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Measuring the Impact of Minimum Wages

Evidence from Latin America

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with

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Simple numerical measures of the minimum wage may offer deceptive indications of its impact. Alternative measures, such as kernel density or cumulative distribution plots, are more reliable, and highlight influences higher in the wage distribution or on the informal sector. Panel employment data from Colombia—where minimum wages seem high and binding—show that the minimum wage can have important impacts on wages and unemployment across the wage distribution.

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Summary findings

Maloney, Nuñez, and colleagues provide an overview of minimum wage levels in Latin America and their true impact on the distribution of wages, using both numerical measures and kernel density plots for eight countries (Argentina, Bolivia, Brazil, Chile, Colombia, Honduras, Mexico, and Uruguay). They especially try to identify "numeraire" effects—where the minimum is used as a reference higher in the wage distribution—and "lighthouse" effects—where it influences wage setting in the unregulated or "informal" sector.

Their main findings: First, statutory minimum wages are often misleading, and graphical methods may be more reliable. Second, the minimum wage's effect on wage setting extends far beyond what is usually considered and probably beyond the effect in industrial countries.

Using panel employment data from Colombia, where minimum wages seem high and binding, the authors quantify the minimum wage's effects on wages and on the probability of becoming unemployed. The Colombian case confirms the evidence offered by kernel density estimates:

- The minimum wage can have an important impact on wage distribution in the neighborhood of the minimum wage.
- The effects echo up the wage distribution in a clear demonstration of the "numeraire" effect. That this effect is stronger in Latin America than in the United States suggests that the minimum wage induces further-reaching rigidities in the labor market. The tradeoff between any possible effect on poverty and reduced flexibility is likely to be more severe in countries where this is the case. The effects on employment, and unemployment, are substantial.
- Informal salaried wages are also affected, confirming the graphical evidence of strong lighthouse effects. Self-employment earnings are not, however, confirming that the minimum wage is not simply serving as a measure of inflationary expectations.

This paper—a product of the Poverty Sector Unit and the Office of the Chief Economist, Latin America and the Caribbean Region—is part of a larger effort in the region to measure and understand the impact of labor market rigidities on employment and poverty. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Anne Pillay, room I8-104, telephone 202-458-8046, fax 202-522-2119, email address apillay@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. William Maloney may be contacted at wmaloney@worldbank.org. April 2001. (26 pages)

Measuring the Impact of Minimum Wages:

Evidence from Latin America[1]

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[1] The individual country kernel density analysis was done by Wendy Cunningham (Argentina, Mexico), Norbert Fiess (Brazil), Claudio Montenegro and Claudia Sepulveda (Chile), Edmundo Murrugarra (Uruguay), Mauricio Santamaria (Colombia) and Corinne Siaens (Bolivia, Honduras). Our thanks for helpful comments to Carmen Pages.

Minimum wages have again surfaced as a central issue in labor market policy in the region. In countries such as Mexico and Brazil, the real level of the minimum wage became so eroded over the 1980s that there is pressure to provide a "living" income for those at the lower tail of the distribution. On the other hand, the high rates of unemployment in some countries and the premium that more open trade postures put on labor market flexibility has made policy makers wary of introducing new rigidities.

This paper first provides an overview of the levels of minimum wages in Latin America and their true impact on the distribution of wages using both numerical measures and kernel density plots for eight countries (Argentina, Bolivia, Brazil, Chile, Colombia, Honduras, Mexico, and Uruguay). In particular, it attempts to identify effects higher in the wage distribution and for effects in the unregulated or "informal" sector. The central message is that the minimum wage has impacts on wage setting far beyond those usually contemplated and likely beyond those found in the industrialized countries. The final section then employs panel employment data from Colombia, a country where minimum wages seem high and very binding to quantify these effects and their impact on employment.

I. The Importance of the Minimum Wage.

First, the redistributional effects of the minimum wage may have the potential to reduce poverty, and foster growth. (see Freeman 1992 for a summary of the US debate). But the larger concern in the literature is that the secondary effects through the creation

of new rigidities in the labor market and the potential decrease in employment opportunities may offset the wage distribution gains. The simplest textbook models suggest that putting a wage floor above the equilibrium level will lead to a fall in employment. These effects have traditionally appeared to be weak in the US, perhaps with the exception of young workers (see, for example, Brown 1988, Brown Gilroy and Kohen 1983). However, more recent work by Currie and Fallick (1996), Abowd et. al. (1999) and Neumark et. al. (2000) report sharp disemployment effects for those constrained by the minimum with employment elasticities of between .4 to 1.6 (in absolute value).

The evidence from Latin America suggests large effects. Freeman and Castillo-Freeman's (1991) analysis of the imposition of US minimum wage norms on Puerto Rico in 1977 suggest that the weak US evidence results primarily from the fact that the minimum wage is so low as to "nibble" rather than "bite" at the wage distribution. However, when the minimum in Puerto Rico was raised to 63% of the average manufacturing wage, the elasticity of employment to the minimum wage became .91 and raising the wage led to massive job loss on the island. The same general picture emerges from Bell (1997) in her study using manufacturing panel data from Mexico and Colombia. She finds no impact of the minimum wage in Mexico where it was not binding. However, in Colombia, she finds an employment elasticity of unskilled workers on the order of .15-.33 and for skilled workers .03-.24 with the effect on workers paid near the minimum wage between .55 to 1.22. She concludes that, across the period 1981-1987, the 10% rise in the minimum wage from 1981-1987 reduced low-skilled, low wage Colombian employment in the range of 2%-12%.

The potentially very high elasticities of those earning near the minimum wage makes the overall impact on poverty potentially ambiguous: an elasticity over 1 implies that total income transfers to the target group *fall* with a rise in the wage. In the US, the evidence is ambiguous. As examples, Card and Krueger find weakly significant improvements in poverty, while Neumark, et. al. (2000) find that earned incomes of low-wage workers decline in response to minimum wage increases and actually increase poverty. [2] The debate arguably becomes more relevant in LDCs where enforcement of labor norms is thought not to extend to the unprotected or "informal" sector. Standard dualistic models ranging from the earliest (Harris and Todaro 1970) to some of the most recent (Agenor and Aizenman 1999) assume a labor market segmented by nominal wage rigidities such as the minimum wage. Here, the worker who loses his job has no access to unemployment insurance and instead takes refuge in the informal sector whose wage adjusts to accommodate supply. In this case, a rise in the minimum wage forces some workers into jobs earning below what they did before. The available empirical evidence for Latin America is ambiguous. Morely (1992) and de Janvry and Sadoulet (1996) find that poverty falls with a rise in the minimum, but only for periods of recovery in the former and only in periods of recession in the latter. Using world wide LDC data, McLeod and Lustig (1996) confirm a negative effect on poverty, but also a significant negative effect on employment as well.

The minimum wage also enters strongly into debates about the impacts of mandated non-wage benefit payments and other regulations have on labor demand. If, for instance, the worker fully values the health insurance provided by the employer, then

[2] Their evidence suggests that the pressure for implementing minimum wages comes from unions seeking to reduce wage competition.

then, in a market with no rigidities, his or her wage will fall by an equivalent amount. However, in the presence of a wage floor, the mandated benefit raises total remuneration to the worker and hence reduces total demand. In reality, most regulation can, at some level, be seen as a tax on firms. As an example, restrictions on firing implicitly deprive the firm of an "option" to divest itself of an asset (the worker) and therefore a tax equal to the option value. This, could be passed down to the worker as the cost of job security, but not if the minimum wage is binding.

A final consideration is how minimum wages may affect how economies adjust to shocks, whether through employment or wages. In the 1994-95 Tequila crisis, Mexico allowed real wages to be eroded over 25% and saw only moderate increases in unemployment. The Colombian Constitution, on the contrary, insists on a "salario minimo mobil" which has been interpreted dictating indexation to past inflation and this has arguably contributed to the high rates of unemployment experienced in response to the financial crisis in 1998.

II. Numerical Measures of the Incidence of Minimum Wages

Raw comparisons of the real minimum wage across countries are of limited use. From both the perspective of improving equity and minimizing labor market distortions, what is of interest is the level of the minimum wage relative to the distribution of remuneration in the individual country. To argue that the minimum is "too low" because it is a wage in Brazil fraction of that in Argentina is irrelevant if overall labor productivity differs by similar magnitudes.

As a first cut at international comparison, Figure 1 ranks various Latin American and OECD countries by the minimum wage standardized by the mean wage (SMW).[3] Latin America spans the range with Uruguay, Bolivia, Brazil, Argentina, Chile and Mexico with the lowest values and Venezuela, El Salvador, Paraguay and Honduras with among the highest. [4]

While informative, standardizing by the first moment is not sufficient to tell us whether the minimum wage is binding for two reasons. First the number of workers affected will depend on the higher moments of the distribution as well: more disperse endowments of human capital (variance) or a particularly large fraction of poorly endowed workers (skewness) would lead to more workers being affected by a given SMW. Second, if the minimum wage is not enforced, very high SMWs are irrelevant.

As a second cut, Table 1 offers several additional measures that attempt to provide a more rounded view. The first column presents the SMW and the second standardizes by the wage at the 50^{th} quantile (median). The median is a better measure of the central tendency since it is less sensitive to extreme values in the upper tail and to compression of the lower tail by the minimum wage. Using it to standardize reverses the SMW rankings of Argentina and Brazil. This effect is even more dramatic if we standardize by the wage at the 10^{th} quantile of the distribution, arguably the range that is of more concern than the center. [5] Brazil suddenly appears among the countries with the

[3] Source: For countries discussed in detail here, IBRD staff estimates for most recent years available. All others IDB (1999) for the early 1990s.

[4] The analysis uses the Permanent Household Survey (EPH) from Argentina, the Continuous Household Survey (ECH) from Bolivia, the National Survey from the Sample of Households (PNAD) from Brazil, the (CASEN) from Chile, the Multi-purpose Permanent Survey (EPHM) for Honduras, the National Urban Employment Survey (ENEU) from Mexico. We restrict the sample to those 16-65, working between 30-50 hours a week for informal salaried workers (those working for firms of five employees or below) and formal salaried workers (six workers and above).

[5] 10% of the sample earns below this wage and 90% above.

most potentially binding minimum (excluding Honduras), and far above Argentina and Uruguay. This makes sense when it is noted that Brazil shows the highest wage variance among countries overall, and among countries for whom the sample is purely urban.

III. Graphical Analysis-Kernel Density Plots

However revealing theoretically, the 10^{th} quantile, variance and skewness measures are problematic since they describe the distribution *after* the imposition of the minimum wage. A graphic approach, however can reliably reveal how the distribution is distorted. The first panels of Figure 2 are kernel estimates of the density function with a vertical line to mark the location of the minimum wage.[6] Kernel Density estimators approximate the density f(x) from observations on x. The estimator calculates the density at the center of the weighted x's found within a rolling interval or "window". They differ from histogram both in allowing the windows to overlap and by the possibility of different weighting schemes on the x's

$$\hat{f}_k = \frac{1}{nh}\sum_{i=1}^{n} K\left[\frac{x - X_i}{h}\right] \qquad (1)$$

The function K, that determines the weights is termed the "kernel". This has the advantage of giving a clearer idea of the shape of the distribution, but it is sensitive to the bandwidth chosen to smooth. This is particularly important for detecting the impact of minimum wages since an excessively large bandwidth will smooth exactly the "cliff" where the minimum wage is binding. Some adjustments away from the default were necessary to present the most revealing plot.

The second panels are the cumulative distributions of wages. These requires no judgements about bandwidths and the vertical "cliffs" indicate where the minimum wage, or multiples, may be influencing. Both the informal and formal wage distributions are plotted in light and dark lines respectively.[7] In each graph, a "piling up" of the probability mass around the minimum wage suggests that the policy has, in effect, forced a change in the distribution.

Interpretation

What is immediately clear is that minimum wages do have the capacity to strongly alter the distribution of wages. Colombia provides an extreme example: the dramatic cliffs in the figures, the low standard deviation, and high skewness (Table 1) likely reflect the impact of the minimum wage rather than the underlying distribution of human capital. Somewhat in contrast to common wisdom, of the Mercosul countries, Brazil and Chile appear to have more binding minimum wages in the formal sector than either the very rigid Argentina, or Uruguay.

More generally, enforcement varies widely across the region and SMWs appear to be somewhat deceptive measures of the efficacy of the minimum wage to affect distribution or a measures of labor market distortion. Chile and Colombia have SMW far below that of Honduras, yet the distortion of the wage distributions in the first two seems dramatic in comparison. This suggests that a country's location in the range of SMWs

[6] See DiNardo, Fortin and Lemieux (1996) for a thorough treatment of kernel density estimation and Velez and Santamaria (1999) for an application of the CDF to Colombia.

[7] Informal sector is defined in each country either by whether a salaried worker is un-affiliated with social security systems, or works in very small firms (around 6 or less). The Colombian survey, in particular, has only limited data and therefore shows little difference in means between the two.

(Figure 1) is insufficient to indicate the impact of a rise in minimum wage and that empirical work with only the statutory measures may give a misleading picture of what's going on.

The impact on the informal sector.

In virtually all countries, there is evidence of what Neri, Gonzaga and Camargo (2000) term the "Efeito Farol" or lighthouse effect on the informal distribution.[8] In fact, *the influence seems far stronger on the informal sector than the formal* in Brazil, Mexico, and in Argentina and Uruguay, countries where the wage appears irrelevant to the formal distribution. It may be argued that the minimum wage is simply a signal of the wage level in high inflation countries, but the evidence is not supportive: Brazil, Colombia and Mexico have very moderate rates of inflation in the sample period. Though probably not enforced by law, the minimum wage appears to be an important benchmark for "fair" remuneration.

This would seem to turn conventional conceptions of the relationship between the informal and formal sectors on their heads-- the binding wage floor is now in the informal sector-- and raises new questions about the *razon de ser* of the informal sector. If it is an inferior unprotected sector, why do workers receive some benefits and not others? Why does some concept of fairness dictate that informal workers should get the minimum, but not benefits? One possibility is that forwarded by Maloney (1999) that the sector is as much a way of avoiding the inefficiencies of labor market regulation as the regulations themselves. Where there is no wage floor in the formal sector, the costs of

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[8] This effect is also noted by Amadeo, Gill, and Neri (2000) for Brazil.

benefits to employers may be largely passed down to workers in the form of lower wages. If this implicit tax is higher than the perceived benefits, then there is an incentive to evade and seek informal employment. Given that informal workers are, on average, substantially younger than formal workers, it may be that many are still covered by their fathers' health insurance and hence, would resist paying the implicit tax again. Further, the often gross inefficiencies in benefits provision drive another wedge between benefits and implicit taxes.

This finding also suggests that the standard dualistic model that sees the flexible informal sector wage as permitting the absorption of workers rationed out from the rigid formal sector is seriously incomplete. It is not clear why we shouldn't also expect a downward sloping demand curve in the informal sector, and hence that the binding minimum wage leads to job loss there and reduced capacity to absorb the unemployed. Again, the present Colombian situation comes to mind. The historically unprecedented unemployment rates may partially arise from the shock to formal production due to the collapse of the financial sector, but also the jobs lost in the informal sector with the sharp rise in the minimum wage over the last two years.

The minimum wage as a reference for other formal wages.

Throughout the region it is common to use the minimum wage as a more general unit of measure for instance for quoting wages of benefits. In Brazil, for example, Neri et al (2000) find strong evidence of this "numeraire" effect throughout the wage distribution finding that 9% of formal sector workers received exactly one minimum wage, but another 6% received exactly a multiple. Argentina, Brazil, Mexico, and Uruguay appear

to show regular "cliffs" across the distribution that are synchronized between both the formal and informal sectors. The next section will test more explicitly for these effects.

IV. Econometric Evidence on the Impact of the Minimum Wage from Colombia

In this section, we follow Neumark (2000) in employing rotating panel data from Colombia to test the impact of a rise in the minimum wage on wages and the probability of becoming unemployed, and for numeraire effects in both. The existence of the panel, as well as the impression from the previous section that the minimum wage is high and binding made Colombia an obvious case study.

Since 1997, the National Statistical Agency (DANE) has created a rotating panel by reinterviewing 25% of households interviewed in the previous round of the Encuesta Nacional de Hogares (ENH-National Household Survey) yielding a set of two consecutive quarterly observations on the same households. Individuals were identified by household and then on the basis of gender, age, marital status, relation with the head of household, schooling level and years of education, variables which do not change between quarters. The Euclidian distance from each individual with respect to the rest of the inhabitants of a house, is calculated and the match accepted if the distance is below a predetermined threshold. Roughly 15% of the individuals in a survey can be linked to the past one in 11 rotating surveys. As table 2 shows, when we restrict to that used in the kernel density plots- men working 30-50 hours per week, we have a total of 10,633 observations who are employed in the first period. Slightly over 19% of these will become unemployed in the second period. Of these, 66% report being salaried workers and 34% report being self-employed. Although the year chosen to estimate the kernel

density plots permitted separating "formal" from "informal" wage earners in every period, this is not the case in other years and we combine the two in the "salaried" sector. Roughly 25% earn below the minimum wage. However, the vast majority of these, as suggested in the kernel density plots, are informal.

We examine the self-employed as another means of separating general price indexing effects from "true" minimum wage effects. If the minimum is simply an economy wide mechanism for coordinating prices, we might see the self-employed using it to fix their product prices. If this were not the case, we would expect that their incomes would be determined by the health of their enterprise and they would not raise their implicit "wage" at the risk of becoming uncompetitive.

The consecutive observations permit identifying the impact of the two annual changes in the minimum wage that occurred between 1997 and the end of the of the available sample in 1999.[9] We estimate the determinants of the percentage change in the real hourly wage worker *i* receives, (dw) and the probability of becoming unemployed (prob z=1) across two quarters as

$$dw_i, prob(z=1) = \sum_j \beta_j R(w_{i1}, mw_1)_j \left[\frac{mw_2 - mw_1}{mw_1}\right] + \sum_j \gamma_j R(w_{i1}, mw_1)_j + \sum_j \phi_j R(w_{i1}, mw_1)_j \left[\frac{w_{i1}}{mw_1}\right] + \delta X_{i1} + \lambda T_i + \pi A_i + \varepsilon_i \quad (2)$$

where mw is the real minimum wage respectively[10].

[9] This period corresponds to what is widely acknowledged as the country's worst employment crisis in the post war period.

[10] The deflator used was the consumer price index for each city.

Though it is common to examine the impact of the minimum wage on wages and employment at the minimum wage, however, the kernel density plots suggest that there are numeraire effects throughout the distribution. If we are interested on the total effect of the MW on distribution and employment, we need to look for these effects as well. Further, there may be general equilibrium effects through changes in the relative demand. For these reasons, a vector of j dummy variables, R, for position ranked by real hourly wage in year 1, of the wage of individual i with respect to the minimum wage (Table 2). The first term on the right-hand-side of the equation captures the effects of a change in the minimum wage on different regions of the wage distribution. The second permits the level of wage growth to change by each cohort in the wage distribution, independent of minimum wage effects. The third allows us to capture (or control) changes within each region or changes in higher levels than those defined by vector R.

Finally, X is a vector with the individual characteristics such as gender, age, education, etc., T and A are a set of quarterly and regional dummy variables which capture the dependence of observations of the same period (including seasonal effects) and region, respectively.

Previous papers find that low income families receive a short run benefit when the minimum wage increases but are negatively affected over the longer term (Neumark and Wascher, 1997; Neumark et al., 1998; Neumark et al., 2000). This is because short run adjustments are made via prices and long run adjustments via quantities: firms must follow the law at first but then, if required, they fire workers. For this reason, the lagged minimum wage $(SM_1 - SM_0)/SM_0$ is introduced. From the point of view of measuring these longer run impacts, it would be preferable to have, as Neumark et. al. did, a full

year span rather than the two quarter panels the ENH offers. This limitation may not be as serious as appears at first for measuring the impact on wages since higher inflation rates erode more quickly any mandated increase in the MW than in the US. It has also been argued (Brown et al. 1982) that the high turnover in low skilled workers may imply that employment adjustment in the most critical ranges around the minimum wage may be relatively rapid. Further, Maloney (1998) shows that average manufacturing tenure in Latin America is roughly 70% of the OECD so the quantity adjustment might occur more rapidly. Nonetheless, we put less weight in our analysis on the lags and do not follow Neumark in generating "representative" worker responses to lagged minimum wages. [11]

Effects on wages

Table 3a reports the effects on real wages of a change in the real minimum wage. on salaried workers. The results are broadly consistent with Neumark's. Around the minimum wage, the effect is high for salaried workers, .87 for those earning .7-.9 minimum wages. Moving up the income scale, the effect remains significant up to 4 minimum wages, although with decreasing coefficients reaching .16 for those earning more than 4 minimum wages. What is remarkable is that the effect dies off much more slowly than in the US. Between 2-3 minimum wages, Neumark found an impact of only .06 % whereas Colombia shows .38 up to 4 minimum wages. This suggests a far greater numeraire effect and hence substantially greater impact of, the minimum wage. As

[11] Neumark argues that generally speaking, the lag has the usual interpretation as long as long as the individual history is not relevant, that is, that the contemporary effect of a change in the MW does not depend on past wages. The problem that he highlights is that a rise in the minimum wage in the previous period may have "swept up" a worker into a different category. Therefore, the correct total effects (contemporaneous plus lagged) needs somehow to compensate for individuals changing classification that involves generating a set of representative workers in each cell.

Neumark found, very large effects are found below the minimum wage and we also do not have an obvious explanation for this. The self-employed show a significant effect below the minimum wage, but overall, there appears to be little impact on the distribution above.

The effect of a one quarter lag suggests two interesting effects. First, that across the wage distribution there is a significant, and broadly uniform (~17%) erosion of the first period effect, perhaps due to inflation. lagged minimum wage has a negative effect for both samples. This suggests that we cannot take the impact effect as the wage rise that firms will use in making employment decisions. Second, again the impact on the self employed is virtually never significant and the magnitude are roughly a third of those for salaried workers. This suggests that not only do the self employed not respond strongly to lighthouse effects, but that they update their "wages" frequently to avoid inflation erosion. This, in fact, may be one of the advantages of being self-employed vs. salaried in high inflation environments.

Effects on Employment

Table 3b shows the consequent effects on employment. Equation (2) is run again, but this time as a logit where if the individual is assigned a value of 1 if he retains his job and a 0 if he is without a job in the second quarter.

The results are consistent with the wage regressions. A rise in the minimum wage has a statistically very significant impact on the probability of becoming unemployed that again decreases with a rising position in the wage distribution. The lags echo this pattern

and suggest that, as might be expected, the adjustment does not take place instantaneously. On average, the contemporaneous effect is roughly twice that found by Neumark for the US and, again, extends far higher in the distribution. Corresponding to the apparent impact on the wages of the very lowest ranges of the self-employed distribution, there are negative impacts on employment as well as some impacts higher in the distribution. Figure 3 graphs both the impact on wages and unemployment probability by position in the distribution.

The regressions, therefore, suggest statistically very significant effects on employment and magnitudes of effect far larger than those seen in the US. However, since they measure the impact on the flow out of employment, they cannot answer the question of what happens to the total stock of jobs. As a very rough first approximation, we run equation 2 again, but eliminating the R dummies so as to get the "average" effect (integrating under the wage distribution in table 3a) of the minimum wage. The average contemporaneous impact is .64 and lagged is -.17 leaving a total effect of .47 % rise in wages. We then multiply this by Fajnzylber and Maloney (2000) estimate of the LR own wage elasticity of blue collar manufacturing employment of .32. If there is no further inflationary erosion, this would imply an elasticity of employment with respect to minimum wage of .15. This is consistent with Bell's estimates and suggests that the 9% rise in minimum wage in 1999 would have had the effect of reducing employment by 1.4%.

V. Conclusion

The Colombian case confirms the evidence offered by the kernel density estimates. First, the minimum wage can have an important impact on the wage distribution in the neighborhood of the minimum wage. Second, the effects echo up the wage distribution in a very clear demonstration of the "numeraire" effect. That this effect is far stronger than found by Neumark in the US suggests that the minimum wage induces further reaching rigidities in the labor market and that the trade off between any possible effect on poverty and reduced flexibility is likely to be more severe in Latin America. The employment effects are shown to be large as a result. The data did not allow testing of the impacts on informal salaried sector wages, but the kernel density plots speak convincingly about the light-house effect and the potentially greater impact on the informal sector. In sum, the minimum wage has impacts both in the higher reaches of the formal distribution and in the informal labor markets that magnify its distortionary effects beyond that previously thought.

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Figure 1: Minimum Wage/Mean Wage in OECD Countries and in Latin America

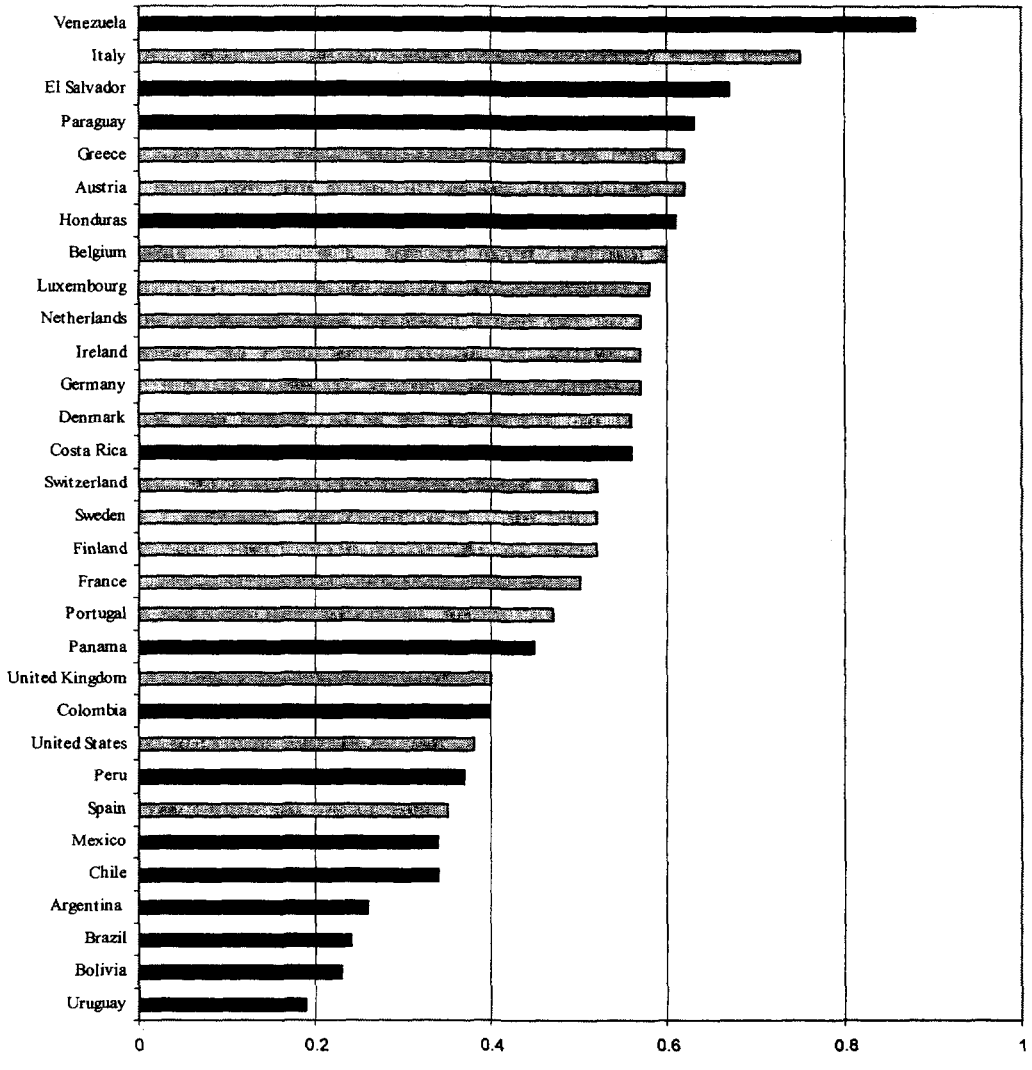

Figure 2: Kernal Density Plots, Cumulative Distributions and Minimum Wage

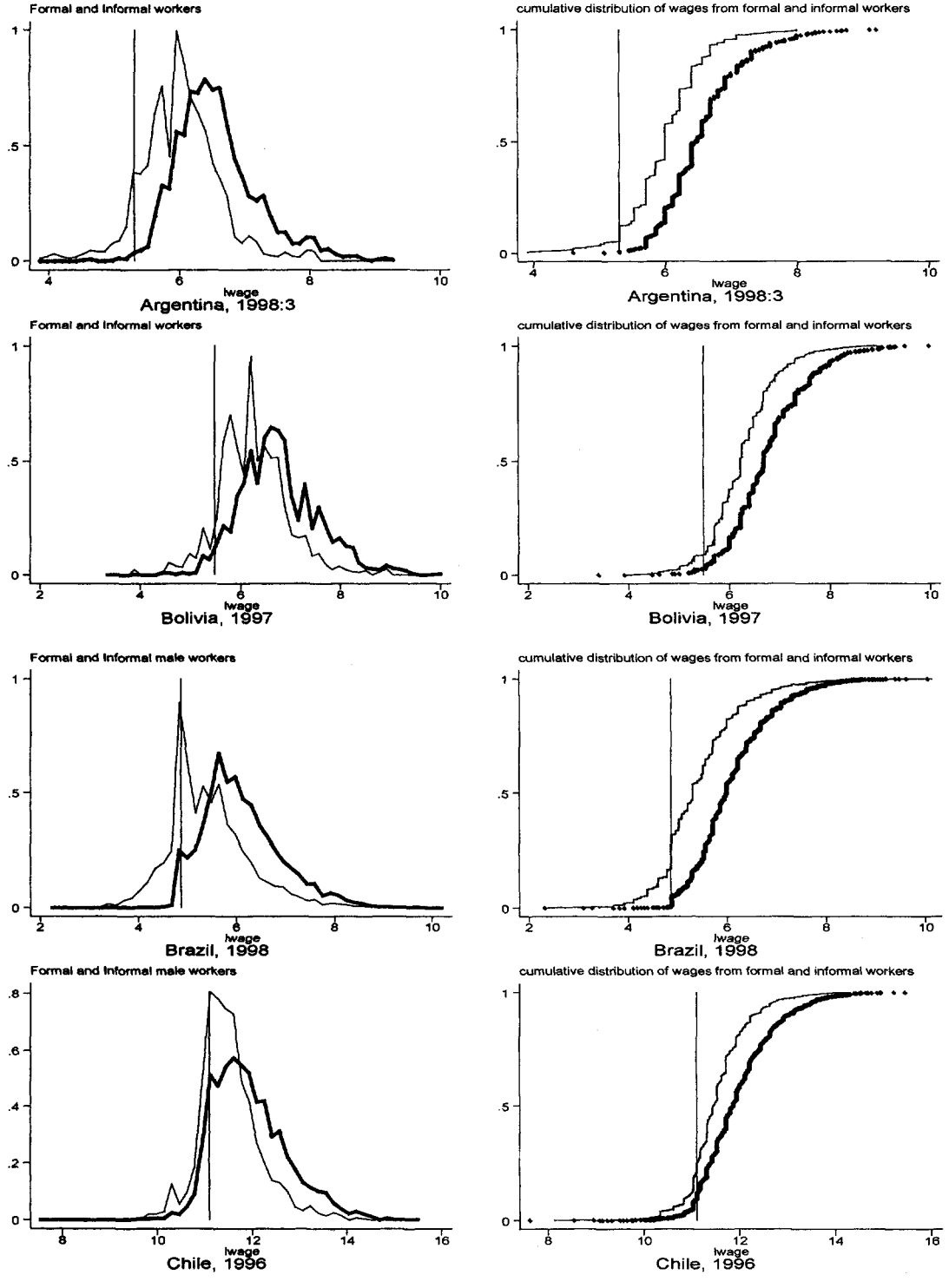

Figure 2, Cont.

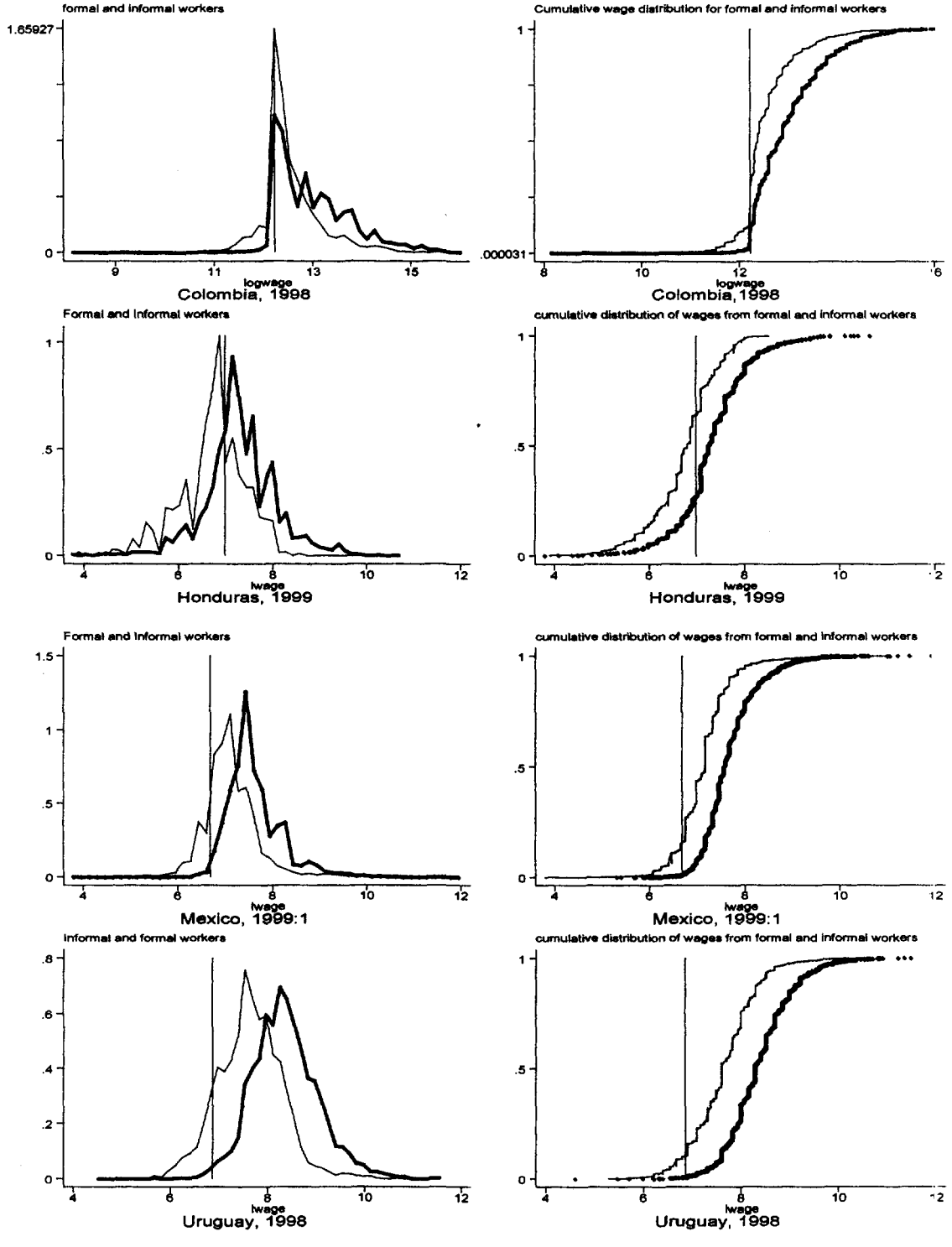

Figure 3: Colombia- Impact of Minimum Wage on Wages and Employment

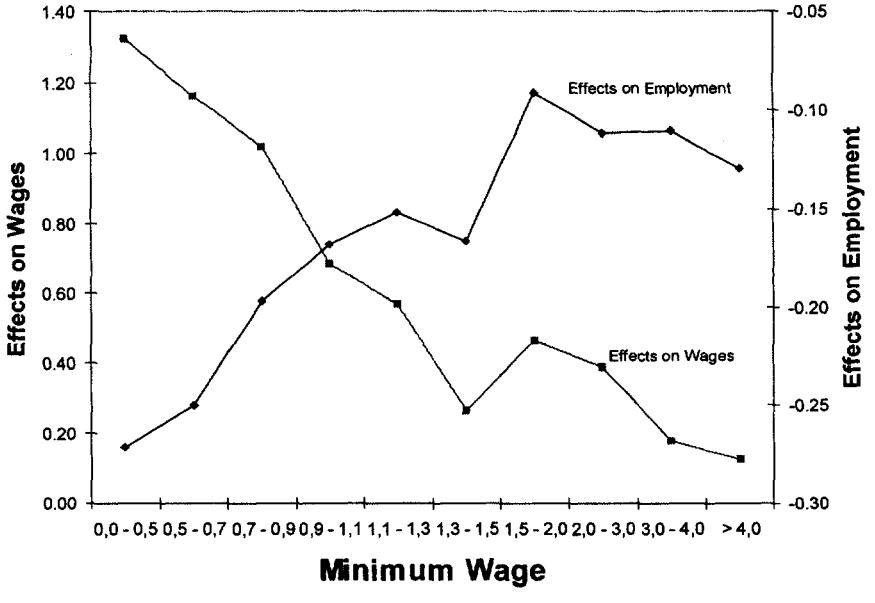

Table 1: Summary Statistics on Minimum Wages and Wage Distributions

	date	mw/mean	mw/50th	mw/10th	std. dev.	skewness
Argentina (U)	1998	0.26	0.33	0.67	0.67	0.53
Bolivia	1997	0.22	0.34	0.80	0.80	0.51
Brazil	1998	0.24	0.43	1.00	0.86	0.61
Brazil (U)	1998	0.22	0.37	1.00	0.71	0.60
Chile	1996	0.34	0.55	1.09	0.77	0.58
Colombia (U)	1998	0.40	0.68	1.00	0.51	1.16
Honduras	1999	0.62	0.90	2.26	0.80	-0.14
Mexico (U)	1999	0.34	0.48	0.87	0.64	0.83
Uruguay (U)	1998	0.19	0.27	0.64	0.72	0.06

Source: IBRD Staff Estimates, U=Urban areas only. Samples include workers between 16-65 years of age working 30-50 hours as salaried workers.

Table 2: Colombia-Distribution of Sample by Salary Range

Men who work 30-50 hours per week

Salary ito MW	Employed in t=1		Unemployed in t=2	
0.0 - 0.5	559	6.24%	267	15.99%
0.5 - 0.7	574	6.40%	229	13.71%
0.7 - 0.9	1112	12.41%	237	14.19%
0.9 - 1.1	1444	16.11%	235	14.07%
1.1 - 1.3	1095	12.22%	145	8.68%
1.3 - 1.5	536	5.98%	85	5.09%
1.5 - 2.0	965	10.77%	132	7.90%
2.0 - 3.0	1121	12.51%	155	9.28%
3.0 - 4.0	455	5.08%	49	2.93%
> 4.0	1102	12.29%	136	8.14%
Total	8963	100%	1670	100%

Table 3a: Colombia- Effect of a 1% Rise in the Minimum Wage on Hourly Salaries

Men who work 30-50 hours per week

Salary ito MW	Self-Employed	Lag	Salaried	Lag
0.0 - 0.5	0.9860 ***	-0.0653 ***	1.7411 ***	-0.1191
0.5 - 0.7	1.0695 **	0.0796	1.2325 ***	-0.1865 **
0.7 - 0.9	1.1598	0.0486	0.8723 ***	-0.1576 *
0.9 - 1.1	1.2723	0.0563	0.5971 ***	-0.1746 *
1.1 - 1.3	0.4563	0.0583	0.6607 ***	-0.1618 *
1.3 - 1.5	0.1591	0.0652	0.2861 **	-0.1806 *
1.5 - 2.0	0.7346	0.0597	0.3896 ***	-0.1794 *
2.0 - 3.0	0.4508	0.0626	0.3528 ***	-0.1816 *
3.0 - 4.0	0.1242	0.0680	0.3848 **	-0.1654 *
> 4.0	0.0843	0.0703	0.1611 ***	-0.1736 *
Average			0.6378 ***	-0.1696 ***
Nobs	2744		5267	

Table 3b: Colombia- Effect of a 1% Rise in the Minimum Wage on the Probability of Becoming Unemployed

Men who work 30-50 hours per week

Salary ito MW	Self-Employed	Lag	Salaried	Lag
0.0 - 0.5	-0.2259 ***	-0.2205 ***	-0.3566 ***	-0.3462 ***
0.5 - 0.7	-0.2207 ***	-0.2160 ***	-0.3151 ***	-0.3035 ***
0.7 - 0.9	-0.1611 **	-0.1541 **	-0.2715 ***	-0.2615 ***
0.9 - 1.1	-0.0921	-0.0847	-0.2765 ***	-0.2595 ***
1.1 - 1.3	-0.1182	-0.1206 *	-0.2298 ***	-0.2169 ***
1.3 - 1.5	-0.1378 *	-0.1327 **	-0.2933 ***	-0.2890 ***
1.5 - 2.0	-0.1044	-0.0988	-0.0967	-0.0623
2.0 - 3.0	-0.0620	-0.0505	-0.1962 **	-0.1675 **
3.0 - 4.0	-0.0408	-0.0343	-0.2530 ***	-0.2204 **
> 4.0	-0.0695	-0.0653	-0.1969 *	-0.1933 **
Nobs	3128		5835	

Note: *** significant at 1%, ** at 5%, * at 10%.

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