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A MENU OF MINIMUM WAGE VARIABLES FOR EVALUATING WAGES AND EMPLOYMENT EFFECTS: EVIDENCE FROM BRAZIL

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A Menu of Minimum Wage Variables for Evaluating Wages and Employment Effects: Evidence from Brazil

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The international literature on minimum wage greatly lacks empirical evidence from developing countries. Brazil's minimum wage policy is a distinctive and central feature of the Brazilian economy. Not only are increases in the minimum wage large and frequent but also the minimum wage has been used as an anti-inflation policy in addition to its social role. This study estimates the effects of the minimum wage on both wages and employment using panel data techniques and Brazilian monthly household data from 1982 to 2000 at individual and regional levels. A number of conceptual and identification questions is discussed, for example: (1) Various strategies on how to best measure the effect of a constant (national) minimum wage are summarized in a "menu" of minimum wage variables and used to estimate wage and employment effects. (2) An employment decomposition that separately estimates the effect of the minimum wage on hours worked and on the number of jobs is used. Robust results indicate that an increase in the minimum wage strongly compresses the wages distribution with moderately small adverse effects on employment.

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1. Introduction

The aim of minimum wage increases is to change the shape of the wages distribution but not to destroy jobs. The effect of the minimum wage on other wages is positive because workers bargain to maintain their relative wages and because firms demand more skilled workers (Sellekaerts, 1981; Grossman, 1983). Its magnitude varies across the wages distribution because different occupations have different comparison groups (Grossman, 1983; Akerlof, 1982 and 1984). Elasticities are larger at lower percentiles, compressing the distribution (Brown, 1999; Card and Krueger, 1995).

There is currently no consensus on the direction of the effect of the minimum wage on employment. The old debate between the neoclassical Stigler (1946) and the revisionist Lester (1946), dormant since the early 80s in an apparent consensus, has been re-awakened. The 80s consensus, in line with standard theory, was of a negative significant but modest effect: increasing the minimum wage by 10% decreased employment by 1%-3% (Brown, et al., 1982). Neumark and Wascher (1992 and 2000), Deere et al. (1995 and 1996), Currie and Fallick (1996) and Burkahuaser et al. (2000), for example, estimate negative effects while Card and Krueger (1995 and 2000), Machin et al. (2003), Machin and Manning (1994), and Dickens et al. (1999), for example, estimate non-negative effects.

In studies for Brazil, in line with the international empirical literature, an increase in the minimum wage compresses the wage distribution and has a small adverse employment effect (Neri, 1997; Carneiro, 2000; Foguel et al., 2000 and 2001; Corseuil and Morgado, 2001; Corseuil and Carneiro, 2001; Fajnzylber, 2001; Carneiro, 2002; Soares, 2002; Corseuil and Servo, 2002; McIntyre, 2002; Soares, 2003; Neumark et al., 2003). A 10% increase in the minimum wage decreases employment by no more than 5%, typically by no more than 1% (not always statistically significant), across all available studies.[1] Using national aggregate data, most of this literature estimates average wage and employment effects imposing restrictions on time modeling (e.g. through trends), which does not ensure full identification of the minimum wage effect.

This study estimates the effects of the minimum wage on both wages and employment using panel data techniques and monthly Brazilian household data from 1982 to 2000 at individual and regional levels. It represents an important contribution because, further to providing evidence using modern econometrics techniques in the Brazilian literature, it extends the current understanding on the effects of the minimum wage in developing countries in the international literature. This study also represents an important contribution to policymaking, especially after recent South America Governments promises of minimum wage increases (The Economist, 2002a, 2002b and 2003).

The international literature is poor on evidence outside the US and is greatly lacking on evidence for developing countries. There are compelling reasons to study the minimum wage outside the US. "No single empirical study of an economic phenomenon is ever highly convincing" (Hamermesh, 2002, p. 4). Many data points are needed – many and independent data points are needed. Further empirical evidence is urged for both developed and developing countries – particularly for developing countries (Hamermesh, 2002). Hamermesh (2002, p. 15) argues for increased reliance on non-US data and policy evaluations: "policies like hours legislation and the minimum wage provide especially fruitful areas in which to apply the results of studying foreign experiences to the US".

Brazil's minimum wage policy is a distinctive and central feature of the Brazilian economy. Minimum wage increases in Brazil are large and frequent, unlike the typically small increases studied in most of the literature (Deere et al, 1996; Hamermesh, 2002; Castillo-Freeman and Freeman, 1992). Studying such increases allows a better possibility of observing the negative effects predicted by standard theory and thus the link between empirical data and theoretical models of the minimum wage.

[1] Dropping the Corseuil and Carneiro (2001) outlier estimate, the employment effect is no more than 3%; dropping the Corseuil and Morgado (2001) estimate, this effect is no more than 1% across the remaining studies.

Furthermore, Hamermesh (2002) remarks that foreign experiences are especially fruitful if they generate exogenous shocks, which is the case in Brazil over the past 30 years. Moreover, special features of the Brazilian Economy are valuable for case studies of the minimum wage, for example: the minimum wage has been used as an anti-inflation policy in addition to its social role against inequality and poverty; the public and informal sectors are overpopulated by minimum wage workers; etc. This unique data is a result of the important role the minimum wage plays in Brazil.

This study uses a number of modern econometrics techniques. (1) It estimates before-and-after non-parametric Kernel wages distributions to illustrate the minimum wage compression effect. It then uses regression models to estimate the wage effect across various percentiles of the distribution. (2) It summarizes various minimum wage variables available in the literature in a "menu" of minimum wage variables, which are then used to estimate wages and employment effects. (3) It estimates the effect of the minimum wage on both hours worked and on the number of jobs, and this way, on total employment. (4) It uses panel data techniques to account for unobserved regional macro fixed effects separately from the minimum wage effect on employment.

This study is organized as follows. Section 2 describes the data and presents the minimum wage institutional background (Section 2.1). Section 3 defines minimum wage variables (Section 3.1) presents wage models (Section 3.2), which motivate a discussion on identification (Section 3.3.1) and model re-specification (Section 3.3.2). Section 4 presents the decomposition of total employment effects into hours and jobs effects (Section 4.1), employment models (Section 4.2) and robustness checks (Section 4.3 and 4.4). Section 4.5 discusses the evidence and Section 5 concludes. Robust results indicate that an increase in the minimum wage strongly compresses the wages distribution with moderately small negative effects on employment.

2. Data

The data used is Pesquisa Mensal do Emprego, a monthly household survey similar to the US Current Population Survey. Between 1982 and 2000, PME collected over 21 million observations across the six main Brazilian metropolitan regions: Bahia (BA), Pernambuco (PE), Rio de Janeiro (RJ), Sao Paulo (SP), Minas Gerais (MG) and Rio Grande do Sul (RS). Its monthly periodicity is important because wage bargains during the sample period occurred annually, bi-annually and monthly (Section 2.1). Comparisons of demographic and economic characteristics across regions and waves show no selectivity bias in any direction (Neri, 1996). The deflator, INPC (National Consumers Price Index), was regionally disaggregated to reduce measurement error. All data is available from the Instituto Brasileiro de Geografia e Estatistica.

Graph 1 plots the real minimum wage and the average, 25th, 50th, and 75th percentiles of the wages distribution over time. A visual inspection suggests that the minimum wage is more strongly correlated with lower percentiles; this is confirmed by correlations in the national aggregate of 0.78 and 0.73 for the 25th and 75th percentiles (Graphs 1.b and 1.d). Such correlations for PE and SP are respectively 0.95 and 0.36, and 0.78 and 0.55, which illustrate large regional variation.

Graph 2 plots log employment rate against log real minimum wage. A visual inspection suggests a non-negative association between the two. The positive correlation in levels fades as the data is differenced; this is confirmed by correlations of 0.181, 0.054, 0.211 and -0.005, respectively in levels, first-difference, twelfth-difference, and both first and twelfth differences. Such correlations for PE and SP in levels are respectively 0.37 and 0.01, which again illustrate large regional variation.

2.1 Minimum Wage

The minimum wage was introduced in 1940 as a social policy to provide subsistence income (diet, transport, clothing, and hygiene) for an adult worker. The associated bundle varied across regions, which was reflected in 14 minimum wages – the highest (lowest) for the Southeast (Northeast) (Gonzaga and Machado, 2002). Wells (1983, p. 305) believes they were "generous relative to existing standards" since about 60% to 70% of workers earned below them; Saboia (1984) and Oliveira (1981) believe they legitimated the low wages of the unskilled. Regional minimum wages existed until 1984 when a single national minimum wage was introduced. Coverage is full; there is no legal sub-minimum or differentiated minimum wage rates for specific demographic groups or labour market categories.[2]

After a steep decrease, the real minimum wage was adjusted and reached its peak during the boom of the 50s, when productivity was high, unions strong, and the Government populist. After that, it decreased as a result of the subsequent recession, rising inflation, and non-aggressive unions (Singer, 1975). The real minimum wage was then 40% lower than in the 50s. The dictatorship installed in 1964 associated high inflation with wage adjustments and limited labour organization, reduced wage militancy, and implemented a centralized wage policy. One of the strategies of this policy was under-indexation of the real minimum wage, which transformed it "from a social policy designed to protect the worker's living standard into an instrument for stabilization policy" (Camargo, 1984, p.19). The "Teoria do Farol" (Lighthouse Effect) associated the subsequent increase in inequality revealed in the 1970 Census with the pos-64 real minimum wage decrease (Souza and Baltar, 1979, 1980; Macedo and Garcia, 1978 and 1980).

According to Carneiro and Faria (1998), the nominal minimum wage was used not only as a stabilization policy but also as a coordinator of the wage policy. One example is that other wages were set as multiples of the minimum wage. Another example is that in the early 80s, wages between 1 and 3 times the minimum wage were bi-annually adjusted by 110% of the inflation rate (Cascade effect); the higher the worker's position in the wage distribution, the lower the percentage adjustment. Such increases immediately spilled over higher up in the wage distribution. In the presence of high inflation and distorted relative prices, rational agents took increases in the minimum wage as a signal for price and wage bargains (Gramlich, 1976; Card and Krueger, 1995; Freeman, 1996) – even after law forbade its use as *numeraire* in 1987. Maloney and Mendez (2003) and Marinakis (1998) show that the Lighthouse and *numeraire* effects are a general phenomenon in Latin America.

The real minimum wage was under-indexed not only because it was associated to high inflation but also because of its impact on the growing public deficit via benefits, pensions, and the Government wage bill.[3] This impact has often been the criterion for the affordable increase in the nominal minimum wage, resulting in under-indexation of the real minimum wage.

Thus, because of its effects both on prices and on the public deficit, the real minimum wage was under-indexed and used as a deflationary policy. However, when pressure was enough, the Government had to give in, allowing increases in the nominal minimum wage – the nominal minimum wage became the "messenger" of the inflation – which in turn severely affected both prices and the public deficit and were therefore inflationary. This effect was perpetuated into an inflation spiral. In this context, the minimum wage has been alternately used as social and anti-inflation policy. The policy choice depended on the level of inflation, on the workers bargaining power, and on the

[2] Up to 70% of the minimum wage can be deducted to pay for accommodation and food costs (CLT, art. 81, DL 5452/43; law 7855/89). This accounts for some below minimum wage workers, although most of those are informal sector workers.
[3] In the sample period, 12% of the population are pensioners, 7% are civil servants.

Government party affiliation (Velloso, 1988; Bacha, 1979). The social role is associated with more populist Governments, lower inflation, and stronger unions.

Graph 1.a shows that the hourly real minimum wage decreased between 1982 and 2000.[4] Its highest (lowest) level was in November 1982 (August 1991), before the acceleration of inflation. In political terms, three events were important in the 80s: (a) in 1984, the minimum wage became national, after slow regional convergence; (b) with the end of the military regime in 1985, the 1988 Constitution re-defined the subsistence income (diet, accommodation, education, health, leisure, clothing, hygiene, transport, and retirement) for an adult worker and his/her family – even though such a bundle was unaffordable at the prevalent minimum wage; (c) the union movement re-emerged and became ever stronger, reaching a high union density for a developing country (Carneiro and Henley, 2001; Amadeo and Camargo, 1993). In economic terms, despite the political changes, the minimum wage was still a component of the centralized wage policy. The 80s and 90s witnessed an exhausting battle against inflation. Five stabilization plans between 1986 and 1994 had different nominal minimum wage indexation rules depending on the inflation level. These indexation rules resulted in the saw-toothed pattern in the real minimum wage shown in Graph 1.a; nominal minimum wage increases were large and frequent, but quickly eroded by the subsequent inflation. Since then, under reasonably stable inflation, the minimum wage has not been explicitly used as an anti-inflation policy.

3. The Minimum Wage Effect on the Wage Distribution

3.1 Minimum Wage Variables

The most common way to relate the minimum wage to other wages in the literature is to use the ratio of the minimum wage to average wage adjusted for coverage of the minimum wage – the Kaitz index (Kaitz, 1970). The Kaitz index also received the intuitive name of "toughness" of the minimum wage (Machin and Manning, 1994). Graph 3.a shows log toughness, whose the correlation with the log real minimum wage in the national aggregate is 0.81. Baker et al. (1999) also found the ratio to have a similar path to that of the minimum wage for Canada; Dickens et al. (1999) for the UK, and Card and Krueger (1995) for the US. While the Kaitz index was 0.39 for the US and 0.40 for the UK in 1993 (Dolado et al., 1996), it was 0.27 for Brazil, although as high as 0.45 in PE, which is a poor region.

Similarly, the ratio of the minimum wage to the median and also to the 25th percentile of the wage distribution are defined as log toughness 50 and log toughness 25. On the one hand, log toughness 50 is a better central measure of the distribution if wage inequality is substantial as in Brazil (Bacha, 1979; Fernandes and Menezes-Filho, 2000), in which case the average fails to be representative of most people (who are at the bottom). The correlation with the log real minimum wage in the national aggregate is 0.81. On the other hand, the minimum wage affects the low, not the average or median wage worker (Deere et al., 1996). This is confirmed by the 0.80 correlation of log toughness 25 with the log real minimum wage in the national aggregate (see Graph 3.b).

Graph 3 also plots other minimum wage variables suggested in the literature. They are called "degree of impact" measures (Brown, 1999), because they focus on the proportion of workers directly affected by increases in the minimum wage. Graph 3.c shows "fraction affected", i.e. the proportion of people earning a wage between the old and the new minimum wage (Card, 1992; and Card and Krueger, 1995),[5] whose correlation with the log real minimum wage in the national aggregate is 0.57.

[4] The hourly minimum wage rate is obtained by dividing the monthly minimum wage by 44*4.3 after, and 48*4.3 until September of 1988, because the new Constitution shortened the working week. The hourly wage rate is obtained by dividing the monthly earnings by the number of hours worked in the week before the interview multiplied by 4.3.

[5] The old minimum wage is multiplied by 0.98 and the new minimum wage, by 1.02 to account for rounding approximations. This procedure was used for all degree of impact measures here defined.

While the fraction affected was 7.4% for the US in 1990 (Card and Krueger, 1995), it was 8% for Brazil, although as high as 49% in PE. Because fraction affected is zero when the nominal minimum wage is constant, fraction was also defined using real data. Graph 3.d shows that "fraction real" has more variation, although a lower correlation with the log real minimum wage in the national aggregate (0.49), than fraction affected because the real minimum wage was never constant in the sample period.

A measure closely related to fraction is the spike in the wages distribution generated by the minimum wage (Card and Krueger, 1995; Brown, 1999). Graph 3.e shows "spike", i.e. the proportion of people earning one minimum wage (Dolado et al., 1996), whose correlation with the log real minimum wage in the national aggregate is 0.64. Spike moves in response to the minimum wage, being bigger after an increase and smaller as different categories negotiate their salaries and pull out of the minimum wage (Card and Krueger, 1995). This is particularly the case if inflation is high and the minimum wage is constant (Carmargo, 1984). Note the corresponding saw-toothed pattern in Graph 1.a, also documented by Brown (1999) for the US. Whereas Graph 3.e shows spike over time for the full sample, Graph 4 shows the actual spike in the earnings distribution for PE for each month of 1992 (the vertical line is the minimum wage). While the spike was 4% for the US in 1993 (Dolado et al., 1996), it was 12% for Brazil, although as high as 25% in PE.[6]

Because of the minimum wage *numeraire* and indexer roles in Brazil (Section 2.1), Gonzaga et al., (1999) expanded spike to embrace those earning not only one, but also 0.5, 1, 1.5, 2, 2.5 and 3 times the minimum wage. Graph 3.f shows "multiples", whose correlation with the log real minimum wage in the national aggregate is 0.31. Figures almost as large as 20% are observed when Plano Cruzado and Plano Real were implemented (spike, fraction and percentage (below) are also large in both events). Neri (1997) suggested multiples as an appropriate variable to test the Lighthouse effect (Section 2.1), which amounts to testing for spillover effects.

A related measure is the proportion of people earning the minimum wage or below (Dolado et al., 1996). Graph 3.g shows "spike and below", whose correlation with log real minimum wage in the national aggregate is 0.77. Note the resemblance with the minimum wage itself (Graph 1.a). A noteworthy figure of 44% is observed in the early 80s in BA, which is a poor region.

The *numeraire* role, together with the Lighthouse effect (Section 2.1), motivated Foguel (1997) and Gonzaga et al. (1999) to define a measure of the effect of a minimum wage increase across the wage distribution. Graph 3.h shows "percentage", i.e. the proportion of people whose wages were increased by the minimum wage percentage increase (regardless of their position in the distribution), whose correlation with the log real minimum wage in the national aggregate is 0.39. As multiples, percentage is a measure of spillover effects.

3.2 Descriptive Wage Models

The compression in the earnings distribution following a minimum wage increase is illustrated by estimating non-parametric Kernel distributions before and after the wage increase. Graph 5 plots

[6] As in Graphs 4 and 5, spike is here defined using real earnings as opposed to real hourly wages used elsewhere in this study. The monthly definition produces larger spikes because workers who earn one monthly minimum wage but work shorter (longer) hours than the typical working week, will earn above (below) one hourly minimum wage. It can be argued that using variables in hourly terms to model a labour market operating on a monthly basis might introduce measurement error. The correlation between the monthly and the hourly definitions of each variable is high and the estimation results are robust to either definition. Furthermore, hourly definitions ensure that the results are consistent with theory and comparable with the existing empirical literature (the minimum wage rate is an hourly rate in most countries for which empirical evidence is available). Moreover the hourly definition plays a crucial role when defining the employment decomposition in Section 4.1.

superimposed distributions which show the change in the shape of the distribution after minimum wage increases in May, September and January of 1992. Just as an increase makes the distribution less dispersed, a decrease (in the remaining months the real minimum wage was inflation eroded) makes it more dispersed. This can be formalized by estimating the effect of the minimum wage at various percentiles across the distribution controlling for the effect of other variables on wages.

The simplest model of wages as a function of the minimum wage is:

$$\log rwage_{irt} = \alpha^{w} + \beta^{w} \log rMW_{rt} + u^{w}{}_{irt},$$

where $rwage_{irt}$ is real wages, rmw_{rt} is real minimum and u^{w}_{irt} is the error term for individual i in region r in time t. This model can be aggregated for the mean and, for a more complete picture, also for the 5th, 10th, 15th, 20th, 25th, 30th, 35th, 40th, 45th, 50th, 90th, and 95th percentiles of the wage distribution. In this fashion, the effect of the minimum wage at various points across the distribution is estimated (Dickens et al., 1999).

Region and time dummies were included to model region and time fixed effects. Region dummies separate regional effects and time dummies separate other macro variable effects from the effect of the minimum wage on wages. A macro variable explicitly included is past inflation. This is because, on the one hand, the macroeconomic policy, including the minimum wage policy, was aimed at stabilizing the inflation; thus, inflation is driving other variables. On the other hand, the minimum wage was used as indexer (Section 2.1); thus, past inflation captures the portion of the minimum wage increase that merely compensates for past inflation. Another macro variable explicitly included is the unemployment rate, typically used as a measure of demand for labour to control for region specific macro shocks that might be correlated with the minimum wage (Card and Krueger, 1995; Brown, 1999). The new equation (after aggregation) is:

$$\log rwage_{rt} = \alpha^{w} + \beta^{w} \log rMW_{rt} + \gamma^{w} \inf lation_{rt-1} + \delta^{w} urate_{rt} + f_{r}^{w} + f_{t}^{w} + u_{rt}^{w} \qquad (1)$$

The standard neoclassical model underlies the above empirical equation. Assume perfect competition on the input and output markets, and a production function *Y* depending on skilled and unskilled labour, with input and output prices *W*, *MW*, and *p*. Maximization of profits at the (representative) firm level delivers the aggregate demand function for (skilled or unskilled) labour, $L^{d}=L(p,W,MW)$, which is the theoretical ground for the employment equation in Section 4; all prices are normalized by *W*, and employment is modeled as a function of toughness and inflation (Card and Krueger, 1995). The demand function can be rewritten as $W=W(p,L,MW)$, which is the theoretical ground for the wage equation above; wages are modeled as a function of the minimum wage, inflation and unemployment rate.

Given the labour demand, if labour supply is positively sloped, some sort of reduced form is what is being estimated, and supply shifters need to be included. The following variables are included to control for region specific demographics potentially correlated with the minimum wage, namely, the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, in the informal sector, in urban areas, in the public sector, in the building construction industry sector, in the metallurgic industry sector, basic education degree holders, high school degree holders, and the proportion of workers with a second job.[7] The new equation is:

[7] There is some agreement that demand side variables should be held constant, but less agreement on whether supply side variables should be included as controls and, if so, which ones. The debate is about whether a reduced form or a demand equation is estimated, depending on whether the minimum wage is binding or not (Neumark and Wascher, 1992 and 1996). Typically, employment equations in the literature have been interpreted as demand equations, even though many include supply side variables (Card and Krueger, 1995). Particularly debatable is the inclusion of a variable measuring enrolment

$$\log rwage_{rt} = \alpha^{w} + \beta^{w} \log rMW_{rt} + \gamma^{w} \inf lation_{rt-1} + \delta^{w} urate_{rt} + \lambda^{w} controls_{rt}^{w} + f_{r}^{w} + f_{t}^{w} + u_{rt}^{w'} \qquad (1')$$

The model was estimated in levels and in first-differences. Dummies, past inflation, controls and constant were included after differencing. The constant is the base dummy (not a trend from the model in levels), and the regional dummies model region specific trends. The models were sample size weighted to account for the relative importance of each region (and for heteroskedasticity arising from aggregation) and White-corrected; the models in levels were corrected for serial correlation specific to each region (Dolado et al., 1996; Zavodny, 2000).

The two first columns of Table A (in the appendix) show robust and significant estimates, more robust for lower percentiles and for models in levels. An increase in the minimum wage affects the 10^{th} percentile 10 times more than the 90^{th} percentile of the wages distribution (model in differences). A 10% increase in the minimum wage is associated with a wage increase of 5.53% (3.56%) for those in the 10^{th} (30^{th}) percentile. This is the counterpart of the compression effect in Graph 5. Equations (1) and (1') can be re-estimated using percentile ratios and the standard deviation of the wage distribution as dependent variables regressed on the same set of regressors as above to check further the compression effect. The results in Table A show that an increase of 10% in the minimum wage decreases the 50^{th}-10^{th} percentile gap by 3.47%, the 90^{th}-10^{th} gap by 5.04%, and the 90^{th}-50^{th} gap by 1.56%. Neumark et al (2003), Soares (2002), Fajnzylber (2001), Corseuil and Morgado (2001) and Corseuil and Carneiro (2001) also found evidence of a compression effect for Brazil. Dickens et al. (1999) and Card and Krueger (1995) found similar evidence for the UK and the US.

3.3 Wage Model Re-Specification

3.3.1 Identification

The effect of the minimum wage on wages would be fully identified in Equations (1) and (1') if the nominal minimum wage had regional variation in Brazil. In that case, no restriction on time modeling would need to be imposed, i.e. a full set of time dummies could be used to model time effects. However, as the nominal minimum wage is constant across regions – any variation across regions in the real minimum wage stems from the variation in the regional deflators – a full set of time dummies cannot be used and some restriction needs to be imposed on modeling time effects (e.g. through time trends). In this case, the effect of the minimum wage on wages is not fully identified because the estimate is sensitive to the particular restriction imposed.

To circumvent this empirical problem, various minimum wage variables with regional variation have been suggested in the literature. The most common variable has been toughness; others are: fraction, spike and below, spike, multiples, and percentage, as defined in Section 3.1.[8] The idea here is to collect all these variables in a "menu" of minimum wage variables and to compare their estimates. Confidence will be greater if the results are robust across variables.

Although such "degree of impact measures" have variation across regions, a full set of dummies still eliminates all the variation in the model, because minimum wage increases are systematic

rates at school (Card and Krueger, 1995; Neumark and Wascher, 1992). If minimum wage reduces both employment and enrolment, reduced form and enrolment rate constant employment equations have very different interpretations (Brown, 1999). In Brazil, a large number of minimum wage workers are adults no longer at school. Also, schooling is largely available outside working hours, and therefore working and schooling need not be exclusive alternatives; if present, the simultaneity bias will not be as severe. Due to these particularities and the unresolved debate, enrolment rate was not here included (Williams, 1993; Baker, 1999).

[8] Lee (1999) and Green et al. (2001) suggested trimmed toughness; Deere et al. (1996) suggested costs of the increase on the firm's side; and various authors suggested some variation of a wage gap measure (Linneman, 1982; Deere at al., 1996; Currie and Fallick, 1996).

(Burkhauser et al., 2000). If on the one hand month dummies eliminate all the variation, on the other hand year dummies alone are not sufficient to model time in a month model. An alternative is a hybrid model, where seasonal-month dummies are included in addition to year dummies, to control for unobserved fixed effects across months, as in Burkhauser et al. (2000). Also, stabilization plan dummies[9] are included to capture common macro shocks under each stabilization plan.

3.3.2 Re-Specification

Thus, the minimum wage variables defined in Section 3.1, namely fraction, fraction real, spike, spike and below, multiples and percentage, are each used in turn as a "proxy" to the real minimum wage in Equations (1) and (1'). Table A (in the appendix) shows estimates more robust and larger at lower percentiles. At higher percentiles, they are not only smaller but also sometimes not significant, suggesting no spillover effects higher in the distribution.

The estimates show a very similar pattern whatever minimum wage variable is used. The fraction estimate, before the inclusion of controls, is 1.202 (0.908) for those in the 10th (30th) percentile of the wages distribution. In other words, an increase in the minimum wage sufficient to increase fraction by 1 percentage point is associated with an increase in the wages of those in the 10th (30th) percentile of the wages distribution of 1.20% (0.91%). A 10% increase in the nominal minimum wage increases fraction by 3.7 percentage points[10] and is associated with an increase in the wages of those in the 10th (30th) percentile of 4.45% (3.36%). Card and Krueger (1995) found estimates between 0.18 to 0.30 using a similar specification, here comparable with 0.52 (Panel B of Table A). Adding demographic controls affects only marginally the magnitude of the estimates, and does not affect their sign or significance. These figures are respectively 1.401 (1.072) for fraction real;[11] 1.821 (0.954) for spike and below; 3.659 (1.034) for spike; 0.657 (0.220) for multiples; and 2.868 (2.391) for percentage. Neumark et al. (2003) found 0.45 (-1.68) estimates for the 10th (30th) percentile of the formal sector wage distribution in Brazil between 1996 and 2001 (low inflation period) using not the proportion of workers at the spike and below, but the proportion of workers "below spike". A preferred specification is not chosen; instead, the range of estimates produced across all specifications is expected to embrace the true coefficient. Table 1 presents the interval that brackets the effect of a 10% increase in the minimum wage across models and variables. A 10% increase in the nominal minimum wage is associated with an increase in the wages of those in the 10th (30th) percentile of 0.23%-6.35% (0.06%-4.61%) across models. Tables 1 and A also show percentile ratios and standard deviation regressions that confirm the compression effect reported in Section 3.2.

The effect of the minimum wage on the wage distribution was here exhaustively measured using a variety of specifications and variables. Initially, the mean, median, various percentiles, their ratios, and the variance of the wage distribution were modeled as a function of the minimum wage. Then such models were re-specified using various alternative minimum wage variables defined to capture

[9] Each had very particular rules (Abreu, 1992); macro shocks were similar within, and different across plans. Additionally, a dummy was defined in October 1988, when the new Constitution: shortened the working week from 48 to 44 hours, and introduced an alternative working day of 6 consecutive hours instead of 8 hours with a lunch break.

[10] This was obtained by regressing the difference of fraction on the difference of the log of nominal minimum wage and controls associated to each equation. However, because the nominal minimum wage does not vary across regions (Section 3.4.1), log toughness, log toughness 50 and log toughness 25 were also used. A 10% increase in the minimum wage increases fraction by 3.7 percentage points, fraction real by 1.4, spike and below by 1.8, spike by 0.3, multiples by 0.4, and percentage by 0.5. These estimates were remarkably robust across specifications.

[11] Fraction real was interacted with a dummy for real minimum wage increases because a decrease might not have such as severe an impact (wages are sticky), i.e. an increase is expected to affect the wage distribution more. However, the data did not show enough variation to reject the null hypothesis.

differently the effect of the minimum wage on the wage distribution: at, below and above the minimum wage, as well as across the distribution. All the above pieces of evidence consistently suggest that the minimum wage compresses the wage distribution.

4. The Effect of the Minimum Wage on Employment

4.1 Decomposition of the Total Employment Effect

Employment can be adjusted in two margins following a minimum wage increase: the number of posts of jobs and the number of hours of work. As a result, the total effect of a change in the minimum wage on employment can be decomposed into hours and jobs effect. If the first is positive and the second is negative, the total employment effect might be non-negative. This might offer an explanation for the clustered-around-zero employment effect found in the literature. Although this issue has not received much attention (Barzel, 1973; Gramlich, 1976; Linneman, 1982; Brown et al., 1982; Brown, 1999), more recent research (Michl, 2000; Zavodny, 2000; Card and Krueger, 2000; Neumark and Wascher, 2000) suggests that non-negative effects on jobs are a sub-product of adjustments in hours. Zavodny (2000), Machin et al. (2003) and Neumark et al. (2003) estimate job and hours effects, but do not formalize it as a decomposition.

Let average hours in the population ($\overline{T}$) be equal to the product of average hours for those working ($\overline{H}$) and the employment rate (E), $\overline{T} = \overline{H}E$ is $\frac{\sum_{i=1}^{N} hour_i}{N} = \frac{\sum_{i \in e}^{N} hour_i}{N_e} \frac{N_e}{N}$, where N_e and N are sample sizes of the employed and working population and $hour$ is hours worked. As noted by Brown et al. (1982, p. 497), "to measure the employment effect of the minimum wage, the ratio of employment to population [E] is used most often as the dependent variable". However, the above decomposition suggests not only E, but also $\overline{T}$ and $\overline{H}$ as dependent variables. Because of that, Equation (2) in Section 4.2 is estimated separately using each of the three employment variables E, $\overline{T}$ and $\overline{H}$ in turn as a dependent variable. Assuming a log-log form and using the same set of regressors in each one of the three equations, the additivity property of OLS holds and the estimate of the real minimum wage in the $\overline{T}$ equation equals the sum of the estimates of the real minimum wage in the $\overline{H}$ and E equations, i.e. $\beta_T^e = \beta_H^e + \beta_E^e$.

4.2 Descriptive Employment Models

The simplest model of employment as a function of the minimum wage is:

$$\log employment_{rt} = \alpha^e + \beta^e \log rMW_{rt} + f_r^e + f_t^e + u_{rt}^e \qquad (2)$$

where $employment_{rt}$ is in turn E, $\overline{T}$ or $\overline{H}$; rmw_{rt} is real minimum wage as before, f_r^e and f_t^e are regional and time fixed effects (Section 3.3.1); and u_{rt}^e is the error term. This equation was then re-estimated including the same controls as in Section 3.1 The new equation is:

$$\log employment_{rt} = \alpha^e + \beta^e \log rMW_{rt} + \gamma^e \inf lation_{rt-1r} + \lambda^e controls_{rt} + f_r^e + f_t^e + u_{rt}^{e'} \qquad (2')$$

This equation was also re-estimated including dynamics in the form of 24 lags of the dependent variable. This is because an increase in the minimum wage might not affect employment contemporaneously, but in future periods (Brown et al., 1982; Hamermesh, 1995).[12] The new equation is:

$$\log employment_{rt} = \alpha^{e} + \beta^{e}\log rMW_{rt} + \gamma^{e}\inf lation_{rt-1} + \lambda^{e} controls^{e}_{rt} + \sum_{l=1}^{24}\rho^{e}_{l}\log employment_{rt-1} + f^{e}_{r} + f^{e}_{t} + u^{e''}_{rt} \quad (2'')$$

As discussed in Section 3.1, dummies, past inflation and constant were included after differencing; the models were White-corrected and sample size weighted.

Each specification was estimated for four alternative data filters: levels, first-difference, twelfth-difference, and both first and twelfth differences. This is to account for Baker et al.'s (1999) criticism that negative or positive employment effects are found depending on whether short or long differencing is used.[13] For each of these filters, the following base model is estimated:

Recall Graph 2 that plots log employment rate (E) against log real minimum wage (rMW). As discussed in Section 2, the plots and correlations suggests a non-negative association between the minimum wage and employment rate. Graph 6 and corresponding Panel I of Table B (in the appendix) show total effect, hours effect and jobs effect estimates, mostly not significant. The total effect estimates are positive because they are dominated by the hours effect (Brown, 1999). A 10% increase in the minimum wage is associated with a 0.01% increase in total employment in the model in levels with dynamics (column 3 of Table B), decomposed into 0.03% increase in the number of hours worked (lighter bars) and 0.04% decrease in the number of posts of jobs (darker bars).[14] In the long run, total employment increases by 0.01% (column 4 of Table B). A 10% increase in the minimum wage is associated with a decrease in total employment of 0.09% (0.07%) at the most (across all estimates) in the short (long) run. Neumark et al. (2003) estimates small negative but not always significant hours (-0.9%) and jobs (-0.6%) effects for Brazil using formal sector data in low inflation period, when more adverse employment effects are expected (Section 4.5).

4.3 Employment Model Re-Specification

As in Section 3.3.2, the minimum wage variables defined in Section 3.1, namely fraction, fraction real, spike, spike and below, multiples, percentage, log toughness, log toughness 50, and log toughness 25, are each used in turn as a "proxy" to the real minimum wage in Equations (2), (2') and (2''). Table B shows estimates mostly statistically different from zero. Panel II – FRACTION shows that the total employment estimate ranges from -0.005 to 0.045. In other words, an increase in the minimum wage sufficient to increase fraction by 1 percentage point is associated with a decrease in total employment of 0.005% at the most. As discussed in Section 3.3.2, a 10% increase in the minimum wage (increases fraction by 3.7 percentage points) is associated with a decrease in total employment of 0.017% at the most. Card and Krueger (1995) found estimates between 0.03 to 0.36 when regressing the change of employment-population ratio on fraction, which lies in the range -0.016 and 0.001 of jobs effects estimate (Panel II of Table B). Panel III – FRACTION REAL shows 0.008 to 0.041; Panel IV – SPIKE AND BELOW, -0.074 to 0.347; Panel V – SPIKE, -0.036 to 0.779; Panel VI – MULTIPLES, -0.031 to 0.068; Panel VII – PERCENTAGE, -0.008 to 0.127; Panel VIII- TOUGHNESS, 0.011 to 0.066; Panel IX – TOUGHNESS 50, 0.005 to 0.055; and Panel X – TOUGHNESS 25, 0.016 to 0.072. The largest and most

[12] Employment is AR(2) using annual data (Layard et al., 1991), which is equivalent to 24 lags on monthly data.

[13] Card and Krueger (1995) found positive results using one and two year differencing whereas Neumark and Wascher (1992) found negative results using long differencing. More technically, the aim is to reduce the variables to stationarity preventing spurious regression, which depends on the number of unit roots of the variables.

[14] Because in dynamic models the set of regressors is not the same, the OLS additivity property does not hold exact.

robust estimates are for spike and spike and below. Finally, the last two columns of Table B show a long run estimate no bigger than -0.117 across models.

Table 2 presents the interval that brackets the effect of a 10% increase in the minimum wage across models and variables. The total employment effect ranges from -0.95% to 1.40%, decomposed into the hours coefficient ranging from -0.01% to 1.81% and the jobs coefficient ranging from -0.73% to 0.28%. Once more, the total employment effect appears to be dominated by the hours effect (Brown, 1999). In the long run, a decrease in total employment is no bigger than 0.67%.

The range of estimates produced across all specifications and variables is expected to embrace the true coefficient. The preferred specification is the one in first differences using spike as a minimum wage variable – i.e., column 3, row 2, Panel V of Table A. This specification is expected to produce errors serially uncorrelated, and spike can be argued to be a better minimum wage variable.[15] Also, spike models produced some of the largest and most robust estimates, conforming to a more cautious approach. Thus, this specification is more reliable both conceptually and statistically; it is also more comparable with specifications in the existing literature, mostly in first differences. Incidentally this preferred specification produces estimates fairly similar to the other specifications.

Bracketing the total employment effect below 1% across such a variety of models is reassuring. The employment effect was here exhaustively measured and was remarkably robust to various alternative specifications and minimum wage variables. This is in line with the international and Brazilian literature and in line with prior expectations discussed in Section 1. All the above pieces of evidence suggest that an increase in the minimum wage does not always have a significant effect on employment and it is not always negative; a cautious reading is that the minimum wage has a moderately small negative effect on employment.

4.4 Alternative Employment Model Re-Specifications

It can be argued that the degree of impact measures are an imperfect "proxy" and do not capture all the relevant variation in the real minimum wage, introducing measurement error and possibly omitted variable bias. An alternative specification, is to interact the degree of impact measures with the real minimum wage to check the robustness of the estimates in Section 4.3

As argued in Section 4.3, spike is regarded as the preferred minimum wage variable. Equations (2), (2') and (2'') were re-specified interacting spike with the real minimum wage. Panel I of Table C shows estimates for the interaction. The pattern of magnitude, signs and significance is remarkably similar to the estimates for spike prior to the interaction (see Panel V of Table B). Table C also shows the test of the equality of estimates (before and after interaction). The null was not rejected in most specifications (32/36); it was not rejected in the preferred specification (Section 4.3), nor in the dynamic specifications, nor for the jobs effects.

Although the interaction has variation across regions and over time, the extra variation is mainly over time and, as argued in Section 3.3, the crucial variation that identifies the minimum wage effect is

[15] Spike is an alternative to toughness and fraction, the most common minimum wage variables in the literature. Toughness varies across regions and over time, but the criticism in Section 3.3.1 applies. Brown (1999) compares the 'degree of impact' measures (for example, fraction) and the 'relative minimum wage' variable (for example, toughness) and concludes that the former are conceptually cleaner although not well suited for studying periods when the minimum wage is constant. That is because fraction is constant at zero regardless of how unimportant the minimum wage might become. On the one hand spike is conceptually related to fraction and is therefore methodologically clean; on the other hand spike does not suffer from the same drawback, as it can be defined even when the minimum wage is constant. Beyond statistical identification, spike is a measure of those workers becoming more expensive, i.e. a measure of the extra employment costs, and therefore well suited to study minimum wage employment effects.

across regions. Furthermore, whatever additional regional variation brought in by the real minimum wage is due to variations in the deflator, and therefore does not help to identify the coefficient (Section 3.3). Once again, this is a data problem, because the nominal minimum wage is constant in Brazil. If spike was interacted with the nominal minimum wage, month time dummies would absorb all the additional time variation brought in by the nominal minimum wage.

A further robustness check is to include the interaction of spike and the real minimum wage in addition to the spike. Panel II of Table C shows the estimates for the interaction. They are mostly not significant (32/36); they are not significant in the preferred specification (Section 4.3) nor in the dynamic specifications. Thus, once more, the interaction does not have regional variation over and above the variation that spike already picks up to help to identify the coefficient. This explains the robustness of the results.

These last two re-specifications are more demanding than the specifications in Section 4.3. It is therefore very reassuring that the results are robust and do not change the previous conclusions.

4.5. Further Employment Effects Evidence

The main message in this study is that wage effects in Brazil are large whereas employment effects are small. Despite of the large minimum wage increases; despite of the large proportion of minimum wage workers at the minimum wage directly affected by these increases; and despite of the large proportion of workers below and above the minimum wage, indirectly affected by these increases via spillovers; the employment effects in Sections 4.2 to 4.4, although in line, are small when compared with the -1% effect in the international literature.

Beyond robustness checks to ensure statistical identification, robustness checks focusing on underlying specificities in the Brazilian Economy might offer explanations for such small effects. Evidence on employment effect on key sub-samples is here reviewed as a further check of the robustness of the above employment effects. Although the evidence considered shed some light as to why employment effects are small for Brazil, uncovering the *a priori* expected more negative employment effect proved difficult.

The reading of the evidence considered here is that small employment effects might be sensible when a number of explanations are combined. For example, employment effects are not easy to find if non-compliance is large and the public sector has an inelastic labour demand. Additionally, employment effects are difficult to find if inflation is high and firms do not adjust employment because they perceive the minimum wage increase as temporary. Furthermore, employment effects are even harder to find if the analysis is not restricted to low wage workers. Such specificities suggest that the economics of the minimum wage in developing countries might be very different from that of developed countries – for which most of the literature is available.

4.5.1 Employment Effects Across Sectors

4.5.1.1 Formal and Informal Sectors

A minimum wage increase is predicted to decrease uncovered sector wages because of displaced covered sector workers moving there. In other words, the uncovered sector labour demand curve should not be downwards sloping and a spike should not be observed in the uncovered sector wage distribution (Welch, 1976; Gramlich, 1976; Mincer, 1976). If covered sector employment effects are negative and uncovered sector effects are positive, this might offer an explanation for the non-negative overall employment effects found in the literature.

The predictions of the Two Sectors Model for the uncovered sector need not hold for the informal sector. Informal sector workers are covered by the legislation, but firms do not comply with it. A minimum wage is still paid in the informal sector, but firms do not comply with other aspects of the labour contract, such as social security taxes, paid holidays, health insurance, etc. (Amadeo et al., 1995). For example, a large spike is observed in the wages distribution of both sectors for Brazil (Lemos, 2004b; Maloney and Nunes, 2003; Gonzaga et al., 1999; Foguel, 1997) and for other Latin America countries (Maloney and Nunes, 2003). Furthermore, spillover effects are also observed in both sectors for Brazil (Lemos, 2004b; Maloney and Nunes, 2003; Gonzaga et al., 1999; Foguel, 1997; Carneiro, 2000) and for other Latin America countries (Maloney and Nunes, 2003). The presence of a spike and spillover effects in both formal and informal sectors suggest employment decreases in both sectors. Various authors estimated negative employment effects in both sectors in Brazil (Lemos, 2004b; Foguel, 1997; Gonzaga et al., 1999). Maloney and Nunes (2003) question the validity of the standard Two Sector Model to explain the formal and informal sector in Latin America.

4.5.1.2 Private and Public Sectors

If the public sector has an inelastic labour demand, it can finance the higher wage bill associated to a minimum wage increase via public deficit. If private sector employment effects are negative and public sector effects are positive, this might offer an explanation for the non-negative overall employment effects found in the literature. Investigating the public sector employment effects is particularly relevant if the public sector is overpopulated by minimum wage workers (the distribution has a spike at the minimum wage) and has no negligible spillover effects, as in Brazil (Lemos, 2004b). Lemos (2004b) estimated negative total long run employment effects in the private sector, but positive in the public sector in Brazil

4.5.2 Employment Effects Across Time

Firms and workers respond very differently to a minimum wage increase depending on the level of the inflation. For very high inflation periods firms perceive the increase as temporary, anticipate the subsequent accommodating monetary policy and wage-price spiral (Section 2.1), and do not adjust employment to avoid adjustment costs. Conversely, more adverse employment effects are expected in low inflation periods. Thus the effect of the minimum wage on employment is expected to differ in high and low inflation periods. If employment effects are negative in low inflation periods, and are non-negative in high inflation periods, this might offer an explanation for the non-negative overall employment effects found in the literature – at least for countries exposed to high inflation, like Brazil. Lemos (2003b) estimated more adverse total long run employment effects in low than in high inflation periods in Brazil. Neumark et al. (2003) estimates moderately adverse negative jobs effects estimates for Brazil using formal sector data in a low inflation period, whereas Fajnzylber (2001) estimates smaller negative jobs effect for Brazil using formal sector data in mainly a high inflation period.

Associated to this is the minimum wage effect on prices. Firms are more able to increase prices when inflation is high; they then encounter little resistance to upward price adjustments, as nominal stickiness is smaller the higher inflation becomes (Layard et al., 1991). As discussed above, firms do not incur in employment adjustment costs if they are able to pass through to prices the higher costs associated to a minimum wage increase. Lemos (2003a) estimates partial pass-through effect of the minimum wage on prices in Brazil. Small employment effects are sensible if coupled with price effects

4.5.3 Employment Effects Across Demographic Groups

Most of the employment effect minimum wages in the Brazilian literature, as are the ones in this study, are estimates for the entire working population (Section 1). Because of that, potential employment effects for low wage workers have been diluted. In that sense, the above employment effects are non-negligible, and estimations for low wage groups are expected to produce substantially larger employment effects. The most obvious strategy is to restrict the analysis to teenagers or low educated workers, as it is usually done in the US literature. If low wage workers employment effects are negative and high wage workers effects are positive, this might offer an explanation for the non-negative overall employment effects found in the (Brazilian) literature. Lemos (2004a) estimated a more negative long run total employment effect for teenagers and low educated than for the entire working population in Brazil.

5. Conclusion

The international literature on minimum wage is scanty on non-US empirical evidence, in particular on developing countries. This study estimates the minimum wage effects on wages and employment using Brazilian household data for the 80s and 90s, which has been under-explored for minimum wage studies. Brazil's minimum wage policy is a distinctive and central feature of the Brazilian economy. Not only are increases in the minimum wage large and frequent, but also the minimum wage has been used as an anti-inflation policy in addition to its social role. It affects employment directly and indirectly, through wages, pensions, benefits, inflation, the informal sector, and the public deficit. This confirms the importance of studying the minimum wage in Brazil.

This study follows recent strands in the literature that try to uncover the wage distributional effects of minimum wages and discusses a number of conceptual and identification questions as tentative explanation of the non-negative employment effects recently found in the literature. The effect of the minimum wage on the wage distribution and employment was exhaustively measured using a variety of specifications and minimum wage variables. Evidence of a compression effect was robust and in line with the international and Brazilian empirical literature. Evidence of a moderately small negative effect was uncovered and shown to be robust. An increase of 10% in the minimum wage was found to decrease the number of jobs by at the most 0.05% but to increase total employment (via increase in the number of hours worked) in the short run. In the long run, total employment was decreased by 0.9% at the most.

These are small employment effects when compared to the 1% effect in the international and Brazilian literature. Small employment effects might be sensible, however, when a number of explanations are combined. For example, employment effects are not easy to find if non-compliance is large and the public sector has an inelastic labour demand. Additionally, employment effects are difficult to find if inflation is high and firms do not adjust employment because they perceive the minimum wage increase as temporary. Furthermore, employment effects are even harder to find if the analysis is not restricted to low wage workers. Such specificities suggest that the economics of the minimum wage in developing countries might be very different from that of developed countries – for which most of the literature is available.

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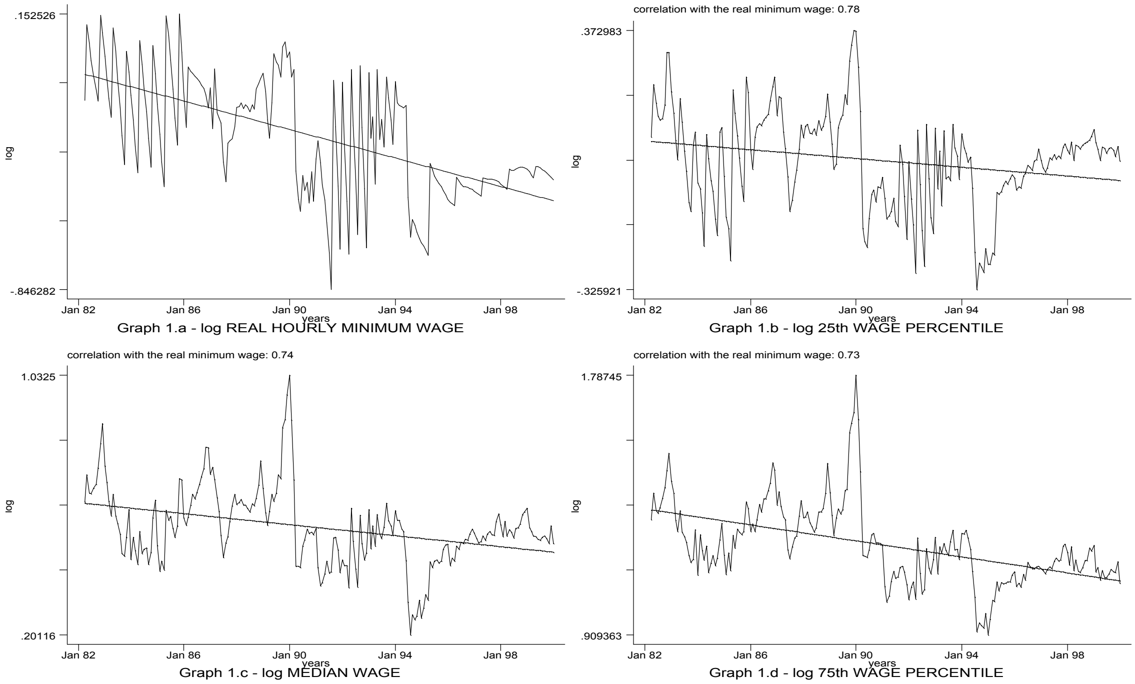
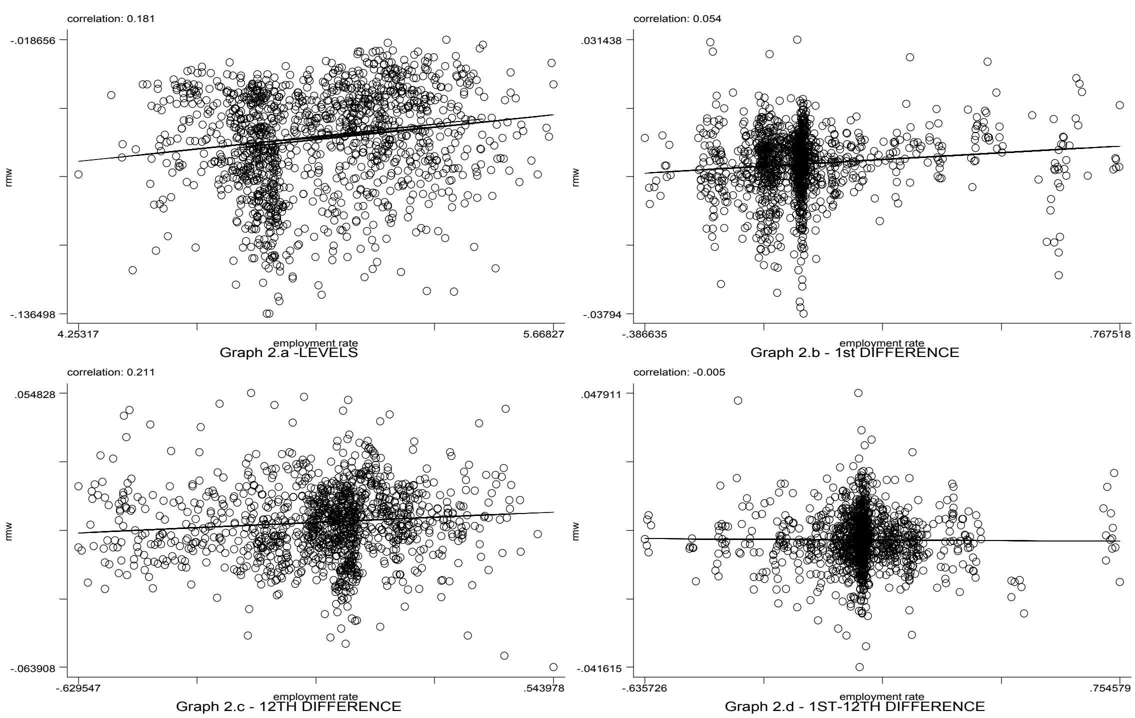
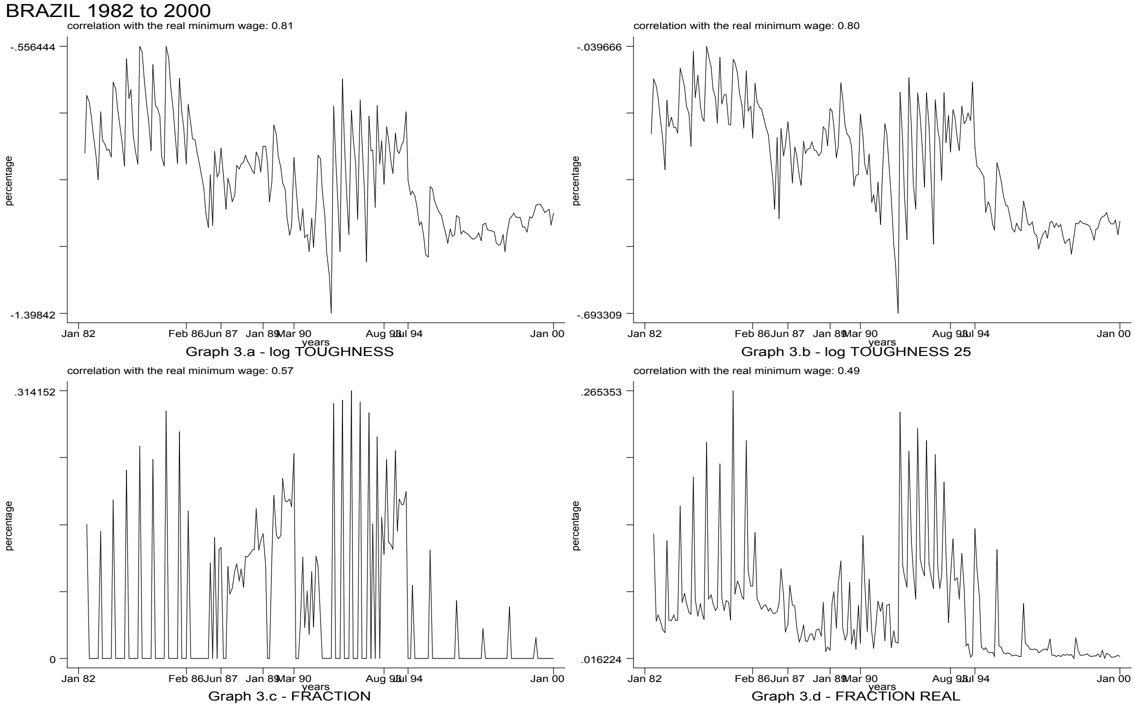
BRAZIL 1982 to 2000



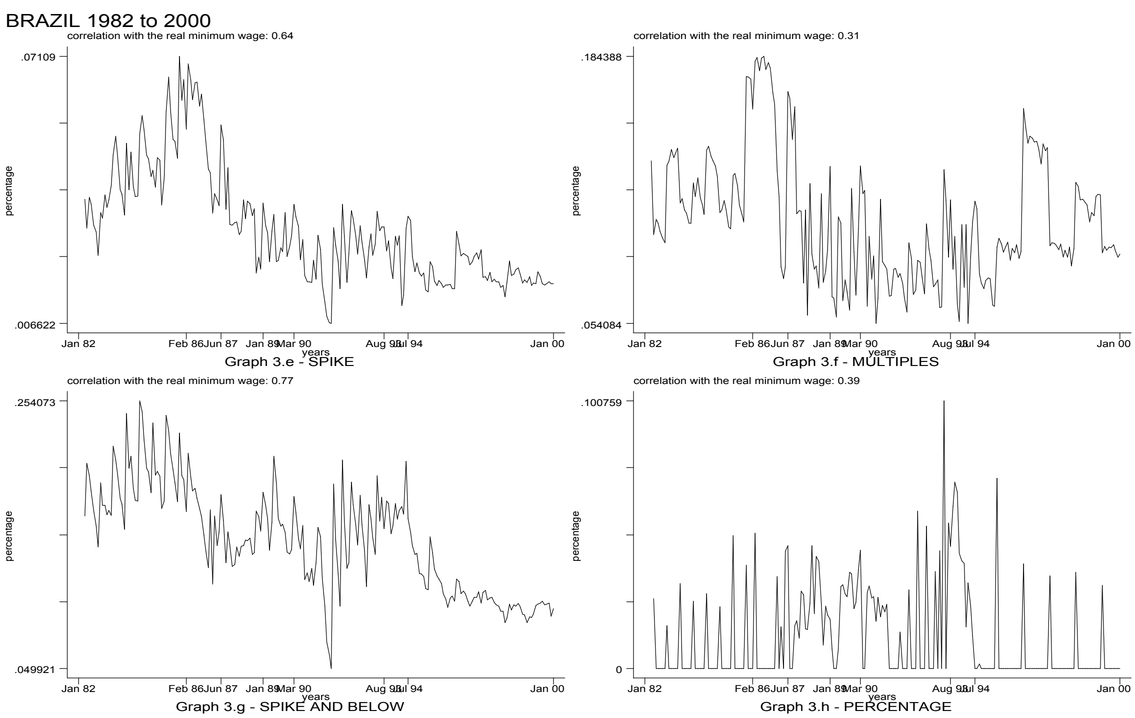
Graph 1 - MINIMUM WAGE AND WAGE DISTRIBUTION



Graph 2 - EMPLOYMENT RATE AND MINIMUM WAGE

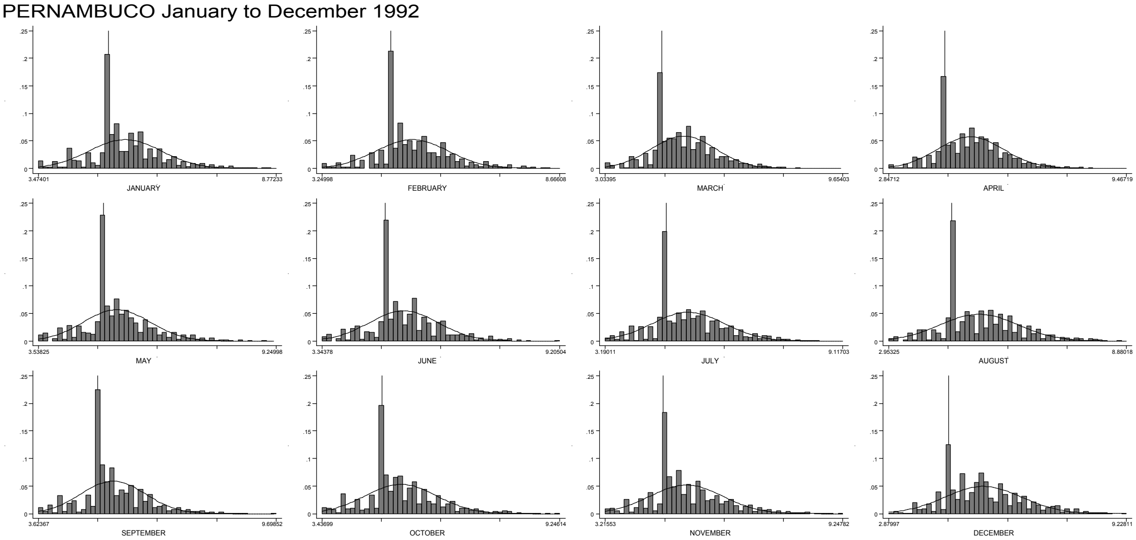


Graph 3 - MINIMUM WAGE VARIABLES - continues



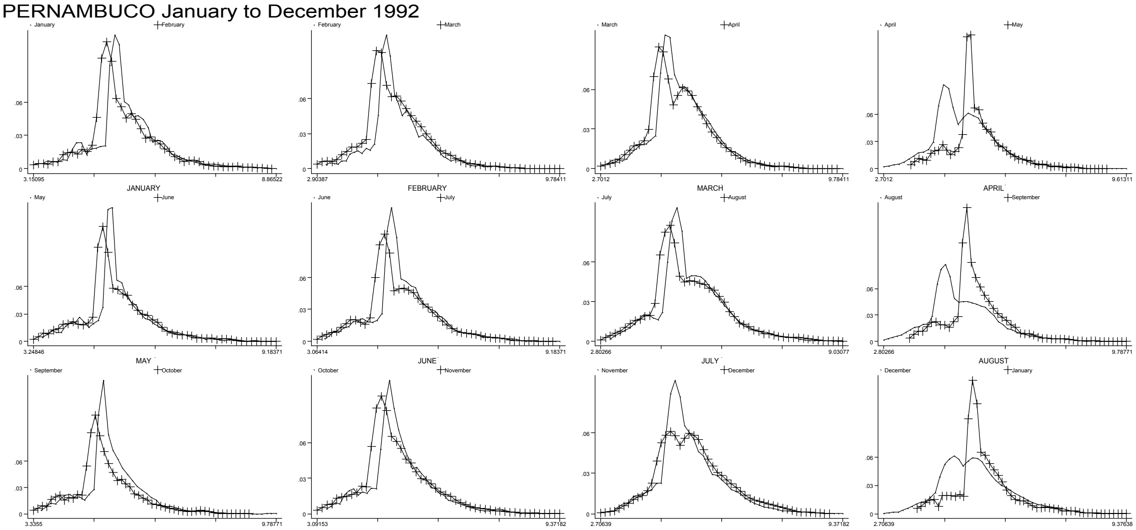
Graph 3 - MINIMUM WAGE VARIABLES - continued

PERNAMBUCO January to December 1992

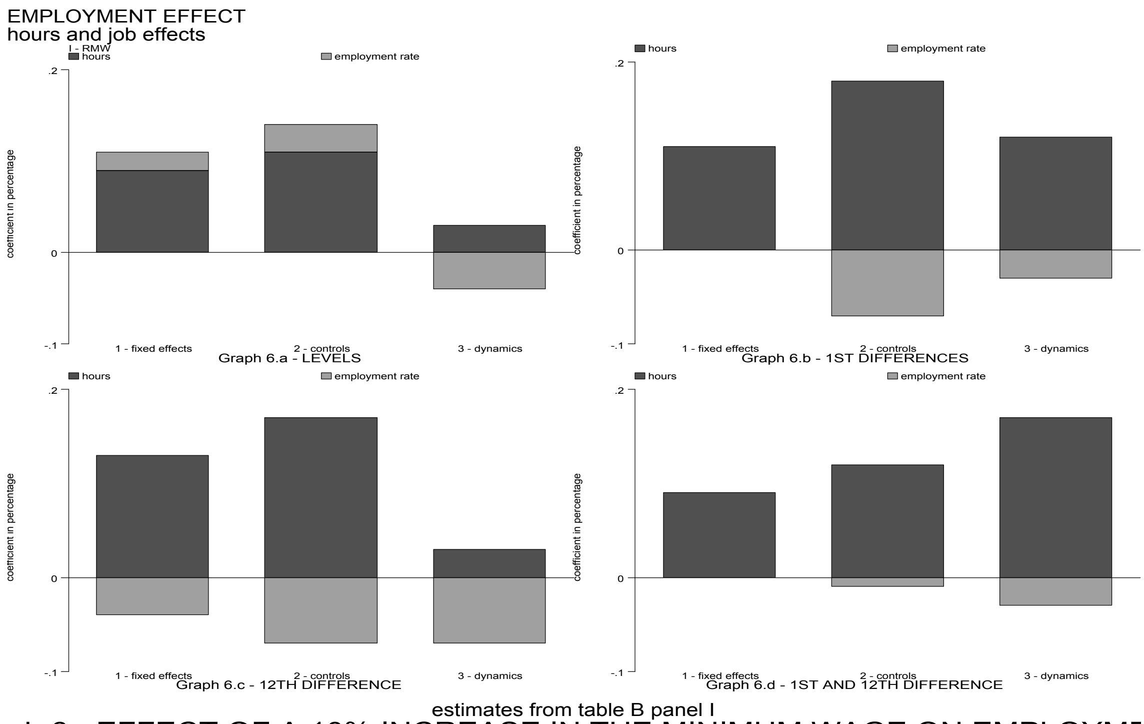


Graph 4 - DISTRIBUTION OF LOG REAL EARNINGS

PERNAMBUCO January to December 1992



Graph 5 - LOG REAL EARNINGS KERNEL DISTRIBUTIONS



ph 6 - EFFECT OF A 10% INCREASE IN THE MINIMUM WAGE ON EMPLOYME

Table 1 - EFFECT OF A 10% INCREASE IN THE MINIMUM WAGE ON WAGES

percentiles	interval	
	min	max
5th	**0.22**	**5.72**
10th	**0.23**	**6.35**
15th	**0.20**	**6.02**
20th	**0.14**	**5.93**
25th	**0.09**	**5.18**
30th	**0.06**	**4.61**
35th	**0.03**	**4.04**
40th	**-0.02**	**3.64**
45th	**-0.17**	**3.22**
50th	**-0.16**	**2.93**
90th	**-1.19**	**1.36**
95th	**-1.20**	**1.15**
mean	**0.02**	**3.39**
50th/10th	***-3.48***	***-0.24***
90th/10th	***-5.10***	***-0.30***
90th/50th	***-1.62***	***-0.06***
standard deviation	***-1.56***	***-0.07***

1) Estimates across variables and models. For full estimates see Table A in the Appendix.
2) To obtain the equivalent of a 10% increase in the minimum wage, the estimates of fraction were multiplied by 3.7, of fraction real by 1.4, of spike and below by 1.8, of spike by 0.3, of multiples by 0.4, and of percentage by 0.5 (see Section 3.4.2).
3) Percentile regressions are shown for selected percentiles, followed by percentile ratio and standard deviation regressions. The dependent variable is the various percentiles, ratios of percentiles and standard deviation of the wages distribution.
4) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, in the informal sector, in urban areas, in the public sector, in the building construction industry sector, in the metallurgic industry sector, basic education degree holders, high school degree holders, and the proportion of workers with a second job.

Table 2 - EFFECT OF A 10% INCREASE IN THE MINIMUM WAGE ON EMPLOYMENT

dependent variables	data filter	interval	
		lower	upper
total employment	(1) levels	**-0.13**	**1.40**
hours worked		**0.00**	**1.13**
employment rate		**-0.39**	**0.28**
total employment	(2) first	**-0.01**	**1.15**
hours worked	difference	**-0.01**	**1.81**
employment rate		**-0.66**	**0.00**
total employment	(3) twelfth	**-0.95**	**1.05**
hours worked	difference	**0.01**	**1.75**
employment rate		**-0.73**	**0.03**
total employment	(4) first and	**0.00**	**1.27**
hours worked	twelfth	**0.00**	**1.69**
employment rate	difference	**-0.26**	**0.01**

1) For full estimates see Table B in the Appendix. To obtain the equivalent of a 10% increase in the minimum wage, the estimates of fraction were multiplied by 3.7, of fraction real by 1.4, of spike and below by 1.8, of spike by 0.3, of multiples by 0.4, and of percentage by 0.5 (see Section 3.4.2).
2) A 10% increase in the minimum wage decreases employment by less than 1% (lower end) across models and variables.
3) The dependent variable is average hours worked for the working population, average hours worked for those employed and employment rate. Hours and Job elasticities add to Total elasticity for the static but not for the dynamic model.
4) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, in the informal sector, in urban areas, in the public sector, in the building construction industry sector, in the metallurgic industry sector, basic education degree holders, high school degree holders, and the proportion of workers with a second job.

Table A - ESTIMATES OF THE COEFFICIENTS OF THE MINIMUM WAGE VARIABLES ON WAGES MODELS

percentiles	MW levels		MW difference		fraction		fraction real		spike		multiples		spike and below		percentage	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
	(1)		(2)		(3)		(4)		(6)		(7)		(5)		(8)	
A - without controls																
5th	**0.572**	0.014	**0.507**	0.024	**0.977**	0.053	**1.174**	0.094	**3.172**	0.464	**0.619**	0.121	**1.320**	0.160	**2.229**	0.280
10th	**0.635**	0.014	**0.578**	0.029	**1.202**	0.057	**1.401**	0.105	**3.659**	0.550	**0.657**	0.143	**1.821**	0.171	**2.868**	0.300
15th	**0.602**	0.014	**0.558**	0.029	**1.223**	0.050	**1.405**	0.102	**3.315**	0.495	**0.586**	0.130	**1.846**	0.153	**3.213**	0.272
20th	**0.593**	0.014	**0.547**	0.030	**1.212**	0.052	**1.368**	0.108	**2.588**	0.507	**0.444**	0.137	**1.732**	0.153	**3.099**	0.299
25th	**0.518**	0.015	**0.468**	0.029	**1.051**	0.052	**1.204**	0.104	**1.777**	0.461	**0.300**	0.119	**1.296**	0.149	**2.795**	0.265
30th	**0.461**	0.015	**0.400**	0.028	**0.908**	0.051	**1.072**	0.097	**1.034**	0.411	**0.220**	0.111	**0.954**	0.140	**2.391**	0.270
35th	**0.404**	0.014	**0.338**	0.025	**0.761**	0.048	**0.897**	0.089	**0.411**	0.360	**0.168**	0.095	**0.638**	0.127	**1.895**	0.236
40th	**0.364**	0.013	**0.295**	0.021	**0.654**	0.040	**0.779**	0.073	**0.202**	0.327	**0.102**	0.091	**0.476**	0.112	**1.693**	0.199
45th	**0.322**	0.013	**0.251**	0.019	**0.556**	0.038	**0.656**	0.066	**-0.339**	0.298	**-0.004**	0.085	**0.309**	0.105	**1.437**	0.186
50th	**0.293**	0.013	**0.223**	0.017	**0.485**	0.035	**0.591**	0.059	**-0.357**	0.287	**0.005**	0.082	**0.197**	0.104	**1.223**	0.166
90th	**0.136**	0.018	**0.062**	0.018	**0.126**	0.042	**0.192**	0.063	**-1.626**	0.315	**-0.170**	0.097	**-0.644**	0.109	**0.180**	0.166
95th	**0.115**	0.019	**0.047**	0.019	**0.093**	0.045	**0.158**	0.067	**-1.622**	0.355	**-0.174**	0.102	**-0.654**	0.119	**0.141**	0.168
mean	**0.339**	0.012	**0.270**	0.017	**0.586**	0.034	**0.700**	0.061	**0.282**	0.289	**0.106**	0.081	**0.386**	0.100	**1.449**	0.178
50th/10th	***-0.340***	*0.014*	***-0.348***	*0.023*	***-0.702***	*0.049*	***-0.796***	*0.082*	***-4.034***	*0.401*	***-0.659***	*0.112*	***-1.592***	*0.138*	***-1.638***	*0.221*
90th/10th	***-0.497***	*0.019*	***-0.510***	*0.028*	***-1.061***	*0.058*	***-1.200***	*0.101*	***-5.349***	*0.548*	***-0.843***	*0.147*	***-2.429***	*0.160*	***-2.686***	*0.271*
90th/50th	***-0.154***	*0.013*	***-0.162***	*0.015*	***-0.360***	*0.032*	***-0.404***	*0.052*	***-1.315***	*0.285*	***-0.184***	*0.078*	***-0.838***	*0.078*	***-1.047***	*0.131*
st.deviation	***-0.151***	*0.005*	***-0.156***	*0.008*	***-0.330***	*0.016*	***-0.372***	*0.030*	***-1.464***	*0.153*	***-0.210***	*0.040*	***-0.720***	*0.044*	***-0.864***	*0.078*
B - with controls																
5th	**0.559**	0.015	**0.479**	0.023	**0.898**	0.051	**1.016**	0.087	**2.818**	0.414	**0.541**	0.110	**1.208**	0.154	**1.921**	0.247
10th	**0.625**	0.015	**0.553**	0.029	**1.138**	0.059	**1.242**	0.104	**3.303**	0.504	**0.580**	0.133	**1.713**	0.169	**2.552**	0.273
15th	**0.586**	0.015	**0.530**	0.028	**1.155**	0.049	**1.245**	0.095	**2.943**	0.437	**0.502**	0.119	**1.734**	0.138	**2.904**	0.238
20th	**0.570**	0.015	**0.508**	0.029	**1.121**	0.049	**1.178**	0.097	**2.159**	0.442	**0.350**	0.123	**1.593**	0.137	**2.719**	0.251
25th	**0.494**	0.015	**0.426**	0.026	**0.955**	0.045	**1.010**	0.087	**1.397**	0.387	**0.218**	0.105	**1.173**	0.125	**2.452**	0.213
30th	**0.432**	0.014	**0.356**	0.025	**0.807**	0.043	**0.882**	0.078	**0.660**	0.347	**0.141**	0.097	**0.834**	0.113	**2.060**	0.218
35th	**0.382**	0.014	**0.300**	0.022	**0.672**	0.041	**0.730**	0.075	**0.106**	0.306	**0.111**	0.085	**0.540**	0.108	**1.609**	0.191
40th	**0.348**	0.014	**0.264**	0.019	**0.581**	0.037	**0.638**	0.065	**-0.055**	0.284	**0.058**	0.082	**0.404**	0.096	**1.459**	0.167
45th	**0.307**	0.014	**0.222**	0.017	**0.489**	0.036	**0.536**	0.060	**-0.557**	0.273	**-0.045**	0.079	**0.240**	0.093	**1.233**	0.162
50th	**0.280**	0.014	**0.200**	0.016	**0.429**	0.035	**0.487**	0.057	**-0.520**	0.265	**-0.020**	0.077	**0.151**	0.096	**1.053**	0.149
90th	**0.134**	0.018	**0.044**	0.017	**0.079**	0.043	**0.115**	0.064	**-1.666**	0.305	**-0.160**	0.094	**-0.662**	0.099	**0.082**	0.159
95th	**0.114**	0.019	**0.032**	0.019	**0.052**	0.047	**0.098**	0.069	**-1.643**	0.338	**-0.179**	0.100	**-0.666**	0.110	**0.050**	0.164
mean	**0.326**	0.012	**0.244**	0.015	**0.520**	0.032	**0.575**	0.055	**0.074**	0.255	**0.068**	0.073	**0.320**	0.087	**1.239**	0.151
50th/10th	***-0.341***	*0.014*	***-0.347***	*0.024*	***-0.694***	*0.052*	***-0.742***	*0.084*	***-3.834***	*0.386*	***-0.602***	*0.109*	***-1.527***	*0.139*	***-1.488***	*0.219*
90th/10th	***-0.487***	*0.019*	***-0.504***	*0.029*	***-1.045***	*0.062*	***-1.117***	*0.103*	***-5.023***	*0.508*	***-0.757***	*0.140*	***-2.338***	*0.158*	***-2.459***	*0.260*
90th/50th	***-0.143***	*0.013*	***-0.156***	*0.015*	***-0.351***	*0.034*	***-0.376***	*0.051*	***-1.189***	*0.269*	***-0.155***	*0.076*	***-0.810***	*0.074*	***-0.971***	*0.129*
st.deviation	***-0.144***	*0.005*	***-0.149***	*0.008*	***-0.314***	*0.016*	***-0.334***	*0.027*	***-1.339***	*0.134*	***-0.179***	*0.038*	***-0.680***	*0.040*	***-0.776***	*0.068*

1) Columns 1-8 show estimates for respectively: minimum wage in levels, minimum wage in differences, fraction, fraction real, spike, multiples, spike and below and percentage (see Section 3.2).

2) Percentile regressions are shown for selected percentiles, followed by percentile ratio and standard deviation regressions. The dependent variable is the various percentiles, ratios of percentiles and standard deviation of the wages distribution.

3) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies.

4) The top panel shows estimates using the base specification with past inflation, unemployment rate, region and time effects as regressors; the bottom panel adds controls to the base specification, namely, the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, in the informal sector, in urban areas, in the public sector, in the building construction industry sector, in the metallurgic industry sector, basic education degree holders, high school degree holders, and the proportion of workers with a second job.

5) To obtain the equivalent of a 10% increase in the minimum wage, multiply the estimates of fraction by 3.7, of fraction real by 1.4, of spike by 0.3, of multiples by 0.4, of spike and below by 1.8, and of percentage by 0.5 (see Section 3..4.2).

Table B - ESTIMATES OF THE COEFFICIENT OF THE MINIMUM WAGE ON EMPLOYMENT MODELS

		fixed effects		controls		dynamics		long run	fixed effects		controls		dynamics		long run
dependent	data filter	coef	se	coef	se	coef	se	coef	coef	se	coef	se	coef	se	coef
variables		(1)		(2)		(3)		(4)	(1)		(2)		(3)		(4)
		I - RMW							**VI - MULTIPLES**						
total employment	(1) levels	**0.011**	0.007	**0.014**	0.007	**0.001**	0.007	**0.001**	**-0.012**	0.035	**-0.008**	0.038	**-0.002**	0.032	**-0.001**
hours worked		**0.009**	0.006	**0.011**	0.006	**0.003**	0.006	**0.002**	**0.008**	0.031	**0.007**	0.033	**0.007**	0.028	**0.004**
employment rate		**0.002**	0.003	**0.003**	0.003	**-0.004**	0.002	**-0.002**	**-0.020**	0.017	**-0.015**	0.017	**-0.003**	0.008	**-0.001**
total employment	(2) first	**0.011**	0.006	**0.012**	0.007	**0.008**	0.006	**-0.002**	**-0.031**	0.031	**-0.025**	0.031	**0.011**	0.027	**-0.003**
hours worked	difference	**0.011**	0.006	**0.018**	0.007	**0.012**	0.006	**-0.001**	**-0.014**	0.030	**-0.010**	0.030	**0.015**	0.025	**-0.002**
employment rate		**0.000**	0.002	**-0.007**	0.002	**-0.003**	0.002	**0.004**	**-0.017**	0.009	**-0.015**	0.007	**-0.005**	0.007	**0.007**
total employment	(3) twelfth	**0.009**	0.008	**0.010**	0.008	**-0.009**	0.006	**-0.007**	**0.068**	0.027	**0.065**	0.027	**0.044**	0.020	**0.032**
hours worked	difference	**0.013**	0.007	**0.017**	0.007	**0.003**	0.005	**0.003**	**0.051**	0.025	**0.054**	0.025	**0.034**	0.018	**0.034**
employment rate		**-0.004**	0.003	**-0.007**	0.003	**-0.007**	0.002	**-0.005**	**0.017**	0.011	**0.011**	0.011	**0.002**	0.007	**0.001**
total employment	(4) first and	**0.009**	0.007	**0.011**	0.007	**0.013**	0.007	**-0.003**	**0.031**	0.031	**0.048**	0.031	**-0.003**	0.019	**0.001**
hours worked	twelfth	**0.009**	0.007	**0.012**	0.007	**0.017**	0.006	**-0.003**	**0.051**	0.030	**0.068**	0.030	**0.001**	0.018	**0.000**
employment rate	difference	**0.000**	0.002	**-0.001**	0.002	**-0.003**	0.002	**0.002**	**-0.020**	0.008	**-0.020**	0.008	**-0.011**	0.006	**0.008**
		II - FRACTION							**VII - PERCENTAGE**						
total employment	(1) levels														
hours worked															
employment rate															
total employment	(2) first	**0.027**	0.009	**0.030**	0.010	**0.014**	0.010	**-0.004**	**0.127**	0.035	**0.124**	0.039	**0.069**	0.033	**-0.017**
hours worked	difference	**0.026**	0.009	**0.038**	0.010	**0.020**	0.008	**-0.002**	**0.122**	0.035	**0.143**	0.038	**0.074**	0.029	**-0.008**
employment rate		**0.001**	0.003	**-0.008**	0.003	**-0.005**	0.003	**0.006**	**0.005**	0.012	**-0.019**	0.010	**-0.006**	0.010	**0.007**
total employment	(3) twelfth	**0.041**	0.015	**0.045**	0.015	**-0.005**	0.013	**-0.003**	**0.107**	0.050	**0.099**	0.051	**-0.008**	0.039	**-0.005**
hours worked	difference	**0.050**	0.012	**0.056**	0.012	**0.019**	0.011	**0.019**	**0.145**	0.043	**0.146**	0.043	**0.052**	0.031	**0.051**
employment rate		**-0.009**	0.007	**-0.012**	0.007	**-0.016**	0.005	**-0.011**	**-0.037**	0.025	**-0.047**	0.024	**-0.043**	0.016	**-0.028**
total employment	(4) first and	**0.031**	0.012	**0.034**	0.012	**0.006**	0.010	**-0.002**	**0.082**	0.043	**0.077**	0.043	**0.001**	0.030	**0.000**
hours worked	twelfth	**0.034**	0.012	**0.036**	0.011	**0.011**	0.008	**-0.002**	**0.092**	0.042	**0.094**	0.042	**0.022**	0.024	**-0.004**
employment rate	difference	**-0.003**	0.003	**-0.002**	0.003	**-0.006**	0.003	**0.005**	**-0.011**	0.012	**-0.017**	0.011	**-0.019**	0.012	**0.015**
		III - FRACTION REAL							**VIII - TOUGHNESS**						
total employment	(1) levels								**0.009**	0.008	**0.011**	0.008	**0.016**	0.008	**0.008**
hours worked									**0.031**	0.007	**0.033**	0.007	**0.022**	0.007	**0.012**
employment rate									**-0.022**	0.004	**-0.022**	0.004	**-0.005**	0.002	**-0.003**
total employment	(2) first	**0.022**	0.014	**0.028**	0.016	**0.012**	0.016	**-0.003**	**0.042**	0.008	**0.045**	0.009	**0.031**	0.007	**-0.008**
hours worked	difference	**0.018**	0.015	**0.040**	0.016	**0.022**	0.014	**-0.003**	**0.047**	0.009	**0.052**	0.009	**0.033**	0.007	**-0.004**
employment rate		**0.003**	0.005	**-0.011**	0.005	**-0.002**	0.006	**0.002**	**-0.004**	0.003	**-0.006**	0.002	**-0.003**	0.002	**0.004**
total employment	(3) twelfth	**0.016**	0.023	**0.021**	0.024	**0.008**	0.018	**0.006**	**0.024**	0.011	**0.027**	0.011	**0.013**	0.008	**0.009**
hours worked	difference	**0.015**	0.019	**0.024**	0.019	**0.018**	0.015	**0.017**	**0.042**	0.009	**0.044**	0.009	**0.029**	0.007	**0.029**
employment rate		**0.001**	0.011	**-0.003**	0.012	**-0.008**	0.008	**-0.006**	**-0.017**	0.004	**-0.017**	0.004	**-0.009**	0.003	**-0.006**
total employment	(4) first and	**0.038**	0.016	**0.041**	0.016	**0.023**	0.013	**-0.006**	**0.060**	0.011	**0.066**	0.010	**0.036**	0.007	**-0.010**
hours worked	twelfth	**0.040**	0.015	**0.041**	0.015	**0.030**	0.011	**-0.005**	**0.065**	0.011	**0.069**	0.010	**0.037**	0.006	**-0.007**
employment rate	difference	**-0.002**	0.006	**0.000**	0.006	**-0.006**	0.006	**0.005**	**-0.005**	0.003	**-0.003**	0.002	**-0.003**	0.002	**0.002**
		IV - SPIKE AND BELOW							**IX - TOUGHNESS 50**						
total employment	(1) levels	**-0.074**	0.028	**-0.067**	0.030	**0.079**	0.029	**0.042**	**0.005**	0.007	**0.006**	0.008	**0.013**	0.008	**0.007**
hours worked		**0.090**	0.023	**0.103**	0.024	**0.114**	0.024	**0.062**	**0.025**	0.006	**0.027**	0.007	**0.019**	0.007	**0.010**
employment rate		**-0.164**	0.014	**-0.170**	0.014	**-0.026**	0.011	**-0.014**	**-0.020**	0.004	**-0.021**	0.004	**-0.005**	0.002	**-0.003**
total employment	(2) first	**0.260**	0.038	**0.273**	0.040	**0.185**	0.036	**-0.050**	**0.037**	0.008	**0.040**	0.008	**0.028**	0.007	**-0.007**
hours worked	difference	**0.280**	0.040	**0.296**	0.039	**0.188**	0.031	**-0.023**	**0.041**	0.008	**0.047**	0.008	**0.030**	0.006	**-0.004**
employment rate		**-0.020**	0.013	**-0.024**	0.009	**-0.010**	0.010	**0.013**	**-0.004**	0.002	**-0.006**	0.002	**-0.003**	0.002	**0.004**
total employment	(3) twelfth	**0.144**	0.038	**0.163**	0.039	**0.078**	0.028	**0.056**	**0.022**	0.010	**0.024**	0.010	**0.010**	0.008	**0.008**
hours worked	difference	**0.210**	0.031	**0.230**	0.031	**0.134**	0.023	**0.134**	**0.037**	0.009	**0.040**	0.009	**0.026**	0.007	**0.026**
employment rate		**-0.066**	0.018	**-0.067**	0.019	**-0.028**	0.012	**-0.019**	**-0.016**	0.004	**-0.015**	0.004	**-0.009**	0.002	**-0.006**
total employment	(4) first and	**0.326**	0.042	**0.347**	0.042	**0.156**	0.030	**-0.042**	**0.050**	0.010	**0.055**	0.010	**0.031**	0.007	**-0.008**
hours worked	twelfth	**0.348**	0.043	**0.359**	0.043	**0.156**	0.024	**-0.030**	**0.055**	0.010	**0.058**	0.009	**0.033**	0.006	**-0.006**
employment rate	difference	**-0.022**	0.012	**-0.012**	0.011	**-0.011**	0.010	**0.008**	**-0.005**	0.002	**-0.003**	0.002	**-0.003**	0.002	**0.002**
		V - SPIKE							**X - TOUGHNESS 25**						
total employment	(1) levels	**-0.022**	0.095	**-0.036**	0.099	**0.203**	0.090	**0.108**	**0.016**	0.008	**0.018**	0.008	**0.019**	0.008	**0.010**
hours worked		**0.210**	0.080	**0.193**	0.084	**0.200**	0.080	**0.109**	**0.027**	0.007	**0.029**	0.007	**0.021**	0.007	**0.012**
employment rate		**-0.232**	0.042	**-0.230**	0.043	**-0.024**	0.025	**-0.013**	**-0.011**	0.004	**-0.011**	0.004	**-0.002**	0.002	**-0.001**
total employment	(2) first	**0.625**	0.111	**0.663**	0.111	**0.441**	0.098	**-0.117**	**0.050**	0.011	**0.055**	0.011	**0.036**	0.008	**-0.009**
hours worked	difference	**0.704**	0.110	**0.737**	0.109	**0.422**	0.090	**-0.051**	**0.056**	0.012	**0.058**	0.011	**0.034**	0.008	**-0.004**
employment rate		**-0.079**	0.034	**-0.074**	0.027	**-0.013**	0.030	**0.016**	**-0.005**	0.003	**-0.003**	0.002	**0.000**	0.002	**0.000**
total employment	(3) twelfth	**0.570**	0.102	**0.551**	0.103	**0.347**	0.083	**0.250**	**0.028**	0.012	**0.032**	0.012	**0.018**	0.008	**0.013**
hours worked	difference	**0.466**	0.095	**0.454**	0.096	**0.328**	0.074	**0.326**	**0.040**	0.011	**0.042**	0.011	**0.030**	0.008	**0.031**
employment rate		**0.104**	0.044	**0.097**	0.043	**-0.012**	0.031	**-0.008**	**-0.011**	0.004	**-0.010**	0.004	**-0.005**	0.003	**-0.003**
total employment	(4) first and	**0.747**	0.117	**0.779**	0.116	**0.317**	0.079	**-0.084**	**0.066**	0.014	**0.072**	0.013	**0.037**	0.008	**-0.010**
hours worked	twelfth	**0.823**	0.116	**0.844**	0.115	**0.317**	0.071	**-0.059**	**0.069**	0.014	**0.072**	0.013	**0.034**	0.007	**-0.006**
employment rate	difference	**-0.076**	0.032	**-0.065**	0.030	**-0.031**	0.027	**0.024**	**-0.003**	0.003	**0.000**	0.002	**0.000**	0.002	**0.000**

1) The dependent variable is average hours worked for the working population, average hours worked for those employed and employment rate. Hours and Job elasticities add to Total elasticity for the static but not for the dynamic model.

2) Column 1 shows the base specification with region and time fixed effects as regressors; column 2 adds past inflation and controls to the base specification; and column 3 further adds dynamics (24 lags of the independent variable). Column 4 shows the long run coefficient associated to the model in column 3. Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, in the informal sector, in urban areas, in the public sector, in the building construction industry sector, in the metallurgic industry sector, basic education degree holders, high school degree holders, and the proportion of workers with a second

3) Panels I-X show respectively estimates of the coefficients of the real minimum wage, fraction, fraction real, spike and below, spike, multiples, percentage, toughness, toughness 50 and toughness 25. Each panel has four rows: (1) within groups (levels), (2) first differences, (3) twefth differences, and (4) first and twelfth differences.

4) Because fraction, fraction real, and percentage are variables already in differences, the models in levels were not estimated.

5) To obtain the equivalent of a 10% increase in the minimum wage, the estimates of fraction were multiplied by 3.7, of fraction real by 1.4, of spike and below by 1.8, of spike by 0.3, of multiples by 0.4, and of percentage by 0.5 (see Section 3.4.2).

Table C - ESTIMATES OF THE COEFFICIENT OF SPIKE INTERACTED WITH THE MINIMUM WAGE ON EMPLOYMENT MODELS

dependent variables	data filter	fixed effects coef (1)	se	controls coef (2)	se	dynamics coef (3)	se	test difference (4)	*Chi2*	difference (5)	*Chi2*	difference (6)	*Chi2*
		I - INTERACTION											
total employment	(1) levels	**0.058**	0.100	**0.043**	0.105	**0.209**	0.107	-0.08	*0.410*	-0.08	*0.380*	-0.01	*0.000*
hours worked		**0.216**	0.083	**0.207**	0.089	**0.202**	0.096	-0.01	*0.000*	-0.01	*0.020*	0.00	*0.000*
employment rate		**-0.158**	0.047	**-0.164**	0.047	**-0.044**	0.028	-0.07	*1.550*	-0.07	*1.220*	0.02	*0.280*
total employment	(2) first	**0.651**	0.134	**0.702**	0.137	**0.551**	0.129	-0.03	*10.720*	-0.04	*11.420*	-0.11	*3.600*
hours worked	difference	**0.754**	0.135	**0.814**	0.134	**0.532**	0.118	-0.05	*13.020*	-0.08	*12.500*	-0.11	*3.780*
employment rate		**-0.103**	0.040	**-0.112**	0.032	**-0.026**	0.037	0.02	*0.420*	0.04	*0.000*	0.01	*0.040*
total employment	(3) twelfth	**0.678**	0.126	**0.653**	0.129	**0.460**	0.114	-0.11	*6.040*	-0.10	*5.950*	-0.11	*2.690*
hours worked	difference	**0.546**	0.119	**0.531**	0.121	**0.424**	0.103	-0.08	*6.030*	-0.08	*6.040*	-0.10	*3.810*
employment rate		**0.132**	0.051	**0.122**	0.051	**-0.018**	0.040	-0.03	*0.570*	-0.03	*0.550*	0.01	*0.000*
total employment	(4) first and	**0.874**	0.152	**0.903**	0.151	**0.425**	0.105	-0.13	*11.320*	-0.12	*13.030*	-0.11	*2.120*
hours worked	twelfth	**0.978**	0.150	**0.998**	0.148	**0.438**	0.095	-0.15	*13.640*	-0.15	*14.730*	-0.12	*2.010*
employment rate	difference	**-0.104**	0.038	**-0.095**	0.036	**-0.045**	0.036	0.03	*0.300*	0.03	*0.070*	0.01	*0.070*
		II - INTERACTION IN ADDITION TO SPIKE											
total employment	(1) levels	**0.471**	0.228	**0.473**	0.244	**-0.159**	0.304						
hours worked		**0.152**	0.176	**0.178**	0.192	**-0.230**	0.266						
employment rate		**0.319**	0.127	**0.295**	0.132	**-0.172**	0.098						
total employment	(2) first	**-1.502**	0.552	**-1.452**	0.579	**-0.214**	0.667						
hours worked	difference	**-1.272**	0.529	**-0.889**	0.553	**-0.013**	0.616						
employment rate		**-0.231**	0.172	**-0.563**	0.146	**-0.318**	0.199						
total employment	(3) twelfth	**0.237**	0.510	**0.141**	0.537	**0.199**	0.476						
hours worked	difference	**0.056**	0.444	**-0.015**	0.464	**-0.052**	0.429						
employment rate		**0.181**	0.207	**0.155**	0.206	**-0.064**	0.180						
total employment	(4) first and	**-0.538**	0.729	**-0.727**	0.729	**0.390**	0.496						
hours worked	twelfth	**-0.243**	0.707	**-0.314**	0.699	**0.745**	0.449						
employment rate	difference	**-0.295**	0.158	**-0.412**	0.164	**-0.132**	0.176						

1) The dependent variable is average hours worked for the working population, average hours worked for those employed and employment rate. Hours and Job elasticities add to Total elasticity for the static but not for the dynamic model.
2) Panel I shows estimates of the coefficients of spike interacted with the real minimum wage, in a model where the interaction replaces the spike. Panel II shows estimates of the coefficient of spike interacted with the real minimum wage in model where the interaction is included in addition to spike. Each panel has four rows: (1) within groups (levels), (2) first differences, (3) twefth differences, and (4) first and twelfth differences.
3) Column 1 shows the base specification with region and time fixed effects as regressors; column 2 adds past inflation and controls to the base specification; and column 3 further adds dynamics (24 lags of the independent variable). Columns 4-6 show the test for equality of the coefficient of spike in Table B Panel V and in this Table C Panel I.
4) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, in the informal sector, in urban areas, in the public sector, in the building construction industry sector, in the metallurgic industry sector, basic education degree holders, high school degree holders, and the proportion of workers with a second job.