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## **ABSTRACT**

### **Political Variables as Instruments for the Minimum Wage**

Following the early 1980s apparent consensus, there has been a controversial debate in the literature over the direction of the minimum wage employment effect. Explanations to non-negative effects range from theoretical to empirical identification and data issues. An explanation, however, that has not been sufficiently explored is that a non-negative effect might be an upward biased estimate of a truly negative effect, resulting from the simultaneous determination of the minimum wage and employment. This paper estimates the employment effect of the minimum wage using a number of political variables – not previously used in the literature – as excluded exogenous instruments to control for the endogeneity of the minimum wage variable. The data used is an under-explored Brazilian monthly household survey from 1982 to 2000. Robust results indicate that an increase in the minimum wage has very small adverse effects on employment.

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## 1. INTRODUCTION

Following the early 1980s apparent consensus of negative significant but modest minimum wage employment effect (Brown et al., 1982), there has been a controversial debate in the literature over the direction of this effect (Brown, 1999). Explanations to non-negative effects range from theoretical to empirical identification and data issues (Card and Krueger, 1995; Brown, 1999). An explanation, however, that has not been sufficiently explored is that a non-negative effect might be an upward biased estimate of a truly negative effect. Such a bias might result from the simultaneous determination of the minimum wage and employment (Williams and Mills, 1998 and 2001).

This paper estimates the employment effect of the minimum wage using a number of political variables – not previously used in the literature – as excluded exogenous instruments to control for the endogeneity of the minimum wage variable.

Furthermore, a number of other conceptual and identification questions are also discussed to ensure full identification of the minimum wage effect. For example: (1) A national minimum wage cannot explain variation in employment across regions (Brown et al., 1982; Card and Krueger, 1995). Identification of the effect of the minimum wage separately from the effect of other variables on employment requires regional variation if no restriction on time modeling is imposed. This motivates the use of “fraction at” as a minimum wage variable, which is here argued to be superior to the commonly used “Kaitz index”, real minimum wage and “fraction affected”. (2) Identification of the effect of the minimum wage separately from the effect of unobserved regional macro fixed effects on employment requires modeling fixed effects, which are implemented here. (3) An employment decomposition that separately estimates the effect of the minimum wage on hours worked and on the number of jobs is utilized (Lemos, 2004a). If the first effect is positive and the second effect is negative, this could be an explanation of non-negative (total) employment effects.

The data used is an under-explored Brazilian monthly household survey from 1982 to 2000. The limited available literature for Brazil, in line with the international empirical literature, suggests that an increase in the minimum wage does not always have a significant effect on employment and it is not always negative (Carneiro, 2002; Corseuil and Servo, 2002; Neumark et al., 2003).

This paper is organized as follows. Section 2 presents the data. Section 3 estimates descriptive models. Section 4 discusses identification: lags of the endogenous variable are used as instruments under the assumption of errors serially uncorrelated (Section 4.1); and political variables are used as

exogenous excluded instruments when this assumption is relaxed (Section 4.2). Robust results indicate that an increase in the minimum wage has very small adverse effects on employment.

## 2. DATA

The data used is PME (Monthly Employment Survey), a rotating panel data for six Brazilian metropolitan regions between 1982 and 2000, similar to the US CPS (Current Population Survey), available from IBGE (Instituto Brasileiro de Geografia e Estatística).

The nominal minimum wage in Brazil is national and coverage is full.<sup>1</sup> The nominal minimum wage was under-indexed over time, as a result of indexation rules of successive stabilization plans. For example, in early 1986, it was bi-annually adjusted initially, but then adjusted whenever inflation was higher than 20%. In mid 1987, it was initially frozen for three months before it was indexed monthly by past inflation. In early 1989, it was again frozen, and in mid 1989 it was again indexed monthly. In late 1991, it was again monthly indexed. In 1993, adjustments were bi-monthly and then monthly. In early 1994, adjustments were daily, and since mid 1995 they have been yearly.

The correlation of the difference of log nominal hourly minimum wage ( $MW$ ) with the difference of log total average hours worked ( $\bar{T}$ ) is -0.04; with the difference of log average hours worked by those working ( $\bar{H}$ ) is -0.05; and with the difference of log of employment rate ( $E$ ) is 0.06. This suggests that when the minimum wage is increased, the total number of hours worked decreases, mainly through a decrease in hours worked, rather than through a decrease in the number of jobs.

## 3. DESCRIPTIVE MODELS

Following Lemos (2004a), a simple empirical model of employment as a function of the minimum wage, grounded on the standard neoclassical theory, is:

$$\Delta \log employment_{rt} = \alpha + \beta \Delta \log MW_t + \gamma \text{inflation}_{rt-1} + \lambda \text{controls}_{rt} + \sum_{l=1}^{24} \rho_{\epsilon_l} \Delta \log employment_{rt-1} + f_r + f_t + u_{rt} \quad (1)$$

where  $employment_{rt}$  is taken in turn to mean  $\bar{T}$ ,  $\bar{H}$  and  $E$  in region  $r$  and month  $t$ ,  $r = 1, \dots, 6$ , and  $t = 1, \dots, 214$ ;  $\text{inflation}_{rt-1}$  is past inflation;  $f_r$  and  $f_t$  are region and time fixed effects modeled by region and time dummies;  $u_{rt}$  is the error term; and  $\text{controls}_{rt}$  are variables that control for region

specific demographics correlated with the minimum wage, i.e. the proportion of workers in the population who are: young, younger than 10 years old, women, illiterates, retired, students, 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.<sup>2</sup> Dynamics account for lagged responses in employment following a minimum wage increase (Hamermesh, 1995).<sup>3</sup> The models were White-corrected and sample size weighted to account for the relative importance of each region and for heteroskedasticity arising from aggregation. By modeling regional and time fixed effects and including controls and dynamics, the errors are no longer expected to be serially correlated over time.<sup>4</sup>

Equation (1) is separately estimated using each of the three employment variables ( $\bar{T}$ ,  $\bar{H}$  and  $E$ ) in turn as dependent variables. The coefficient of the minimum wage in the  $\bar{T}$  equation equals the sum of the coefficient of the minimum wage in the  $\bar{H}$  and  $E$  equations, i.e.  $\beta_T^e = \beta_H^e + \beta_E^e$ .<sup>5</sup> This makes it possible to decompose the total effect of a minimum wage increase on employment into hours effect and jobs effect (Lemos, 2004a).

Because the nominal minimum wage is the same across regions in Brazil,  $\beta$  is not identified. Even using the “relative minimum wage” variables typically used in the literature, namely the real minimum wage and the “Kaitz index” (Kaitz, 1970) – defined as the ratio of the minimum wage to average wage adjusted for coverage of the legislation – does not ensure identification, because the variation in the ratio is driven by the variation in the denominator (Welch and Cunningham, 1978; Freeman, 1982). Because of that, “degree of impact” measures are becoming common in the literature (Brown, 1999), for example, “fraction affected” – defined as the proportion of workers earning a wage between the old and the new minimum wage (Card, 1992) – and “fraction at” the minimum wage in the wage distribution (Section 2.2) – defined as the proportion of workers earning one minimum wage (Dolado et al., 1996) (plus or minus 0.02% to account for rounding approximations).

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<sup>1</sup> Accommodation and food costs can be deducted from the wage. That might account for some below minimum wage workers, although the majority of those are informal sector workers.

<sup>2</sup> Particularly debatable is the inclusion of a variable measuring enrolment rates in school (Card and Krueger, 1995; Neumark and Wascher, 1992 and 1996), which was not included here because of the unresolved debate (Williams, 1993; Baker et al., 1999). The debate is about whether a reduced form or a demand equation is estimated (Card and Krueger, 1995; Brown, 1999), depending on whether enrolment rates are simultaneously determined with employment or not.

<sup>3</sup> Employment is reported to be AR(2) using annual data (Layard et al., 1991), which is equivalent to 24 lags on monthly data. The results were robust to including 12 lags only, but that was thought to prematurely censor the adjustment process because further lags were still significant.

<sup>4</sup> The results were robust to SUR estimation. GMM *a la* Arellano and Bond (1991) is not an option because  $T > N$ .

While “fraction affected” is constant at zero when the minimum wage is constant, and thus it does not capture the erosion of the minimum wage in relation to other wages; “fraction at” is not only a measure of this erosion, but it is also a measure of those workers whose wages went up and thus a measure of employment extra costs. Its correlation with the log nominal hourly minimum wage in the sample period is 0.40. Therefore, “fraction at” is the minimum wage variable used to estimate Equation (1).

Even though “fraction at” has variation across regions and over time, modeling time effects with interactions of month and year dummies would eliminate all the variation in the model. That is because the variation in the minimum wage (and associated variation in “fraction at”) is not independent of the variation in the time dummies since the minimum wage is systematically increased on a particular month (mostly May). Thus, time effects are modeled by year and month dummies but not their interaction, to control for fixed effects across years and months (Burkhauser et al, 2000). In addition, stabilization plan dummies are included to capture common macro shocks under each of the five stabilization plans in the sample period, and a dummy in October of 1988 is added to account for the introduction of the New Constitution. The regional dummies model region specific trends because regions are expected to differ not only in the position but also in the pace of their business cycles.

Table 1 shows positive estimates. A 10% increase in the nominal minimum wage (increases “fraction at” by 0.3 percentage points and)<sup>6</sup> is associated to an increase in total employment of 0.13%, decomposed into an increase in the number of hours worked of 0.13% and no change in the number of jobs. The total and hours estimates are significant and the jobs estimate is non-significant. However, this is a correlation, once the model is purely descriptive. The next step is an attempt to estimate behavioural effects.

#### 4. IDENTIFICATION

The identification strategy here has three steps. (1) By using “fraction at” as a measure of the different impact of a constant minimum wage across regions, the effect of the minimum wage is not

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<sup>5</sup> Because of dynamics in the form of lagged dependent variables, the set of regressors is not the same in all three equations and the OLS additivity property does not hold exactly.

<sup>6</sup> The 0.3 calibration factor is the coefficient of the nominal minimum wage on a regression of the difference of “fraction at” on the difference of the log of the nominal minimum wage and the other regressors in Equation (1). Because the nominal minimum wage does not vary across regions, this model was also estimated using the nominal minimum wage normalized by the average (median and the 25<sup>th</sup> percentile), producing remarkably robust results. The intuition is given by a simple deterministic model, where  $y = a_1 + b_1x$ ,  $y = a_2 + b_2z$ ,  $z = a_3 + b_3x$  and  $b_1 = b_2b_3$ ,  $\forall b_1, b_2, b_3 \neq 0$  (Lemos, 2004a).

confounded with the effect of other macro variables on employment. (2) By accounting for regional fixed effects, the effect of the minimum wage (measured by “fraction at”) is not confounded with the effect of unobserved macro fixed effects on employment. The last step is to control for simultaneity bias. (3) By correcting for simultaneity bias, the effect of the minimum wage (measured by “fraction at”) is not confounded with the effect of unobserved macro variables on employment.

Even if the nominal minimum wage is assumed to be predetermined,<sup>7</sup> “fraction at” and employment are simultaneously determined. Once the minimum wage is increased, the relative wage bargains determine the workers’ position in the wages distribution; this also determines who earns one minimum wage, i.e. who is at the “fraction at”. An exogenous or predetermined variable – that affects employment only via “fraction at” – is necessary to ensure identification. Under the assumption of serially uncorrelated errors, two such an instrumental variables are suggested.

Firstly, the twelve first lags of “fraction at” – naturally correlated with “fraction at” but uncorrelated with the error term – fulfil the properties of a valid instrument. Panel 1 of Table 2 shows estimates of a fairly similar sign, magnitude and significance to the uninstrumented estimates in Table 1 (Section 3). A 10% increase in the nominal minimum wage is associated to an increase in total employment of 0.16%, decomposed into an increase in the number of hours worked of 0.15% and no change in the number of jobs.

Secondly, the Necessary Minimum Wage (SMN) – defined in the Constitution as the subsistence income for an adult worker and their family – and its twelve first lags are used as instruments. The SMN measures the hypothetical past inflation that would have been experienced by minimum wage workers across regions if they consumed the SMN bundle. It is a constructed, not an observed variable. That is because the SMN bundle has never been affordable at the prevalent minimum wage. The correlation between the two in differences is 0.53. SMN is thought to be well correlated with the systematic part of the minimum wage but not correlated with the endogenous part of it. That is because the SMW, being a constructed variable, does not really play a role in wages and employment determination. Therefore it is not simultaneously determined with employment. Panel 2 of Table 2 shows negative estimates. A 10% increase in the nominal minimum wage is associated to a decrease in

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<sup>7</sup> The nominal minimum wage might be endogenous if its increases are related to regional macroeconomic performance (Card and Krueger, 1995; William and Mills, 1998 and 2001). Further endogeneity can be caused by the denominator of the real minimum wage (Kaitz index), i.e. price (average wage) deflators (Dolado et al, 1996; Zavodny, 2000). The most obvious instruments for “fraction at”, other than its own lags, are lagged real minimum wage and lagged Kaitz index. However, they do not ensure identification, as discussed in Section 3; and they suffer from the same drawback as “fraction at” when serial correlation is relaxed (Section 4.1).



total employment of 0.11%, decomposed into a decrease in the number of hours worked of 0.05% and a decrease in the number of jobs of 0.04%. The estimates are now non-significant.

#### **4.1 SERIAL CORRELATION**

In Section 4, the errors were assumed uncorrelated over time. Ultimately, an orthogonality condition must be made to produce an estimable equation and it is not too unrealistic to assume that serial correlation will vanish after differencing, adding dynamics, controls, regional and time dummies. The overidentifying restrictions (Sargan) test can be used to verify this assumption (Andrews, 1999; Szroeter, 2000).

Panels 1 and 2 of Table 3 show the associated Sargan test, Hausman test and F test (in the first step of the 2SLS) for the models in Panels 1 and 2 of Table 2. The Hausman test does not show much evidence of endogeneity, as expected from the discussion in Section 4; the F test shows the instruments performed well; but the Sargan test rejects the null hypothesis of no serial correlation in Panel 2 – this invalidates the use of SMN and its lags as instruments for “fraction at” in Equation (1), and casts doubts on the use of lags of “fraction at”.

Only an excluded instrument with truly exogenous variation, uncorrelated with the error term and all its past lags, will ensure consistency. Political variables are suggested as an attempt to define such an instrument.

#### **4.2 EXCLUDED EXOGENEOUS INSTRUMENTS**

Three different sources of political variables were used to define exogenous excluded instruments. Table 4 gives the institutional details underlying the validity of the instruments and their raw correlations.

##### **4.2.1 Politicians Data**

It is well established in the literature on the politics of the minimum wage that politicians might favour or oppose minimum wage increases depending on the overall macroeconomic performance in each region. Card and Krueger (1995, p. 134) argue, “Politicians from states in which an increase in the minimum wage is expected to have a strong effect on wages or employment opportunities might oppose the increase, whereas those from states in which the expected effect is smaller might support

it.” The final increase is the result of compromise between competing interest groups (regions) (Becker, 1983). In other words, the final increase is a regional weighted average; the impact of the increase in each region determines the political support (the relative weight) of that region to the increase.

In Brazil, the Intersyndical Department of Parliamentary Consultancy (1) ranks the 100 most influential congressmen according to political science criteria (debating, negotiating, voting, articulating, forming opinion, leading, etc.) rating their powers of persuasion (DIAP, 1994 to 2002); and (2) attributes marks to politicians voting in favour of workers in labour related bills (DIAP, 1986, 1990, 1994a and 2002). These are measures of regional weight and were here used as instruments for the sampled regions. The more influential congressmen from a particular region, the more weight on the interests of that region; and the more pro-increase (contra-increase) these influential congressmen, the higher (lower) the minimum wage.<sup>8</sup> Sobel (1999) argues that interest group pressure significantly influenced congressional voting on the passage of the minimum wage bills in the US. Panel I of Table 4 shows mostly strong correlations.

These measures are not thought to be simultaneously determined with employment. First, the influential status is based on personal characteristics. Second, the pro-increase (pro-worker) status is acquired by consistently voting in favour of workers in workers related bills. Most of these bills are not directly related to employment, as for example: land reform, union leader tenure, president mandate length, etc.<sup>9</sup> The pro-worker status was re-defined using solely those bills not simultaneously determined with employment but the results were robust to either definition. Dummies were also defined for whether these politicians are left or right wing,<sup>10</sup> whether or not they hold a degree, and the number of mandates they hold, which were then interacted.

#### **4.2.2 Voting Data**

Some might argue that voting data would measure the regional weight more directly associated with minimum wage increases. Card and Krueger (1995) used voting data to construct a measure of political support. Similar data, accounting for votes in favour and against a minimum wage bill by

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<sup>8</sup> It is more intuitive to discuss the sign of the correlation in relation to the minimum wage even though the above are instruments for “fraction at”. Both correlations should bear the same sign, because “fraction at” and minimum wage are positively correlated (Section 3). Where the correlations differ substantially, they are pointed out in the text.

<sup>9</sup> For a full list, see DIAP (1986, 1990, 1994a and 2002). These publications are not part of a series; they have slightly different methodologies that required some adjustment. But the main idea is the same – grading politicians on how worker sympathetic they are.

politicians of the sampled regions, was collected for Brazil.<sup>11</sup> Usually, pressure against the bill results in inflation erosion of the real minimum wage (Sobel, 1999). In Brazil, there are two distinct reasons to oppose the increase. In line with the above, pressure against the increase means that the increase cannot be afforded; this argument is usually related to the inflation impact or public deficit impact of the increase. In contrast, pressure against the increase means that the increase is not large enough to even maintain the minimum wage purchase power; this argument is usually related to protecting the worker's standard of living. Examples of both arguments can be found in the newspapers:

“...to buy the same basket as in 1940, when it was introduced, the minimum wage would have to be R\$517.55 [as opposed to the current R\$130]” (Estadao, 10<sup>th</sup> May, 1998).

“The popular movement against the minimum wage of R\$151 toughens up in Brasilia at Easter, when a circus tent will be installed in front of the Congress to shelter 1,000 retired workers who will camp there until voting on the bill on the 26<sup>th</sup>. The vigil will include a mass for the “conversion” of deputies and senators in favour of a more generous minimum wage... ” (Estadao, 19<sup>th</sup> April, 2000).

“The Government makes the minimum wage increase conditional upon the inflation level, the benefits and pension bill, the Estates and Cities finances... Most Congressmen know that a big increase would put at risk the economic stability of the country.” (Estadao, 15<sup>th</sup> January 1998).

“The minimum wage increase affected inflation... but the time is long gone when the increase would spread through the whole Economy, like the petrol increase” (Estadao, 13<sup>th</sup> May, 2000).

The underlying reason for being against the increase will depend on the political and economic context, party affiliation and workers' bargaining power, which naturally vary over time. In Brazil, in most of the sample period, the centralized wage policy was intended to be deflationary via under-indexation of the real minimum wage (Section 2). In this context, opposing such a policy meant protecting the worker's living standard. Thus, the more congressmen against the increase, the more pressure for a larger increase, and the higher the minimum wage. Panel II of Table 4 shows strong negative correlations.<sup>12</sup> Absence (not justifiable absence through sickness, official mission, etc.) is also important because it might be a strategy against the passage of the bill. For example:

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<sup>10</sup> Left wing designation according to Figueiredo and Limongi (1995).

<sup>11</sup> This data was collected from the National Congress Daily (Diario do Congresso Nacional, DCN).

<sup>12</sup> A positive sign was expected for IV10 and IV11. The number of congressmen both in favour and against the increase can move in the same direction as the minimum wage, but the proportions are not expected to. Thus, proportions were defined (IV15 and IV16). Although the sign remains negative, the correlations are robust across definitions and variables – they cannot have happened by chance alone. Most importantly, there is plausible economic reasoning for either a positive or a negative correlation. Provided the correlation is nonzero and stable over time, it suffices to establish a robust correlation.

“The increasing tension between allies and adversaries of the Government because of the difficulties in finding a solution to the minimum wage increase might stop the voting... the leader of the Labour Party... announced yesterday that his party will be absent” (Estadao, 9th November, 2000).

Card and Krueger (1995, p. 135) used their political variable as a “proxy for otherwise unobservable factors in a state that might be related to the impact of the law”, implicitly assuming a direct effect on employment over and above the indirect effect via the minimum wage. There is no reason to believe that at the time politicians are voting the bill, this is having a simultaneous effect on employment in Brazil. Firstly, the minimum wage is more related to the wage-price spiral than to employment. Firms anticipate the spiral, which is a rapid phenomenon under high inflation, and do not adjust employment to avoid incurring in adjustment costs (Lemos, 2004b). Secondly, any arguments that the voting data instruments might be endogenous should be considered in the light of the robustness of the results across instruments (Tables 2 and 3). In the presence of severe endogeneity, there is no reason why politicians data, voting data, and election data instruments would produce bias in the same direction and of similar magnitudes.

An interesting feature of voting data is that voting can be non-secret (nominal), secret, or party oriented, for which a “voting dummy” is defined. During the dictatorship there was no voting, and when there was, it was symbolic – this is an exogenous instrument in itself. Parties orient the vote prior to voting; non-secret votes (only on demand) are usually a strategy of those opposing the increase (favouring a larger increase) to expose their opponents. For example:

“In a convoluted session stretching until early morning, the Government got the Congress to approve the R\$151 minimum wage... after 3 months of fighting and thanks to a full day of intense lobbying. The session, due to start at 7pm, was postponed to 8pm, to prevent voting going live on television, exposing the ‘situation’ Congressmen [those in favour of the R\$151 Government proposal] ...who did not succeed in making a deal for symbolic voting, which guarantees the anonymity of votes. The opposition Congressmen... insisted on nominal voting”. (Estadao, 11th May 2000). “By determination of the president... the general secretary will list the names of the Congressmen who will be punished for voting against the Government.” (Estadao, 12th May 2000).

The lower the minimum wage, the more pressure for a larger increase, and the more often non-secret votes are demanded. Panel II of Table 4 shows strong negative correlations. Block (1980 and 1989) and Card and Krueger (1995) discuss party influence on the passage of minimum wage bills in the US. Weighting the number and proportion of votes by the voting dummy generates an additional instrument. This places more weight on the more reliable non-secret votes data, which also represents

more proactive pro-increase and democratic times. Panel II of Table 4 shows strong negative correlations.

Another way to measure the political bargaining process is to consider the frequency of increases. An increase occurred whenever the socio-economic-political tension became unbearable (81/217 months). The timing of the increases can be regarded as a measure of tension and used to define a “voting cycle” variable.<sup>13</sup> The more often bills are presented, the higher the minimum wage (the lesser inflation erosion). Panel II of Table 4 shows positive correlations. The voting cycle is assumed to be predetermined, as tension at each moment is a function of past events. Weighting the voting data by the voting cycle generates an additional political variable that measures regional political support over time. This places more weight on voting when it is imminent, and less weight when it is less relevant. Weighting is also expected to improve the instruments performance – it produces variation across regions and over time – although Table 4 shows the correlations to be again strong and negative, but not stronger.

As an attempt to further measure the political bargaining process, other sources of data were explored. First, data was collected on bills submitted to voting by congressmen of each sampled region. The more bills presented, the lower the minimum wage (the faster its inflation erosion). Also, a dummy was defined for whether the bill was effective (ever voted). The more effective bills, the higher (less inflation eroded) the minimum wage. Two more variables were defined to measure the length of the passage of the bill. The longer the passage, the more pressure (the less bargaining power), the higher (lower) the minimum wage.<sup>14</sup> Also, the number of bills was weighted by the “effectiveness” and “length” dummies. Second, data was also collected on the number of speeches by congressmen from each sampled region. The more speeches needed, the lower the minimum wage.<sup>15</sup> Third, for most of the bills submitted, a commission was formed to appreciate the impact of the increase prior to

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<sup>13</sup> Tension can only be measured when it reaches its peak triggering an increase. Assuming that tension grows linearly, the voting cycle was defined as a linear time trend between each of the two increases. Other functional forms (exponential, squared, squared root and log) were also experimented.

<sup>14</sup> Table 4 shows that the correlation sign differ for “fraction at” and minimum wage. This is either because of no genuine correlation (correlations are indeed low) or because of measurement error. Regarding the latter, this data was collected from the National Congress System Information (SICON) web page, and checked against data from the Section for Parliamentary Information (SEDOP). The data is assumed to be reliable and measurement error negligible (for example, IV51 to IV53 show strong correlations).

<sup>15</sup> This data was collected from the Shorthand Notes from the National Congress Sessions (and associated DCN); it is assumed to be reliable and the measurement error negligible for IV62 to IV64, but not for IV65 and IV66. This is because the last two are subject to interpretation, aggravated by the complex socio-economic-political Brazilian context.

voting. Data on the number of congressmen from the sampled regions in each commission was collected. The more congressmen in favour of the increase, the lower the minimum wage, as before.<sup>16</sup>

### 4.2.3 Election Data

Regional affordability is not the only criteria for political support. As a further attempt to collect data with independent variation, consider political propaganda:

“...around 500 mayors will meet in Brasilia to discuss a strategy to pressure the Congress against ... the minimum wage increase... [they] changed their strategy of pressure... mainly due to the proximity of the election campaign for the re-election of congressmen, who dispute the support of the mayors in their electoral basis.” (Estadao, 11th December 2001).

“Usually, the minimum wage increase is defined... in December, but this year the elections anticipated the debate... the Government strategy is to postpone the increase above inflation until after October, when the new president will have been elected.” (Estadao, 10th July 2002).

Firstly, assume that incentives for more generous increases depend on the proximity of elections. Sobel (1999, p. 766) specified a model that “shows an incentive for Congress to time changes in the minimum wage just before elections”. He argues that this was the case over the entire history of the minimum wage, starting with the Fair Labor Standards Act going into effect just eight days before election. Similarly, in Brazil, the Consolidacao das Leis do Trabalho introduced the minimum wage as a prelude to amending the Constitution to introduce presidential elections. In every single electoral year in the sample period, there was a minimum wage increase – often up to two months before the election. This is reassuring evidence that the minimum wage is used as political propaganda. The basic assumption is that voters are myopic and opportunistic policymakers systematically manipulate macroeconomic policy right before elections to maximize their chances of re-election (Nordhaus, 1975; Lindbeck, 1976). Thus, the timing of elections was used to define an “election cycle” variable<sup>17</sup> Carmignani, 2003). The closer the elections, the higher the minimum wage. Panel III of Table 4

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<sup>16</sup> A positive sign was expected for IV73, as for IV10 and IV11. Proportions were defined, which did not change the sign of the correlations with the minimum wage, but turned into positive the correlations with “fraction at”. As before, this is either because of no genuine correlation or because of measurement error. Although the data is assumed to be reliable (collected from the SICON, and checked against the SEDOP), measurement error is not assumed to be negligible, because of the nature of the data (there was not always a commission, not always a minimum wage one, etc.). Even though these instruments were thought to capture the true underlying political process, not much confidence should be placed in them.

<sup>17</sup> Like the voting cycle, the political cycle is a linear (exponential, squared, squared root and log) time trend between two consecutive elections (IV80 to IV87).

confirms the expected negative correlations. The political cycle is assumed to be exogenous, as it is determined by regular intervals of time.

Secondly, assume that left-wing politicians are in favour of more generous increases. The lower the minimum wage, the more the popular discontentment, and the more left-wing politicians are elected. Data on the number of (votes on) left wing politicians was used as an instrument.<sup>18</sup> The underlying assumption is that any endogeneity coming from the simultaneous determination of the number of left wing politicians elected and employment is negligible on monthly data because elections happen every 4 years. However, incentive for increases are greater not only the more popular discontentment, but also the closer the elections. Weighting the election data by the election cycle generates an additional political variable varying over time and across regions. As before, weighting is also expected to improve the instruments performance, although Panel III of Table 4 shows the correlations to be again strong and negative, but not stronger.

Thirdly, assume that incentives for increases are greater, the lower the minimum wage. Even if popular discontentment is high and the next elections are close, not much political propaganda is made if the minimum wage is already at a relatively high level. Weighting the election data not only by the election cycle, but also by the real minimum wage, generates an additional political variable varying over time and across regions. Moreover, this additional political variable re-introduces the minimum wage variation into the model (Card and Krueger, 1995; Machin and Manning, 1994). Panel III of Table 4 shows that this improves the correlations.

The above instruments are in the main strongly correlated with “fraction at” (Table 4), but not thought to be endogenously determined with employment. Indeed, the Sargan test did not reject the null when instrumenting Equation (1) using such instruments (Table 3). This is supportive of the assumption that any correlation with past information is not as strong as to contaminate the results and reject the null.

Some might argue that interactions “fake” the correlation with the endogenous variable and “create” a weak instrument; i.e. even if the instrument is uncorrelated with the endogenous variable in the population, correlation might not be zero in a finite sample (Nagar, 1959; Bound et al., 1995; Staiger and Stock, 1997). There is nothing intrinsic about interactions that produce nonzero correlations. In general, provided that there is some *a priori* economic reasoning in establishing the validity of the instruments – as exhaustively discussed above – and they pass the appropriate tests (see

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<sup>18</sup> This data is available in Nicolau (1998) and updated in his webpage.

Table 3), nothing particular about interactions invalidates instruments. The issue is about weak instruments, not interactions *per se* (Angrist and Krueger, 1995 and 1999). Interactions were here justified for a conceptual reason. Incidentally, they produce variation in both dimensions (over time and across regions) for instruments originally only varying in one dimension. In general, interactions did not produce stronger correlations; most of the above instruments are interaction-free, and yet well correlated with “fraction at” (indicated in bold in Table 4). Interactions were here motivated as further robustness checks and were by no means crucial in defining the instruments.

#### 4.2.4 Results

These instruments were organized into four groups to account for potential criticisms on interactions and on endogenous or weak instruments contaminating the results: (1) only interaction-free instruments; (2) a subsample from the interaction-free instruments whose correlation with “fraction at” was higher than 0.30; (3) voting data interacted with the voting cycle; (4) election data interacted with the election cycle and the real minimum wage.

Panels 3 to 6 of Table 2 shows that the estimates are still clustered around zero, but their magnitude in absolute terms has changed, suggesting that some bias was corrected. Estimates are fairly robust whether using the full sample or the subsample of interaction-free instruments more strongly correlated to “fraction at”. The preferred specification is the one in Panel 3 of Table 2, which uses the less debatable interaction-free set of political instruments. A 10% increase in the nominal minimum wage increases total employment by 0.01%, decomposed into an increase in the number of hours worked of 0.05% and a decrease in the number of jobs of 0.03%. The estimates are not significant. The estimates are marginally larger in absolute value when using voting data and larger in absolute value when using election data, but not significant. The estimates are remarkably robust in the long run. A 10% increase in the minimum wage decreases total employment in the long run by 0.01% at the most, but does not decrease the number of jobs. These are small employment effects when compared to the -1% effect in the international literature.

The initial hypothesis that the uninstrumented positive short run employment effect estimates could be upwards biased estimates of a truly negative effect encounters some support, as the instrumented jobs effect estimate turned into negative in all specifications using political variables as instruments, and there was also some evidence that the total employment effect estimates were negative. However, the estimates were not precise enough for the hypothesis of biased estimates to be



a satisfactory explanation of the non-negative employment effects found in the literature. Nonetheless, the evidence here consistently suggests, across a number of instruments, that an increase in the minimum wage has very small adverse effects on employment.

Perhaps the explanation to such small employment effects is elsewhere. One explanation is that firms will 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, 2004b). Other explanations can be offered when a number of specificities inherent to developing countries are considered. For example, employment effects would not be too adverse in an economy where: non-compliance is large and the public sector has an inelastic labour demand (Lemos, 2004c and 2004d); inflation is high and firms do not adjust employment because they perceive the minimum wage increase as temporary (Lemos, 2004e); low wage workers are a large proportion of the labour force (Lemos, 2004f).

## **5. CONCLUSION**

There has been a controversial debate in the literature over the direction of the employment effect of the minimum wage. Among a number of explanations, one that has not been sufficiently explored is that a non-negative effect might be an upward biased estimate of a truly negative effect, resulting from the simultaneous determination of employment and the minimum wage variable.

This hypothesis was here investigated, whereby various instrumental variables were used to ensure consistent estimation of the employment effect. In presence of errors serially correlated, lagged endogenous variable was not a valid instrument. A number of political variables were used instead as exogenous excluded instruments uncorrelated with the error term and all its past history to control for the endogeneity of the minimum wage variable.

Using the preferred specification, a 10% increase in the nominal minimum wage was found to increase total employment in the short run by 0.01%, decomposed into an increase in the number of hours worked of 0.05% and a decrease in the number of jobs of 0.03%. However, these estimates were not significant. The estimates are remarkably robust in the long run across specifications. A 10% increase in the minimum wage decreases total employment in the long run by at the most 0.01%, but does not decrease the number of jobs. These are small employment effects when compared to the -1% effect in the international literature.

The initial hypothesis that the uninstrumented positive short run employment effect estimates could be upwards biased estimates of a truly negative effect encounters some support. However, the

estimates were not precise enough for this hypothesis to be a fully satisfactory explanation. Nonetheless, the evidence here consistently suggests that an increase in the minimum wage has very small adverse effects on employment in Brazil. This is reassuring evidence that the minimum wage does not hurt where it hurts most: causing disemployment.

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**Table 1 - EMPLOYMENT EFFECT OF A 10% MINIMUM WAGE INCREASE - uninstrumented**

<b>dependent variable</b>	<b>short run</b>		<i>long run</i>
	<b>coef</b> (1)	se	<i>coef</i> (2)
(1) total employment	<b>0.13</b>	0.03	-0.04
(2) hours worked	<b>0.13</b>	0.03	-0.02
(3) employment rate	<b>0.00</b>	0.01	0.00

(1) The minimum wage variable is "fraction at". To obtain the equivalent of a 10% increase in the nominal minimum wage, the estimates were multiplied by 0.3.

(2) The dependent variable is total average hours worked, average hours worked for those working and employment rate.

(3) Rows 1 to 3 within each panel show the estimates for total, hours and job effects.

(4) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are population and institutional variables.

(5) Columns 1 and 2 show the short and long run coefficient.

**Table 2 - EMPLOYMENT EFFECT OF A 10% MINIMUM WAGE INCREASE - instrumented**

<b>dependent variable</b>	<b>short run</b>		<i>long run</i>
	<b>coef</b> (1)	se	<i>coef</i> (2)
<b>1 - IV: lagged spike</b>			
(1) total employment	<b>0.16</b>	0.06	-0.04
(2) hours worked	<b>0.15</b>	0.05	-0.02
(3) employment rate	<b>0.00</b>	0.02	0.00
<b>2 - IV: necessary minimum wage</b>			
(1) total employment	<b>-0.11</b>	0.12	0.03
(2) hours worked	<b>-0.05</b>	0.11	0.01
(3) employment rate	<b>-0.04</b>	0.03	0.05
<b>3 - IV: interaction-free political instruments</b>			
(1) total employment	<b>0.01</b>	0.09	0.00
(2) hours worked	<b>0.05</b>	0.08	-0.01
(3) employment rate	<b>-0.03</b>	0.03	0.04
<b>4 - IV: interaction-free whose correlation with "fraction at" higher than 0.30</b>			
(1) total employment	<b>-0.01</b>	0.13	0.00
(2) hours worked	<b>0.05</b>	0.12	-0.01
(3) employment rate	<b>-0.03</b>	0.04	0.04
<b>5 - IV: voting data interacted with voting dummy and voting cycle</b>			
(1) total employment	<b>0.03</b>	0.18	-0.01
(2) hours worked	<b>-0.02</b>	0.17	0.00
(3) employment rate	<b>-0.06</b>	0.06	0.04
<b>6 - IV: election data interacted with election cycle and real minimum wage</b>			
(1) total employment	<b>-0.23</b>	0.21	0.06
(2) hours worked	<b>-0.13</b>	0.19	0.02
(3) employment rate	<b>-0.05</b>	0.04	0.07

(1) The minimum wage variable is "fraction at". To obtain the equivalent of a 10% increase in the nominal minimum wage, the estimates were multiplied by 0.3.

(2) Each panel shows estimates using a different set of instruments for "fraction at", as indicated.

(3) The dependent variable is total average hours worked, average hours worked for those working and employment rate.

(4) Rows 1 to 3 within each panel show the estimates for total, hours and job effects.

(5) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are population and institutional variables.

(6) Columns 1 and 2 show the short and long run coefficient.

**Table 3 - SPECIFICATION TESTS - for models in Table 2**

<b>dependent variable</b>	Sargan test (1)	df	<i>Hausman test</i> (2)	<i>se</i>	F test (3)	df
<b>1 - IV: lagged spike</b>						
(1) hours worked	24.99	11	-0.13	0.20	6.35	88/895
(2) employment rate	16.86	11	0.03	0.03	33.21	88/895
<b>2 - IV: subsistence minimum wage</b>						
(1) hours worked	24.69	12	0.65	0.39	3.15	89/894
(2) employment rate	58.28	12	0.03	0.02	31.35	89/894
<b>3 - IV: interaction-free political instruments</b>						
(1) hours worked	116.11	74	0.28	0.29	2.78	147/826
(2) employment rate	110.54	74	-0.01	0.03	44.39	148/826
<b>4 - IV: interaction-free whose correlation with spike was higher than 0.30</b>						
(1) hours worked	40.21	25	0.27	0.43	2.68	102/881
(2) employment rate	37.78	25	0.00	0.03	54.52	102/881
<b>5 - IV: voting data interacted with voting dummy and voting cycle</b>						
(1) hours worked	9.59	11	0.52	0.55	2.61	92/891
(2) employment rate	5.44	11	0.02	0.03	35.40	92/891
<b>6 - IV: election data interacted with election cycle and real minimum wage</b>						
(1) hours worked	21.05	17	0.89	0.58	2.61	90/889
(2) employment rate	26.67	17	0.03	0.03	34.11	90/889

(1) The minimum wage variable is "fraction at". To obtain the equivalent of a 10% increase in the nominal minimum wage, the estimates were multiplied by 0.3.

(2) Each panel shows specification tests for the associated models in Table 2 using a different set of instruments for "fraction at", as indicated.

(3) The dependent variable is total average hours worked, average hours worked for those working and employment rate.

(4) Rows 1 to 2 within each panel show the estimates for hours and job effects. The results for total hours are qualitatively the same as the results for hours worked and were here omitted.

(5) Time effects are modelled with year, seasonal-month, stabilization and 1988 structural break dummies. Controls are population and institutional variables.

(6) Columns 1 to 3 show respectively Sargan, Hausman and F test (in the first step of the 2SLS). Degree of freedom for Sargan and F tests are indicated. Standard errors for Hausman test are indicated.



Table 4 - CORRELATIONS BETWEEN THE POLITICAL INSTRUMENTS AND BOTH "FRACTION AT" AND MINIMUM WAGE. - continues

IV	fraction	MW	instrument	intuition
<b>I - POLITICIANS DATA</b>				
IV1	0.21	0.62	no. of politicians from each sampled region out of the 100 most influential politicians in the country	the more influential the congressmen and the more pro-increase, the higher the minimum wage
IV2	0.28	0.16	IV1 as a proportion of total influential politicians from sampled regions	as above
IV3	0.01	0.38	measure of how worker-sympathetic congressmen from each sampled region are	the higher the mark, the more pro-increase the congressmen, the higher the minimum wage
IV4	-0.56	-0.51	dummy: 1 if left wing, 0 otherwise for congressmen in IV3 (average)	the more left wing congressmen, the higher the minimum wage
IV5	0.16	0.04	dummy: 1 if university graduated, 0 otherwise for congressmen in IV3 (average)	the more educated the congressmen, the greater the support for a higher minimum wage
IV6	-0.25	-0.54	no. of mandates for congressmen in IV3 (average)	the longer the congressmen are in power, the less favourable they are of a higher minimum wage
IV7	-0.42	-0.35	interaction of IV3*IV4*IV5*IV6	
<b>II - VOTING DATA</b>				
IV8	-0.44	-0.59	no. of senator votes from each sampled region in favour of the minimum wage increase	the more congressmen in favour of the increase (against a larger increase), the lower the minimum wage
IV9	-0.56	-0.48	no. of deputy votes from each sampled region in favour of the minimum wage increase	as above
IV10	-0.20	-0.17	no. of senator votes from each sampled region against the minimum wage increase	the more congressmen against the increase (in favour of a lower increase), the lower the minimum wage
IV11	-0.50	-0.49	no. of deputy votes from each sampled region against the minimum wage increase	as above
IV12	-0.07	-0.05	no. of senators from each sampled region absent when the minimum wage increase was voted for	the more congressmen absent (the less pressure for a larger increase), the lower the minimum wage
IV13	-0.13	-0.35	no. of deputies from each sampled region absent when the minimum wage increase was voted for	as above
IV14	-0.51	-0.60	IV8 as a proportion of total senator votes	as above
IV15	-0.42	-0.36	IV9 as a proportion of total deputy votes	as above
IV16	-0.20	-0.20	IV10 as a proportion of total senator votes	as above
IV17	-0.47	-0.60	IV11 as a proportion of total deputy votes	as above
IV18	-0.47	-0.49	dummy for senator's votes in IV8 to IV13: 3 non-secret, 1 secret, and 2 party oriented vote	the lower the minimum wage, the more often non-secret votes are demanded (to expose those against it)
IV19	-0.59	-0.60	dummy for deputy's votes in IV8 to IV13: 3 non-secret, 1 secret, and 2 party oriented vote	as above
IV20	-0.38	-0.49	interaction of IV8*IV18	
IV21	-0.54	-0.47	interaction of IV9*IV19	
IV22	-0.19	-0.15	interaction of IV10*IV18	
IV23	-0.49	-0.49	interaction of IV11*IV19	
IV24	-0.07	-0.05	interaction of IV12*IV18	
IV25	-0.12	-0.34	interaction of IV13*IV19	
IV26	-0.44	-0.49	interaction of IV14*IV18	
IV27	-0.20	-0.17	interaction of IV15*IV19	
IV28	-0.44	-0.34	interaction of IV16*IV18	
IV29	-0.46	-0.57	interaction of IV17*IV19	
IV30	0.36	0.29	voting cycle (linear)	the more often minimum wage bills are voted, the higher the minimum wage (the less inflation erosion)
IV31	0.37	0.27	voting cycle (squared root)	as above
IV32	0.08	0.02	voting cycle (squared)	as above
IV33	0.34	0.22	voting cycle (log)	as above
IV34	0.08	0.02	voting cycle (exponential)	as above
IV35	-0.25	-0.42	interaction of IV8*IV30	
IV36	-0.40	-0.43	interaction of IV9*IV30	
IV37	-0.17	-0.14	interaction of IV10*IV30	
IV38	-0.31	-0.36	interaction of IV11*IV30	
IV39	-0.30	-0.44	interaction of IV14*IV30	
IV40	-0.34	-0.42	interaction of IV15*IV30	
IV41	-0.18	-0.17	interaction of IV16*IV30	
IV42	-0.28	-0.42	interaction of IV17*IV30	
IV43	-0.29	-0.45	interaction of IV20*IV30	
IV44	-0.40	-0.43	interaction of IV21*IV30	
IV45	-0.15	-0.11	interaction of IV22*IV30	
IV46	-0.31	-0.36	interaction of IV23*IV30	
IV47	-0.34	-0.47	interaction of IV26*IV30	
IV48	-0.33	-0.40	interaction of IV27*IV30	
IV49	-0.16	-0.15	interaction of IV28*IV30	
IV50	-0.28	-0.41	interaction of IV29*IV30	

Table 4 - CORRELATIONS BETWEEN THE POLITICAL INSTRUMENTS AND BOTH "FRACTION AT" AND MINIMUM WAGE - continues

IV	fraction	MW	instrument	intuition
IV51	-0.30	-0.34	no. of minimum wage bills submitted by congressmen from each sampled region	the more (need for) minimum wage bills, the lower the minimum wage (the faster inflation erosion)
IV52	-0.11	-0.05	no. of minimum wage bills submitted by left wing congressmen from each sampled region	as above
IV53	-0.31	-0.38	no. of minimum wage increase bills submitted by congressmen from each sampled region	as above
IV54	-0.07	-0.02	IV52 as a proportion of IV51	as above
IV55	-0.29	-0.44	IV53 as a proportion of IV51	as above
IV56	0.06	0.14	dummy for bills in IV51: 0 if bill not effective and 1 if effective (average)	the more effective the bills (the less inflation erosion), the higher the minimum wage
IV57	-0.06	0.04	no. days minimum wage bills in IV51 took to be appreciated (sum, if more than 1 bill per month)	the longer the bills take to be appreciated (the less bargaining power), the lower the minimum wage
IV58	0.00	0.11	no. days minimum wage bills in IV51 took to be appreciated (average per month)	as above
IV59	-0.32	-0.39	interaction of IV51*IV56	
IV60	-0.11	-0.08	interaction of IV51*IV57	
IV61	-0.08	0.00	interaction of IV51*IV58	
IV62	-0.15	-0.14	no. of speeches from congressmen from each sampled region regarding the minimum wage	the more (need) for speeches, the lower the minimum wage
IV63	-0.14	-0.14	no. of speeches from left wing congressmen from each sampled region regarding the minimum wage	as above
IV64	-0.14	-0.15	no. of speeches from congressmen from each sampled region regarding a minimum wage increase	as above
IV65	-0.14	-0.12	no. of speeches from congressmen from each sampled region favourable to a minimum wage increase	as above
IV66	-0.10	-0.09	no. of speeches from congressmen from each sampled region against a minimum wage increase	as above
IV67	-0.16	-0.16	IV62 as a proportion of speeches	as above
IV68	-0.17	-0.18	IV63 as a proportion of speeches	as above
IV69	-0.13	-0.13	IV64 as a proportion of speeches	as above
IV70	-0.08	-0.06	IV65 as a proportion of speeches	as above
IV71	-0.19	-0.23	no. of congressmen from each sampled region in minimum wage commissions	the more congressmen in the commission in favour of the increase, the lower the minimum wage, as for IV8
IV72	-0.25	-0.19	no. of left wing congressmen from each sampled region in minimum wage commissions	as above
IV73	-0.12	-0.22	no. of right wing congressmen from each sampled region in minimum wage commissions	as above
IV74	-0.20	-0.30	IV71 as a proportion of commission congressmen	as above
IV75	0.10	-0.16	IV71 as a proportion of commission congressmen from the sampled regions	as above
IV76	0.04	-0.08	IV72 as a proportion of commission congressmen from the sampled regions	as above
IV77	0.10	-0.16	IV73 as a proportion of commission congressmen from the sampled regions	as above
<b>III - ELECTIONS DATA</b>				
IV78	-0.27	-0.35	national election cycle (linear)	the closer the elections, the more generous the minimum wage increase
IV79	-0.03	-0.05	municipal election cycle (linear)	as above
IV80	-0.22	-0.30	national election cycle (square root)	as above
IV81	-0.04	-0.02	municipal election cycle (square root)	as above
IV82	-0.31	-0.39	national election cycle (squared)	as above
IV83	-0.20	-0.22	municipal election cycle (squared)	as above
IV84	-0.15	-0.22	national election cycle (log)	as above
IV85	-0.05	-0.01	municipal election cycle (log)	as above
IV86	-0.03	-0.03	national election cycle (exponential)	as above
IV87	-0.05	-0.08	municipal election cycle (exponential)	as above
IV88	-0.38	-0.54	no. of left wing candidates to president elected from each sampled region	the lower the minimum wage, the more left wing congressmen elected
IV89	-0.64	-0.34	no. of left wing candidates to federal deputy elected from each sampled region	as above
IV90	-0.34	-0.19	no. of left wing candidates to senator elected from each sampled region	as above
IV91	-0.23	-0.25	no. of left wing candidates to governor elected from each sampled region	as above
IV92	-0.49	-0.28	no. of left wing candidates to state deputy elected from each sampled region	as above
IV93	-0.02	-0.07	no. of left wing candidates to capital mayor elected from each sampled region	as above
IV94	-0.38	-0.54	IV88 as a proportion of total number of candidates to president	the lower the minimum wage, the more left wing congressmen elected
IV95	-0.60	-0.48	IV89 as a proportion of total number of candidates to federal deputy	as above
IV96	-0.45	-0.46	IV90 as a proportion of total number of candidates to senator	as above
IV97	-0.28	-0.28	IV91 as a proportion of total number of candidates to governor	as above
IV98	-0.60	-0.48	IV92 as a proportion of total number of candidates to state deputy	as above
IV99	-0.02	-0.07	IV93 as a proportion of total number of candidates to capital mayor	as above

Table 4 - CORRELATIONS BETWEEN THE POLITICAL INSTRUMENTS AND BOTH "FRACTION AT" AND MINIMUM WAGE - continued

IV	fraction MW	instrument	intuition
IV100	-0.26	-0.23	no. of votes in left wing president candidates in each sampled region
IV101	-0.16	-0.11	no. of votes in left wing federal deputy candidates in each sampled region
IV102	-0.30	-0.12	no. of votes in left wing governor candidates in each sampled region
IV103	-0.15	-0.06	no. of votes in left wing state deputy candidates in each sampled region
IV104	-0.54	-0.69	IV100 as a proportion of total votes in president candidates
IV105	-0.63	-0.49	IV101 as a proportion of total votes in federal deputy candidates
IV106	-0.39	-0.30	IV102 as a proportion of votes in governor candidates
IV107	-0.61	-0.49	IV 103 as a proportion of votes in state deputy candidates
IV108	-0.33	-0.46	interaction of IV78*IV98
IV109	-0.49	-0.37	interaction of IV79*IV98
IV110	-0.35	-0.23	interaction of IV80*IV98
IV111	-0.25	-0.29	interaction of IV81*IV98
IV112	-0.39	-0.34	interaction of IV82*IV94
IV113	-0.03	-0.11	interaction of IV83*IV99
IV114	-0.33	-0.46	interaction of IV84*IV98
IV115	-0.46	-0.45	interaction of IV85*IV98
IV116	-0.39	-0.48	interaction of IV86*IV98
IV117	-0.31	-0.31	interaction of IV87*IV98
IV118	-0.45	-0.46	interaction of IV88*IV98
IV119	-0.03	-0.11	interaction of IV89*IV99
IV120	-0.23	-0.26	interaction of IV90*IV98
IV121	-0.20	-0.08	interaction of IV91*IV98
IV122	-0.30	-0.19	interaction of IV92*IV98
IV123	-0.20	-0.09	interaction of IV93*IV98
IV124	-0.43	-0.55	interaction of IV94*IV98
IV125	-0.45	-0.46	interaction of IV95*IV98
IV126	-0.35	-0.34	interaction of IV96*IV98
IV127	-0.44	-0.46	interaction of IV97*IV98
IV128	-0.33	-0.45	interaction of IV108*minimum wage
IV129	-0.46	-0.22	interaction of IV109*minimum wage
IV130	-0.32	-0.16	interaction of IV110*minimum wage
IV131	-0.21	-0.22	interaction of IV111*minimum wage
IV132	-0.33	-0.16	interaction of IV112*minimum wage
IV133	-0.03	-0.24	interaction of IV113*minimum wage
IV134	-0.33	-0.45	interaction of IV114*minimum wage
IV135	-0.42	-0.30	interaction of IV115*minimum wage
IV136	-0.38	-0.39	interaction of IV116*minimum wage
IV137	-0.27	-0.24	interaction of IV117*minimum wage
IV138	-0.41	-0.30	interaction of IV118*minimum wage
IV139	-0.03	-0.24	interaction of IV119*minimum wage
IV140	-0.23	-0.24	interaction of IV120*minimum wage
IV141	-0.17	-0.06	interaction of IV121*minimum wage
IV142	-0.29	-0.13	interaction of IV122*minimum wage
IV143	-0.16	-0.05	interaction of IV123*minimum wage
IV144	-0.42	-0.50	interaction of IV124*minimum wage
IV145	-0.41	-0.29	interaction of IV125*minimum wage
IV146	-0.32	-0.24	interaction of IV126*minimum wage
IV147	-0.40	-0.29	interaction of IV127*minimum wage

source: IV1-IV44 National Congress; IV45-IV49 DIAP

(1) instruments in bold are prior to interaction