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Minimum Wages and Earnings Inequality in Urban Mexico†

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This paper analyzes the contribution of the minimum wage to the well documented rise in earnings inequality in Mexico between the late 1980s and the early 2000s. We find that a substantial part of the growth in inequality, and essentially all of the growth in inequality in the bottom end of the distribution, is due to the steep decline in the real value of the minimum wage. (*JEL* J31, J38, O15, O17, O18, R23)

There is plenty of evidence that the wage structure in Mexico changed considerably during the 1980s and 1990s. A variety of datasets and samples show, in particular, that wage inequality and the returns to skill have increased markedly since the mid-1980s to at least the mid-1990s, after which the rising trend in inequality has slowed down or even reverted (see Gordon H. Hanson 2007).

Although these changes are uncontroversial, there is still no consensus about their determinants. Starting in the mid-1980s, the Mexican government embarked on massive privatization and trade liberalization programs (Rafael La Porta and Florencio Lopez-de-Silanes 1999; Hanson 2007), labor market institutions and union power were curbed (David Fairris 2003), and increases in the minimum wage did not keep pace with the rate of price and wage inflation (see, for example, Fairris, Gurleen Popli, and Eduardo Zepeda 2008). These changes happened against the backdrop of a generalized increase in wage inequality in the United States and other developed economies (Lawerence F. Katz and David H. Autor 1999) and at a time of rising international migration to the United States that—among other things—affected the domestic supply of labor (Daniel Chiquiar and Hanson 2005; Prachi Mishra 2007). Concurrently, in the mid-1990s, Mexico experienced a severe economic and financial crisis. This concurrence of factors makes it hard to disentangle their individual contributions to changes in earnings inequality in Mexico.

Most of the existing research on the determinants of change in the wage structure in Mexico has focused on the role of international trade and foreign direct investment

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(FDI). Due to its proximity to, and increasing economic integration with, the United States, Mexico has typically been regarded as an ideal testing ground for theories of the effect of international trade on the structure of wages.

As summarized in Katz and Autor (1999), a number of papers have argued that increasing wage inequality in the United States since at least the 1980s has been the result of increasing "globalization." A simple version of the Heckscher-Ohlin model predicts, in fact, that economic integration will lead to a rise in the returns to skill in the United States, a country that is relatively abundant in *skilled* labor. Perhaps as a result of the scarce evidence in support of an effect of trade on the wage structure in the United States, researchers have turned to analyzing changes in the wage structure in Mexico. Since Mexico is abundant in *unskilled* labor, a Heckscher-Ohlin model predicts that returns to skill here should have fallen as a result of increasing economic integration with the United States (see Ann Harrison and Hanson 1999 and Pinelopi Koujianou Goldberg and Nina Pavcnik 2007 for a synthesis and a critical appraisal of this argument).

However, the predictions of this model are clearly at odds with the data as, following liberalization, inequality in Mexico started to rise rather than fall. A number of papers have attempted to solve this apparent puzzle by arguing that the depressing effect of trade on inequality was offset by a rise in the demand for skills due to skill biased technological change (Gerardo Esquivel and Jose Antonio Rodriguez-Lopez 2003), a trade-induced fall in the price of capital (Michael Ian Cragg and Mario Epelbaum 1996), or increased FDI (Robert C. Feenstra and Hanson 1997). Hanson and Harrison (1999), however, claim that a Heckscher-Ohlin model might well explain the evidence, since Mexico was skill-abundant relative to the countries it found itself competing with after the mid-1980s liberalization, explaining why inequality and relative returns to skill increased. This, according to Raymond Robertson (2004), might also explain why inequality fell in the second half of the 1990s, after Mexico joined the North American Free Trade Agreement (NAFTA) and further integrated with the United States and Canada, two countries abundant in skilled labor.

While we do not rule out any of these explanations, in this paper, we focus on the effect of the minimum wage. Between 1989 and 2001, the Mexican minimum wage declined by about 50 percent relative to median earnings, suggesting its potential role in the observed rise in inequality. With few exceptions (Fairris, Popli, and Zepeda 2008), this explanation has been largely neglected. Bell's seminal study (Linda A. Bell 1997), showing that between 1984 and 1990 the minimum wage was too low to have an effect on formal manufacturing wages, has long been taken to imply that the deterioration in its real value could not be held responsible for the subsequent increase in wage inequality.

Our analysis reveals that a substantial part of the growth in inequality between 1989 and 2001, and essentially all the growth in inequality in the bottom end of the distribution, is due to the steep decline in the real value of the minimum wage. In order to come to this conclusion, we borrow from Lee's analysis (David S. Lee 1999) of the effect of the minimum wage on changes in wage inequality in the United States. Lee (1999) assumes that, in the absence of the minimum wage, wage inequality would have been the same (or would have changed at the same rate) across

US states. Since our units of observation are municipalities, we can also experiment with more generous parameterizations for trends in latent inequality, accounting for permanent unobserved differences in wages across municipalities, unrestricted time-varying state-specific effects, and municipality time-varying characteristics, including a measure of trade openness. By probing the robustness of our results to a variety of specifications, we hope to rule out that our results are driven by other determinants of wage inequality that are spuriously correlated with changes in the real value of the minimum wage.

The structure of the paper is as follows. Section I provides background information on the minimum wage in Mexico and presents descriptive evidence on the trend in inequality and the real value of the minimum wage. Section II presents the empirical model. Section III presents the regression results, and Section IV concludes.

I. Institutions and Basic Trends

A. *Changes in the Earnings Structures*

In order to describe the evolution of earnings inequality in Mexico, in the rest of the analysis, we use micro data from the ENEU (Encuesta Nacional de Empleo Urbano) between 1989 and 2001.[1] Similar to the US Current Population Survey, the ENEU is the Mexican official labor market survey and is the only household survey continuously available since the late 1980s that collects detailed labor market information and a large array of socioeconomic characteristics. The ENEU has been widely used for studies of the Mexican labor market, including several prominent studies documenting and analyzing changes in the wage distribution (e.g., Hanson, Robertson, and Antonio Spilimbergo 2002; Hanson 2004; and Eric A. Verhoogen 2008).

The survey covers only the urban areas of the country, the primary sampling units being municipalities.[2] The sampling scheme has changed over time, as a number of smaller municipalities have progressively entered the sample. In order to avoid inequality trends being affected by compositional changes, we restrict the sample to the 63 large municipalities that have been consistently surveyed throughout the period of analysis (which we refer to as *panel* municipalities).[3] For robustness, though, we also present results for all municipalities in the survey.

Although the survey is run every quarter,[4] we restrict our sample to the first quarter of each year, as this is the only period of the year for which Social Security data—that we later integrate into the analysis—are available to us. In the analysis,

[1] Although the survey is available from 1987, we restrict ourselves to the data from 1989 since, over the first two survey years, wages of informal workers change dramatically, and we have no clear explanation for this. It is reassuring, though, that our estimates of the effect of minimum wages are essentially unaffected by the exclusion of these two years.

[2] Mexico City comprises 16 distinct boroughs. These constitute second-level administrative divisions, *on a par* with the municipalities. However, unlike municipalities, they do not have regulatory powers and are not fully autonomous in their internal administration.

[3] A list of these municipalities is contained in the Web Appendix. These municipalities accounted for 45 percent of the population in urban areas as of 2000.

[4] The survey has a panel component, as households stay in the sample for five consecutive quarters. We ignore this feature of the data and we treat each survey wave as independent.

we pool men and women, although we also later present separate regressions for the two groups.

We finally restrict the sample to salaried employees between the ages of 16 and 60 and we exclude those, respectively, below the bottom or above the top percentile in each municipality. Of the approximately 90,000 individuals per year in the selected age group, around 36,000 are wage earners, with an average number of individuals by municipality of 570 per quarter.

The definition of earnings in the publicly available version of the ENEU refers to monthly "equivalent" earnings from the main job after taxes and Social Security contributions, including overtime premia and bonuses. For those paid by the week, the survey transforms weekly earnings into monthly earnings by multiplying the former by 4.3. Similar adjustments are used for workers paid by the day or every two weeks.

Panel 1 of Figure 1 reports the first, third, seventh, and ninth deciles of the distribution of log monthly earnings relative to the median. Percentiles are obtained using sampling weights. The data in Figure 1 refer to the average across all panel municipalities and are obtained from a weighted regression of each decile gap by year and municipality on additive year and municipalities dummies, with regression weights given by the number of observations by municipality. The figure reports the coefficients on the year dummies standardized to their value in 1989.

Similarly to what was found using other datasets and samples, the data show a clear fanning out of the distribution, with earnings inequality rising markedly both at the top and at the bottom of the distribution. The rise in inequality comes to a halt in the second half of the 1990s. Overall, between 1989 and 2001, the 50–10 percentile gap rises by 15 p.p. and the 90–50 percentile gap rises by around 17 p.p. Other standard measures of inequality (not reported), such as the standard deviation of log earnings, provide a very similar picture.

B. *Minimum Wages: Institutional Features and Trends*

Legislated minimum wages are a long standing feature of the Mexican labor market, dating back to the Federal Employment Code of 1931. Since 1986, each municipality has been assigned to one of three "minimum wage areas" denoted by *A*, *B*, and *C*, with *A* being the highest minimum wage area and *C* the lowest. Minimum wage setting has henceforth been assigned to a tripartite National Commission for Minimum Wages that is constituted of representatives from business, labor unions, and the government.

The assignment of municipalities to different areas is intended to deliver approximately the same real value of the minimum wage in each municipality, so area *A* wages are the highest and area *C* wages are the lowest.[5] Because of this assignment

[5] Most of the smaller and rural municipalities of the country belong to area *C*, which accounts for 63 percent of the workforce, while areas *A* and *B* account, respectively, for 11 percent and 26 percent of the workforce. Area *A* encompasses the capital city, cities close to the US border, plus some tourist resorts and industrial hubs. The second and third most populated cities in Mexico (Guadalajara and Monterrey) belong to area *B*.

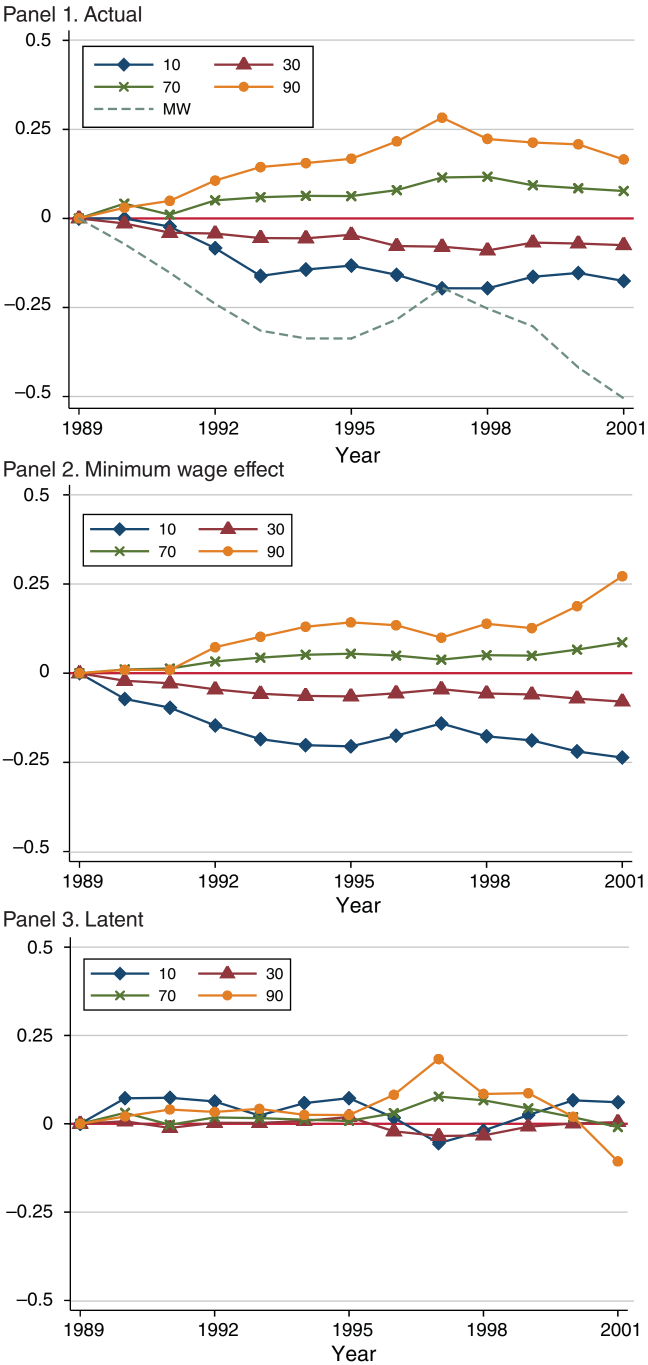

Figure 1. Actual and Latent Trends in Inequality and the Effect of the Minimum Wage: Mexico 1989–2001

Notes: Panel 1 depicts the evolution of the gap between different deciles of the log earnings distribution and the median. An additional line (denoted by *MW*) reports the differential between the log minimum wage and the median. Panel 2 depicts the contribution due to changes in the real value of the minimum wage, and panel 3 depicts the estimated trend at each decile conditional on the minimum wage (latent changes). Results refer to the regression in column 2 of Table 2 (and results in columns 3 and 6 of Table 4). All series are standardized to their value in 1989. *Source*: ENEU

Table 1—Minimum Wages and Earnings in Mexico

		Minimum wage area		
		A	B	C
1985	Median daily earnings — Social Security data (pesos)	13.20	11.26	10.66
1989	Daily minimum wage (pesos)	8.64	8.00	7.21
	Log monthly minimum wage	5.56	5.48	5.38
	Percent at or below minimum wage	17	15	13
	First decile — log monthly earnings distribution — ENEU	5.51	5.45	5.37
	Median — log monthly earnings distribution — ENEU	5.89	5.84	5.78
	Ninth decile — log monthly earnings distribution — ENEU	6.76	6.69	6.47
	Log monthly minimum wage — median log monthly earnings distribution	−0.33	−0.36	−0.40
2001	Daily minimum wage (pesos)	40.35	37.95	35.85
	Log monthly minimum wage	7.10	7.04	6.98
	Percent at or below minimum wage	3	3	5
	First decile — log monthly earnings distribution — ENEU	7.31	7.45	7.16
	Median — log monthly earnings distribution — ENEU	7.99	8.01	7.85
	Ninth decile — log monthly earnings distribution — ENEU	9.06	8.93	8.70
	Log monthly minimum wage — median log monthly earnings distribution	−0.89	−0.97	−0.87

Notes: The table reports descriptive statistics on the minimum wage and earnings in Mexico. Data are reported separately by minimum wage area and time (1989 and 2001).

Source: ENEU and Mexican Social Security data.

criterion, municipalities in the same state can belong to different minimum wage areas.

The assignment of municipalities to minimum wage areas has remained unchanged since 1986. From 1989 to 1996, mandated percentage increases in the minimum wage have also been the same across areas, after which the minimum wage across areas began converging.[6]

Descriptive statistics on the minimum wage and other variables are presented in Table 1. The first row of the table presents information on a measure of average wages based on the 1985 Social Security data, or prior to the formation of the minimum wage areas. Although we have no direct access to the micro data from the Mexican Social Security records, for each municipality we have measures of different deciles of the daily wage distribution as of March first of each year. This equivalent daily wage is available for all employees, whether paid on a daily basis or not. This includes cash and in-kind benefits and is expressed in gross terms. Here, we report the average municipality median log earnings across all panel municipalities in each area. Consistent with the intended assignment of municipalities to different minimum wage areas, the data show that area *A* municipalities have the highest level of pre-minimum wage earnings. The opposite is true for area *C*, with area *B* locating somewhere in the middle.

The following row reports the level of minimum wage in 1989. Unlike the United States, where the minimum wage is set on an hourly basis, the Mexican minimum

[6] In particular, the ratio of the minimum wages in areas *B* and *C* relative to area *A* rose, respectively, from 0.93 and 0.84 in 1996 to 0.94 and 0.89 in 2001.

wage is set on a *daily* basis, with those working a fraction of a normal working day being subject to a pro-rata minimum wage. As of 1989, in area A, this was 8.64 pesos, approximately US$3.70 per day,[7] while in area C, this was 7.21 pesos, about 16 percent lower than in area A.

While the Mexican minimum wage is set on a daily basis, the ENEU only reports information on employees' *monthly* earnings, and it is not possible to compute daily wages. This is because information on the number of working days is not available in the publicly available version of the ENEU. Despite this, there is clear evidence of monthly earnings in the ENEU clustering precisely at 30 daily minimum wages.[8]

This is apparent in Figure 2 which reports kernel density estimates of the log monthly earnings distribution. Panels 1–3 of Figure 2 refer to the year 1989, where each row refers to a different minimum wage area. The spiked distribution is a rectangular kernel with bandwidth 0.0125. Data are standardized to the area median earnings.[9] Indeed, earnings appear to cluster at a number of discrete values. The data show, in particular, a very clear spike at 30 times the daily minimum wage, denoted by MW in the figure.[10] In the following, we refer to this as the "monthly minimum wage." As of 1989, for example, 17 percent of area A workers were paid at or below the monthly minimum wage, with 8 percent being paid precisely the monthly minimum wage. Data in Table 1 show that, in 1989, the log monthly minimum wage in area A was 5.56, about 33 log points lower than the median of log monthly earnings. Similar values of the log minimum wage relative to the median are observed in other areas.

For each rectangular kernel in Figure 2, we report additional labels for levels of earnings corresponding to specific integer and noninteger multiples of the monthly minimum wage (1.5, 2, 2.5, 3, 3.5, 4, and 5).[11] It is noticeable that a high number of spikes on the right of the minimum wage correspond precisely to these multiples. These spikes are particularly evident at low multiples.

Even below the monthly minimum wage, we see workers earning precisely one-half or two-thirds of the monthly minimum wage. These are presumably part-time workers, although the fact that a nonignorable mass of the earnings distribution locates below the monthly minimum wage might also suggest nonenforcement or earnings underreporting.[12]

[7] This is equivalent to an hourly minimum wage of 1.08 pesos for a normal working day, i.e., around US$0.46 (US$0.93 at PPP adjusted US dollars). For comparison, the hourly federal minimum wage in the United States in 1989 was US$3.35.

[8] One feature of the minimum wage in Mexico is that, for minimum wage workers, social security contributions are entirely paid by the employer and no income tax is levied.

[9] The support for the kernel density estimates, on the horizontal axis, is given by equally spaced points at distance 0.01 ranging from −1.5 to 1.5. We have arbitrarily set a small bandwidth in order to identify spikes in the earnings distribution. Results are similar, but less stark, if we use a larger bandwidth (of 0.015 or 0.02).

[10] To compute this, we have approximated the value of the log monthly minimum wage to the closest multiple of 0.01.

[11] Again, we approximate these values to the closest multiple of 0.01.

[12] Most of the other spikes that are unaccounted for by multiples of the minimum wage correspond to rounded monthly or weekly earnings (denoted by a symbol "X" in the figure), i.e., multiples of 100 or 430 (4.3 $\times$ 100) pesos. That (self-reported) earnings cluster at rounded values is not a feature unique to Mexican data (see for example Jorn-Steffen Pischke 1995 for the United States). Other (unlabeled) spikes in the figure correspond to the minimum wage and multiples of it from other minimum wage areas. Workers can live in one area and work in another, or firms in one area might pay higher minimum wages in force in neighboring areas

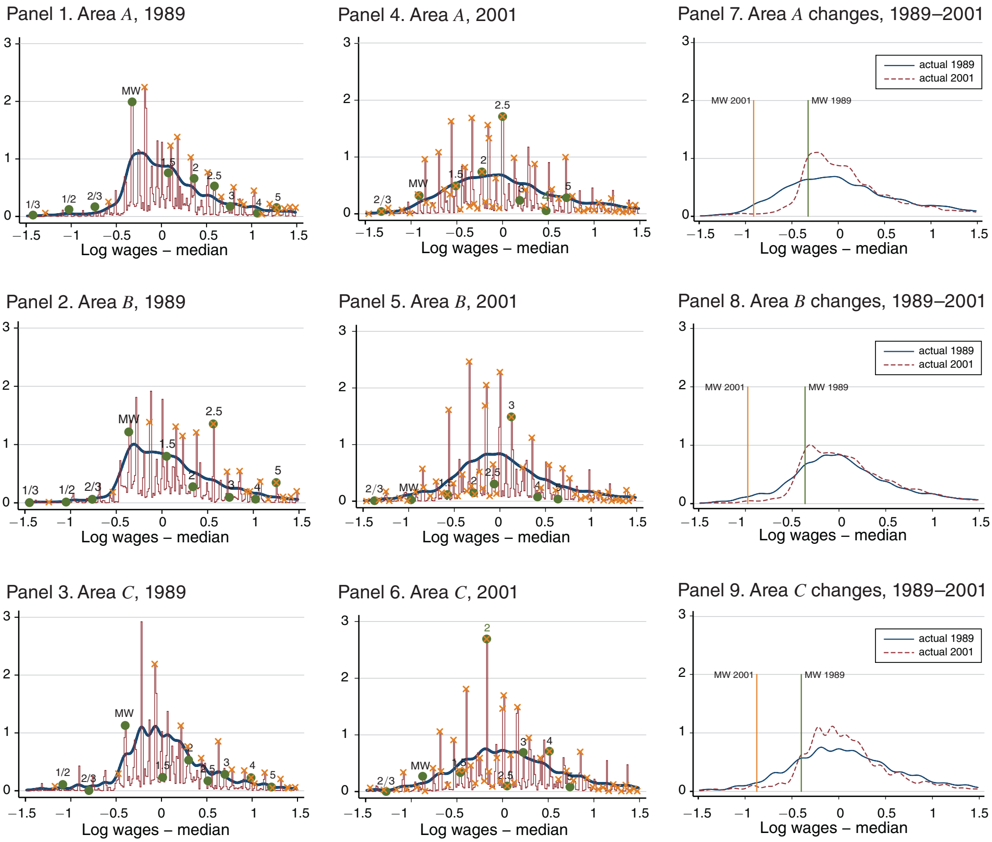

Figure 2. Changes in Earnings Inequality and the Minimum Wage: Mexico 1989–2001

Notes: Panels 1–3 and 4–6 report, respectively, rectangular and Gaussian kernel density estimates of the log earnings distribution in each minimum wage area in 1989 and 2001. Labels in the figure correspond to multiples of the monthly minimum wage. Crosses refer to rounded earnings. Panels 7–9 report the same Gaussian kernel estimates at the two points in time with a vertical line corresponding to the minimum wage in each year. All series are standardized to the median in each area and year.

That monthly earnings in Mexico cluster at multiples of the monthly minimum wage is consistent with the role of *numeraire* that the minimum wage has traditionally played in the Mexican economy—a phenomenon often referred to as "lighthouse effect." Not only wages (see Sara G. Castellanos, Rodrigo García-Verdú, and David S. Kaplan 2004; and Fairris, Popli, and Zepeda 2008), but also social benefits, pensions, fellowships, and even fines have traditionally been expressed in multiples of the minimum wage. Legislated occupational minimum wages—that in Mexico coexist with the "general" minimum wage used in this study—are also expressed as multiples (greater than one) of the general minimum wage in each area. This feature of the minimum wage as a nominal anchor of the labor market, and the

to attract workers. In either case, we ignore this in the analysis, as these spikes are likely to be endogenous to the local level of the minimum wage.

economy as a whole, is common to other Latin American countries, most notably Brazil (see, for example, Miguel Nathan Foguel 1998), and arguably an inheritance from the hyperinflation of the 1970s and 1980s.[13] Not only does this explain why a spike appears precisely at the monthly minimum wage, but it also explains why the minimum wage appears to have spillover effects that propagate to higher percentiles of the earnings distribution.[14]

In Figure 2, alongside the rectangular kernel density estimates for each area, we report smoothed kernel densities based on a Gaussian smoother with optimal bandwidth (Bernard W. Silverman 1986).[15] These smoothed densities are particularly useful for comparisons across areas and time as they interpolate across spikes that are time- or area-specific, and that tend to overshadow the overall shape of the distribution.

Panels 4–6 of Figure 2 report kernel density estimates for 2001. The difference between the minimum wage and median earnings—a measure of the real value of the minimum wage—declines considerably across all areas over the 13 years of analysis, implying a substantial loss in the potential "bite" of the minimum wage. Data in Table 1 show that, by the year 2001, the gap between the monthly minimum wage and the median in area A is –89 log points, i.e., 56 log points lower than in 1989. Similar values are observed in other areas. By 2001, only between 3 and 5 percent of workers (depending on the area), are paid at or below the minimum wage. As of the last year of observation, not only do we not observe any clear spike in the earnings distribution at the monthly minimum wage, but there is also little evidence of spikes at multiples of it. This suggests that the decline in the real value of the minimum wage led to a loss in its role as a numeraire of the economy, and hence in its potential ability to compress the earnings distribution through spillovers to higher percentiles.

The deterioration in the real value of the minimum wage until at least the mid-1990s was largely the reflection of the stance taken by President Salina's government against inflation and its objective of attracting foreign capital. This resulted in a solidarity pact and a period of wage moderation that the labor unions accepted in exchange for a more generous system of social transfers and price capping (Francisco Zapata 2000).

In order to examine the evolution of the real value of the minimum wage throughout the entire period 1989–2001, we revert to panel 1 of Figure 1 where, alongside changes in the earnings distribution, we also report the difference between the log minimum wage and the median in each year. Again, this is the average across all municipalities, obtained by means of a regression as the other series in the figure.

One can notice an almost monotonic deterioration in the real value of the minimum wage. Between 1995 and 1997, following the NAFTA agreement of 1994,

[13] For example, contracts for university and other public employees establish compensation in multiples of precisely 30 daily minimum wages. In other instances, for example, in determining workers' eligibility for credit dispended by INFONAVIT, the National Fund for Workers' Housing, the minimum monthly minimum wage is calculated as 30.4 times the daily minimum wage.

[14] The ENEU question used to derive our measure of earnings makes no reference to the minimum wage. This allows us to rule out the possibility that the spikes in the data are due to the framing of the question.

[15] We have used the command *kdens* in Stata to compute kernel densities (Ben Jann 2005). The optimal bandwidth for a Gaussian kernel is calculated as $h = \sigma n^{-1/5}$, where σ is the standard deviation of log wages, and n is sample size. In practice, in our data, this varies between 0.05 and 0.08. Gaussian kernel estimates are rather insensitive to the choice of the bandwidth.

the minimum wage rose temporarily (by 20 percent) relative to median earnings. Although no explicit clause about the Mexican minimum wage was contained in NAFTA, during the negotiation phase, President Carlos Salinas pledged to raise the minimum wage permanently "now and for the future" (Anthony DePalma 1993b). This pledge, which was echoed by President Bill Clinton in several public fora, was apparently in response to US concerns that the trade agreement would entice businesses to relocate to Mexico to take advantage of its low labor costs. This temporary rise in the value of the minimum wage appears to have had no effect on the earnings distribution. By then, the real minimum wage was already too low to have an effect on the earnings of low paid workers.

Although President Salinas' pledge was honored in the early years of the newly elected President Ernesto Zedillo's government (DePalma 1993a), this was later reneged upon, as the new government imposed wage moderation in an attempt to curb resurgent inflation prompted by the currency devaluation (William A. Orme 1996). Starting from 1997, the real value of the minimum wage in Mexico hence rejoins its downward trend.

Panels 7–9 of Figure 2 report, again, the two Gaussian kernel estimates of the log earnings distribution in 1989 (panels 1–3) and 2001 (panels 4–6), alongside a vertical line corresponding to the monthly minimum wage. Again, all series, including the minimum wage, are standardized to the median. The minimum wage appears to create a visual support for the earnings distribution in 1989, but, as its real value declines, the distribution "fattens up" at the bottom tail, while the bunching around the old minimum wage disappears. This suggests that the decline in the real value of the minimum wage has a causal effect on the growth in wage inequality.

II. Model: Specification and Identification

In order to identify the effect of the minimum wage on the distribution of earnings, we follow Lee (1999), and more recently Autor, Alan Manning, and Christopher L. Smith (2009), who use this strategy for the United States. While existing analyses for the United States tend to focus on earnings differentials across states, our analysis is at the municipality level, as Mexican municipalities within the same state can be subject to different minimum wages. The model specifies an identifiable function for the latent wage distribution, i.e., the one that would have been observed in the absence of the minimum wage. Other than for sampling and specification errors, it attributes any deviation around this function to the effect of the minimum wage.

Let w_{mt}^{q} be the q-th percentile of the log earnings distribution in municipality m at time t and let w_{mt}^{*q} be the latent percentile. A reasonable starting model for the effect of the minimum wage on the wage distributions is a censoring model, that assumes that everybody with latent wages below the minimum wage is paid precisely the minimum wage and everybody above is unaffected.

Suppose that a sufficiently high percentile p exists, such that wages at this percentile or higher percentiles are unaffected by the minimum wage, i.e., $w_{mt}^{s} = w_{mt}^{*s}$,

$s \geq p$. The censoring model implies that the log q to p earnings differential can be expressed as

$$(1) \qquad \begin{aligned} w^q_{mt} - w^p_{mt} &= w^{*q}_{mt} - w^{*p}_{mt} \quad &\text{if} \quad w^{*q}_{mt} \geq MW_{mt} \\ w^q_{mt} - w^p_{mt} &= MW_{mt} - w^p_{mt} \quad &\text{if} \quad w^{*q}_{mt} < MW_{mt}, \end{aligned}$$

where MW_{mt} is the logarithm of the nominal minimum wage in municipality m. Equation (1) states that the q to p percentile differential of the actual log earnings distribution in municipality m equals the latent differential if the latent q-th percentile is above the minimum wage, and equals the differential between the minimum wage and the pth percentile otherwise. The assumption that, at percentile p or above, wages are unaffected by the minimum wage allows us to replace the latent percentile p with the actual percentile in equation (1).

In order to operationalize equation (1), we again follow Lee (1999) and Autor, Manning, and Smith (2009), and we express the q to p percentile gap $(w^q_{mt} - w^p_{mt})$ as a function of latent wage differentials plus a minimum wage effect. We parameterize this minimum wage effect as a quadratic function of the difference between the log minimum wage and the pth percentile of the actual log earnings distribution. Following Lee (1999), we refer to the differential $(MW_{mt} - w^p_{mt})$ as the "effective minimum wage," as this expresses the minimum wage relative to some level of local earnings that is unaffected by the minimum wage and that proxies for local living standards. Lee (1999) and Autor, Manning, and Smith (2009) assume (and find evidence consistent with the hypothesis) that in the United States earnings at or above the median are unaffected by the minimum wage, implying that $p = 50$. So, in their case, the "effective minimum wage" is essentially a measure of the real minimum wage. This might not be a reasonable assumption for Mexico, for which we have preliminary evidence (which we confirm below) of spillovers of the minimum wage to percentiles above the median. This suggests using a value for p greater than 50.

To achieve identification, we finally need to impose some parameterization for latent wage differentials $(w^{*q}_{mt} - w^{*p}_{mt})$. While Lee (1999) assumes that latent wage differentials are the same across US states (or that they vary at the same rate across states), we experiment with less restrictive specifications. In the empirical section, we start by assuming that (possibly conditional on some additional covariates) latent wage differentials grew at the same rate across municipalities, so that latent wage differentials can be expressed as $w^{*q}_{mt} - w^{*p}_{mt} = \alpha^q_m + \alpha^q_t + X'_{mt}\gamma^q$, where α^q_m and α^q_t are, respectively, quantile-specific municipality and time fixed effects, and X is a vector of additional municipality specific covariates.

From the above, the regression model is

$$(2) \qquad w^q_{mt} - w^p_{mt} = \alpha^q_m + \alpha^q_t + \beta^q_1[MW_{mt} - w^p_{mt}] + \beta^q_2[MW_{mt} - w^p_{mt}]^2 + X'_{mt}\gamma^q + u_{mqt},$$

where u is an error term. Latent wage differentials are assumed to vary additively by municipality and time guarranting in principle that sufficient variation is left in the dependent variable to identify the effect of the minimum wage.

One implication of model (2) is that, at percentile p or above, it must be the case that $\beta_1 = \beta_2 = 0$, i.e., it must be the case that the minimum wage does not have an effect, as, by assumption, latent and actual wages are identical. This is a testable assumption and its rejection will suggest that the effective minimum wage is endogenous to the error term in equation (2), hence affecting the consistency of the regression estimates.

Model (2) provides a simple local parametric alternative to the censoring model in equation (1) and is the basis of our empirical analysis. Although we do not impose any a priori restriction on the value of the parameters β_1 and β_2, for specific configurations of these parameters, the model guarantees that, at least over a defined range of variation of $(MW_{mt} - w_{mt}^p)$, the q to p percentile gap tends to $(MW_{mt} - w_{mt}^p)$ as $(MW_{mt} - w_{mt}^p)$ grows, and it tends to $(w_{mt}^{*q} - w_{mt}^{*p})$ as $(MW_{mt} - w_{mt}^p)$ falls, consistent with the censoring model in (1) (see also Autor, Manning, and Smith 2009).

Depending on the value of the parameters β_1 and β_2, the model also allows workers at, and possibly away from, the minimum wage to receive wage premia—or suffer wage penalties—relative to the legislated minimum wage. Although at the cost of some parameterization, relative to model (1), model (2) offers the additional advantage of allowing for both potential noncompliance and spillovers of the minimum wage to higher percentiles of the distribution.

One difficulty with the OLS estimates of equation (2) is that any measurement error in the qth percentile of the earnings distribution will lead to a spurious positive correlation between different measures of inequality and the effective minimum wage, hence possibly leading to upward biased estimates of the effect of the minimum wage. Lee (1999) attempts to remedy the division bias using trimmed mean wages as a measure of centrality. Autor, Manning, and Smith (2009) note that a trimmed mean might only control for a small share of this spurious correlation and suggest using the differential variation in the US states minimum wages over and above the federal minimum wage as an instrument for the effective minimum wage in each state. This is a valid instrument to the extent that legislated minimum wages by area do not adjust endogenously to differences in the levels or trends in local latent inequality.

Not only are there potential reasons to be slightly skeptical of this identification assumption, but, because Mexican minimum wages grew at the same rate across areas in the first half of the period, we cannot effectively exploit their differential variation for identification. To circumvent this problem, we instrument effective minimum wages by municipality (and their square) calculated on the ENEU data with effective minimum wages (and their square) calculated using Social Security data.[16] Social Security data refer to gross pay and only refer to formal workers, implying that they

[16] A problem arises for Mexico City, as there is no clear correspondence between its neighborhoods in the ENEU and those used by the Social Security Administration. To get around this problem, we compute the average seventh decile of the distribution of log earnings from the Social Security data across all neighborhoods of Mexico City, and use this average to compute a measure of the effective minimum wage that we use as an instrument for the effective minimum wage in all neighborhoods of the capital. Social Security data are left censored at

might provide error-ridden estimates of average earnings across municipalities and time. This, however, should not invalidate our IV approach. To the extent that measurement error in the Social Security data is uncorrelated with measurement error in the ENEU data, this procedure will still purge the estimates of the potential correlation between the included regressors and the error term due to measurement error.

III. Empirical Analysis

A. *Regression Estimates*

Tables 2 and 3 report the IV estimates of equation (2). Each column refers to a different specification or to a different sample. Entries in the tables refer to the estimated first derivative of each dependent variable with respect to the effective minimum wage evaluated at the sample mean.[17] OLS estimates are available in the Web Appendix and, consistent with what was predicted above, they are systematically higher than the IV estimates (by around 0.20). Unless otherwise specified, regressions are weighted by cell size and standard errors in brackets are clustered by municipality. Each entry refers to a separate regression, where each row refers to the differential between consecutive deciles of the earnings distribution and the seventh decile ($p = 70$). The reason for using the seventh decile as opposed to the median, as in Lee (1999), is that, at least in some specifications, we find evidence of earnings up to the sixth decile being significantly affected by the minimum wage.

Column 1 of Table 2 presents a specification that, in addition to a linear and quadratic term in the effective minimum wage, includes time plus municipality fixed effects to account for latent earnings differentials. This and all other specifications also include the interaction of year dummies with dummies for the three minimum wage areas. This allows us to abstract from the differential changes in the minimum wage and latent wages across areas. The *F*-test on the included instruments for the effective minimum wage (but not its square) reported at the bottom of the table is large (14.04), implying a strong predictive power of the instruments.[18]

The fixed effect regression estimates show that a 10 p.p. rise in the effective minimum wage is associated with a statistically significant rise in the gap between the bottom decile and the seventh decile of around 5 p.p. (0.552×0.10). As expected, point estimates tend to become smaller at higher deciles and are statistically significant only up to the second decile. The regression coefficients turn from being positive for deciles below the seventh to being negative for higher deciles, implying some spillover effects, but these are not statistically significant.

the area minimum wage and, until 1995, they were capped at ten times the minimum wage. This prevents us from using these data to characterize the trends in the earnings distribution.

[17] This is $\beta_{1q} + 2\beta_{2q}[MW - w^p]$, where variables without the *mt* subscript refer to sample means over all municipalities and all periods. In practice, in most specifications, estimates of β_{2q} are insignificant, arguably due to a weak first stage for the quadratic term.

[18] We do not report estimates in levels, as the *F*-tests for both the linear and the quadratic terms are below conventional significance levels (the *p*-values are, respectively, 0.172 and 0.414). Differing levels of informality across municipalities imply that, in a cross section, average earnings from the Social Security data are poorly correlated with earnings from the ENEU that include both formal and informal workers. This stops being true when municipality fixed effects are included, consistent with evidence that we find in the ENEU that differences in the incidence of informality across municipalities are approximately unchanged over time.

Table 2—The Impact of the Minimum Wage on Earnings Differentials: Mexico 1989–2001. IV estimates

	Baseline sample			
	(1)	(2)	(3)	(4)
p10–p70	0.552***	0.493**	0.677***	0.705**
	(0.182)	(0.197)	(0.169)	(0.330)
p20–p70	0.433**	0.478**	0.681***	0.833***
	(0.186)	(0.181)	(0.104)	(0.206)
p30–p70	0.244	0.288	0.492***	0.531*
	(0.159)	(0.216)	(0.160)	(0.303)
p40–p70	0.190	0.189	0.391***	0.366
	(0.131)	(0.153)	(0.107)	(0.260)
p50–p70	0.117	0.168	0.283***	0.286
	(0.139)	(0.127)	(0.100)	(0.214)
p60–p70	0.076	0.089	0.171**	0.147
	(0.103)	(0.088)	(0.084)	(0.213)
p80–p70	0.042	−0.183*	−0.118	−0.160
	(0.177)	(0.108)	(0.110)	(0.213)
p90–p70	−0.140	−0.435	−0.082	−0.163
	(0.264)	(0.266)	(0.207)	(1.010)
Observations	819	819	819	819
Municipality fixed effects	Yes	Yes	Yes	Yes
State × year		Yes	Yes	Yes
Municipality trends			Yes	Yes
Municipality controls				Yes
F-test — linear	14.04	7.898	18.37	14.86
	[0.000]	[0.001]	[0.000]	[0.000]
F-test — quadratic	1.045	1.841	1.601	1.436
	[0.358]	[0.167]	[0.210]	[0.246]

Notes: Each entry in the table refers to the coefficient from a regression of each decile gap relative to the seventh decile by year and municipality on the effective minimum wage and its square. Estimated effects at the mean are reported. Estimation method: instrumental variables, with the effective minimum wage computed using ENEU data instrumented with the effective minimum wage computed using Social Security data. All regressions include year × minimum wage areas effects. Standard errors in round brackets clustered by municipality. *F*-test refers to an *F*-test on the excluded instruments in each first stage regression. *p*-values in square brackets. Municipality controls include an employment weighted average of *ad valorem* industry tariffs, the share of workers in each age group (16–20, 21–30,.., 51–60), the share of workers in each of three education groups (completed primary, completed junior high, and more than junior high), the share of females, and the proportion of workers by one-digit industry.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

In column 2 of Table 2, we additionally control for the interaction of year dummies with state dummies. The 63 municipalities in the sample belong to 15 states. These regressions effectively identify the effect of the minimum wage based on its differential variation across municipalities in the same state. This is important, because Mexico, like the United States, is a federation of states, each with a certain degree of autonomy, with a constitution, governor and congress. State-specific policies or macroeconomic factors might induce a spurious correlation between the minimum wage bite in a state and trends in inequality. Others (see, for example, Feenstra and Hanson 1997 and Hanson 2004) have exploited regional or state-level variation to identify the effect of US production delocalization, FDI,

Table 3—The Impact of the Minimum Wage on Earnings Differentials: Mexico 1989–2001. Robustness Checks

	Unweighted	All municipalities	Males	Females	Formal	Informal
	(1)	(2)	(3)	(4)	(5)	(6)
p10–p70	0.725***	0.675***	0.784***	0.317	0.788***	−0.206
	(0.155)	(0.190)	(0.144)	(0.516)	(0.226)	(0.260)
p20–p70	0.708***	0.784***	0.730***	0.564**	0.619***	−0.161
	(0.214)	(0.168)	(0.120)	(0.253)	(0.188)	(0.182)
p30–p70	0.498***	0.713***	0.578***	0.507***	0.370**	−0.112
	(0.139)	(0.156)	(0.122)	(0.139)	(0.153)	(0.173)
p40–p70	0.492***	0.611***	0.546***	0.237	0.275**	0.109
	(0.179)	(0.152)	(0.107)	(0.206)	(0.136)	(0.150)
p50–p70	0.405***	0.415***	0.413***	0.258*	0.153	−0.068
	(0.122)	(0.143)	(0.097)	(0.137)	(0.153)	(0.165)
p60–p70	0.149*	0.252*	0.181*	0.109	−0.086	−0.157
	(0.087)	(0.131)	(0.108)	(0.088)	(0.116)	(0.157)
p80–p70	−0.134	−0.036	−0.151	0.026	0.061	−0.314
	(0.091)	(0.144)	(0.097)	(0.160)	(0.103)	(0.197)
p90–p70	0.044	0.100	0.000	0.053	0.054	−0.334
	(0.216)	(0.555)	(0.325)	(0.214)	(0.251)	(0.268)
Observations	819	1,773	819	819	819	819
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State × year	Yes	Yes	Yes	Yes	Yes	Yes
Municipality trends	Yes	Yes	Yes	Yes	Yes	Yes
F-test — linear	15.79	33.43	19.28	12.58	18.78	15.06
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
F-test — quadratic	2.324	3.225	1.158	1.138	1.344	1.882
	[0.106]	[0.042]	[0.321]	[0.327]	[0.268]	[0.161]

Notes: Each entry in the table refers to the coefficient from a regression of each decile gap relative to the seventh decile by year and municipality on the effective minimum wage and its square. Estimated effects at the mean are reported. Estimation method: instrumental variables, with the effective minimum wage computed using ENEU data instrumented with the effective minimum wage computed using Social Security data. All regressions include year × minimum wage areas effects. Standard errors in round brackets clustered by municipality. *F*-test refers to an *F*-test on the excluded instruments in each first stage regression. *p*-values in square brackets.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

and migration opportunities on the Mexican wage structure and the distribution of income. Indeed, there is evidence that Mexican regional wage differentials widened during the 1980s and 1990s, with wages in the northern areas of the country, close to the US border, increasing relative to those in the southern areas (Hanson 2004, 2007; Chiquiar 2005). By including state × year fixed effects, we control for state-specific factors that others have shown to be important predictors of changes in the wage structure. The estimated effects of the minimum wage are similar to the ones in column 1, suggesting only a modest role for omitted state-level variables in explaining the results.

The data used for the estimation together with the predicted IV regression estimates from Table 2, column 2, are reported in Figure 3. The figure plots the 70–10

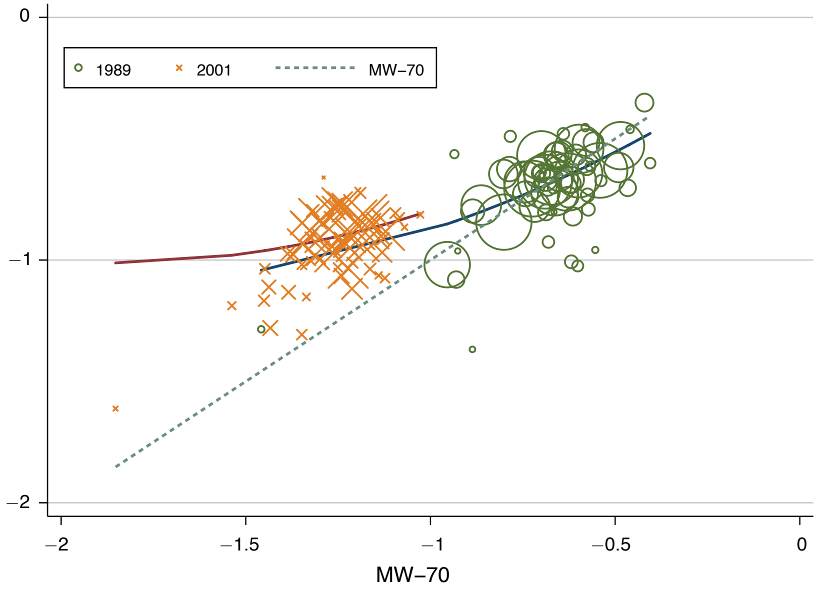

Figure 3. Earnings Inequality and the Minimum Wage by Municipality (IV Estimates with Municipality Fixed Effects): Mexico 1989–2001

Notes: The figure depicts the tenth percentile of the log earnings distribution by municipality and year over the log minimum wage. All series are standardized to the seventieth percentile of the log earnings distribution by municipality and year. The solid lines are regression lines from the specification in Table 2, column 2. See text for details. The thinner line is a 45 degree line.

percentile gaps across all panel municipalities (on the vertical axis) as a function of the effective minimum wage (on the horizontal axis).[19] We plot this series at the beginning (1989) and at the end (2001) of the period. The thinner line is a 45 degree line representing the effective minimum wage by municipality. The size of each symbol is proportional to the sample size, so larger symbols imply greater weight in the regressions. Differences in the intercept of the estimated regression curves in the two years identify changes in earnings differentials over and above the effect of the minimum wage, i.e., changes in latent inequality.

One can notice that, at the beginning of the period, the effective minimum wage tracks wage differentials at the bottom of the distribution (denoted by circles) remarkably well. After about a decade, the mass of the distribution (denoted by "X" symbols) shifts to the southwest, implying a substantial decline in the effective minimum wage and a contemporaneous rise in bottom-tail inequality. Most data points, though, lie on a regression curve that is almost undistinguishable from the one estimated for 1989. If anything, the intercept of the regression curve is slightly higher in 2001 than in 1989, implying a fall in latent inequality. This suggests that the decline in the minimum wage is fully responsible for the observed increase in

[19] To obtain these figures, we have estimated the model in fixed effects, and we have standardized the municipality fixed effects for both the dependent and the independent variables to sum to zero, so that the data are centered on the sample mean in each year. We report the data points net of these estimated fixed effects.

inequality at the bottom of the distribution, as there is no appreciable change in the intercept of the fitted regression curves.

Column 3 of Table 2 additionally controls for municipality specific linear time trends. Point estimates grow in absolute value at all deciles, implying that municipalities that experienced a greater increase in inequality also experienced a greater fall in the effective minimum wage. Point estimates are significant up to the sixth decile and are not significantly different from zero afterward, implying pronounced spillover effects of the minimum wage that propagate to higher percentiles of the earnings distribution. Estimates in column 3 suggest, for example, that a 10 p.p. increase in the effective minimum wage raises earnings at the bottom decile by almost 7 p.p. and median earnings by around 3 p.p. relative to the seventh decile.

One source of concern for the results in the previous columns is that the correlation between wage inequality and the minimum wage might be contaminated by the opening of the Mexican economy throughout the 1980s and 1990s, which others claim contributed to shaping the trends in earnings inequality. If trade reforms affected different municipalities differently, so that municipalities with higher growth in earnings—and hence a greater reduction in the effective minimum wage—also happened to be relatively more affected by trade liberalization, one might end up overestimating the role played by the deterioration in the real value of the minimum wage on inequality. In an attempt to account for the effect of trade reforms, we have computed an employment weighted average of ad valorem industry tariffs for each municipality in each year.[20] We have used the average industrial employment structure (across all 13 years) for each municipality from the ENEU to compute these weights. We also include in regressions the share of workers in each age group (16–20, 21–30, … , 51–60), the share of workers in each of three education groups (completed primary, completed junior high, and more than junior high), the share of females, and the proportion of workers in each one-digit industry in each year. This allows us to additionally control for observable characteristics of the workforce that might be correlated with the trend in the effective minimum wage. Point estimates that include these additional controls are presented in column 4 of Table 2 and are remarkably similar to those in column 3, albeit slightly less significant, leaving our conclusions about the effect of the minimum wage on earnings inequality essentially unaltered.

Table 3 shows additional robustness checks. We present a regression that uses unweighted (as opposed to weighted by cell size) data in column 1, and a regression that uses all the municipalities in the sample, whether panel or not, in column 2. In both cases, we use the same saturated specification as in column 3 of Table 2, with municipality time trends and state $\times$ year fixed effects. Neither the weighting scheme nor the inclusion of all municipalities in the sample make any substantial difference to our conclusions.

[20] Tariffs data are available at the four-digit industry level and refer to trade with the United States (Benjamin Aleman-Castilla 2006). After a period of substantial stability, in 1994, following the signing of NAFTA, tariffs fell abruptly, after which some further reduction took place. We have compared our import tariffs for trade with the United States with data on average import tariffs (irrespective of the origin country) for the period from 1988 to 1995. As expected, the two series are remarkably similar up to 1993, after which we see a fall in import tariffs from the United States, but not from other countries.

Separate regressions for men and women are reported in columns 3 and 4 of Table 3. We still use the same measure of the effective minimum wage as in the previous columns—computed as the difference between the monthly minimum wage and the seventh decile of the pooled (across gender groups) earnings distribution. The earnings of both men and women appear to be affected by the minimum wage, although for women the point estimate at the first decile is lower and statistically insignificant. Lower precision of the estimates for women is expected, as there are fewer observations than for men, with women accounting for around a quarter of the sample.

This result, however, might also point to the circumstance that a small fraction of very low-wage workers are not covered by the minimum wage. This is confirmed in columns 5 and 6 of Table 3 where we run separate regressions for formal and informal workers, depending on whether or not they report social security contributions in their main job. Again, as in the previous columns, we use the seventh decile of the pooled (formal plus informal workers') earnings distribution to compute the effective minimum wage. Because informal workers have presumably fewer guarantees and are less protected from unjustified firing, one might suspect that these workers are also less likely to be covered by minimum wage legislation. William F. Maloney and Jairo Nunez Mendez (2004), though, find no evidence in support of this hypothesis, and Bell (1997) actually reports that the minimum wage has a stronger effect on informal workers than on formal workers.

Results for workers in the formal sector (where the minimum wage is most likely to "bind"), in column 5, show significant effects of the minimum wage for percentiles up to the fortieth, and effects close to zero for all other percentiles, similar to comparable evidence for the United States (see Autor, Manning, and Smith 2009, who find significant effects up to the thirtieth percentile). Contrary to previous evidence, estimates in column 6 show no significant effect of the minimum wage on informal workers' earnings. If anything, point estimates are negative, but they are all statistically insignificant. Although it appears that a group of workers is unaffected by the minimum wage, implying some noncompliance, this group is relatively small (22 percent of employment), and this does not affect our main conclusion—that the minimum wage tends to affect the overall distribution of earnings in Mexico.

B. *Decomposing Changes in Earnings Inequality*

In order to estimate the contribution of the erosion in the real value of the minimum wage to the observed rise in inequality, we compare actual and counterfactual estimates of changes at each decile gap. In practice, we use the regression results from Table 2 to orthogonalize changes in the earnings distribution into a term attributable to the fall in the real value of the minimum wage and a term that subsumes latent changes in inequality. We present these results in Table 4.

The first column presents estimated changes in actual earnings at each decile relative to the median. These are the same data as in Figure 1. While the 50–10 percentile gap increases, on average, by 1.5 p.p. a year, the 90–50 percentile gap increases by 1.7 p.p. Estimates of the effect of the minimum wage are reported in

Table 4—Estimated Trends in Earnings Differentials and the Contribution of the Minimum Wage: Mexico 1989–2001

	Actual	Changes in minimum wage			Latent		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
p10–p50	−0.015***	−0.016***	−0.014***	−0.017***	0.001**	−0.001**	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
p20–p50	−0.008***	−0.014***	−0.011***	−0.015***	0.005***	0.002***	0.006***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p30–p50	−0.006***	−0.005***	−0.005***	−0.010***	−0.001***	−0.001***	0.005***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
p40–p50	−0.003***	−0.001***	−0.001***	−0.004***	−0.002***	−0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p60–p50	0.003***	0.001***	0.003***	0.003***	0.002***	0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p70–p50	0.007***	0.007***	0.005***	0.011***	0.000	0.002***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
p80–p50	0.013***	0.013***	0.013***	0.017***	−0.001	−0.001	−0.004***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
p90–p50	0.017***	0.022***	0.018***	0.010***	−0.005***	-0.001	0.007***
	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State × year			Yes	Yes		Yes	Yes
Municipality trends				Yes			Yes

Notes: The table reports the estimated annual change in each decile gap relative to the median. Column 1 reports actual changes. Columns 2–4 report changes due to changes in the real value of the minimum wage, estimated based on the regressions in columns 1–3 of Table 2. Columns 4–6 report residual changes. Standard errors in brackets clustered by year. See also notes to Table 2.

columns 2–4.[21] These correspond, respectively, to the specifications with municipality fixed effects (column 1 of Table 2) with the addition of state × year dummies (column 2 of Table 2) and the further addition of municipality trends (column 3 of Table 2). For each specification, we observe significant effects of the minimum wage at both the top and the bottom of the distribution. For example, the specification in column 3 suggests that the decline in the real value of the minimum wage is responsible for a rise in the 50–10 percentile gap of 1.4 p.p. a year and a rise in the 90–50 percentile gap of 1.8 p.p. Results from other specifications are not very dissimilar.

The estimated contribution of the minimum wage to changes in the earnings structure using the specification with state × year dummies (column 3 of Table 4) is reported in panel 2 of Figure 1. The predicted trends in inequality due to the erosion in the real value of the minimum wage are essentially similar to the actual trends in the first panel. One, however, has to take these results with some caution. Some of the point estimates of the effect of the minimum wage in Table 2, and most notably those at higher percentiles, are not statistically significant at conventional levels. In this sense, we might be exaggerating the effect of the erosion in the real value of the minimum wage on inequality at the top of the distribution.

[21] These are computed by standardizing predicted changes in the gap between each decile and the seventh decile to the predicted change in the median relative to the seventh decile. Estimates refer to the coefficient on a linear trend. Standard errors are clustered by year.

For each specification, the last three columns of Table 4 report latent changes in inequality. For example, if one considers the specification with municipality and state $\times$ year fixed effects in column 6 of Table 4, estimated latent changes at each percentile are very small, on the order of 0.1 to 0.2 p.p. per year. This is also evident in panel 3 of Figure 1 that shows that, once the effect of the minimum wage is accounted for, changes in latent inequality are essentially negligible. Admittedly, we still observe some temporary fanning out of the wage distribution in the second half of the 1990s that cannot be accounted for by changes in the real value of the minimum wage. In this respect, Verhoogen (2008) convincingly argues that this increase was the result of a differential quality upgrading across firms that followed the peso devaluation of December 1994.

Results based on other specifications are slightly different, but they convey a similar message. The decline in the real value of the minimum wage appears to explain most of the variation in the earnings structure over the period of analysis.

IV. Discussion and Conclusions

In this paper, we use household micro data from urban Mexico from the late 1980s to the early 2000s to analyze the contribution of the decline in the real value of the minimum wage to the well-documented rise in the country's earnings inequality. We show that, at least in the early years, not only did the minimum wage create a floor to the earnings distribution, but it also had spillover effects that propagated to higher percentiles of the distribution. This finding is consistent with the role of numeraire of the minimum wage in the Mexican economy, as wages of many nonminimum wage workers have traditionally been expressed precisely as multiples of the minimum wage.

The decline in the real value of the minimum wage accounts for most of the growth in inequality at the bottom end. Once we account for changes in the minimum wage, we also find evidence of what appears to be a temporary increase in inequality in the mid-1990s, leaving space for other explanations linked to the effect of international trade, macroeconomic and exchange rate shocks that others before us have shown to have affected the structure of earnings in Mexico.

Our finding that the minimum wage explains a very significant share of the increase in inequality observed in Mexico between the late 1980s and the late 1990s is surprisingly consistent with what others argue happened in the United States. David Card and John E. DiNardo (2002) and Thomas Lemieux (2006), building on the work of DiNardo, Nicole M. Fortin, and Lemieux (1996) and Lee (1999), suggest that the rise in US inequality in the 1980s was largely an "episodic phenomenon," and that most of the increase at the bottom of the wage distribution is potentially linked to the erosion of the real value of the minimum wage.

From a substantive point of view, our findings seem to suggest that the role of trade and "globalization" in shaping trends in the wage structure in developing countries, and in particular in Mexico, might have been overemphasized.

In closing, at least three caveats apply to our conclusions. First, we have treated changes in the real value of the minimum wage as exogenous. As noted by Richard B. Freeman (2009), many developing countries experienced some deterioration in the real value of the minimum wage in the 1990s, and this is perhaps no accident.

We cannot rule out that the Mexican government allowed the minimum wage to deteriorate—by simply not adjusting its value to the rate of inflation—for fear that this might impede readjustment to macroeconomic shocks, or because of increasing pressure toward inequality in market wages, in turn, prompted by the forces of globalization. Although our results are confirmed even after we control for an index of trade openness by municipality, our analysis of the role of trade is unlikely to carry a causal interpretation.

Similarly to existing analyses for the United States (DiNardo, Fortin, and Lemieux 1996; Lee 1999), we also ignore the potential disemployment effects of the minimum wage, a highly debated issue in the literature (David Neumark and William Wascher 1992; Card and Alan B. Krueger 1994). A truncation in the wage distribution, arising from low-wage workers getting priced out of the labor market as a result of a minimum wage rise, is observationally indistinguishable from wage censoring, whereby the minimum wage creates a floor to the wage distribution. Although we do not attempt to remedy for this, we note that, except during the severe financial crisis of the mid-1990s, open unemployment in Mexico has been very low and untrended, suggesting that large employment adjustments did not occur. Clearly, though, we cannot rule out that pronounced employment changes would have taken place had the real value of the minimum wage been left unchanged.

A final caveat is that our analysis refers only to urban workers, hence ignoring the potential general equilibrium effects that arise in a Harris-Todaro model when a rural uncovered sector is present. Although we remain agnostic on these general equilibrium effects, it is reassuring that existing analyses find similar trends in the earnings structure in both urban and rural Mexico (see Fairris, Popli, and Zepeda 2008).

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