0.3	2.8	0.2	4.7	3.8	16.8	11.8	34.8
Operators	0.7	3.6	1.3	2.6	8.3	33.7	26.8	76.7
Laborers	1.8	15.4	0.0	0.0	24.8	59.2	25.0	-
Office staff	0.5	5.6	1.6	5.4	8.8	46.9	18.1	42.9
Salespersons	0.9	13.6	4.5	45.5	14.3	48.2	34.4	59.5
Service work	2.7	14.3	2.0	25.0	24.2	58.7	66.0	76.2

B. Non-Compliance by Region								
	Formal Sector				Informal Sector			
	Male		Female		Male		Female	
	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time
Fed District	0.3	2.2	1.1	4.9	8.2	46.5	40.3	67.6
North	0.6	2.1	0.7	13.7	9.6	35.6	35.1	49.2
South	3.0	0.0	4.7	40.0	29.0	75.0	43.6	61.3

C. Non-Compliance by Education								
	Formal Sector				Informal Sector			
	Male		Female		Male		Female	
	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time
No Education	0.7	0.0	6.3	50.0	26.5	57.6	62.2	82.9
L.T. 6 years	0.9	9.5	2.4	22.2	16.0	47.7	59.1	74.7
7-9 years	1.1	4.5	1.8	11.8	14.3	52.5	39.3	65.2
10-12 years	0.8	6.7	1.3	6.6	8.8	32.0	20.1	51.3
13-16 years	0.5	9.9	0.9	2.9	1.9	32.4	10.3	30.3
16+ years	0.2	1.4	1.3	0.0	2.0	9.4	3.4	26.2

¹ A worker is classified as formal sector if he or she reports receiving social security and indicates that they work in a registered firm. All other workers are classified as informal sector workers. Based on a sample of 11,419 formal sector workers and 6,672 informal sector workers.

² A worker is classified as full-time if he or she reports working at least 35 hours a week and indicates that they normally expect to work full-year.

TABLE 10
Labor Market Segmentation in Mexico, 1988
Private Sector Workers

Dependent Variable: ln (hourly income)

Independent Variables:	Male Workers						Female Workers					
	Full-Time Only ¹			Part-Time Only			Full-Time Only			Part-Time Only		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Formal Sector ²	.107 (.012)	.025 (.011)	.038 (.012)	.252 (.054)	.101 (.050)	.116 (.057)	.523 (.017)	.415 (.017)	.154 (.019)	.437 (.061)	.255 (.060)	.071 (.066)
Experience		.040 (.001)	.033 (.001)		.062 (.003)	.049 (.003)		.035 (.002)	.028 (.002)		.040 (.004)	.036 (.004)
Experience ²		-.001 (.000)	-.0005 (.000)		-.001 (.000)	-.001 (.000)		-.0005 (.000)	-.0004 (.000)		-.0005 (.000)	-.0005 (.000)
No Educ.		-.495 (.028)	-.356 (.030)		-.638 (.084)	-.421 (.080)		-.563 (.041)	-.317 (.037)		-.773 (.105)	-.530 (.102)
Some Primary Educ.		-.344 (.020)	-.261 (.018)		-.434 (.065)	-.269 (.063)		-.481 (.031)	-.289 (.028)		-.559 (.083)	-.397 (.089)
Primary Grad.		-.232 (.018)	-.171 (.016)		-.189 (.062)	-.122 (.059)		-.261 (.027)	-.172 (.024)		-.430 (.090)	-.309 (.087)
Some Second.		-.086 (.021)	-.070 (.019)		-.097 (.073)	-.073 (.069)		-.061 (.032)	-.066 (.027)		-.156 (.099)	-.114 (.094)
Some H.S.		.199 (.019)	.141 (.017)		.304 (.067)	.243 (.063)		.179 (.028)	.130 (.025)		.183 (.093)	.251 (.091)
College		.593 (.025)	.417 (.023)		.489 (.082)	.347 (.080)		.598 (.047)	.378 (.043)		.675 (.122)	.687 (.124)
More than College		.864 (.025)	.659 (.026)		.817 (.091)	.583 (.099)		.842 (.056)	.690 (.056)		.838 (.138)	.784 (.145)
Northern Region			.190 (.010)			.263 (.035)			.257 (.016)			.375 (.046)
Southern Region			-.141 (.059)			-.200 (.164)			.117 (.070)			-.142 (.143)
Federal District			.052 (.016)			.153 (.055)			.187 (.023)			.163 (.057)
Occupation dummies	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Industry dummies	N	N	Y	N	N	Y	N	N	Y	N	N	Y
R ²	.009	.241	.393	.009	.213	.310	.138	.291	.483	.026	.147	.266
N	12990	12990	12990	2331	2331	2331	5620	5620	5620	1927	1927	1927

¹Full-time workers are individuals who report working greater than 35 hours per week and year-round.

²Equal to one if the individual reports working in a job with a registered private firm and reports receiving social security.

TABLE 11
Labor Market Segmentation in Mexico, 1988
(Private Sector Workers Excluding Self-Employed)¹

Dependent Variable: ln (hourly income)

Independent Variables:	Male Workers						Female Workers					
	Full-Time Only ²			Part-Time Only			Full-Time Only			Part-Time Only		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Formal Sector ³	.315 (.013)	.119 (.012)	.184 (.011)	.555 (.053)	.244 (.051)	.273 (.050)	.663 (.018)	.492 (.018)	.237 (.019)	.643 (.058)	.400 (.059)	.267 (.065)
Experience		.038 (.001)	.029 (.001)		.062 (.005)	.048 (.005)		.034 (.002)	.024 (.002)		.034 (.005)	.028 (.005)
Experience ²		-.001 (.000)	-.0005 (.000)		-.001 (.000)	-.001 (.000)		-.001 (.000)	-.0004 (.000)		-.0004 (.000)	-.0004 (.000)
No Educ.		-.413 (.034)	-.236 (.029)		-.691 (.120)	-.433 (.113)		-.535 (.045)	-.247 (.037)		-.692 (.134)	-.354 (.124)
Some Primary Educ.		-.286 (.021)	-.187 (.018)		-.507 (.079)	-.323 (.075)		-.434 (.030)	-.221 (.026)		-.557 (.105)	-.287 (.099)
Primary Grad.		-.206 (.018)	-.130 (.015)		-.246 (.076)	-.155 (.068)		-.240 (.026)	-.139 (.021)		-.317 (.100)	-.126 (.093)
Some Second.		-.064 (.022)	-.040 (.018)		-.070 (.080)	-.036 (.074)		-.032 (.031)	-.040 (.024)		-.256 (.109)	-.157 (.099)
Some H.S.		.195 (.019)	.127 (.016)		.260 (.076)	.214 (.070)		.163 (.026)	.095 (.023)		.181 (.099)	.195 (.099)
College		.581 (.026)	.390 (.023)		.342 (.091)	.219 (.087)		.547 (.046)	.311 (.039)		.506 (.131)	.497 (.131)
More than College		.886 (.028)	.651 (.027)		.919 (.143)	.645 (.139)		.695 (.061)	.559 (.054)		.662 (.174)	.573 (.171)
Northern Region			.191 (.010)			.248 (.044)			.247 (.015)			.255 (.056)
Southern Region			-.057 (.064)			-.218 (.198)			.026 (.075)			.128 (.175)
Federal District			.094 (.016)			.212 (.068)			.207 (.021)			.168 (.070)
Occupation dummies	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Industry dummies	N	N	Y	N	N	Y	N	N	Y	N	N	Y
R ²	.063	.280	.505	.085	.262	.391	.236	.359	.598	.112	.217	.382
N	8818	8818	8818	1171	1171	1171	4599	4599	4599	965	965	965

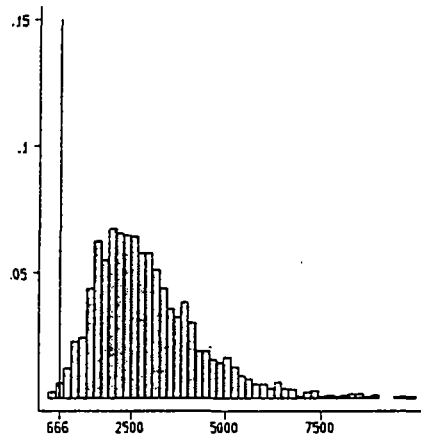
¹Excludes 4,190 and 1,178 full and part-time male and 1,030 and 970 full and part-time female self-employed workers.

²Full-time workers are individuals who report working greater than 35 hours per week and year-round.

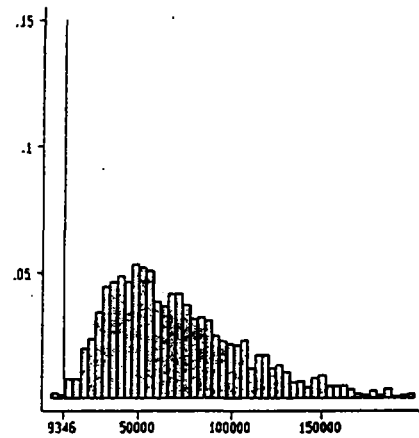
³Equal to one if the individual reports working in a job with a registered private firm and reports receiving social security.

FIGURE 1
Wage Distributions in Mexico¹
(Daily Wage in Pesos)

All Workers

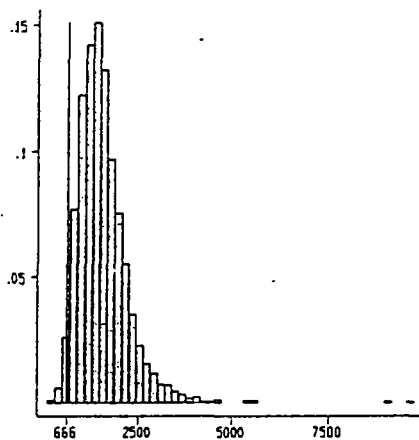


1984

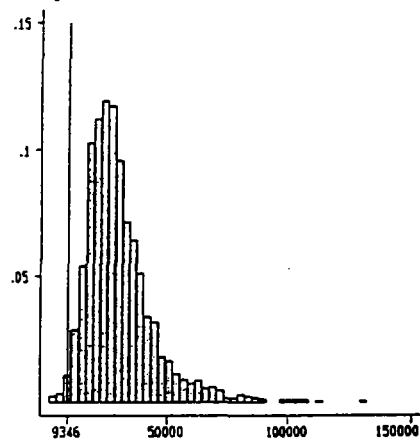


1990

Blue Collar Workers Only



1984

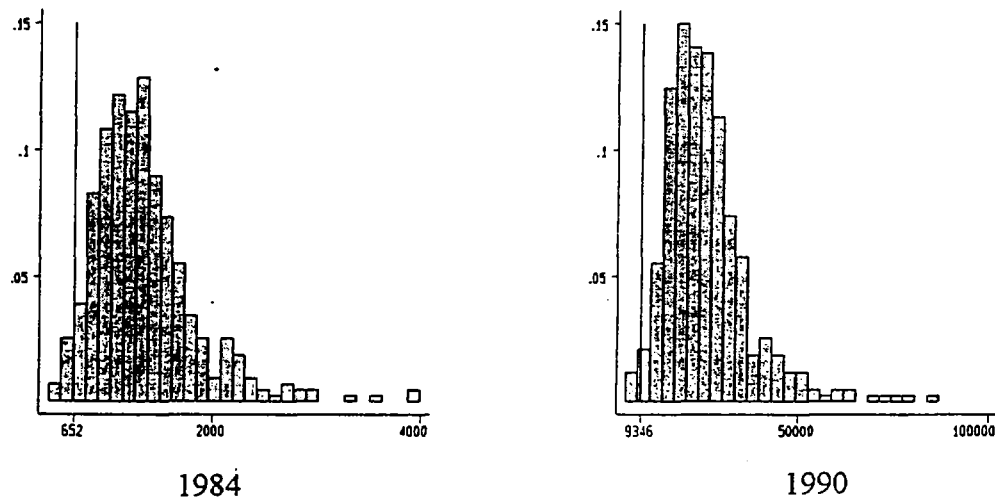


1990

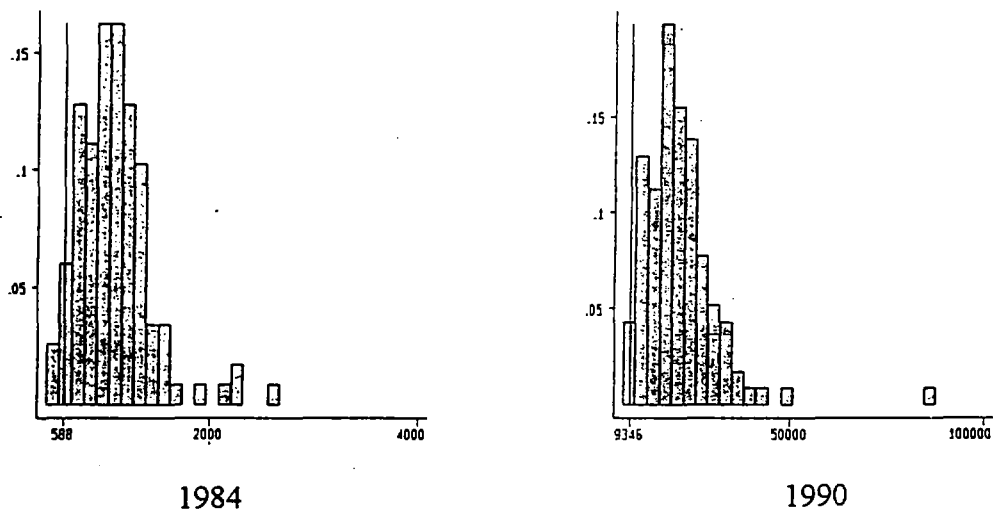
¹ Based on sample of 16,388 manufacturing firms. Daily minimum wage equal to 666 pesos (\$3.46) and 9346 pesos (\$3.17) in 1984 and 1990 respectively.

FIGURE 2
Wage Distributions in Mexico, by Industry and State
(Daily Wage in Pesos)

Blue Collar Workers, 3 Lowest Paying Industries¹



Blue Collar Workers, 8 Lowest Paying States²

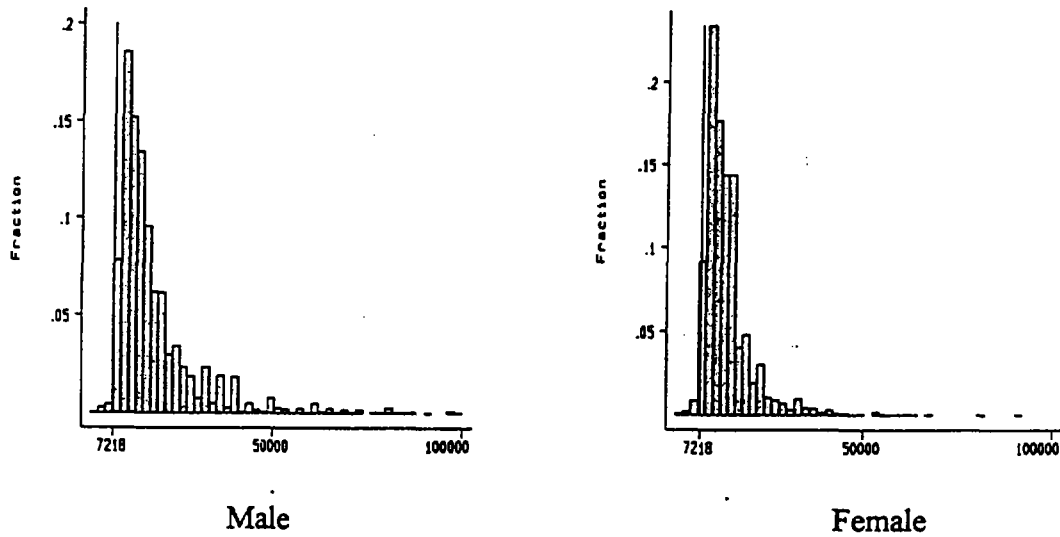


¹ 3 Lowest Paying Industries by 2-digit ISIC code are: 31, 33, 39. Based on a sample of 3,228 manufacturing firms. Daily minimum wage equal to 652 pesos (\$3.42) and 9346 pesos (\$3.17) in 1984 and 1990 respectively.

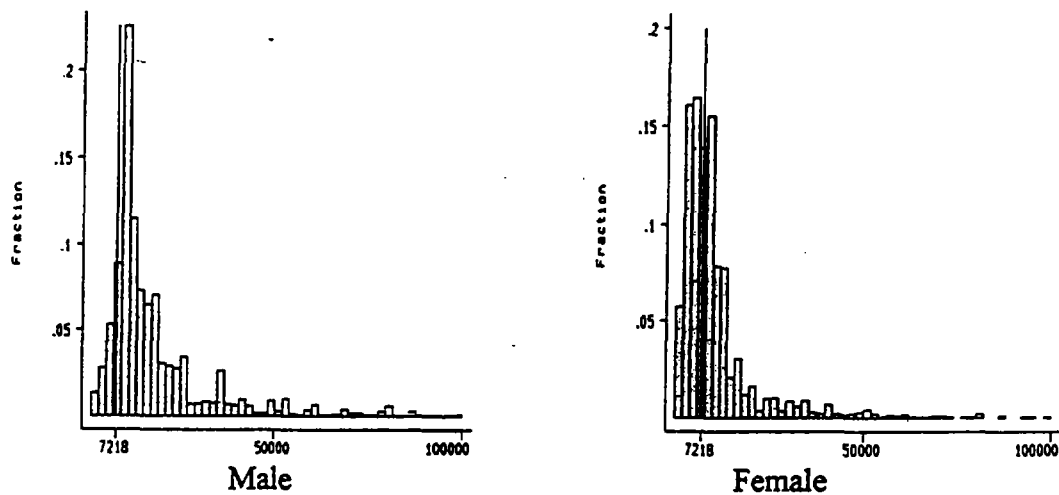
² 8 lowest paying states are: Aguascalientes, Campeche, Durango, Michoacán, Oaxaca, Quintana Roo, Yucatán, and Zacatecas. Based on a sample of 819 manufacturing firms. Daily minimum wage equal to 588 pesos (\$3.05) and 9346 pesos (\$3.17) in 1984 and 1990 respectively.

FIGURE 3
Wage Distributions in Mexico¹
Household Data for Full-Time Urban Workers, 1988
(Daily Wage in Pesos)

Formal Sector²



Informal Sector³

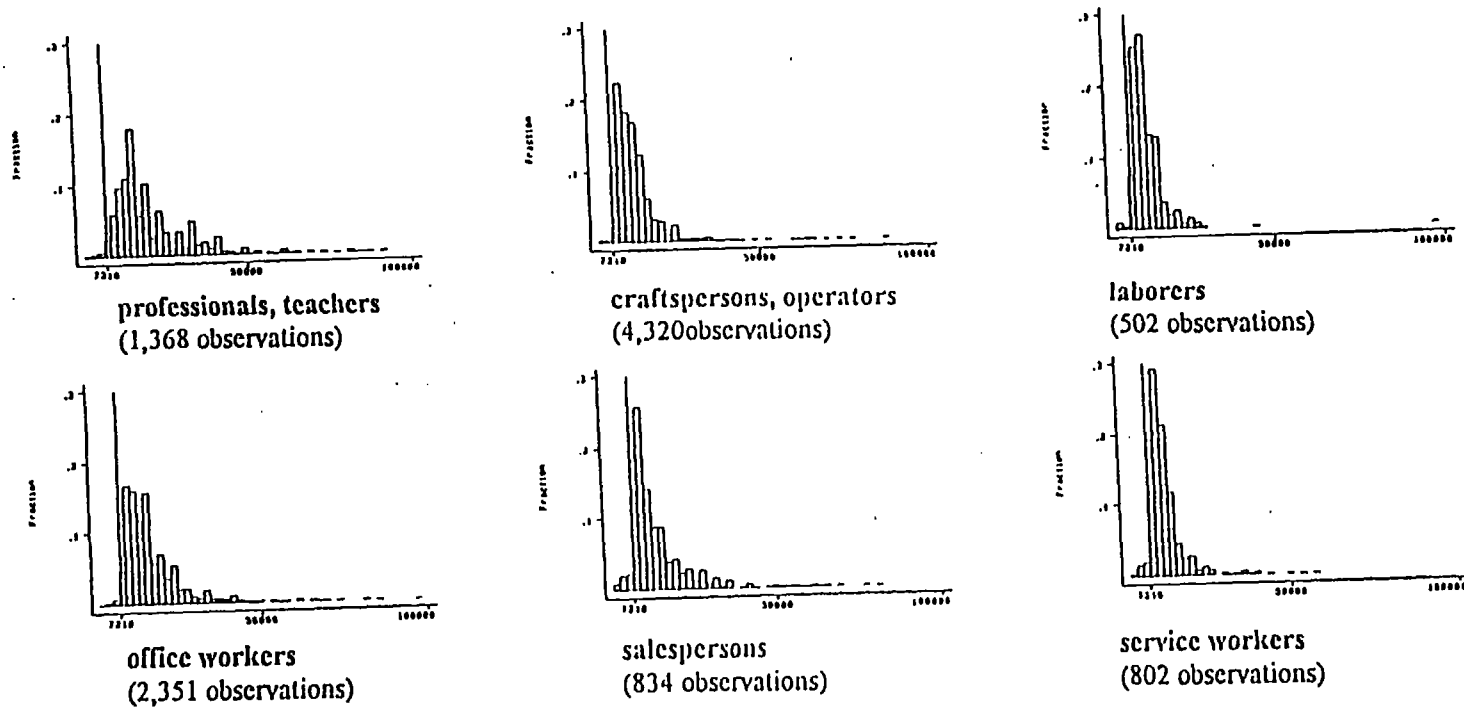


¹Distribution truncated at upper tail due to scaling.

²Workers at registered private firms receiving IMSS. Based on a sample of 9,824 men and 4,752 women.

³Self-employed, working at unregistered private firms, or not receiving IMSS at a registered firm. Based on a sample of 9,747 men and 3,824 women.

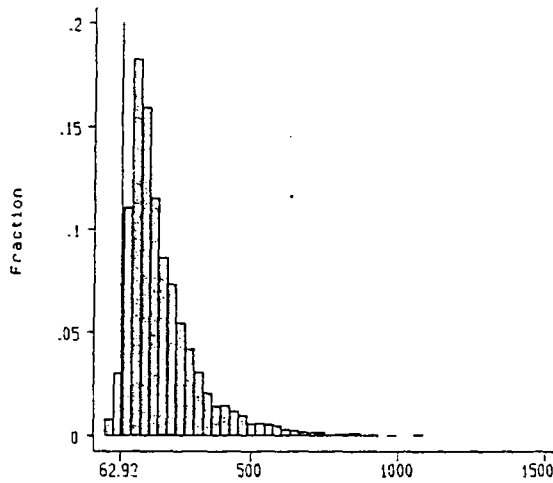
FIGURE 4
Wage Distribution in Mexico¹
Household Data for Urban, Formal Sector Workers by Occupation
(Daily Wage in Pesos)



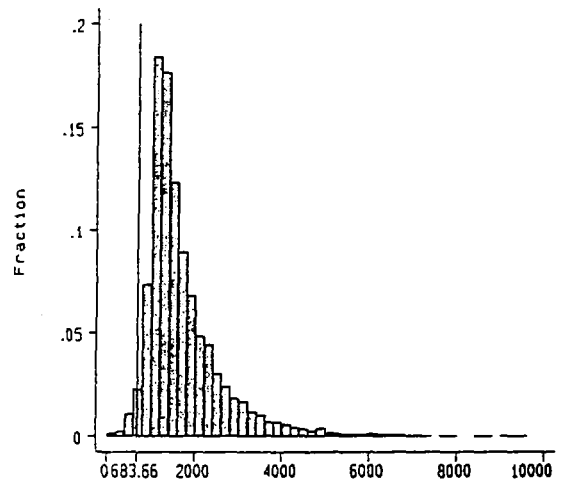
¹ Distribution truncated at upper tail due to scaling.

FIGURE 5
Wage Distributions in Colombia¹
(Daily Wage in Pesos)

Skilled Workers

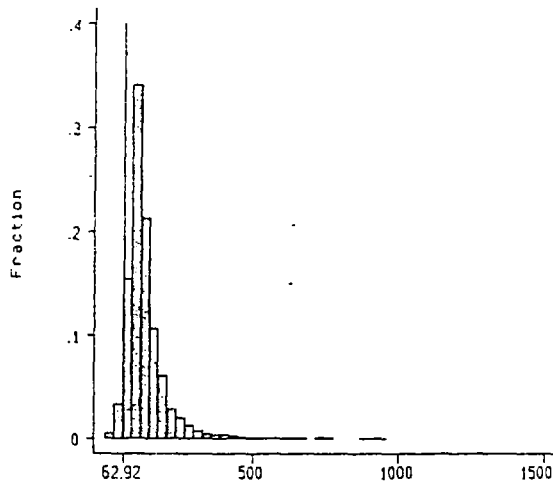


1977

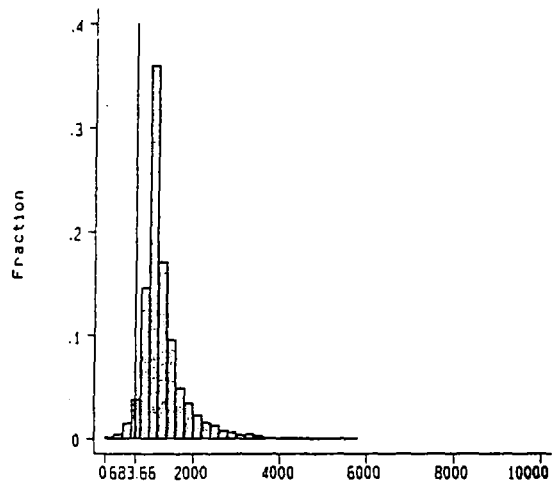


1987

Unskilled Workers



1977

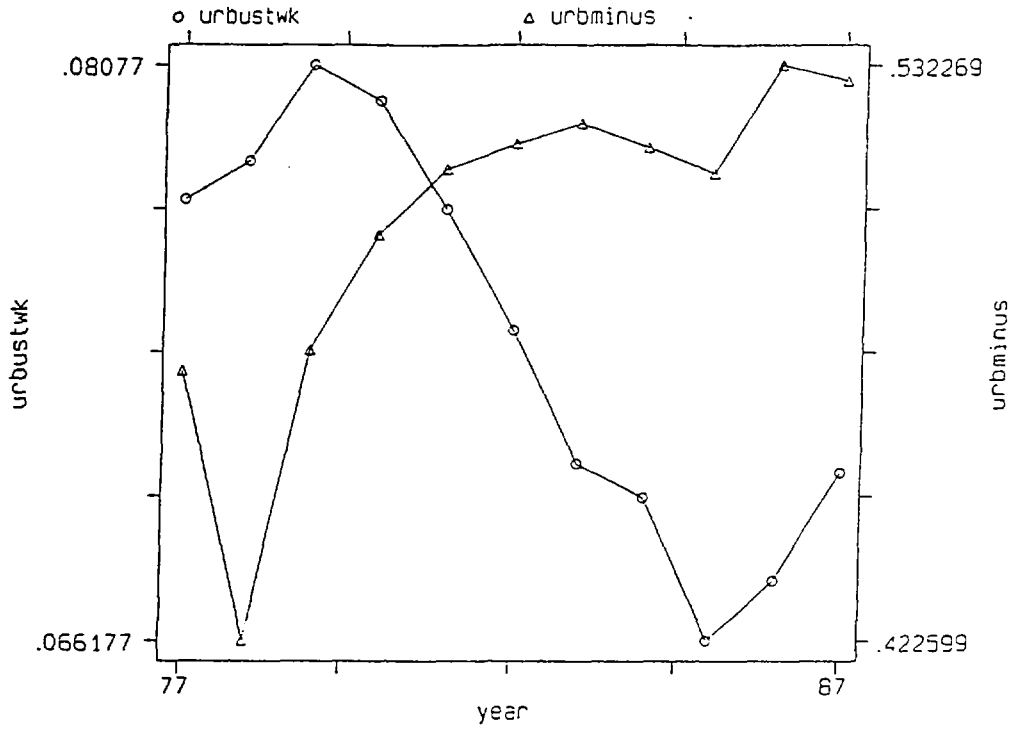


1987

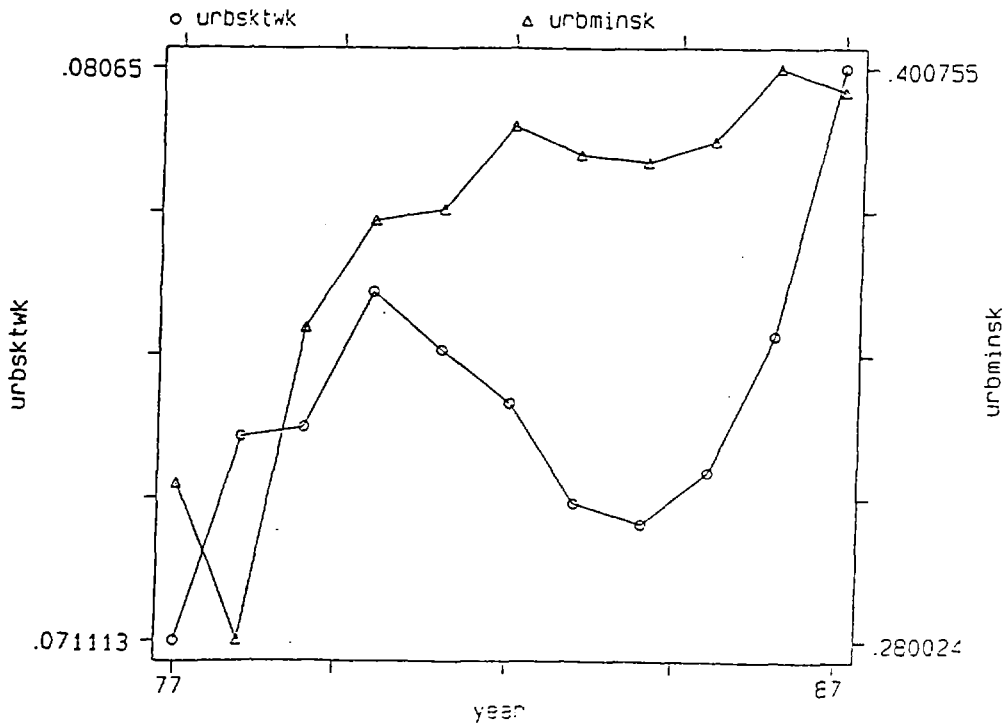
¹ Based on data from 5630 and 6630 manufacturing firms in 1977 for skilled and unskilled workers respectively and 6400 and 6839 manufacturing firms in 1987 for skilled and unskilled workers respectively. Daily minimum wage equal to 62.92 pesos (\$1.76) and 683.66 (\$3.42) in 1977 and 1987 respectively.

FIGURE 6
Minimum Wage Behavior in Colombia

URBUSTWK=Total Unskilled Employment in Large Cities/Total Unskilled Employment
URBMINUS=Minimum Wage in Large Cities/Average Unskilled Wage in Large Cities



URSKTWK=Total Skilled Employment in Large Cities/Total Skilled Employment
URBMINSK=Minimum Wage in Large Cities/Average Skilled Wage in Large Cities



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