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## The impacts of the minimum wage on the labor market, poverty and fiscal budget in Brazil

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# 108

**DISCUSSION PAPER**

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## **THE IMPACTS OF THE MINIMUM WAGE ON THE LABOR MARKET, POVERTY AND FISCAL BUDGET IN BRAZIL**

**Miguel N. Foguel  
Lauro Ramos  
Francisco Carneiro**





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Brasília, January 2015

## THE IMPACTS OF THE MINIMUM WAGE ON THE LABOR MARKET, POVERTY AND FISCAL BUDGET IN BRAZIL<sup>1</sup>

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## RESUMO

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Este trabalho procura contribuir para a discussão a respeito do papel do salário mínimo no Brasil, avaliando os efeitos potenciais de políticas de salário mínimo nos grandes agregados do mercado de trabalho, assim como sobre a incidência de pobreza e seu impacto fiscal. A primeira parte descreve, de forma sucinta, o histórico institucional do salário mínimo desde sua criação, a evolução do seu valor real ao longo deste período, além de fornecer a caracterização do perfil dos indivíduos que o recebem. A seguir, após uma rápida apresentação das diferentes visões acerca do seu papel no plano teórico e uma revisão dos resultados encontrados no plano empírico, procede-se às estimações de seu impacto no emprego, salários, pobreza e equilíbrio fiscal.

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# ABSTRACT

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This paper aims at contributing to the debate regarding the role of the minimum wage in Brazil. This is carried out by assessing its potential effects on the labor market outcomes, as well in terms of poverty alleviation and fiscal impact. First, a succinct description of the institutional framework, the evolution of its real value over time, and a characterization of the profile of minimum wage earners are presented. Next, after a brief survey of theoretical views and empirical results found in the literature, the estimations, as well their implications in terms of minimum wage policies, are presented and discussed.

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## 1 - INTRODUCTION

The debate about the settlement of the minimum wage level, as well as about its very own existence, is very intense across the world. Brazil is no exception on this matter. In fact, the debate seems to be more passionate here than elsewhere. The reason for that concerns the multiple roles and effects related to a minimum wage policy, particularly so in Brazil.

Of course, most of the time the minimum wage is regarded basically as an instrument aimed at helping those in the bottom of the income distribution to fulfill their basic needs and, therefore, alleviating the incidence of poverty. But the imposition of a wage floor has implications on the workings of the labor market and, as a consequence, on its outcomes, which may very well undermine, or even counterweigh, the original goal. Moreover, according to the set of rules and relationships that prevail in the economic system, the minimum wage level may have significant effects on an array of economic variables, impacting the economic performance and, ultimately, the rate of growth.

The core of the problem that gives rise to such lively debate is exactly the conflicting nature of the purposes and the side effects induced by a minimum wage policy. Even though the basic needs fulfillment approach is usually more emphasized, it is not straightforward to arrive at an overall and consensual assessment of these policies, more so in terms of their dynamic impacts.

For the sake of illustrating the point, one can resort to a, maybe oversimplified, dichotomy. Going up the road that direction, one can think of the premises of two clear and conflicting views on the normative impact of minimum wage policies in developing countries. On the one hand, there is the view that spouses the idea that higher minimum wages contribute to redistribute resources in a welfare enhancing fashion, and as such they have the potential to reduce poverty, increase productivity, and foster economic growth. On the other hand, the more skeptical view holds that minimum wage interventions end up misallocating labor, wasting resources through rent-seeking practices, impairing the ability to adjusting to economic shocks, deterring investment and, thereupon, reducing rates of economic growth. Furthermore, they eventually cause wage depression in the segments where the poor are predominant, such as the urban informal sector and in the rural areas [Freeman (1996)].

This essay is an attempt to assess the impacts of minimum wage policies on labor market outcomes, in a broader sense, and also on poverty and fiscal budget performance in Brazil. Previous analysis of the impacts of such policies in the Brazilian economy [Velloso (1988), Ramos and Reis (1995), Foguel (1997), Neri *et al.* (1999), Corseuil *et al.* (2000), *inter alia*] concentrated the bulk of their efforts on the spill-over effects of those policies on wages, as well on their capacity to reduce poverty and earnings inequality. Very little, to say the least, has been pursued in a thorough way about their effects on the employment level and/or on the fiscal budget. Notwithstanding the awareness of staying far away from the mark, this paper looks for filling the gap, at least to some extent, in the

country's literature by assessing the economic and welfare impact of minimum wage policies in a broader perspective.

The paper is organized as follows. Section 2 describes the historical background and the temporal evolution of the minimum wage value since its creation in the beginning of the 1940's. In Section 3 a brief profile of minimum wage earners is presented, using the Brazilian National Household Survey (PNAD) of 1998. Section 4 is dedicated to assess the impact of the minimum wage on employment and wages in Brazil, using time-series techniques and labor market data from the Monthly Employment Survey (PME). In Section 5 we summarize recent results from other studies on the impact of the minimum wage on poverty in Brazil. Section 6 presents results on the impacts of the minimum wage on two important components of the Brazilian fiscal deficit: the government payroll and the social security budget. In Section 7 we present some subsidies for the present debate about the reform of the minimum wage policy in Brazil. We do that by pointing out some of the conceptual advantages and disadvantages of minimum wage systems that have been used in the world. Section 8 concludes.

## 2 - THE EVOLUTION OF THE MINIMUM WAGE IN BRAZIL

### 2.1 - Historical Background

Though its creation was made official in <sup>01/14/1936</sup>, <sup>the</sup> minimum wage had already been mentioned in the <sup>Constitution of 1934</sup> as a level of earnings good enough to provide the satisfaction of the basic needs of a worker according to the geographic region <sup>she</sup> he was living in.<sup>1</sup> Its explicit goal at that time was to guarantee for an adult working a regular work week of 44 hours, with no distinction of gender, a remuneration that would enable her/him to fulfill the basic needs of food, hygiene, housing, clothing, and transportation. The settlement of its value, however, only took place <sup>four</sup> years later <sup>2</sup> in 01/05/1940, and it started to be in force in 01/07/1940.

A major change in the system took place in 1946, with the advent of a new Constitution. The household became the new unit of reference, instead of the individual. Therefore, the minimum wage should suffice for providing not only the workers' satisfaction of her/his needs, but those of the entire household. However, as the absence of any revision concerning its value at the time illustrates well, this change of goals was not immediately pursued. Though very short of the mark, an attempt to reconcile the value of the minimum wage with its role prescribed by the Constitution came up in 1962, when President Goulart created the so-called "salário família", a kind of bonus equivalent to 5% of the minimum wage per child 14 years old or younger.

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1 Constitution of 1934, Article 121, Paragraph 1, Item b.

2 In order to establish the regional values for the minimum wage, the government created the Minimum Wage Commissions, which were formed by an equal number of employees and employers and directed by a member of the government (or someone indicated by it). There were two specific cases where the minimum was differentiated within a same region. The first was for those under 18 years old, who received 50% of the official value. Second, in the case of unhealthy activities, there was an additional ranging from 10% to 40%, depending on the case.

The next change worth mentioning took place in 1984, when the value of the minimum wage was unified in the whole country. The minimum for all regions was raised to the level in force in the South and Southeast. Prior to that the number of regional minimum wage had varied widely: there were 14 when it was created, reaching a peak of 39 in 1963, and a minimal of 2, right before the unification.

In 1987 the role of the minimum wage as a reference for the determination of other wages in the labor market, including the lowest level of remuneration of skilled workers was revoked. The deindexation came in for the sake of a higher flexibility for the minimum wage policy, which was considerably constrained for its, most of the times undesirable, side effects on the other wages in the economy.<sup>3</sup>

## 2.2 - The Current System

The current minimum wage system in Brazil was defined by the new Constitution of 1988, which stipulated "a nationally unified minimum wage, able to fulfill the worker's basic needs, as well as those of her/his family, concerning housing, education, health, leisure, clothing, hygiene, transportation, and social security, periodically adjusted in order to preserve its purchasing power, and with the explicit forbiddance of any sort of tying to its value."<sup>4</sup>

There are several aspects related to the minimum wage in the new Constitution that are worth mentioning:

- a) the new Constitution enlarged the array of needs to be satisfied by the minimum wage, adding health, leisure, and social security to the ones previously existent;<sup>5</sup>
- b) the national unification of the minimum wage was incorporated into the body of the Constitution;
- c) periodical adjustments of its value became mandatory, in order to preserve its purchasing power. This point is particularly important due to the high inflation rates observed at the end of the eighties and beginning of the nineties;<sup>6</sup>
- d) the 1988 Constitution ratified the forbiddance of the use of the minimum wage as a basis for the determination of any other wages/earnings, such as the floor for the remuneration of skilled labor categories, or social benefits, as the "salário-família." The main exception was the determination that no retirement benefit paid by the social security system could be lower than the ongoing minimum wage;

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3 To replace the minimum wage as a reference for other wages and benefits the government created the *Piso Nacional de Salários* (National Wage Floor), whose real value suffered a sharp reduction along the following months due to the inflationary environment prevailing in the economy and the absence of updating policies.

4 Own translation.

5 This prescription was not pursued in practiced, as there was no effort for reevaluating the level of the minimum wage in response to its new and expanded goal.

6 This orientation was not fully respected either and, as we will see ahead, the purchasing power of the minimum wage in fact decreased sharply in the years immediately after the promulgation.

e) there was a reduction in the regular work journey, that came down from 48 to 44 hours per week, which implied an increase close to 10% in the hourly value of the minimum wage.

The most important aspect introduced by the Constitution of 1988 was the tying of the floor for the retirement benefits to the minimum wage, which turned out to be one of the main constraints on the design of policies aimed at increasing its real value from then on, as these benefits have a significant fiscal impact.<sup>7</sup>

### 2.3 - Temporal Evolution of the Real Value of the Minimum Wage

Figure 1 shows the evolution of the real value of the highest minimum wage since its creation until its national unification in 1984. The values correspond to the average level for each year, using the consumption price index for São Paulo (IPC-SP) as the deflator.

According to the legislation that created it, the nominal minimum wage should not be changed over a period of three years, unless under extraordinary economic circumstances. In fact, the first revisions took place only in 1943. The next increase happened in 1952, when President Vargas took over for the second time. The 8-year freeze eroded its real value, who fell to half of its initial level, and the minimum wage lost part of its importance, as in both the industrial and agricultural sectors workers were receiving higher wages. There were several adjustments throughout the rest of decade at much smaller time intervals. Most of the times the minimum wage lagged behind inflation, but in 1956 and 1959 President Kubistcheck reverted the trend and pushed it up, to its highest values ever.

After 1964, under the military regime, wages in general started to be regarded as one of the main sources of inflation in Brazil. As a consequence the minimum wage began to be systematically adjusted well below the cost of living increases. There was a small recovery at the end of the seventies due to a wage policy which stipulated monthly updates in the minimum wages 10% above the inflation rate. This policy lasted only until 1981, when the small edge over inflation came to a term. After then, the minimum wage fell sharply in 1983, as a consequence of the acceleration in the inflation rate that year and changes in the wage policy.<sup>8</sup> When the new government took over in 1985, there was a recovery of its real value, that was strengthened by the general price freeze that happened in 1986 (the so-called *Plano Cruzado*).

The renewed inflationary pressures that followed the price freeze caused another fall in the real value of the minimum wage, who went down by around 30% in 1987. In August of that year, with the creation of the *Piso Nacional de Salários*, the minimum wage was freed from its role as a reference for the wage formation of some skilled labor categories. That generated a new period of recovery that, despite the boost in inflation, lasted until 1989. The real increase along these two

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7 Another barrier is the impact on municipal accounts, especially in the poorest areas of the country.

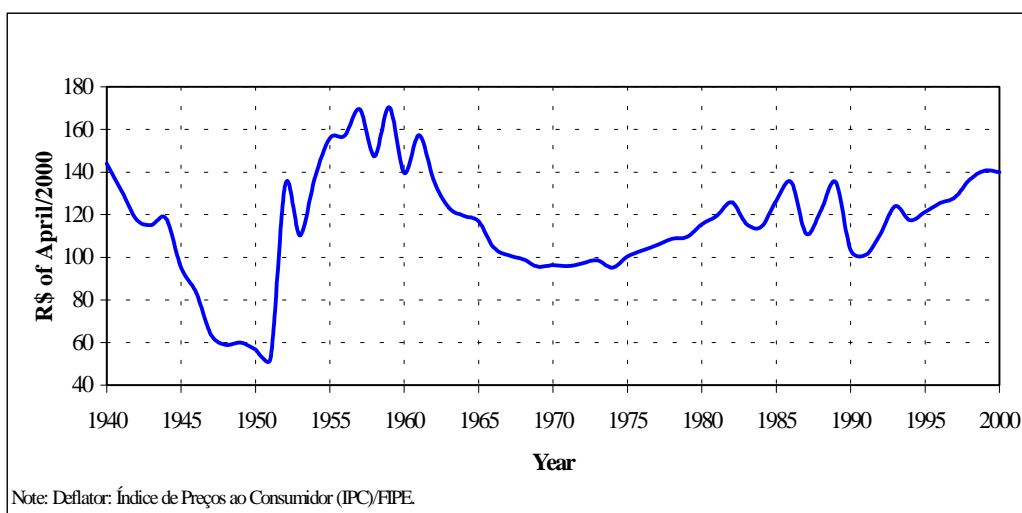
8 The annual inflation rate jumped from 100% to 200% in that year.

years reached close to 25%, but was not large enough to bring its real value to the level observed in 1986. The government transition in 1990, which brought about a new stabilization plan and a deep recession, caused another sharp fall in the minimum wage, who reached its lowest value throughout the decade in 1990.

Despite the indisputable fall along this period, there are some qualifications to be made about the evolution of the minimum wage, especially when we want to associate this fall to a deterioration of the living standards of the poor. First, the value of the minimum wage was unified nationally in 1984, taking its highest regional value (prevailing in the South and in the Southeast) as the new national value. Therefore, the other regions experienced an increase, and not a decline, in the period.<sup>9</sup> Second, the degeneration of close to 10% between 1985 and 1989 is, at least partially, offset by the changes introduced by the new Constitution in 1988: among other things, the number of hour worked per week was reduced from 48 to 44, and a vacation bonus was created.

The current policy, that has been prevailing since the creation of the *Plano Real* in July of 1994, establishes annual updates for the minimum wage usually in the month of May. The magnitude of the increase was higher than the inflation rate in the period right after the implementation of the stabilization plan, which led to a moderate recovery of its real value. In the last couple of years, however, the fiscal constraint imposed by the retirement benefits thwarted that practice, and the increases have been similar to the rates of inflation.

Figure 1  
Real Minimum Wage: Temporal Evolution



*Annual Averages*

<sup>9</sup> It is true that we still observe a fall if we evaluated the weighted average, the weights being the number of minimum wage earners in each region, but it is not as pronounced as when we take the highest national value.

### 3 - PROFILE OF MINIMUM WAGE EARNERS

It seems to be a consensus that the value of the minimum wage is extremely low in Brazil, falling quite short of the amount necessary for achieving the goals set up in the Constitution. Redeeming the minimum wage has been listed as one of the main goals by virtually all the governments in recent times, but none of them came even close to accomplish this task. It seems that their will faces overwhelming economic problems that make such increases unattainable.

In order to develop a better feeling of the magnitude of these problems, as well as to allow a more accurate evaluation of the costs and benefits of a minimum wage policy, it is important to know the characteristics of the workers affected by it. In this section we will briefly identify the profile of the potential beneficiaries of the minimum wage legislation in terms of personal attributes and the characteristics of the segments of the labor market where they work.<sup>10</sup>

Access to the data of the 1998 PNAD, the Brazilian national household survey, allows a rich characterization of minimum wage workers (MWW), as well as the comparison with other groups of interest. Through this section we will use the occupied urban economic active population (OEAP) – 40.2 million workers - and those in the protected (or formal) sector (PS) — which amount to close 55% (22.5 million workers) of the OEAP — as reference groups for addressing the profile of the MWW (2.4 million employees, which represent 6% of the OEAP and 10% of the PS).

#### 3.1 - Personal Attributes

The composition of the above mentioned groups according to personal attributes is shown in Table 1, where we can identify substantial differences among them, especially between minimum wage earners and the OEAP as a whole.

While in the OEAP the percentage of women is under 34%, reaching 39% in the formal sector, it is close to 42% for the universe of individuals that make the minimum wage. These figures indicate that, even though women do not face barriers to their access to the protected segment of the economy, they are more likely to receive just the minimum wage once in there.

Another point that emerges from Table 1 is the over-representation of the youth among minimum wage earners: the 10-19 age group constitutes 18.1% of them and less than 10% of the OEAP. The same happens with the 20-29 age group, that responds for 28.8% of the OEAP and 34.9% of the latter segment. The other age groups, especially prime-age ones (30-39 and 40-49), on their turn, are under-represented among the MWW.

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<sup>10</sup> We will limit our description to those that are in the labor market, living aside the beneficiaries of the social security system. We will consider as minimum wage earners the employees with work card, and also the public servants (in other words, the set of workers protected by the legislation, sometimes referred as the formal sector of the economy), whose hourly wage falls in the 0.75-1.25 minimum wage/hour bracket.

Table 1  
**Minimum Wage Worker's Profile in Urban Brazil Personal Attributes — 1998**

	OEAP	PS	MWW
			(%)
Gender			
Male	66.5	61.0	58.3
Female	33.5	39.0	41.7
Age			
10-19	9.6	6.7	18.1
20-29	28.8	32.3	34.9
30-39	27.7	30.3	21.4
40-49	20.5	20.9	15.1
50-64	11.7	9.1	9.5
65+	1.8	0.7	1.0
Education			
Illiterates	7.4	4.5	12.8
Elementary	25.9	19.4	31.5
Intermediate	27.4	25.6	32.2
High School	27.3	33.8	22.3
College	12.0	16.7	1.2
Household			
Head	53.9	51.9	40.6
Secondary	46.1	48.1	59.4
Ethnicity			
White	58.8	62.4	41.1
Non-white	41.2	37.6	58.9
# workers (millions)	40.2	22.5	2.4

Source: Own elaboration from 1998 PNAD (IBGE).

Regarding education, we find no surprises: the average level of schooling is smaller for MWW than for the labor force as a whole, as those with low level of education, particularly so the illiterates, are more likely to receive the minimum wage than those with high levels of education (especially college).

Perhaps the most important information in Table 2 is the one regarding the composition according to the position in the household: no more than 40.6% of the minimum wage earners are heads of the household, whereas they represent over half of both of the labor force and of the formal sector. This under-representation of heads of household among the minimum wage earners weakens the potential of minimum wage policies as mechanisms to improve the distribution and to reduce poverty.

When it comes to ethnicity, Table 2 shows that the whites, though having higher chances of getting a job in the protected sector, are much less bound to receive the minimum wage once in there: they represent only 41.1% of the minimum wage earners, compared to 58.8% of the OEAP and 62.4% of the formal sector.

Table 2  
Minimum Wage Worker's Profile in Urban Brazil Characteristics of the Jobs —  
1998

	OEAP	PS	MWW
			(%)
Region			
South	16.2	17.4	11.7
São Paulo	27.6	30.3	8.2
Southeast	22.3	23.7	27.1
Northeast	20.8	17.1	38.1
Others	13.1	11.6	14.8
Area			
Metropolitan	37.7	41.9	25.2
Non-Metropolitan	62.3	58.1	74.8
Sector of Activity			
Industry	15.6	20.2	19.1
Civil Construction	9.5	4.4	6.7
Commerce	17.0	13.8	17.6
Services	27.6	22.5	24.2
Others	30.3	39.1	32.4
# workers (millions)	40.2	22.5	2.4

Source: Own elaboration from 1998 PNAD (IBGE).

### 3.2 - Characteristics of the Jobs

Table 2 makes it possible to analyze the minimum wage earners' profile in terms of some characteristics of the jobs they hold. Concerning geographic regions, included here in order to capture differences in the workings of the regional labor markets, there is a clear distinction between the state of São Paulo and the Northeast. Whereas São Paulo accounts for around 30% of the OEAP and the formal sector, only 8.2% of the minimum wage earners are in there. On the other hand, the Northeast region responds for no more than one fifth of the OEAP, but almost 40% of the minimum wage workers are there. The other regions are in between these extremes.

One point related to the regional differences that deserves to be stressed is the fact that the "degree of formalization" (PS/OEAP) is also much higher in the state of São Paulo than in the Northeast as a whole – 0.61 and 0.46, respectively. This may constitute an indication that the imposition of a legal minimum wage becomes less restrictive the more dynamic the labor market is. Therefore, the adoption of a nationally unified minimum wage may have distinct effects in each region, as the nature of their labor markets is not the same. Thus, in principle, one may argue that the adoption of "regional minimum wages", i.e., values that are not necessarily equal by region, could be a superior strategy, as it would potentially allow for a better matching between the legal value of the minimum wage and the characteristics of each market.



The comparison between metropolitan and non-metropolitan areas shows that even though metropolitan workers are over-represented in the formal sector, they are highly under-represented among the MWW. Concerning the aggregation by sector of activity, it is worth mentioning that the fact that minimum wage workers are under-represented in the Civil Construction and Services is, at least to some extent, misleading. This is so because the low incidence of these workers in there is a consequence of the low degree of formality in these segments. As a matter of fact, when the comparison is undertaken in terms of the formal sector composition, the conclusions are just the opposite, meaning that in these two segments it is harder to get a protected job, and if a worker manages to do so, she/he has a higher chance of earning the minimum wage.

#### **4 - THE IMPACTS ON THE LABOR MARKET**

In this section we are concerned with the effects of the minimum wage on the Brazilian labor market. Following the usual approach, our main focus is on the impacts of the minimum wage on wages and employment. Before presenting our estimates on this matter, we briefly present the main theoretical issues on the effects of the minimum wage on the labor market.<sup>11</sup>

##### **4.1 - Theoretical Considerations**

One of the main arguments against a statutory minimum wage is that it will generate job losses, specially to workers that the policy intends to benefit. More specifically, under the assumption that the labor market is perfectly competitive, if the value of the minimum wage is fixed above the market clearing-wage, labor demand will fall, leading to a lower equilibrium employment level. Figure 2 illustrates this standard theoretical prediction: rising the minimum wage ( $W_m$ ) above the initial equilibrium wage ( $W_o$ ) lowers labor demand from  $L_o$  to  $L_m$ . The size of the employment loss will be higher, the higher the (real) value of the minimum wage and the more elastic the labor demand curve. The elasticity of the demand for labor will be larger, the larger elasticity of substitution between unskilled and skilled labor.

The predictions of the standard model have been recently challenged by a set of empirical studies, which found insignificant or even positive employment effects of the minimum wage [see particularly Card and Krueger (1995)]. These results have promoted a renewed interest in alternative models of the labor market functioning. The most known of these models is the monopsonistic labor market model, which is based on the assumption that employers have some discretion in setting wages. As shown in Figure 3, the employer is able to set a wage  $W_o$  — which is below the marginal product of labor —, with  $L_o$  as the associated level of employment. If the minimum wage is set at  $W_e$  — which would correspond to the market clearing-wage in a competitive labor market — the effect on employment will be positive (and maximum). However, imposing a minimum wage higher

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11 For a more complete review of the theoretical literature see Brown *et al.* (1982), Card and Krueger (1995) and Foguel (1997).

than  $W_e$  reverses these job gains, with employment falling below its original level for minimum wages fixing above  $W'$ , say at  $W''$ . Again, the magnitude of the elasticity of labor demand influences the size of the employment change: the larger the elasticity, the higher will be both the job gains and losses.

Reaching similar predictions, there appeared other models based on efficiency-wage, human capital and job-search arguments. Within an efficiency-wage framework, Rebitzer and Taylor (1995) showed that minimum wages can increase employment, at least in the short-run. However, as in the monopsonistic case, a rise in the minimum wage beyond a certain level will generate negative impacts on employment. In a human capital context, minimum wages may induce low skilled workers to invest in education and firms to increase investment in physical capital and training. These investments have positive effects on growth and, therefore, on employment [Cahuc and Michel (1996) and Acemoglou and Pischke (1998)]. Built on the job-search theory, there have been developed some models in which the minimum-wage level influences the intensity of job search of workers and the distribution of job offers of firms. The authors of this class of models show that if the minimum wage is set within a certain wage interval – for instance, between workers' reservation wage and their marginal productivity – there can be a fall in unemployment, with positive welfare effects [Burdett and Mortensen (1989) and Manning (1994)].

Figure 2  
Minimum-wage Effects on Employment in a Competitive Labor Market

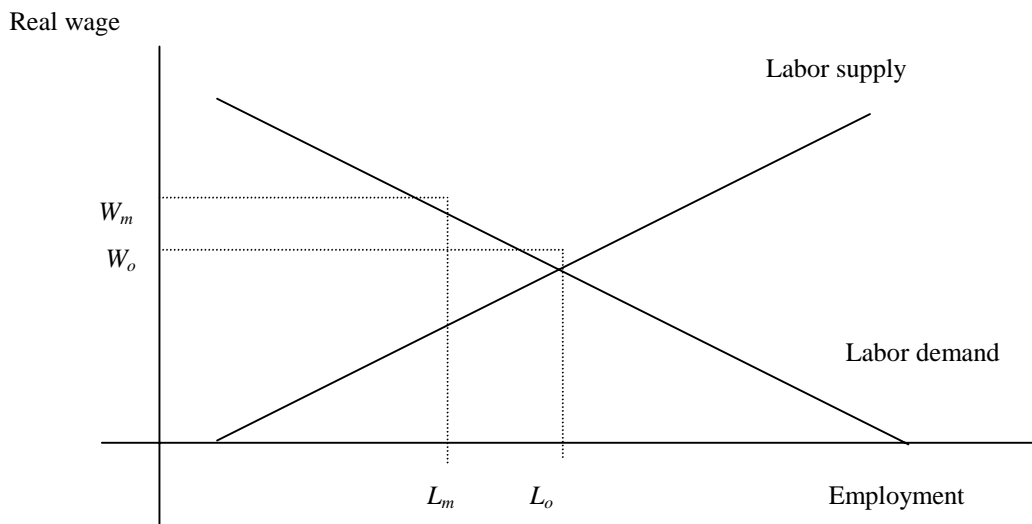
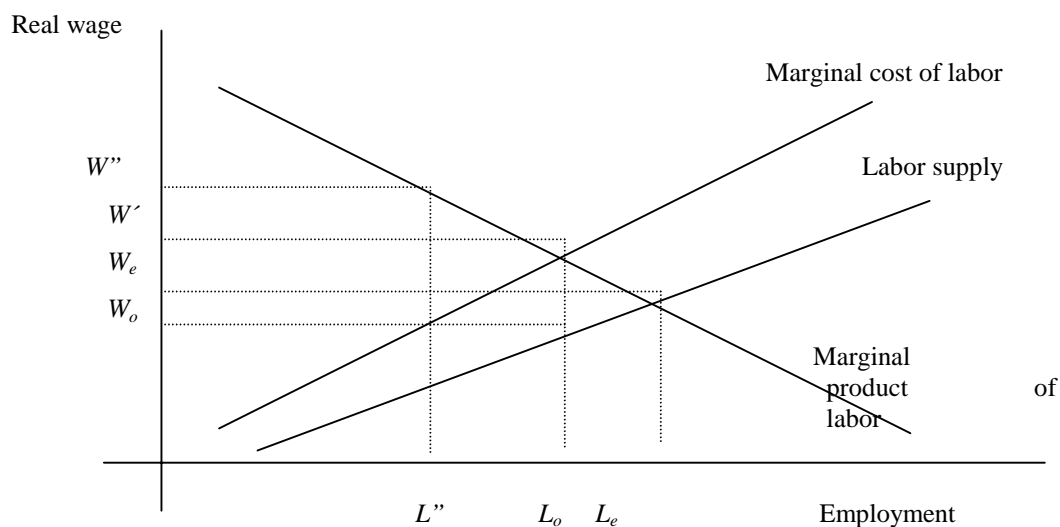


Figure 3  
Minimum-wage Effects on Employment in a *Monopsonistic* Labor Market



These theoretical considerations have important implications for the empirical study of the employment effects of minimum wages. First, because they give an analytical base for both negative and positive employment responses. Second, because there may be some non-linearity in its effects on employment, with positive impacts if the minimum wage is set below a certain level but with job losses thereafter. Third, since most of these models are based on quite restrict assumptions – in particular the hypotheses of homogeneous labor –, it is important to allow for the possibility that the minimum wage effects be different for specific groups, such as youths, industries and regions.

Before presenting our estimates of the impacts of the minimum wage on wages and employment in Brazil, it is worth discussing briefly how the minimum affects informality. The most important paper in this literature is certainly Mincer (1976), who developed a model relating the minimum wage to the status of workers in the labor force: the covered (or formal) sector, the uncovered (or informal) sector and unemployment. As both sectors are assumed to be perfectly competitive, a statutory minimum wage reduces employment in the covered sector. The displaced workers transit to the uncovered sector or to unemployment conditioned on how attractive the (higher) wage in the covered sector becomes. In other words, workers may prefer to stay unemployed waiting for a vacancy in the higher wage covered sector. If workers move to the uncovered sector, the labor supply in this sector expands generating a rise in uncovered sector employment. In this case, total employment can rise or fall: if the job gains in the uncovered sector were higher (lower) than the job losses in the covered sector, total employment will be higher (lower). The predictions of the model concerning the informality degree is also ambiguous: it can rise or fall depending on whether workers move to (waiting) unemployment or to the uncovered sector.

## 4.2 - Estimates for the Impacts on Wages and Employment

As we have argued, the debate about the effects of a minimum wage in the economy has for long been characterized by intense controversy. The textbook description of a competitive labor market predicts that the introduction of a minimum wage will price workers out of jobs. This traditional view, however, has recently been challenged on the grounds that, in certain circumstances, the introduction of a minimum wage might generate an employment gain [Card and Krueger (1995)] and positive impacts on the other wages in the economy [Machin and Manning (1994); Tiffin and Dawson (1996)].<sup>12</sup>

A number of recent studies has attempted to assess the impact of the minimum wage on the labor market for different countries. For Britain, for example, Bell and Wright (1996) analyzed the impact of Wage Boards and Councils and found that minimum wages did not push the wages of workers in covered jobs above those in non-covered jobs, suggesting thus that there are only small wage and employment effects. Machin and Manning (1994) concluded that the decline of the level of the minimum wage relative to the average wage significantly contributed to widening wage dispersion over the 1980s in Britain. Machin and Manning (1996), on the other hand, stressed the finding that in Britain the abolition of the Wage Boards and Councils resulted in wage falls in new jobs and no employment gains.

There are also studies that associate minimum wage increases with business failure rates. Waltman *et al.* (1998) and Fischer (1997), for example, analyzed whether minimum wage increases drive small businesses out of the market entirely. The argument behind this issue is that since business firms are presumably employing resources at maximum efficiency, rising labor costs must be absorbed elsewhere. As demand may be inelastic for some industries, and substitution of labor by capital may require expensive capital investment, many firms may actually exit the market. The general conclusion of studies for the US economy is that minimum wage hikes do not drive businesses into bankruptcy at a higher rate than would have happened had there been no increase in minimum wages.

In the case of developing countries, there are mixed results concerning the impact of minimum wages on the labor market. Bell (1997), for example, has found substantial unemployment effects of minimum wages for the case of Colombia and no wage or employment effects in the formal sector of the labor market in Mexico. For the case of Brazil, Carneiro and Faria (1997) and Carneiro and Henley (1998) have found that the minimum wage was an important determinant of other wages during the 1980s, but that this importance in affecting wage determination was gradually eroded throughout the 1990s.

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<sup>12</sup> See the critic to this general view in Wimmer (1996).

In this section we present our results regarding the impact of the minimum wage on employment and wages in the Brazilian metropolitan labor market. We present our results both for the formal and informal sectors. Following the usual approach, our main focus is on the impacts of the minimum wage on employment. However, given that there was an important literature investigating the impact of minimum wages on other wages in Brazil, we briefly review this literature and also present our own assessment of the role of minimum wages in affecting other wages in Brazil.

#### **4.2.1 - Estimates for the impact on employment**

In terms of the impact of changes in the minimum wage on employment, there are no previous estimates that can be used as a base for comparison for the case of Brazil. Therefore, our results should be viewed as a first gross attempt at assessing the likely effects of the minimum wage legislation over the levels of employment using aggregate time series data for Brazil. Using modern econometric techniques that allow us to separate the long-run behavior from the short-run dynamics of a given structural time series model, we have run employment equations for the period 1982-99.<sup>13</sup> The results revealed a robust and negative impact of changes in the minimum wage in the employment levels of formal workers in the long run, with the reverse taking place for the case of informal workers. That is, increases in the value of the official minimum wage tend to decrease formal employment and increase informal employment.

The elasticity of employment with respect to changes in the minimum wage ranged from  $-0.001$  to  $-0.024$  for formal sector workers and from  $0.0004$  to  $0.003$  for informal workers (see Tables A1 to A4 in the appendix). Although the elasticities were very low in absolute terms they suggest important long-term trends in the employment adjustment process for both sectors. In the formal sector, changes in minimum wages tend to affect negatively employment. On the other hand, changes in the value of the minimum wage tend to affect positively employment in the informal sector since this is the sector where the workers who lose their jobs in the formal sector may find new and temporary occupations.

Another interesting result is concerned with the way in which employment levels in both sectors behave over the business cycle. Formal sector employment tends to react pro-cyclically to changes in economic activity whereas informal employment reacts anti-cyclically to output fluctuations. The intuition behind this process is straightforward since economic growth tends to create more jobs, encourage formal employment and, therefore, discourage informal employment.

As for the short run dynamics, the overall pattern observed for the long run remained the same. In the cases of both formal and informal sectors, the equations satisfy all test statistics at the 5% level of significance and present the expected coefficient estimates. The dynamics found for the case of employment was much simpler than that for the case of wages. Lagged changes in aggregate output have a

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<sup>13</sup> For technical details, see the appendix.

positive impact on current changes in employment in the formal sector and a negative impact on current changes in employment in the informal sector. The impact of changes in the minimum wage on employment is also differentiated. Current changes in the minimum wage impact positively current changes in informal employment with the opposite taking place for the case of formal employment. After some months, however, there is a change in the direction of the impact of minimum wage changes over employment for both sectors, what is indicative that some form of catch up effect might take place following minimum wage increases (see Table A5 in the appendix).

#### **4.2.2 - Earlier evidence of the impact on wages**

The debate as to whether changes in the minimum wage can impact other wages in Brazil dates back to the 70s. A first strong view about this issue was raised by Macedo and Garcia (1978), who argued that changes in the minimum wage had limited impact on the wage rate, as they estimated an elasticity below unity between the wage rate and the minimum wage in the period 1967/74. Souza and Baltar (1979) increased the period of analysis and offered a very different interpretation of the data. Their view was that the minimum wage policy was an important determinant of other wages in Brazil. Their argument was that ups and downs in the real value of the minimum wage were closely followed by the real wages of industrial workers of São Paulo between 1961 and 1976, a finding that is consistent with a unity elasticity.

Improving on the methodology of analysis, Velloso (1990) considered fluctuations in the business cycle as an additional determinant of changes in industrial wages. The author estimated the impact of changes in the real value of the minimum wage and of fluctuations in the business cycle (as measured by the open unemployment rate) on the real value of wages of formal and informal workers, over the period 1976/86. For formal workers, a 10% increase in the real value of the minimum wage would cause an increase of 3.6% to 6.3% in the real wage of workers with signed labor cards. For informal workers, a 10% increase in the real value of the minimum wage would be followed by increases of 4.3% to 6% in the real earnings of those without signed labor cards. The similar elasticities for the two sectors suggest that the wages of both formal and informal workers respond in a very similar way to changes in the official minimum wage. The effect of fluctuations in the business cycle on wages, however, was larger for informal workers. A 10% increase in open unemployment would have a depressing effect of 0.4% in the wages of formal workers and of 0.8% in the earnings of informal workers.

#### **4.2.3 - Estimates for the impact on wages**

A different methodological approach was used by Carneiro and Faria (1997) to investigate issues of temporal precedence between the minimum wage and the other wages in Brazil. Using monthly aggregate data on the evolution of average industrial wages — a proxy for the market wage — and the minimum wage for the period 1985/93, the authors established that changes in the official minimum wage

preceded changes in average industrial wages in Brazil between 1980 and 1985. In the sub-period 1986/93, however, there was simultaneous determination of the market wage and the minimum wage. The result for the former period lends support to the idea that the minimum wage was an important parameter that guided the determination of the other wages during this period [Souza and Baltar (1979)]. In the latter sub-period, the simultaneous determination of the minimum wage and the market wage was believed to illustrate the loss of effectiveness of the official wage policy and the growth of union bargaining power over the second half of the 1980s [Carneiro and Henley (1998)].

For the most recent period, we have performed a more thorough investigation of several aspects related to the wage determination process in Brazil. Using the theoretical framework of bargaining models as background, we investigate the long-run determinants and the short-term dynamics of nominal wages over the period 1982/99. We have considered only the salaried labor force and hence formal sector workers are those engaged in paid employment with signed labor cards, since they are the ones in the covered sector of the economy. In the same vein, informal sector workers are those engaged in paid employment but without signed labor cards.

The use of bargaining models for this purpose is appropriate since the bargaining power of labor unions increased substantially in Brazil over the 1980s. As in Layard *et al.* (1993), a wage equation derived in the context of bargaining between firms and labor unions can be expressed in general terms as:

$$W = f(m, q - l, u, h, \pi)$$

where  $W$  is the average nominal wage,  $m$  is the minimum wage,  $q - l$  represents labor productivity,  $u$  is unemployment,  $h$  is a tax wedge, and  $\pi$  the rate of inflation (see details of each variable in the appendix). Assuming that labor unions have the power to appropriate productivity gains and price increases when bargaining over wages, increases in prices and labor productivity are expected to affect positively nominal wages. As the tax wedge can be seen as a proxy for the cost of labor, it should impact positively nominal wages. The minimum wage is also expected to affect nominal wages positively whereas increases in unemployment are expected to have an unambiguous negative impact on wages.

The wage data we use are monthly time series based on the *Monthly Employment Survey (Pesquisa Mensal de Emprego/IBGE)*, which covers the six major metropolitan areas of Brazil. The official minimum wage rate is available from the Ministry of Labor, while labor productivity, unemployment, inflation and the tax wedge are derived from the series of industrial output, industrial employment, and price indices also calculated by the *Brazilian Institute of Geography and Statistics (IBGE)*. For estimation purposes, all variables were considered in logarithmic form.<sup>14</sup>

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14 For the details of the methodology used to obtain the following estimates, see the appendix.

The empirical results confirm all of these priors. The structural estimates for the behavior of nominal wages in the long run have shown a unity elasticity of nominal wages with respect to minimum wages and positive coefficients for labor productivity, the tax wedge and inflation, with unemployment attracting the expected negative sign (see Tables A6 to A9 in the appendix).<sup>15</sup>

Furthermore, the overall pattern was also similar for both formal and informal workers indicating that both sectors adjust in a very similar way to labor demand shocks. For workers with signed labor cards, a 10% increase in labor productivity leads to a 4% increase in nominal wages, but a 10% increase in unemployment decreases wages by 6% in nominal terms. The price elasticity of nominal wages for formal workers ranged from 0.3 to 0.5, indicating that workers in the formal sector are no longer able to fully adjust their wages for inflation. For workers without signed labor cards, the impact of changes in unemployment was much more pronounced since the elasticity of nominal wages with respect to unemployment was much higher than that found for formal workers (ranging from  $-0.38$  to  $-0.89$ ). On the other hand, workers in the informal sector seem to be able to adjust their earnings more freely for inflation since the price elasticity was also higher than that found for the formal sector. The positive coefficient for labor productivity suggests that both formal and informal workers in Brazil are able to convert positive demand shocks into wage increases.

As for the short-run dynamics of nominal wages, we notice a substantial reduction in the role of the minimum wage in the process of wage determination. The minimum wage elasticity drops considerably for both sectors in the short run. In the formal sector, using different econometric specifications, this elasticity was never greater than 0.10 whereas in the informal sector it was considerably higher reaching 0.24, but still a long way lower than the unity long-run elasticity (see Table A10 in the appendix). This might be suggesting that changes in the minimum wage have a greater impact in the earnings of the informal sector which is sector with the lowest salaries and where most of the poor are likely to be found.

The earnings of informal sector workers are also more sensitive to fluctuations in economic activity in the short run. The unemployment elasticity of nominal wages for informal workers was of  $-0.12$  as compared to  $-0.09$  for formal sector workers. This indicates that a 10% increase in unemployment causes a 1.2% drop in the earnings of informal workers as opposed to a fall of only 0.9% in the wages of formal workers (see Table A10).

## **5 - THE IMPACTS ON POVERTY**

Minimum wage increases will rise the income of poor families conditioned on a set of factors. First, it is necessary that the increase in poor family earnings

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<sup>15</sup> With exception of labor productivity, which appeared with negative coefficient in the fully parametric least square method (FPLS). See the appendix.



accruing to the minimum wage rise exceeds the loss in earnings among low-wage workers who lose their jobs. Second, it is important to know the direction and magnitude of the effect of minimum wage on the supply of labor of other family members. Third, as minimum wage hikes change family incomes — for instance, through employment displacement —, it is also important to consider income compensation that may be channeled through government transfers, such as the unemployment insurance program.

The empirical literature on minimum wage effects on poverty shows that minimum wage increases are associated with poverty reduction in developing countries [Lustig and McLeod (1996)]. For Brazil, two recent studies have tried to estimate the magnitude of this impact: Corseuil *et al.* (2000) and Neri *et al.* (1999). In the first study, the poverty gap for the six main metropolitan areas in Brazil is decomposed in a way that isolates part of the poverty impact of minimum wage rises from 1995 to 1998. More specifically, this decomposition tries to capture the effects of the minimum wage on labor income of likely affected workers (such as those who earned between old and new minima) from the formal and informal sectors. It is important to notice that the methodology only captures the impact on labor income of those who do not lose their jobs after the minimum wage rise. Therefore, the results should be interpreted as an upper bound impact on poverty since they do not include the negative employment effect of the minimum wage. The results of the study show that the impact of the minimum wage rises during this period is positive: the elasticity of the minimum wage in relation to the poverty gap is 0.4, which means that a 10% increase in the minimum wage would reduce poverty in 4%. The study also shows that about 2/3 of the reduction in poverty associated to the minimum wage comes from income increases of informal sector workers.

Neri *et al.* (1999) use a different methodology. Instead of decomposing minimum wage effects on poverty, they simulate what the poverty impact would be for selected groups of affected workers from both formal and informal sectors for the whole country. Their simulations do not incorporate employment effects of the minimum wage. Simulating an increase of about 43% in the minimum wage, the study results show that the proportion of poverty in Brazil would decline by 6%. Similar to Corseuil *et al.* (2000), the authors find that the minimum wage impact on poverty is concentrated among informal workers.

In sum, the available evidence indicates that increases in the minimum wage have been able to alleviate poverty in Brazil. However, this result should be taken with some caution for at least two reasons. First, because the employment effects of the minimum wage on poverty is not captured by the available studies. Second, it seems important to further investigate the mechanisms that relates minimum wage hikes to labor income of informal sector workers. After all, expecting that the rise in the minimum wage will reduce poverty through the uncovered sector may seem “unreliable” for the public decision makers.

## 6 - THE IMPACTS ON THE FISCAL DEFICIT

In this section, we estimate the impact of minimum wage adjustments on two relevant components of the fiscal deficit in Brazil: the payroll of the three levels of government (Federal, State and Municipal) and the social security budget. We do that by simulating what the impact would be if the minimum wage assumed some arbitrary values.

### 6.1 - Impacts on the Payroll of the Three Levels of Government<sup>16</sup>

Minimum wage adjustments can have a direct impact on the payroll of the three levels of government since the salaries of public employees who earn less than the new value of the minimum wage are automatically adjusted when the minimum changes. The objective of this subsection is to calculate the magnitude of this impact for each level of government. The results show that the impact is insignificant for the federal level, the opposite occurring for the other two levels, especially for the municipal administration. This is due to the larger proportion of public servants whose salaries are below or equal to the minimum wage in the local levels.

In order to estimate the impact of the minimum wage for each level of government, we use the last available administrative files from the Ministry of Labor: *Relação Anual de Informações Sociais* of 1997(Rais), which contains information on the number of formal sector employees and their salaries in December of that year. We selected only public employees that belong to the direct public administration sector. More specifically, we only considered public servants that are employed in the federal, state and municipal administration (executive, legislative and judiciary sectors), including those who are in autarkies, the army and the police. It is worth mentioning that we included public workers whose labor rights are regulated by the *Regime Jurídico Único* (RJU) and by the *Consolidação das Leis do Trabalho* (CLT). Employees at public enterprises were excluded from our calculations.

The methodology we used was based on simulations in which we defined some arbitrary values for the minimum wage and calculated the changes in the payroll of each level of government. The value of the minimum wage we use to calculate these changes was R\$ 136 (baseline), the value prevailing just before the last readjustment occurred in April 2000. As the last RAIS available is for the year of 1997, we had to make an initial change in our basic data since the minimum wage prevailing in December of that year was R\$ 120. Basically, we considered that all public workers in our database with salaries between R\$ 120 and R\$ 136 would be earning exactly the latter value. Those workers whose salaries were below R\$ 120 had their salaries changed by a factor of 1,1333, which represents the variation from R\$120 to R\$ 136. It is worth noticing that after producing this adjustment

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16 This subsection is based on a technical note produced by Luciana Mendes (IPEA), who kindly allowed us to use her results.

these workers kept earning less than our base of comparison (R\$ 136).<sup>17</sup> The values we defined in our simulations were: R\$ 151 (the value established in April 2000), R\$ 163 (20% readjustment), R\$ 177 (30%) and R\$ 204 (50%).

We worked with two groups of public employees. The first was formed by workers whose salaries were between our baseline (R\$ 136) and the simulated values. The second was composed by public workers who earned less than our baseline. For the first group, the payroll impact of changes in the simulated values of the minimum wage was calculated by firstly multiplying the number of public workers with salaries within the considered interval (for instance, between R\$ 136 and R\$ 151) by the simulated values of the minimum wage. This calculation gives the payroll if all workers in the first group were earning exactly the simulated value. Subtracting this value of the payroll from the one obtained with our baseline gives the change in the payroll associated with the first group.<sup>18</sup>

Concerning the second group, their salaries were firstly multiplied by a factor corresponding to the ratio between our baseline and the simulated value (for example,  $1.1103 \cong 151/136$ ). Multiplying the number of workers in the second group by their “new” salaries gives the payroll if all workers in this group had their salaries adjusted by the simulated variation in the minimum wage. Subtracting this value of payroll from the initial one gives the change in the payroll associated with the second group. Summing the estimated changes in the payroll associated with the two groups gives the total change in the payroll of each level of government.

Table 3 presents the results. They are presented in an annual basis which are monthly figures multiplied by thirteen in order to include the 13<sup>th</sup> salary. We also present percentage figures so as to have an idea of relative changes. As it can clearly be seen, changes in the minimum wage do not have important impacts on the payroll of the federal government. This is due to the fact that only 0,2% of federal public employees earn salaries lower than or equal to the minimum wage.

The impact on the total state payroll is much higher than for the central government since 1.9% of state public employees earn salaries lower than or equal to the minimum wage. For the R\$ 151 minimum wage the change in the state payroll would be R\$ 130 millions reaching R\$ 560 millions if the minimum were fixed at R\$ 204. This represents respectively 0.5% and 2.2% of the total payroll of state administrations.

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17 Implicitly we are making the strong hypothesis that the wage distribution of public workers between 1997 and 2000 has not changed.

18 It is worth mentioning that we did not include changes in the payroll associated to wage labor costs such as *salário-família*, social security contribution due to the governments, etc.

Table 3

**Impact of the Minimum Wage on the Payroll of the Three Levels of Government —Annual Values**

(R\$ Millions)				
Minimum Wage	Federal	State	Municipal	Total
151	3.1	129.6	197.7	330.4
163	4.9	211.0	359.2	575.0
176	9.1	324.2	553.6	886.9
204	23.6	562.0	1017.2	1602.7
	Relative Impact (%)			
151	0.02	0.52	1.41	0.64
163	0.04	0.84	2.55	1.11
176	0.07	1.29	3.94	1.71
204	0.19	2.24	7.23	3.09

Source: Own elaboration using information from *Rais (MTE) of 1997*.

Concerning the effect on the payroll of municipal governments, since almost 13% of their public workers earn salaries lower than or equal to the minimum wage, adjustments in its nominal value have the highest impact among the three levels of government. It would amount almost R\$ 200 millions for the R\$ 151 minimum wage value, which represents 1.4% of municipal level payroll. If the minimum wage were established at R\$ 176 (R\$ 204), the change in the total payroll would be R\$ 550 millions (R\$ 1 billion), corresponding to a relative change of 3.9% (7.2%) in the total payroll of local government administrations.

In sum, our results show that the impact of the minimum wage is not relevant for the federal government payroll, the opposite occurring for the other two levels of government, in particular for the municipal administration. With the current R\$ 151 minimum wage, the aggregated impact on the payroll of the three levels would be R\$ 330 millions, 60% of which coming from the change in the payroll of the municipal level and 39% from the state level. As a relative rule, the (average) payroll elasticities of the minimum wage would be: 0.003, 0.045 and 0.134 respectively for the federal, state and municipal levels. This means that a 10% rise in the minimum wage would increase by 0.03%, 0.45% and 1.34% the respective payrolls of the three levels of government.

## 6.2 - Impacts on the Social Security Budget

Since the promulgation of the Federal Constitution in 1988, the minimum wage has become the floor for social security benefits in Brazil. This means that every time the minimum wage is adjusted retired workers receiving benefits between the old and the new minimum wage value have their benefits automatically adjusted. As there is a great fraction of retired workers in this group, the impact of the minimum wage on the social security budget is large. The objective of this subsection is to estimate this impact. Similarly to the former subsection, we do that by simulating what the impact would be if the minimum wage assumed some arbitrary values (R\$151, R\$160, R\$165, R\$170 and R\$177).

There are two impacts of the minimum wage to be considered: the first is on social security expenditures and the other on revenues. In the following we expose briefly the methodology used to estimate the net impact of changes in the minimum wage on the social security budget. Throughout we use data from two different sources: *a)* microdata from the National Household Survey (*Pesquisa Nacional por Amostra de Domicílios — PNAD/IBGE*) of 1996, 1997 and 1998; *b)* and, administrative files from the Social Security Ministry (*Boletim Estatístico and Anuário Estatístico da Previdência Social*) of 1996, 1997 and 1998.

Concerning the minimum wage impact on social security revenues, we assumed that only those workers whose labor earnings were between the old and the new (simulated) minimum wage would have their social security contribution risen due the minimum wage adjustments.<sup>19</sup> More specifically, let  $w_i$  be the wage of worker  $i$  and  $W_m$  the proposed (simulated) value of the minimum wage. Then, the rise in social security revenues associated with worker  $i$  will be:

$$\begin{aligned} & \alpha_w(W_m - w_i), \quad \text{if } W_m \geq w_i \\ & 0, \quad \text{otherwise} \end{aligned}$$

The aggregate rise in social security revenues will be:

$$R = \sum_{i=1}^{N_r} \max(0, W_m - w_i) \cdot a_w$$

where  $N_r$  represents the number of workers whose earnings were below the proposed minimum wage and  $a_w$  represents the contribution aliquot for formal and self-employed workers (0.2782 and 0.20, respectively).

To estimate the impact on social security expenditures we proceeded in a similar fashion. The aggregate rise in expenditures can be written as:

$$E = \sum_{i=1}^{N_e} \max(0, W_m - b_i)$$

where  $b_i$  represents benefits below the proposed minimum wage and  $N_e$  the number of retired workers whose benefits fall in the interval between the old minimum wage and the proposed one.

The impact on the social security budget can be calculated by subtracting the aggregate rise in expenditures from the aggregate rise in revenues ( $E - R$ ). Table 4 shows our results, which are presented in annual terms and include the 13<sup>th</sup> salary. The recent rise in the minimum wage to R\$ 151 would generate a net increase on the social security budget of R\$ 2,2 billions, which represents 24% of the social security deficit observed in 1999. If the minimum wage were fixed at R\$ 165 (R\$

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<sup>19</sup> It is implicitly assumed that the effect on wages above the new minimum wage value is not relevant. In this exercise, we did not consider the disemployment effects of the minimum wage.

177) the deficit increase would reach R\$ 4,3 billions (R\$ 6,2 billions), representing 48% (70%) of the social security deficit in 1999. These relatively high figures appear because the increase in expenditures derived from minimum wage adjustments is around 13 times higher than the increase in revenues. This confirms that the minimum wage is a binding variable for the social security budget. A sort of practical rule can be obtained: for each R\$ 1 of increase in the minimum wage the social security deficit would rise by about R\$ 160 millions.

Table 4

**Impact of the Minimum Wage on the Social Security Budget —Annual Values**

(R\$ Millions)			
Minimum Wage	Revenues	Expenditures	Net Impact
151	171	2,340	2,169
160	290	3,820	3,530
165	360	4,660	4,300
170	432	5,520	5,088
177	537	6,740	6,203

*Source: Own elaboration using information from PNAD (IBGE) and Administrative data from the Social Security Ministry.*

## 7 - SUBSIDIES FOR A MINIMUM WAGE POLICY REFORM

The aim of this section is to provide some subsidies for the present debate about the reform of the minimum wage policy in Brazil. We think that a critical assessment of this question should be based on two grounds, which are interconnected. The first is the issue of the scope and coverage of the minimum wage policy. The second has to do with the criteria used for adjusting the value of the minimum wage. Our proposal here is simply highlighting the advantages and disadvantages of different configurations for these two dimensions. Our comments should by no means be interpreted as any endorsement of one type of configuration over another.

### 7.1 - Scope and Coverage

In general, there are four types of scope of minimum wages: national, regional, occupational and by industry. These systems are not necessarily exclusive. In many countries, a national or regional minimum wage coexist with a parallel occupational structure. In Brazil, the first two systems have been used: from its creation in 1940 until 1984, the minimum wage was regional; from 1984 until 2000 it was nationally defined; since April 2000 it has become a mix of national and regional.

Minimum wage coverage is usually for all workers. However, there can be more limited coverages such as those applied in South Korea and Portugal where enterprises with less than certain number of workers were exempted of paying the minimum wage. Also, there is a specific coverage treatment for young workers.

Although in some countries they are treated equally, many countries apply a lower rate for young workers. Throughout the minimum wage policy history in Brazil, enterprises have been allowed to pay a lower minimum wage to apprentice workers.

### **7.1.1 - National and regional systems**

The *general minimum wage* system establishes a single rate applied nation-wide. Many countries use this system (including Brazil since 1984) which has as one of its main advantages the simplicity of application. In fact, having a single national rate makes monitoring relatively straightforward and the system simpler to maintain. In addition, to the extent that wage differentials is an important factor explaining migration flows within a country, a single wage floor may contribute to prevent the increase of rural migration to dense populated areas.

Establishing a general minimum wage has some disadvantages, however. The main one is that it requires a high degree of homogeneity of economic development and labor market conditions of the country. When these conditions are not met, fixing a single wage floor for the whole country may generate important negative effects. Since workers' productivity varies among regions (or sectors) of the country, a single national floor may produce a loss in terms of enforcement. If the rise in informality is not the consequence, then a nation-wide minimum wage may generate an increase in unemployment in less developed regions. In both cases, it seems clear that a general minimum wage may produce a loss in terms of policy objectives.

Someone might point out that a single national minimum wage system has another disadvantage in the case of Brazil. As we saw in Section 6, minimum wage rises impact significantly the budget deficit. However, this negative effect does not necessarily have to do with the application of a general minimum wage system in Brazil. In fact, the main negative impact on the government budget is related to the fact that the minimum wage is also the floor of social security benefits. In other words, if the minimum wage were not the floor for government benefits payments, then applying the general minimum wage system would not necessarily cause significant impacts on the budget deficit. In practice, however, the existence of a national minimum wage has contributed to the deterioration of the government deficit in Brazil.

There are two basic types of *regional minimum wage* systems. There are cases where a national floor is not fixed and the establishment of regional rates are made for every spatial unity in the country (provinces, states or municipalities). This was the case of Brazil until 1984 and of some other countries (for example, Mexico, Indonesia and Philippines). The second type is the one applied in the United States and recently proposed in Brazil. The federal authorities define a national minimum wage and allow the state authorities to set a local minimum wage that must be at least as high as the national value.

The main advantage of the regional system is that it circumvents the disadvantages of the national one. If carefully defined regional minimum wages can reduce the negative effects associated with increasing informality and/or unemployment in less developed regions.

Many specialists also point out that regional minimum wages is more coherent with the existence of regional differences in the cost of living. That is, as the cost of living tends to differ from region to region, if the minimum wage is to be fixed in accordance with the needs of workers, then its value should be differentiated in regional terms.

The main disadvantage of regional minimum wages is the incentive they may create to increasing migratory flows from lower to higher minimum wage regions. Two problems may be associated with these flows. The first is the excessive growth in the populations living in the more developed regions, particularly in the Southeast states of São Paulo and Rio de Janeiro. As the inflow of low qualified workers increases the supply of this type of labor to regions with higher levels of productivity, unemployment and/or sub-employment are likely to rise. In addition, housing problems and the demand for social public services will increase with direct consequences on the level of well being and public expenditures of those already densely populated areas.

A second issue is what may be called a selectivity migration problem. If the workers that decide to migrate to higher minimum wage areas are those with higher productivity at the margin, then average productivity in the regions where they initially live will tend to decrease. In other words, accepting that productivity is continuously distributed, if the migrants are not the lowest productive workers in their original regions of work, then their leaving will cause a fall in average productivity in those regions. The decrease in productivity will be more severe the more productive are the migrants. The direct consequence of this selectivity problem is the decrease in per capita income in the already less developed regions.<sup>20</sup>

These issues (particularly the first one) were recently risen in the debate about the change from the national to the regional minimum wage system in Brazil. One aspect that was not taken into consideration in this debate was the question of what variables will be used by state authorities in their decision about the setting of local minimum wage values. If governors of higher developed states know that high values of local minimum wages attract a significant flow of low quality workers, then they will probably set a lower minimum wage. On the other hand, if governors of less developed states know that they may lose part of their better productive workers, then they may fix higher levels for their local minimum wages.

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20 According to an anonymous commentator, this argument is not so straightforward as the migratory flow might also represent an adverse shock in the supply of local labor in the less developed regions with the effect of provoking an increase in the wages, via excess demand.



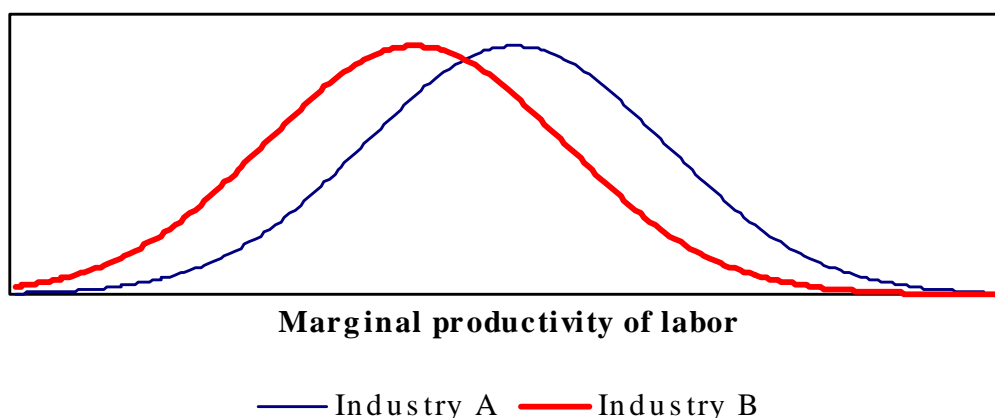
It is difficult to tell the equilibrium of this “game”. It will depend on a set of local factors, including labor supply and demand functions, productivity distributions, risk aversions of workers, state budgets and political aspects. Anyhow, it should not be forgotten that the impacts of migration flows may be an important variable to be taken into consideration in the decision making process of state authorities.

### 7.1.2 - Occupational and industry systems

There are two other minimum wage systems. *Industry minimum wages* is a system in which the value of the minimum wage is differentiated by sector, usually widely defined. In most cases where this type of system has been applied the value of the minimum is set through industry level collective agreements (Germany, Austria, Sweden and Denmark). *Occupational minimum wage* systems are similar in many aspects to the industry system. Based on relatively narrowly defined occupations this system has been used in many countries such as Costa Rica, Colombia, Spain, Luxembourg and some African and Middle East countries.

The main advantage of the industry system is related to the existence of economic heterogeneity among the sectors of the economy. To the extent that the sectors have different levels of productivity, it seems reasonable to have different industry minimum wages. Just as an hypothetical example, suppose that there are two sectors in the economy with different productivity distributions (Figure 4). Assuming that the wage rate is equal to the marginal productivity of labor, if a single minimum wage value was set for the two industries, then a higher proportion of workers would be displaced in industry B than in industry A. If for instance industry B represents a large sector in the economy, the negative impact of fixing a single minimum wage will be more severe.

Figure 4  
Hypothetical Productivity Distributions of Two Industries



This simple example is just for illustrating why it seems reasonable to differentiate the minimum wage among economic sectors. Actually, this rationality is also valid for differentiating the minimum wage among the regions of a country. The

corollary is then: the more significant the differences in the productivity distribution of different groups of workers, the more coherent is differentiating the value of the minimum wage among these groups.

The basic role of occupational minimum wages is to protect certain groups of specially vulnerable workers. In many occupations workers are not well organized having little bargaining power to negotiate their wage rate. This is more common for low qualified occupations which would probably have very low wages if a minimum wage floor was not fixed. As low qualified labor is relatively abundant in low developed countries, the use of occupational minimum wage systems seems more appealing for them.

The main disadvantage of industry and occupational minimum wage systems is the complexity in maintaining the minimum wage fixing machinery. They both require a large effort of coordination, with administrative and monitoring burdens being particularly great. It has not been uncommon that such systems go out of control specially when the number of minimum wages rise to include new industries or occupations. This last case is more complicated since the diversity of occupations is always increasing. In addition, countries that have tried to apply the occupational system have tended to set the minimum wage structure in a very narrowly defined fashion. For instance, in Costa Rica there were 520 different occupational minimum wage rates in 1987 [ILO (1998)].

### **7.1.3 - Coverage**

There are basically two possibilities for limited minimum wage coverage. The first are exemptions given for certain types of enterprises, usually those with a relatively reduced number of employees. The second, and more common, is the special treatment to young workers.

Capacity to pay is the main argument used to exempt small enterprises to pay the minimum wage. Theoretically, small enterprises have tighter capacity to pay because they face more severe credit constraints. Such restrictions tend to be specially binding in economic downturns when the supply of credit becomes more selective. In principle, this argument could be used for supporting minimum wage exemptions to small enterprises, at least in a temporary fashion. However, to the extent that the problem of small enterprises is related to credit constraints, exempting them to pay the minimum wage is not well targeted. Instead, it should be applied an adequate credit policy so that to ameliorate credit access to small enterprises.

In many countries, the minimum wage for young workers is the same as for adults. However, some countries apply a lower rate for youths based on the argument that these workers are less skilled and experienced than adults. In Brazil, there is not exactly a lower rate for young workers. The Brazilian minimum wage policy allows enterprises to pay lower rates to apprentices. In spite of being based on the same argument, this option creates some problems since the concept of apprentices is somewhat vague.

There are two opposite advantages of applying a lower minimum wage rate for youths. On the one hand, it eases their access to the labor market. This could be specially useful for countries where youth unemployment is (particularly) high. On the other, lower minimum wage rates may create incentives for youths not to drop out from school.

It is difficult to say which of these advantages is more beneficial for the country. In countries with low educational rates such as Brazil, it seems that maintaining the youths out of the labor market until they complete the secondary degree is more beneficial. The question is that the lower the minimum wage the easier it is for enterprises to contract youths. In this sense, there is no obvious solution to youth minimum wage fixing. In the end, the fixing will depend on the labor supply decisions of youths and the labor demand for them.

One disadvantage of applying youth minimum wages is defining the age groups. Some countries specify many age groups such as the Netherlands and Belgium. In the case of the former the minimum wage rate is differentiated for youths with 22 (85% of the full rate), 21 (72,5%), 20 (61,5%), 19 (52,5%), 18 (45,5%), 17 (39,5%), 16 (34,5%) and 15 (30%) [ILO (1998)]. In other countries, a reduced rate is applicable only to those under a certain age (Spain and Portugal, 18; Turkey, 16; the United States, 20). It should be pointed out that in some countries the reduced rates are limited to a certain job tenure. In Korea, for instance, the youth minimum wage is applicable for workers under 18 with less than 6 months of job experience.

## **7.2 - Criteria for Adjusting Minimum Wages**

The criteria used to define the initial minimum wage levels are not necessarily the same as for their subsequent adjustments. In the first case, policy-makers and other parties tend to use as reference a combination of at least three different concepts: *a*) needs of workers; *b*) labor market functioning (impacts on wages and employment); and *c*) macroeconomics factors (effects on inflation, budget deficit and growth). However, it is not uncommon that minimum wage successive adjustments become somewhat distant from the initial determination. This is basically due to changes in the economic priorities and the political environment of the country.

There are at least three important issues concerning minimum wage adjusting procedures. The first is related to the indicators or formulae used by the fixing authorities. The second refers to the periodicity of adjustments, which also involves expectations of whether they will be permanent or transitory. The third is related to which decision making configuration is used to establish the adjustments.

### **7.2.1 - Indicators**

The most employed indicator for adjusting the minimum wage level is the consumer price index. The logic is that it is the only available indicator for the

evolution of the purchasing power of workers' income. In this sense, the rationale of indexing the minimum wage to inflation privileges the criterion of the needs of workers. However, when the sole criterion is indexation, minimum wage adjustments may provoke negative impacts on other dimensions such as employment, budget deficits and even on inflation itself, specially when past and full inflation mechanisms are applied. The main advantages of indexing the minimum to inflation is that it is transparent and simple.

There are some countries where the evolution of average wages is also taken into consideration. The rationale is that the growth of average wages reflects productivity gains, thus opening space for increases in the minimum wage. In other words, when minimum wage adjustments are also linked to the evolution of average wages, this allows minimum wage earners to benefit more directly from economic development. In this sense, the incorporation of average wages as another reference for the minimum wage adjustment system seems to be superior to the sole criterion of the inflation indexation scheme.

### **7.2.2 - Periodicity**

The periodicity of minimum wages adjustments vary from country to country. While in some they are established on a regular basis (generally once a year), in others adjustments take place on irregular intervals. The first case is commonly seen in countries with low and stable inflation rates such as Belgium, France, Japan and South Korea, with the United States being a noticeable exception. In general, irregular adjustments are directly related to inflation rates of a country. When inflation rates get high or accelerate, the minimum wage level tends to be adjusted more frequently. Anyhow, the more irregular the adjustments the more tend to be the fluctuations of the real minimum wage value. Moreover, it is not uncommon that long and infrequent adjustments provoke decreases in value of real minimum wages.

There is one important question related to the issue of periodicity that deserves some comments. Since economic agents change their decisions depending on expectations they have about changes in relevant prices such as the minimum wage, it is important to take into consideration whether minimum wage adjustments are expected to be permanent or transitory. In other words, to the extent that labor relationships are characterized by adjustment costs, depending on the expectations economic agents form about the duration of minimum wage adjustments, its effects on the labor market can be high or low, or even nil. Therefore, it seems important that the rules that will eventually be used in the process of adjusting the minimum wage be transparent to society. It involves turning explicit the rules that will be used and maintaining them as stable as possible.

### **7.2.3 - Configuration of decision making**

Above we discussed some important issues involved in the minimum wage adjustment process. But in addition to the questions of commonly used indicators,

periodicity of adjustments and transparency of the rules to be used there is another fundamental issue which concerns what might be called the configuration of the decision making process. By that we basically mean the parties and arrangements that can be used in the functioning of the minimum wage policy.

In Brazil as in many other countries minimum wage adjustments have been decided solely by government authorities. In principle, there should be no problems with this decision making option so long as it is believed that governments act as perfect central planners. If this is so, governments maximize social well-being taking all present and future constraints into consideration when choosing the allocation of resources. The level of the minimum wage would then be fixed so that the economy will function efficiently, with maximum well-being being enhanced.

In practice, however, it has been observed that government authorities do not behave as perfect central planners. The reasons for that are vast and complex, involving a myriad of factors from availability of complete information to political issues. That it is probably the main reason for why many countries apply a different decision making configuration in the minimum wage adjustment process. In those countries, the minimum wage is adjusted through bargaining processes that involve employers and employees representatives. Although this scheme is more usual in countries with industry or occupational minimum wages, there should be no impediments to generalize this practice when national and/or regional minimum wages systems are used. In fact, more centralized bargaining boards may sum important features since it is expected that the parties also take into consideration the macroeconomics effects of minimum wage adjustments, such as inflation and growth.

The participation of government authorities in the minimum wage bargaining process could be desirable for at least two reasons. The first is that government authorities should represent the interests of outsider workers such as the unemployed. The second is that minimum wage adjustments can impact the budget deficit, and so the interests of current and future taxpayer generations.

## **8 - CONCLUSION**

In this paper, we have investigated the economic impact of the minimum wage in Brazil. The analysis has focused on the effects of the minimum wage on the labor market, poverty levels and the government accounts. The period of analysis covers the 1980s and 1990s and the data are from different sources. For the impact on labor markets we have used microdata from the National Household Survey of the Brazilian Institute of Geography and Economics (PNAD-IBGE) of 1998 and aggregate monthly data on employment and wages from the Monthly Employment Surveys (PME-IBGE) for the period 1982-2000. The analysis of the impact of the minimum wage on the fiscal budget is based on data from the Annual Report on Social Information (Rais-MTE) and the Social Security Ministry. Data on the

evolution of the minimum wage since its inception in Brazil were obtained from the Labor Ministry.

In terms of methodology, the paper has used different approaches to highlight the impacts of the minimum wage in the Brazilian economy. As a first step, we presented a brief historical background and institutional features related with the creation of the minimum wage in the 1940s and its temporal evolution since then. As a matter of fact, the current real value of the minimum wage is well below its highest level observed in the mid-1950s. The minimum wage policy that has prevailed since 1994 with the Real Plan has been one of annual adjustments, usually in May of each year. The fiscal constraints faced by the government have limited the scope of the official minimum wage adjustment year after year and although the government has allowed corrections in amounts similar to the evolution of inflation rates since 1994, it is still a consensus among workers and labor market analysts that the value of minimum wage is extremely low in Brazil.

The second step carried out in the paper was to identify the profile of minimum wage recipients in Brazil, since any changes in the minimum wage policy would primarily affect this segment of the economic active population. In overall terms, there is an over-representation of the youth among minimum wage earners while the level of education of these workers is lower than for the labor force as a whole. In terms of position in the household, some 41% of the minimum wage earners are heads of the family — a figure that represents more than half of the labor force. This under-representation of heads of households among minimum wage earners weakens the potential of minimum wage policies as a means to improve income distribution and reduce poverty.

As regards the regional character of the minimum wage, we have found that there is a clear distinction between the state of São Paulo and the Northeast. Whereas São Paulo accounts for around 30% of the OEAP and the formal sector, only 8.2% of the minimum wage earners are located there. On the other hand, the Northeast region responds for no more than one fifth of the OEAP, but almost 40% of the minimum wage earners are located there. One point related to the regional differences that deserves to be stressed is the fact that the “degree of formalization” (PS/OEAP) is also much higher in the state of São Paulo than in the Northeast as a whole – 0.61 and 0.46, respectively. This may constitute an indication that the imposition of a legal minimum wage becomes less restrictive the more dynamic the labor market is. Therefore, the adoption of a nationally unified minimum wage may have distinct effects in each region, as the nature of their labor markets is not the same. Thus, in principle, one may argue that the adoption of “regional minimum wages”, i.e., values that are not necessarily equal by region, could be a superior strategy, as it would potentially allow for a better matching between the legal value of the minimum wage and the characteristics of each market.

In the case of the employment effect of minimum wages in Brazil, our results revealed a robust and negative impact of changes in the minimum wage in the employment levels of formal sector workers in the long run, with the reverse

taking place in the case of informal employment. That is, due to labor mobility, increases in the value of the minimum wage provoke unemployment effects in the formal sector, which are then matched by increases in informal occupations. As regards poverty alleviation, the available evidence indicates that increases in the minimum wage have been able to reduce poverty in Brazil. These results should be seen with care, however, since the employment effects of the minimum wage on poverty are not captured in the studies available.

As regards the impact on wages, our findings suggest that minimum wage changes affect positively other wages with a unity long-run elasticity. In the short run, the impact of minimum wage changes on other wages was more pronounced in the case of the informal sector. In the formal sector, the minimum wage elasticity was never greater than 0.10 whereas in the informal sector it reached 0.24. This might be suggestive that changes in the minimum wage might have a greater impact on the earnings of the informal sector, which is the sector with the lowest salaries and where most of the poor are likely to be found.

In terms of the fiscal impact of the minimum wage, our results indicate that this effect is not relevant for the federal government wage bill, with the opposite taking place for the other two levels of government, especially in the case of municipalities. The analysis of the impact on the social security budget confirms that the minimum wage is a binding variable. As a rule of thumb, for each R\$ 1 of increase in the minimum wage, the social security deficit would rise by about R\$ 160 million.

Finally, we have discussed some subsidies for the current debate about the reform of the minimum wage policy in Brazil. Our discussion on this regard focused on two major issues, the scope of the minimum wage policy and the criteria used for adjusting its value. In overall terms, we have argued that establishing a general minimum wage has some disadvantages. The main one is that it requires a high degree of homogeneity of economic development and labor market conditions of the country. When these conditions are not met, fixing a single wage floor for the whole country may generate important negative effects.

In terms of criteria for minimum wage adjustments, in Brazil as in many other countries minimum wage adjustments have been decided solely by government authorities. In principle, there should be no problems with this decision making option as long as it is believed that governments act as perfect central planners. If this is so, governments maximize social well-being taking all present and future constraints into consideration when choosing the allocation of resources. In practice, however, it has been observed that government authorities do not behave as perfect central planners. The reasons for that are vast and complex, involving a myriad of factors from availability of complete information to political issues. Thus, one could be more tempted to argue that the participation of government authorities in the minimum wage bargaining process could be desirable for at least two reasons. The first is that government authorities should represent the interests of outsider workers such as the unemployed. The second is that minimum wage

adjustments can impact the budget deficit, and so the interests of current and future taxpayer generations.

## TECHNICAL APPENDIX

Seminal work by Granger and Newbold (1974) and Phillips (1986), and research on cointegration, cast doubt on empirical evidence based on regression analysis of time-series data given any nonstationary variables. To avoid the problem of the spurious regression and the failure to account for the appropriate dynamic specification, we first performed unit roots tests on our variables and then used cointegration analysis to investigate the existence of any lasting long-run equilibrium amongst the variables and the short-term dynamics of the wage determination process.

The stationarity of the variables was tested by means of standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, both with seasonal dummies and with and without a trend. To determine the appropriate lag length of the tests, we used the Schwarz BIC model selection criterion as recommended by Stock (1994). The results of the tests allowed the rejection of the null hypothesis of non-stationarity, confirming the findings of previous studies of the wage determination process in Brazil [e.g., Carneiro and Henley (1998)], and also the results implied by alternative methodologies as in Cati *et al.* (1999).<sup>21</sup>

Although cointegration analysis represents now a mandatory procedure to deal with time series data, several Monte Carlo studies about the power of cointegration tests show that in general these tests are not powerful [Maddala and Kim (1998), p. 233]. Another problem is how to interpret the results of cointegration analysis. If there is only one cointegration relationship, then it may be easy to interpret it as a long-run equilibrium. However, if we find the number of cointegration vectors to be greater than one, this creates problems of interpretation, and more economic theory is necessary. In addition, there is the issue of whether one should use single-equation or system estimation methods. We are conscious of these caveats and thus we follow the advice of Maddala and Kim (1998) that it is important for empirical researchers to report the results from several tests of cointegration.

The Johansen (1988) procedure was initially applied and the results of this are reported in Tables A1 and A2, for the case of employment, and Tables A6 and A7 for the case of wages. The results are obtained using lags up to the 8<sup>th</sup> order in the vector autoregression. Both the eigenvalue statistic and the trace test strongly reject the null of no cointegration in favour of one cointegrating relationship. The Tables also report the standardized eigenvectors ( $\beta'$ ) and adjustment coefficients ( $\alpha$ ). The adjustment coefficients ( $\alpha$ ) measure the feedback effect of the (lagged) disequilibrium in the cointegrating relation onto the variables in the VAR. In

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<sup>21</sup> The unit root test results are available upon request.



deciding the appropriate lag length of the vector-autoregressive (VAR) system for cointegrating purposes we first ran an unrestricted reduced form (URF) for our six variables with a maximum lag length of 12. F-tests for the significance of retained regressors (i.e., the contribution of each lag on each variable to the six-equation VAR system taken together) indicated that no lags above the eighth order are significant.

As in the cases of both formal and informal sector wages there was evidence of a single cointegrating vector, we decided to use the fully parametric least square estimator (FPLS), as proposed by Inder (1995). This method starts with a general VAR model of  $I(1)$  variables and derives the implied single equation  $y_{1t} = \beta'y_{2t} + A(L)\Delta y_{1t} + B(L)\Delta y_{2t} + v_t$ , where  $A(L)$  and  $B(L)$  are polynomials in the lag operator  $L$ . Then, after suitable truncation of the lag polynomials  $A(L)$  and  $B(L)$ , one must regress  $y_{1t}$  on  $y_{2t}$ , leads and lags of  $\Delta y_{2t}$ , and lags of  $\Delta y_{1t}$ . The leads and lags of  $\Delta y_{2t}$  eliminate any effect of endogeneity and the lags of  $\Delta y_{1t}$  capture remaining autocorrelation in the stationary component of the regression. This efficient single-equation method is a version of the fully-modified ordinary least square estimator (FM-OLS) and is similar in spirit to Phillips-Perron (1988) unit root tests in the sense that it starts with the OLS estimator and applies corrections to it to take care of the endogeneity and serial correlation problems.<sup>22</sup> For the sake of comparison, we also ran an autoregressive distribute lag model with the same lag length as in the Johansen analysis.

The static long-run solution to the ADL model is reported in Tables A3 and A4 (employment) and Tables A8 and A9 (wages) along with the results of the Johansen (1988) and Inder (1995) cointegration tests. The different methods yielded similar results, at least in terms of the sign of the coefficients. The structural estimates for the behavior of nominal wages in the long run have shown a unity elasticity with respect to minimum wages and positive coefficients for labour productivity, the tax wedge and inflation, with unemployment attracting the expected negative sign (with the exception of labour productivity, which appeared with a negative coefficient in the FPLS estimation).

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22 The traditional two-step cointegration procedure proposed by Engle and Granger (1987) is similar to Augmented-Dickey Fuller (ADF) tests in the sense that it modifies the estimating equations.

## LIST OF VARIABLES

*Minimum Wage (m)*: index of monthly nominal minimum wage, published by the Brazilian Ministry of Labor.

*Wages of Formal Sector Workers (Wcc)*: monthly index of nominal wages of formal sector workers (with signed labor cards), published by the Brazilian Institute of Geography and Statistics (IBGE).

*Wages of Informal Sector Workers (Wsc)*: monthly index of nominal wages of informal sector workers (without signed labor cards), published by the Brazilian Institute of Geography and Statistics (IBGE).

*Aggregate Output (Y)*: index of monthly gross domestic product, published by the Brazilian Institute of Applied Economic Research (IPEA).

*Consumer Prices (p)*: national consumer price index, published by the Brazilian Institute of Geography and Statistics (IBGE).

*Formal Employment (Ecc)*: monthly index of formal sector employment (workers with signed labor cards), published by the Brazilian Institute of Geography and Statistics (IBGE).

*Informal Sector Employment (Esc)*: monthly index of informal sector employment (workers without signed labor cards), published by the Brazilian Institute of Geography and Statistics (IBGE).

*Unemployment (U)*: open unemployment rate, published by the Brazilian Institute of Geography and Statistics (IBGE).

*Productivity (Q/L)*: aggregate output index divided by the employment index, both published by Brazilian Institute of Geography and Statistics (IBGE).

*Tax Wedge (H)*: producer real product wage ((nominal wages + employers payroll taxes) / wholesale prices) divided by consumer real post-tax wage; wages and prices published by IBGE, employers and employee payroll tax rates published by the Internal Revenue Service. Data on average income tax rates were not available. Marginal income tax rates remained unchanged through the period, varying between 10 and 25% per cent. Thus an average figure of 15% was assumed for the whole time period.

Table A.1

**Cointegration Analysis of Formal Sector Employment — 1982(1)/1999(11)**

Eigenvalues	0.1513	0.0737	0.0123
Hypotheses	$r = 0$	$r \leq 1$	$r \leq 2$
$\lambda$ Max	30.02	14.00	2.26
95% critical value	25.50	19.00	12.30
$\lambda$ trace	46.29	16.27	2.26
95% critical value	42.40	25.30	12.30
Standardized Eigenvectors ( $\beta'$ )			
	Ecc	Y	m
	1.000	-3.938	0.006
	-0.906	1.000	-0.019
	649.130	-251.140	1.000
	Standardized Adjustment Coefficients ( $\alpha'$ )		
	0.007	0.189	-0.029
			NA

Note: The vector autoregression includes eight lags on each variable, a constant term and monthly dummies. The  $\lambda_{max}$  and  $\lambda_{trace}$  are Johansen's maximal eigenvalue and trace statistics.

Table A.2

**Cointegration Analysis of Informal Sector Employment — 1982(1)/1999(11)**

Eigenvalues	0.234	0.078	0.028
Hypotheses	$r = 0$	$r \leq 1$	$r \leq 2$
$\lambda$ Max	45.55	14.98	5.25
95% critical value	25.50	19.00	12.30
$\lambda$ trace	64.46	18.90	4.91
95% critical value	42.40	25.30	12.30
Standardized Eigenvectors ( $\beta'$ )			
	Esc	Y	m
	1.000	1.320	-0.003
	-0.566	1.000	-0.003
	-96.44	-914.340	1.000
	Standardized Adjustment Coefficients ( $\alpha'$ )		
	-0.139	-0.108	-0.750
			NA

Note: The vector autoregression includes eight lags on each variable, a constant term and monthly dummies. The  $\lambda_{max}$  and  $\lambda_{trace}$  are Johansen's maximal eigenvalue and trace statistics.

Table A.3

**Estimated Long-Run Relationships for Formal Sector Employment — 1982(1)/1999 (11)**

Dependent Variable	FPLS	ADL Solved Long Run Solution	Johansen
Ecc			
M	-0.001	-0.024	-0.006
Y	0.044	2.220	3.938
Trend	N.A.	-0.003	-0.008

Notes: FPLS estimations were performed with 2 leads and 2 lags for each variable, selected by the method proposed by Inder (1995).

Table A.4

**Estimated Long-Run Relationships for Informal Sector Employment — 1982(1)/1999(11)**

Dependent Variable Wsc	FPLS	ADL Solved Long Run Solution	Johansen
m	0.002	0.0004	0.003
Y	-0.027	-0.3670	-1.320
Trend	N.A.	0.0035	0.004

Notes: FPLS estimations were performed with 2 leads and 2 lags for each variable, selected by the method proposed by Inder (1995).

Table A.5

**Short-Run Employment Equations**

Dep. Var.: $\Delta E_t$	Employment Equations		
Formal Sector Explanatory Variables	Estimated Coefficients	Informal Sector Explanatory Variables	Estimated Coefficients
Constant	0.0009 (0.0013)	Constant	-0.0233 (0.0081)
$\Delta E_{CC\ t-11}$	0.1731 (0.0544)	$\Delta E_{SC\ t-1}$	-0.2461 (0.0694)
$\Delta m_t$	-0.01059 (0.0058)	$\Delta m_t$	0.0176 (0.0122)
$\Delta m_{t-3}$	-0.01202 (0.0056)	$\Delta m_{t-6}$	0.0262 (0.0121)
$\Delta Y_{t-5}$	0.08629 (0.0363)	$\Delta Y_{t-5}$	-0.2069 (0.0770)
<b>ECM</b>	-0.09127 (0.0740)	<b>ECM</b>	-0.0575 (0.0214)
$R^2$	0.5814	$R^2$	0.4000
F(20, 156)	10.8340	F(20, 156)	5.8472
$\sigma$	0.0127	$\sigma$	0.0267
DW	2.1000	DW	2.0100
AR 1- 7 F(7,149)	2.5990	AR 1- 5 F(5,153)	1.7689
ARCH 7 F(7,142)	0.3858	ARCH 5 F(5,148)	1.3946
NORM $\chi^2(2)$	2.4990	NORM $\chi^2(2)$	0.1774
HET F(25,130)	0.7085	HET F(23,134)	0.6092
RESET F( 1,155)	1.3654	RESET F( 1,157)	0.3120

Note: The sample period is 1982(1) to 1999(11). Standard errors in parentheses. ECM stands for Error Correction Mechanism, measured as the residuals from the long run cointegrating vector lagged once. All equations include monthly seasonal dummies.

Table A.6  
**Cointegration Analysis of Formal Sector Wages — 1982(1)/1999(11)**

Eigenvalues	0.293	0.234	0.162	0.098	0.051	0.004
Hypotheses	$r = 0$	$r \leq 1$	$r \leq 2$	$r \leq 3$	$r \leq 4$	$r \leq 5$
$\lambda_{\text{Max}}$	41.26	31.75	21.07	12.35	6.18	0.54
95% critical value	39.40	33.50	27.10	21.00	14.10	3.8
$\lambda_{\text{trace}}$	113.10	71.88	40.13	19.07	6.18	0.54
95% critical value	94.20	68.50	47.20	29.70	15.40	3.80
Standardized Eigenvectors ( $\beta'$ )						
	Wcc	m	q - l	u	h	$\pi$
	1.000	-1.029	-0.395	0.598	-0.717	-0.485
	-1.046	1.000	-0.614	0.413	-3.007	32.399
	2.814	-2.696	1.000	-0.895	14.134	2.543
	3.972	-3.996	3.487	1.000	5.594	-0.296
	-0.249	0.239	-0.433	0.285	1.000	-0.429
	-0.018	-0.288	-5.048	-0.016	-12.706	1.000
Standardized Adjustment Coefficients ( $\alpha'$ )						
	-0.075	0.378	0.035	0.076	0.019	0.047

Note: The vector autoregression includes eight lags on each variable, a constant term and monthly dummies. The  $\lambda_{\text{max}}$  and  $\lambda_{\text{trace}}$  are Johansen's maximal eigenvalue and trace statistics.

Table A.7  
**Cointegration Analysis of Informal Sector Wages — 1982(1)/1999(11)**

Eigenvalues	0.293	0.224	0.151	0.066	0.054	0.007
Hypotheses	$r = 0$	$r \leq 1$	$r \leq 2$	$r \leq 3$	$r \leq 4$	$r \leq 5$
$\lambda_{\text{Max}}$	41.34	30.23	19.52	8.19	6.67	0.85
95% critical value	39.40	33.50	27.10	21.00	14.10	3.8
$\lambda_{\text{trace}}$	106.8	65.47	35.24	15.72	7.53	0.85
95% critical value	94.20	68.50	47.20	29.70	15.40	3.80
Standardized Eigenvectors ( $\beta'$ )						
	Wsc	m	q - l	u	h	$\pi$
	1.000	-1.033	-0.663	0.891	-1.756	-2.585
	-0.446	1.000	1.748	-6.671	27.945	-128.384
	-0.169	0.092	1.000	1.144	-7.238	-10.478
	-0.819	0.783	-1.815	1.000	2.913	-2.960
	0.204	-0.196	0.225	0.023	1.000	-0.075
	-0.219	0.251	0.374	-0.086	0.659	1.000
Standardized Adjustment Coefficients ( $\alpha'$ )						
	-0.066	0.186	0.023	0.065	0.014	0.045

Note: The vector autoregression includes eight lags on each variable, a constant term and monthly dummies. The  $\lambda_{\text{max}}$  and  $\lambda_{\text{trace}}$  are Johansen's maximal eigenvalue and trace statistics.

Table A.8

**Estimated Long-Run Relationships for Formal Sector Wages  
1982(1)/1999(11)**

Dependent Variable Wcc	FPLS	ADL Solved Long Run Solution	Johansen
M	1.016	1.022	1.029
P	0.339	4.196	0.489
H	0.036	0.255	0.717
q - 1	-0.003	0.016	0.396
u	-0.194	-0.434	-0.598

*Note: The FPLS model was estimated with two leads and two lags for each of the relevant variables, selected in line with the procedure suggested by Inder (1995).*

Table A.9

**Estimated Long-Run Relationships for Informal Sector Wages —  
1982(1)/1999 (11)**

Dependent Variable Wsc	FPLS	ADL Solved Long Run Solution	Johansen
m	1.019	1.020	1.033
p	0.099	5.692	2.585
h	0.167	0.166	1.756
q - 1	-0.010	0.011	0.665
u	-0.375	-0.679	-0.891

*Note: The FPLS model was estimated with two leads and two lags for each of the relevant variables, selected in line with the procedure suggested by Inder (1995).*

Table A.10  
**Short-Run Wage Equations**

Dep. Var.: $\Delta W_t$	Wage Equations		
	Formal Sector	Formal Sector	Informal Sector
Explanatory Variables	Estimated Coefficients	Explanatory Variables	Estimated Coefficients
Constant	0.0651 (0.0142)	Constant	0.00837 (0.0058)
$\Delta W_{CC\ t-1}$	0.8230 (0.0435)	$\Delta W_{SC\ t-1}$	0.4544 (0.0434)
$\Delta m_t$	0.0850 (0.0281)	$\Delta m_t$	0.2564 (0.0305)
$\Delta_{12}\Delta W_{CC\ t}$	0.5048 (0.05212)	$\Delta m_{t-1}$	0.0845 (0.0343)
$\Delta\Delta_{12}\pi_t$	-0.3906 (0.05232)	$\Delta m_{t-2}$	0.1001 (0.0276)
$\Delta\pi_t$	0.41084 (0.0783)	$\Delta m_{t-3}$	0.1521 (0.0271)
$\Delta u_{t-2}$	-0.0924 (0.0547)	$\Delta\Delta_{12}\pi_t$	-0.3217 (0.0457)
$\Delta Y_{t-2}$	0.03887 (0.1376)	$\Delta\pi_t$	0.2769 (0.0787)
$\Delta h_{t-4}$	1.0210 (0.5118)	$\Delta u_{t-2}$	-0.0733 (0.0592)
ECM	-0.4392 (0.0972)	$\Delta Y_{t-2}$	0.2850 (0.1433)
		$\Delta Y_{t-3}$	0.4275 (0.1413)
		$\Delta(q-1)_{t-4}$	0.1431 (0.0614)
		ECM	-0.2895 (0.0967)
$R^2$	0.9067	$R^2$	0.8984
F(21, 144)	66.6160	F(24, 141)	51.9440
$\sigma$	0.0442	$\sigma$	0.0457
DW	2.2900	DW	2.1500
AR 1- 7 F(7,137)	1.3486	AR 1- 7 F(7,134)	0.8671
ARCH 7 F(7,130)	0.9934	ARCH 7 F(7,127)	0.8477
NORM $\chi^2(2)$	5.2554	NORM $\chi^2(2)$	4.2081
HET F(30,113)	2.5997	HET F(37,103)	1.2803
RESET F( 1,143)	8.0807	RESET F( 1,140)	15.3010

Note: The sample period is 1982(1) to 1999(11). Standard errors in parentheses. ECM stands for Error Correction Mechanism, measured as the residuals from the long run cointegrating vector lagged once. All equations include monthly seasonal dummies.

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