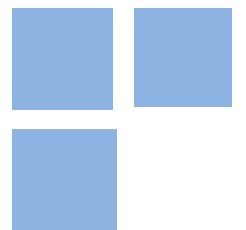


# Producing Higher Quality Jobs: Enforcement of Mandated Benefits across Brazilian Cities between 1996-2007

Rita Almeida, Pedro Carneiro and Renata Narita

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July 20, 2013

## Abstract

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# 1 Introduction

Over the last decade economic growth in Brazil has translated into rising real wages and strong job creation, particularly among those workers with a *carteira de trabalho*.<sup>1</sup> However, it remains an open question whether job quality in the country has risen significantly. One of the instruments that policymakers can use to directly foster job quality is the enforcement of mandated benefits in the labor code. This paper analyzes whether the enforcement of the labor code, through the compliance with the set of mandated job benefits, translates into higher job quality at the city level. We explore a unique administrative panel data on the enforcement of labor market regulations and detailed job quality proxies at city level, between 1996 and 2007. Our findings show that stricter enforcement at the city level increases compliance with the labor code at the local level, increasing the provision of jobs offering mandated benefits and increasing mean wages in the economy. We also show that there is a strong trade-off between the provision of mandated benefits and the wage level, on the one hand, and the provision of optional job benefits on the other hand. We argue that enforcement policy can be welfare improving depending on how valuable are to workers wages and mandated benefits relatively to the optional benefits.

Job quality is captured by a vector of job characteristics which includes level of wages, the set of mandated and voluntary benefits (e.g., private health insurance, education/child care subsidy or food subsidy). In Brazil, the set of mandated job benefits established by law is wide ranging and imposes high labor costs on firms. For example, since 2001, the firm's costs with social security contributions and severance pay reach 28.5 percent of gross wage (35 percent including all other payroll taxes). However, in addition to the mandated benefits firms might also provide voluntary benefits. Usually, jobs providing mandated benefits also tend to provide voluntary benefits and they tend to be concentrated among the most skilled workers. Nevertheless, this strong correlation between mandated and voluntary benefits also holds within skill groups. Moreover, jobs providing the set of mandated benefits also pay relatively higher wages, especially for the low educated workers.<sup>2</sup> Therefore, workers skills are not the only determinant of how firms combine

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<sup>1</sup>Over the decade, mean wages increased 11% for the workers with *carteira* and 18% for the workers without *carteira de trabalho*. (author's calculations using PNAD 2004, 2007). One important reason is economic growth, which has occurred mainly after 2004. Another remarkable fact which is perhaps consequence of growth is the creation of more than 6 million formal vacancies (or a 20% increase) from 2004 to 2007 [RAIS, Ministry of Labor].

<sup>2</sup>Data shows that the correlation between having social security benefit and (i) having employer provided health care is 0.25; (ii) having food benefits is 0.26 and (iii) having education/child care benefit is 0.07. The numbers are very similar even when we separate the sample by education groups. For employees with 0 to 4 years of schooling the correlations are, respectively, 0.25, 0.25 and 0.07 and for employees with more than 12 year of schooling these are, respectively, 0.20, 0.18, 0.04. The correlation between receiving social security benefits and wages is also positive 0.20 for all employees. It is a bit higher for very low educated

mandated, voluntary and wage levels.

An alternative factor possibly shaping the provision of mandated and voluntary benefits relates to the degree of enforcement of the labor laws across cities. Stricter enforcement of labor law increases directly job quality through a direct effect in the compliance with the mandatory labor market regulations. However, when faced with increased enforcement of mandated job benefits, and thus with higher costs of labor, firms may choose to either decrease the demand for labor, decrease hourly wages, reduce hours of work or adjust provision voluntary benefits. In the presence of strict enforcement, the set of voluntary job benefits could be easier to adjust than the mandated job benefits simply because they are not mandated by the law. Almeida and Carneiro (2009a) find that stricter enforcement is associated with more formal contracts (with carteira) and with lower wages in the formal sector but it is unclear what happens on all the other dimensions, especially mandated and voluntary benefits. The extent to which firms adjust through these other channels is important and will likely affect the worker's welfare.

We define mandated benefits as those benefits that are mandatory for all firms according to the labor code and regardless of the sector of activity. According to the Brazilian regulations, these include having social security coverage, a formal worker registration with the Ministry of Labor (or the commonly known carteira de trabalho), a wage in accordance with the minimum wage and receiving transportation benefits<sup>3</sup>. The social security coverage provides workers retirement benefits, disability and death benefits, unemployment insurance and maternity leave. The formal worker registration grants workers annual paid leave, and the compliance with the legal maximum weekly working hours (44 hours/week). We define the set of voluntary benefits as the set of all those job attributes beyond wages and hours that are not defined in the labor code. Firm might choose to offer these to employees, depending on their preferences and outside options. These benefits include, for example, the provision of a private health insurance, education and child care benefits to dependents, food benefits and housing benefits.

Discussing the evidence for Brazil is very relevant for other developing countries in Latin America. First, In Brazil, as in many other Latin American countries, the set of mandated job benefits established by law is wide ranging and imposes high labor costs on firms. Brazilian firms face the fifth toughest regulatory costs related to hiring, firing and working time in Latin America (Botero et al, 2004). Second, as several other large countries in the region, Brazil has a strict labor code set at the country level which is

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employees (0.37) and much lower for highly educated employees (0.15). [Own calculations using PNAD 2007]

<sup>3</sup>Non compliance with the mandated benefits could be partial. For example, some workers could have a carteira de trabalho but may not receive transportation benefits. In Section 2.1 we will discuss the conditions under which workers are entitled to different mandated benefits (like social security coverage, formal registration with the Ministry of Labor and the compliance with minimum wages).

regionally enforced through labor inspections. There is a large debate on the effect of this regulation on several labor market outcomes. More regulation is associated with more formality of labor and with lower wages for formal sector workers (Almeida and Carneiro, 2009a). However, little is known on the effects of stricter labor regulations on alternative job quality measures. This is an important contribution of this paper.

This paper analyzes whether the enforcement of the labor code, through the compliance with the set of mandated job benefits, translates into higher overall job quality at the city level. In addition we also look at the effects of enforcement on wages and employment. We explore a unique administrative panel data on the enforcement of labor market regulations and detailed job quality proxies at city level, between 1996 and 2007. Our identification strategy links variation in the enforcement of labor market regulations across cities (or municipios) and over time with city level variables (wages, employment and alternative mandatory and voluntary job attributes). An increase in the enforcement of labor market regulations through more labor inspections, is expected to directly impact on the compliance with some mandated benefits. Cardoso e Lage (2007) show that enforcement is primarily linked to stricter enforcement of mandated health and safety regulations, and to the worker's formal registration. When faced with higher costs of labor, firms may choose to either decrease the demand for labor (disproportionally formal), decrease hourly wages in formal sector, reduce hours of work or adjust provision voluntary benefits. In the presence of strict enforcement, and with stick wages in the short run, the set of voluntary job benefits could be easier to adjust than all the other dimensions. In the medium run, as wages adjust downwards, there might be an increase in the voluntary benefits, depending on how worker value these benefits relatively to wages.

Our empirical findings show that stricter enforcement at the local level increases compliance with the labor code and the provision of jobs with the mandated benefits by the labor code (including social security coverage, worker formal registration and compliance with minimum wage). We also show that there are two strong tradeoffs, one between the provision of mandated benefits and the wage level, and another between mandated and voluntary job benefits. However, with stricter enforcement, mean wages are higher in the economy. This is the result of higher formality and also of higher wages being offered in the formal sector. The implication is that while government can use enforcement policy to improve compliance with set of mandated benefits, it will decrease the provision of voluntary benefits which may be equally (possibly even more) valued by workers. The welfare gains of stricter enforcement will then depend on whether more wages and less informality compensates sufficiently for loss of voluntary benefits.

The main empirical challenge we face is that variation in the enforcement across cities is likely not randomly distributed across cities and this is likely correlated with level of wages, employment and job quality measures. On one hand, enforcement may be stronger in cities with more infractions of labor laws. On the other hand, a city with better insti-

tutions could have stricter enforcement of the labor law. We find strong evidence that the level of enforcement (captured by the number of inspections in the city) is higher among the more developed cities. Figures 1a and 1b show that enforcement per 1,000 people in a city, is higher among the richer states which are in the South, Southeast and Center of Brazil. To minimize this problem, we allow for heterogeneity at the city level by including city fixed effects. Therefore, our reduced form will relate changes in the enforcement of the labor law in a given city with changes in labor market variables of interest. However, one could still question the exogeneity of changes in enforcement at the city level over time. Figures 2a and 2b show that enforcement has become stricter over time in more developed cities like the southern Brazilian states of Minas Gerais and Rio Grande do Sul, which were already among the more developed states back in 1996. To the extent that these changes correlate with improvement in labor market outcomes, we would be over estimating the effects of enforcement. To mitigate this concern in our reduced form we will condition on a number of time varying city characteristics like total population, average age of the population at the city level, average education of the population at the city level, share of urban population in the city, the sector composition of the economic activity in the city and the city's per capita income in each year. Because labor market, education and anti-criminal state level policies are also likely to affect enforcement and labor market outcomes, we also control for state specific year trends. Reassuringly, our main findings do not significantly change with the set of city or state level controls, which suggest that the endogeneity of the variation of enforcement in changes is probably not a serious concern.

Our paper relates with different literatures. First we relate to the literature analyzing the link between employment protection regulations and labor market outcomes (e.g., Kugler (1999, 2001, 2004), Kugler and Kugler (2003), Eslava et al (2005), Ahsan and Pages (2007), Petrin and Sivadasan (2006) and several other studies cited in Heckman and Pages (2004)]. Particularly related to our paper is Besley and Burgess (2004) and Autor, Kerr and Kugler (2007) who explore changes in the de facto regulations to identify the effects of employment protection laws on labor market outcomes. Our identification strategy relates closely with Almeida and Carneiro (2009a, 2009b) who also explore within country variation in the enforcement of labor market regulation. However, unlike our paper Almeida and Carneiro (2009a) do not explore time series data on the enforcement of regulation at the city level, nor do they consider the effects of regulation on a detailed breakdown of mandated and voluntary job attributes. Our paper makes two important contributions to this literature. First, we analyze the effects of labor market regulations on other job attributes besides the formality of the work contract. While in most studies, job quality is captured simply by formality of the work contract (e.g., ILO, 2003, Madrigal and Pages, 2008; Boeri et al, 2008), this is just one dimension of job quality.<sup>4</sup>

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<sup>4</sup>According to the ILO definition, the informal sector is composed of unprotected workers (who are not

We show that, in Brazil, there is a strong correlation between being formal (measured by having *carteira de trabalho*) and receiving other mandated or optional benefits. However, this correlation is far from perfect and there is significant within country and time series variation in the provision of these job attributes. Second, we explore time series variation in the enforcement of labor market regulations to mitigate the potential problem of unobserved city level characteristics potentially correlated with labor market outcomes and with enforcement of the law.<sup>5</sup>

Second, we relate to the literature linking the employer provided benefits and individual job satisfaction. For developed countries, this literature shows that the provision of fringe benefits correlates positively with individual job satisfaction (e.g., many articles cited in Artz (2008): Bender, Donohue and Heywood (2005), Heywood and Wei (2006), Bender and Heywood (2006), Donohue and Heywood (2004), Uppal (2004), Benz (2005) and Artz (2008)).<sup>6</sup> The evidence for developing countries is scarcer. Madrigal and Pages (2008) link job protection and firm size with job satisfaction for three Latin American countries. They find that job satisfaction correlates with firm size for wage earners. The effect is heterogeneous across workers with the low skilled valuing relatively more self employment and less salaried jobs with benefits than the high skilled workers. Boo, Madrigal and Pages (2009) investigate the relationship between part-time work and job satisfaction for Honduras. They find that both women and men tend to prefer a full-time job, unlike evidence found for developed countries where the effect of hours worked on job satisfaction is negative. In Honduras, working part-time is a luxury good whose most disadvantaged families or families with children cannot afford.

Third, we relate to the literature investigating the extent to which higher mandated benefits translate to lower wages (or the commonly know rate of pass through). Among the papers cited in Boeri, Helppie and Macis (2008), the most closely related to our work are Kugler and Kugler (2002) and Gruber (1997). Kugler and Kugler (2002) study the effects of payroll taxes using a panel dataset of manufacturing plants in Colombia. The authors find 2.4% drop in wages as a result of a 10% increase in payroll taxes. Gruber

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covered by social security), self-employed, unpaid workers and workers or owners of smaller enterprises (firms with fewer than 10 workers).

<sup>5</sup>This is a different approach than the one used in Almeida and Carneiro (2009). They explore only the cross sectional variation in the cost of providing enforcement in each city, which is proxied by the commuting time between each city and the enforcement office interacted with number of inspectors in the state. Reassuringly their main findings on the effects of enforcement on wages, employment and formality are quite similar to the ones we obtain in our paper.

<sup>6</sup>Fringe benefits include non-wage benefits like flexible working hours, vacation days, parental leave, dental/health insurance, child care, employer provided pensions, profit sharing. These are usually less taxed than wages and thus employers have a monetary incentive to provide them as long as they are valuable to the worker. For example, Artz (2008b) shows that the provision of flexible work hours, pensions, dental insurance, parental leave and child care benefits raises individual job satisfaction in the US, even after controlling for individual heterogeneity and the endogeneity of fringe benefits.



(1997) explores the social security reform of Chile in 1981, which represented a large decrease in payroll taxes, and find no employment effects after a complete adjustment of the wages up. Wages also seem to respond inversely to the adoption or increase in other mandated benefits. For example, Gruber (1994) uses US state-level data to show that wages went down considerably when maternity benefits increased with a reform in the 1970s.

We explore two main sources of data. First, we explore information on the enforcement of labor regulations by exploring an administrative panel data set on the labor inspections in each Brazilian city, between 1996 and 2006. This data, collected by the Brazilian Ministry of Labor, provides information on the number of labor inspections in each city. Inspectors check the compliance of firms with different mandated attributes related to the compliance with minimum wages, severance pay, formal worker registration, transportation benefits, legal working time.

Second, we explore information in the Pesquisa Nacional por Amostra de Domicílios (PNAD) surveys to compute alternative measures of job quality at the city level between 1997 and 2007. Based in this data we compute three alternative sets of measures of job quality. First, we capture job quality at the city level with the non-wage benefits mandated by the Brazilian labor law. In particular, we compute the share of the city population covered by the minimum wage, share of workers with transportation benefits, share of workers with contributions to the social security, share of workers with formal registration with the Ministry of Labor (through ownership of carteira de trabalho) and share of workers complying with the maximum weekly working hours. Second, we capture job quality at the city level with the set of voluntary job benefits. In particular, we compute the share of the city population with housing benefits, food benefits, private health insurance and education and child care subsidies.<sup>7</sup> Third, we compute more indirect proxies of job quality which relate to whether jobs are offered in large firms, the share of workers with full time contracts and the share of workers in the construction sector. Proxying job quality with firm size follows Madrigal and Pages (2008) and several other papers relating firm size with higher investment in human capital or in innovation (e.g., Almeida and Aterido, 2008, Almeida and Fernandes, 2007, McKenzie et al, 2009). Proxying job quality with the share of the population in the construction sector follows Firpo and Carvalho (2009).<sup>8</sup>

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<sup>7</sup>Unfortunately, we cannot disentangle education and child care benefits. While the former is mandatory (part of the social security package), the latter is voluntary. Education benefits (or Salário Família) is part of the social security benefits and is given to low income working parents with school age children. We thus prefer to include these benefits in the voluntary group.

<sup>8</sup>Firpo and Carvalho (2009) link risk on the job with lack of employability. The authors use data from Brazil to construct a rank of occupations based on risk and return (which is wage) since these two aspects should compensate each other when workers (firms) decide to take up a job (offer a job). To measure risk, they use education, experience, location in the country (metropolitan region, state), internet use, the estimated probability of being employed, duration of employment and migration to capture willingness to

The assumption is that in some sectors, like the construction, there is a higher risk of being laid off due to cyclical variations in the demand (related with business cycle). To the extent that this is anticipated, workers could demand a wage premium or higher non-wage fringe benefits. Finally, we compute the share of city population with full time contracts also as a proxy for job quality.

The paper proceeds as follows. In section 2, we discuss the labor market regulations in Brazil and the recent evolution in the enforcement of the labor laws conducted by the Brazilian Ministry of Labor. In section 3, we discuss the data and in section 4 we propose a simple theoretical model to understand the main findings. Section 5 discusses the empirical strategy and section 6 the main findings. Section 7 concludes and highlights the main policy implications.

## **2 Labor Market Regulations and Enforcement in Brazil**

### **2.1 Labor Market Regulation**

The current Brazilian labor code dates back to 1943 with the *Consolidacao das Leis do Trabalho* (CLT). Since then two major revisions took place (Barros, Corseuil and Gonzaga, 1999). In 1964, revisions reduced power of labor unions and prohibited strikes, reflecting the repressive military regime (Amadeo and Camargo, 1996). In 1988, the new Brazilian Federal Constitution (FC), reflected the re-democratization process, and increased back the benefits to workers. These latter changes represented a large increase in the labor costs to firms. First, it reduced the maximum weekly working period (from 48 to 44 hours). Second, it increased the overtime wage premium from 20% to 50% of regular wage. Third, the maximum number of hours for a continuous work shift dropped from 8 to 6 hours. Fourth, maternity leave increased from 3 to 4 months. Fifth, it increased the one month vacation time pay from 1 to 4/3 of a monthly pay. Following 1988 the changes in the labor code included additional increases in the cost of labor to the employers. First, the employer's payroll contribution increased from 18.2% to 20% (and to 22.5% for workers in the financial sector). Second, from 1988, the penalty on the firm for dismissing the worker without cause increased from 10% to 40% of the total contributions to the severance fund, FGTS. Third, from 2001, the monthly contribution towards FGTS increased from 8% to 8.5% and the penalty on the firm increased further from 40%

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be mobile. Using hedonic wage regressions, they thus predict the risk component which is given by the direct effect of being in an occupation on wages plus the effects on wages due to individual and jobs quality attributes. The authors find that services, less capital-intensive manufacturing and construction and arts and sciences professionals are ranked worse while military, managers (public or private) are in the top.

to 50%, where 40% goes to the employee and the extra 10% goes to the government.<sup>9</sup>

As result, in Brazil employers face very high costs of hiring and firing formally workers. For example, in 2007, for a net wage of 100 Reais, the firm needs to disburse approximately 165.70 Reais (Cardoso and Lage, 2007).<sup>10</sup> In addition, if the worker is dismissed for unjustified reasons, with the exception of workers on probationary period, the firm is fined and has to pay the worker additional 40% of the FGTS balance and, since 2001, the firm also has to pay the government 10% of the worker's FGTS balance.<sup>11</sup> Unlike in most of the countries, in Brazil severance payments received by the worker are not subject to income taxation. This means that the workers value one Real of FGTS more than one Real in gross wages.<sup>12</sup> Moreover, firms pay taxes on profits, which represent about 23% (15% IRPJ and 8% CSLL). As a result, the cost of FGTS to the firm is much smaller than the value of FGTS to the worker. Moreover, not differently than in other Latin American countries, employers in Brazil must also give an advance notice to workers. During this interim period, workers are granted up to two hours per day (25% of a regular working day) to search for a new job or the firms voluntarily choose to grant them the full monthly wage without requiring them to work. Barros and Corseuil (2001) find that there are large productivity losses during this period.

In the empirical work, we will analyze five different mandated benefits, which we observe at the individual level in PNAD: social security coverage, worker's registration with Ministry of Labor (*carteira de trabalho*), wage complying with the minimum wage, transportation benefits and a maximum weekly working hours. We describe briefly next the benefits provided by each of these categories. The entitlement to a *carteira de trabalho* implies that the worker is protected by the Employment Laws, laid out by the CLT and re-

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<sup>9</sup>The FGTS (*Fundo de Garantia por Tempo de Servico*) is 8% (8.5% since 2001) of the employee's monthly wage which goes into an individual account managed by a federal bank, where deposits get adjusted by inflation plus a 3-6% annual interest rate, depending on tenure in the current job. Workers have access to their accounts only if they get fired for no reasons, upon retirement or other reasons which mostly include the worker to buy its first own house.

<sup>10</sup>That mainly include: the firm's costs with social security contributions and severance pay (28% of gross wage or 28.5% since 2001). In addition, firms must pay 2% of the worker's gross wage as insurance to cover for accidents in work. Also, all private-owned firms pay 2.5% for *Salario-Educacao* which is a contribution towards a fund of the Ministry of Education to support financing public primary education. Finally, there is also a sector contribution (known by the acronyms of SEBRAE, SESI, SESC, SENAI, INCRA) which may reach up to 1.5% of gross wages for the manufacturing sector. Data on the mandated benefits provided by the law are available at the Brazilian Ministry of Social Pensions (<http://www.previdenciasocial.gov.br>) and Ministry of Labor (<http://www.mte.gov.br>).

<sup>11</sup>Therefore, dismissal costs increase significantly with tenure and may generate the adverse effects of increase firings and workers to force being fired. The high turnover rates among the workers in Brazil is therefore not surprising.

<sup>12</sup>Nonetheless, the rate of return on the FGTS fund is lower than the market rates. (Gonzaga, 2004) In that case, workers could prefer having the monthly contribution towards severance in terms of salary rather than in terms of compulsory savings.

vised subsequently in the 1988 FC. In particular, since 1988 owning a carteira de trabalho entitles workers to paid annual leave (CLT art. 129), maternity leave (CF art.7, XVII), severance pay conditional on being fired (Law 8036 of 1990), maximum weekly working period of 44 hours (CF, art. 7, XIII), unemployment insurance (Law 7998 of 1990) and other associated benefits such as social security and transportation benefits (Law 7418 of 1985 and Decree 95247). The social security benefits entitles workers to retirement pensions, disability benefits, death insurance and to Salario Familia.<sup>13</sup> The social security law, Law Elói Chaves and Decree 4682, dates from 1923 and was implemented gradually. In 1960, the Lei Organica de Previdencia Social extended social security coverage to most urban workers and three years later coverage was extended also to rural workers.

We observe the direct entitlement with minimum wages, with transportation benefits and to maximum weekly hours. The minimum wage was implemented in Brazil since mid 1930's, in Law 1985 of 1936 and Decree 399 of 1938. The minimum wage is set monthly at the federal level.<sup>14</sup> In 1996, the minimum wage was set to 112 Reais and, in 2007, it was 380 Reais. At 2008 prices, the minimum wage in 1996 was Reais 248 or US\$ 250 and in 2007 it was Reais 406 or US\$ 200. The transportation benefits may be provided in kind or through a monetary transfer. The amount or the cost of this benefit for the firm varies from city to city in Brazil. It also depends on the journey and on the type of transport needed/available in the city (mainly by bus, metro or car).

Safety in workplace is also another important benefit which is mandated by law. The labor code is quite ample in this attribute as specified by the CF (art.6 and 7, XXII, XXIII, XXVIII e XXXIII), CLT (V, 1977) and by law 5.889 of 1973 for the rural workers. Cardoso e Lage (2007) argues that enforcement is highly linked to inspecting safety regulations. We unfortunately do not observe safety in workplace benefits in data to test it. However, it is also true that fines applied because of lack of compliance with safety are highly correlated with fines by lack of worker's registration, which is one of the aspects we investigate.

Finally, there are benefits which are voluntarily paid by the firm and we observe in data. These are the benefits of health insurance (employer provided), education or child

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<sup>13</sup>Salario Familia entitles low wage workers with dependant children (until 14 years of age) to a monetary benefit per dependant. Salario Familia currently ranges between Reais 19 and Reais 27 per month and child, depending on the individual wage. Households where both parents work and are eligible for this benefit, receive this contribution twice.

<sup>14</sup>After 2002, Brazil had more than one minimum wage. In particular, since then the state of Rio de Janeiro adopted a minimum varying also by occupation. Since 2007, three other states in the country – Sao Paulo, Parana and Rio Grande do Sul – also adopted a state specific minimum. In the empirical work we explore time series variation between 1996 and 2007 and thus should account for these differences. States with higher minimum wage, could have more difficulties in complying with the law and thus could have more evasion (and consequently more/less enforcement). Our empirical work will explore time series variation at the municipio level and thus should not be affected by these differences.

care, food and housing. Arbache (1994a,1994b) and Arbache and Ferreira (2001) have analyzed the implications of voluntary benefits (that he systematically calls by ‘indirect wages’) for the income tax collection and contributions to social insurance in Brazil. The idea is that as voluntary benefits are not taxed (it does not imply contribution towards social security) and are unequally spread across workers (it benefits only registered employees, which already have higher wages on average), it reduces revenue to finance the social security system and increase inequality in a broad sense. Arbache and Ferreira (2001) based on various sources give estimates on the costs of providing some voluntary benefits. In 1992, the food benefit cost approximately US\$35 per month and per worker (57% of the minimum wage). The estimated cost of private health care in 1991 provided by the firm is on average US\$13.81 also per month and per worker (22% of the minimum wage). Neither the existing literature nor we have estimates on average costs of for the firm to provide housing, education or child care benefits. Data however shows that health insurance and food benefits are the most important source of voluntary benefits.<sup>15</sup>

## **2.2 Enforcement of labor regulation in Brazil**

Firms weight the costs and benefits of complying with this strict labor regulation. They decide whether to hire formally, informally or formally but without complying fully with specific features of the labor code (e.g., avoid the provision of specific mandated benefits like the provision of health and security conditions, or avoid payments to social security). The expected cost of evading the law is a function of the probability of being caught and of the monetary value of the penalties (fines and loss of reputation). In turn, the probability of being caught depends on the firm’s characteristics (such as size and legal status) and on the degree of enforcement of regulation in the city where the firm is located.

A comprehensive explanation of the enforcement of labor regulation system and its importance in Brazil is given in (Cardoso and Lage, 2007) and in Almeida and Carneiro (2009a, 2009b). The Ministry of Labor is in charge of enforcing compliance with labor regulation in Brazil. Given the size of the country, enforcement is first decentralized at the state level with the main labor offices (delegacias) being located at most state capitals. Enforcement is further decentralized at a more local level within each state. For example, the state of Sao Paulo has 21 labor offices (subdelegacias) while other smaller states, like Acre or Amapa, only have one office, usually coinciding with the delegacia of the state capital. The descentralization of the enforcement in Brazil at the level of the subdelegacia will be a key feature of our empirical work. In particular, we will explore variation in the yearly number of labor inspections at the city level between 1996 and 2007.

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<sup>15</sup>Using individual data from PNAD 1997 to 2007, we see that 41% of employees have food benefits, 17% have employer provided health insurance, while only 7% receive housing and 2.5% get education or child care benefits.

Labor inspections became stricter and more relevant after mid 90s. The large public deficit at that time led the Brazilian government to search for alternative ways to collect revenue. The size of informal economy (57% of the workforce in the country did not pay payroll taxes in 1996, PNAD) and in particular the significant evasion of severance pay by firms seemed to be a profitable target for labor officers whose main role was to act as tax collectors.

Most of the inspections (and fines) are to ensure compliance of firms with the worker's formal registration in the Ministry of Labor, contributions to the severance pay fund (FGTS), compliance with minimum wage and with the maximum working period/shifts. Evasion of one of these dimensions accounts for approximately 62% of all fines issued in 2007. The monetary amount of the fines is economically significant and maybe issued per worker or it may be indexed to firm size. For example, in 2009 values, a firm is fined by Reais 403 for each worker without a carteira de trabalho and by Reais 170 per violation of the terms of payment. Depending on its size and profitability fines related with FGTS range from Reais 11 and Reais 106 per worker. Fines related to evasions of the working schedule (daily, weekly or extra hours) vary from Reais 40 to Reais 4,025 per worker. When firms are caught evading more than once, all fines are doubled. At 2009 prices, the federal minimum wage was Reais 415 so not complying with worker registration may imply a penalty of approximately one monthly wage.

An inspection can be triggered either by a random firm audit, or by a report (often anonymous) of non-compliance with the law. Workers, unions, the public prosecutor's office, or even the police can make reports. In practice, almost all of the targeted firms are formal firms because it is difficult to visit a firm that is not registered, since there are no records of its activity. Also, inspectors face a performance based pay scheme which often leads them to look for big cases where the penalty is likely to be large.<sup>16</sup>

### 3 Data

We explore two main sources of data. First, we use administrative city level data on the enforcement of labor regulations collected by the Brazilian Ministry of Labor. Data for the number of labor inspections and fines in each city is available for the following years: 1996, 1998, 2000, 2002, 2004 and 2006. Second, we explore the household level survey PNAD, collected by the Instituto Brasileiro de Geografia e Estatística (IBGE). Data is available annually for the years 1996 through 2007 (except for 2000, when PNAD is not

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<sup>16</sup>In particular, up to 45% of their wage is tied to the efficiency of the overall enforcement system (1/3 is tied to the inspectors own performance while 2/3 is tied to the system's global performance). Their base salary is also competitive. In 2004, their monthly wage was between USD 2,490 (starting position) and USD 3,289 (top management) [Almeida and Carneiro, 2009]

available). For the year 2000, we interpolate with values obtained from the simple average of the variables between year 1999 and 2001.<sup>17</sup> PNAD collects detailed labor market variables at the individual level. In each year, the sample covers approximately 300,000 individuals in a sample of cities across all Brazilian states. In particular, PNAD selects all metropolitan and large cities and extracts a random sample of the smaller cities.<sup>18</sup> We use PNAD to construct several city level measures of employment, wages and proxies for the quality of jobs at the city level. To compute the mean labor market variables at the city level we only consider individuals aged 23 through 65 years old.<sup>19</sup> Tables 11 through 14 in the appendix report the descriptive statistics of the main variables in the paper.

Table 9 and table 10 in the appendix reports the number of cities with labor inspections, the number of cities with labor fines issued, the total number of inspections, the total number of fines and the proportion of fines per cause in the entire country and only in the cities covered with PNAD. The incidence of enforcement is high and increasing throughout Brazil during this period. The proportion of cities with labor inspections rose from 46% in 1996 to 67% in 2006. However, Figures 2a and 2b report a large within country variation in the intensity of enforcement within Brazil and broad regions (captured by the share of cities with labor inspections) Figure 2a refers to the Northern states and Figure 2b refers to the Southern states. The figures report large within country variations in the levels and trends of the enforcement. Furthermore, Figures 1a and 1b also report a large variation in the levels and trends in the extensive margin of enforcement (captured by the total number of inspections per 1,000 individuals in the city). For example, while the total number of inspections decreases from 3 inspections per 1,000 inhabitants in 1996 to 2.5 in 1998 and from 2.9 in 2000 to 2.4 inspections per 1,000 inhabitants in 2006, the city level patterns differ markedly both in the levels and in the trends. Figures 1a and 1b also show that enforcement per 1,000 people in a city, is higher among the richer states which are in the South, Southeast and Center of Brazil. Figures 3a and 3b report similar statistics only to the cities covered by PNAD at each point in time, where it can be seen similar pattern of such measure to the one observed in figures 1a and 1b for all cities in the country.

In the empirical work we will relate the degree of enforcement of labor market regulation with several labor market variables at the city level, after conditioning on a set of city time varying characteristics. Our main measure of enforcement is the logarithm of the number of labor inspections at the city level divided by 10,000 (plus one), i.e.,

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<sup>17</sup>It is important to note however that all regressions in this paper were also run for the sample without year 2001 (or 2000 for the right hand side variables for which use the interpolation) and results which we show later would not change significantly.

<sup>18</sup>At the beginning of each decade, PNAD selects the cities that will be included in the survey. The sampling includes all metropolitan and large cities and selects a random sample of the remaining cities (municipios). For example, for the state of Sao Paulo PNAD include 112 cities, where 56 are metropolitan or large. Albieri and Bianchini (1999) describe the sampling in detail.

<sup>19</sup>Domestic employees comprises about 5% of all workforce aged 23-65 according to PNAD 1996-2007.

$\log(\text{labor inspections}/10,000+1)$ .<sup>20</sup> This variable captures the total number of visits by labor inspectors to each city. We explore PNAD to compute several city and time varying characteristics, including labor market outcomes. The city level characteristics include total city population, average years of schooling of population aged 23-65, average age of the population in the city, the share of urban population in city, average per capita household income and the share of workers in agriculture, mining, trade, services, manufacturing, transport and telecommunications and in construction.

We also explore PNAD to compute several labor market variables, which include total city employment, employment composition, moments of the wage distribution and alternative measures of job quality. All the variables proxying job quality discussed below are computed as the number of wage earners in each city with a specific job attribute as a percentage of the total city population aged 23-65 years old. Because labor inspections target mostly the wage earners in firms, we always exclude from the numerator domestic employees, unpaid workers or self-employed workers.

We consider three alternative types of job benefits. First, we compute variables to proxy for city level coverage with mandated benefits, which include social security coverage, formal worker registration with the Ministry of Labor (*carteira de trabalho*), compliance with minimum wage and transportation benefits. These are measured with the number of wage earners with social security coverage as share of city population between 23 and 65 years old. We compute similar statistics for the workers with *carteira de trabalho*, with monthly labor earnings above the federal minimum wage, with transportation benefits and working up to 44 hours/week.

Second, we compute variables to proxy for city level coverage with a set of voluntary benefits, which include housing benefits, private health insurance, education or child care benefits and food benefits. Again these are measured with the number of wage earners with housing benefits as share of total city population aged 23 and 65 years old. We compute similar statistics for the workers with (private) health insurance, with education or child care benefits and with food benefits.

Third, we consider in addition a set of job characteristics that are more indirectly related with job quality at the city level. In particular, we compute the share of wage earners in firms with more than 11 employees as share of total population, the share of wage earners in construction and the share of wage earners that work more than 30 hours per week (i.e., are considered full time).<sup>21</sup> The rationale is that job quality correlates with

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<sup>20</sup>This is an arbitrary measure that suits the range of the inspections variable in our data. It is reassuring to see that our main findings would be qualitatively similar if we were to change the enforcement variable to the total number of inspections at the city level.

<sup>21</sup>Most of the full time workers in Brazil work 44 hours/per week, which is the maximum allowed in the law, Therefore, the effect of enforcement in the full time/part time breakdown is more informative than in the number of working hours. We follow the ILO definition of part time work as workers with less than 30



firm size and with satisfaction on the job. Madrigal and Pages (2008) report that job satisfaction is higher among larger firms. This is likely to occur because in large firms there is more job training, better working conditions, more networking, more specific human capital (as large firms invest more in technology). Firpo and Carvalho (2009) also argue that construction jobs are worse due to a poorer trade-off between wage returns and the risk involved. They consider as part of the risk the probability of becoming unemployed, the duration of employment, geographic location, ease of searching for a new job and individual's characteristics such as education and experience. Finally, we also assume that job quality is correlated with working fewer hours (or having a part-time job).<sup>22</sup>

Finally, we also compute additional labor market indicators at the city level. First, we compute the median, percentile 10th and 90th of the labor earnings for all wage earners in each city. Similarly, we also construct these moments for workers with and without the specific mandated or voluntary attributes discussed above. Second, we compute city level measures of the composition of employment in each city: as the share of wage earners (registered or unregistered with Ministry of Labor), the share of the self-employed, the share of the unpaid workers, the share of domestic employees and the share of the non-employed, always as a proportion of the total city population between 23 and 65 years old.

## 4 Theoretical Model

We motivate our estimations with a simplified version of a theoretical model of compensating differentials studied in Rosen (1974, 1986) and summarized in Fernandes (2002). These models relax the assumption that wages are the only choice variable when firms and workers decide on the optimal allocation of labor. In addition to wages, workers value also job attributes. Some jobs offer worse working conditions than others, and thus firms must pay a compensating differential to account for the worker's lower utility.

As discussed in the previous section, we observe whether Brazilian workers receive a set of mandated and voluntary benefits. If individuals value these benefits, they should be willing to receive lower wages in exchange for having these job attributes. The greater the worker's valuation of each benefit, the larger the wage reduction she would be willing to accept. All else constant, providing these benefits is costly to firms and thus, they are willing to offer jobs that trade off these benefits in exchange of lower wages.

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or 35 hours per week.

<sup>22</sup>According to evidence for other Latin American countries this may not be true since working part-time is a luxury consumption, which the most disadvantaged families or families with children cannot afford. [Boo, Madrigal and Pages (2009)].

Assume that the workers utility function is  $U = U(w, B)$ , where  $w$  is wage and  $B$  is an indicator as to whether the worker is in a job which provides benefits. Let  $B = 1$  if benefits are received and 0 otherwise, with  $U(w, 1) > U(w, 0)$  for all  $w$ . Let  $w_0$  be the equilibrium wage in the market without benefits and  $w_1$  the wage in the market with benefits. The reservation wage of the worker who is indifferent between working in the job without benefits and taking up a job with benefits is thus the wage which equates  $U(w^*, 0) = U(w_1, 1)$ . In that case, the compensation needed for the worker to be indifferent is equal to  $w^* - w_0$ . Given that  $w_1 - w_0$  is the market wage differential, the decision rule for the worker would be  $B = 0$  if  $w_1 - w_0 > w^* - w_0$ , i.e if the individual's required wage compensation to work without benefits is lower than the one provided in the market and  $B = 1$  if  $w_1 - w_0 < w^* - w_0$ . If  $w_1 - w_0 = w^* - w_0$ , then workers would be indifferent between the two types of jobs, with and without benefits.

Suppose now that the economy is populated by a continuum of workers (normalized to 1), which are identical in their productive characteristics. However, assume they differ in their preferences for benefits so that they may decide on different values for  $B$ . Some will optimally prefer to be in a job with benefits and some will not. This implies that in the population there are different levels of reservation wages ( $w^*$ ). Assuming that  $X = w^* - w_0$  follows a continuous distribution function,  $g(X)$ , the aggregated labor supply of workers without benefits is given by  $G(w_1 - w_0) = \int_0^{w_1 - w_0} g(X) dX$  and the aggregated labor supply of workers with benefits  $1 - G(w_1 - w_0)$ .

Now, consider the demand for labor and that the number of vacancies is also normalized to 1. Firms will have to decide on offering jobs of type  $B = 0$  or of type  $B = 1$ . This decision will depend on the costs they incur to offer such benefits. Let the cost of providing benefits per worker be  $C$ . A firm chooses  $B = 0$  if  $C > w_1 - w_0$  or  $B = 1$  if  $C < w_1 - w_0$ . The firm will be indifferent between offering of not benefits if  $C = w_1 - w_0$ . As cost of provision varies across firms, firms will take different decisions as to whether they will provide or not benefits. Assuming  $C$  is continuous with probability distribution function,  $f(C)$ , the aggregate demand for workers with benefits is given by  $F(w_1 - w_0) = \int_0^{w_1 - w_0} f(C) dC$ , and the aggregate demand for workers without benefits is  $1 - F(w_1 - w_0)$ . In equilibrium the market wage differential,  $w_1 - w_0$ , is such that the demand and supply equate for the two types of jobs, i.e. by making  $G(w_1 - w_0) = 1 - F(w_1 - w_0)$ , which is solved with knowledge on the density functions  $g(X)$  and  $f(C)$ .<sup>23</sup>

The main intuition underlying this model is that workers with high preference for benefits will be allocated to jobs offering benefits but paying lower wages. These jobs

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<sup>23</sup>It is possible to generalize this result for a  $J$ -dimensional vector of job quality attributes. In equilibrium, there are  $J$  different wages in the market relative to the wage of the workers without the  $J$  attribute ( $W_j^* - W_0$ ) and allocations  $N_j$ , which are determined by the relative preference of workers for job attributes and by the relative cost of providing these benefits.

would be offered by firms facing lower costs to provide such benefits. On the contrary, workers with low preference for benefits will be offered jobs with no benefits in firms paying higher wages and facing higher costs of providing benefits. This prediction, however, does not ignore that in the data there are workers which earn high wages and work in jobs with benefits. The decreasing association between wages and job benefits is only expected for workers with similar characteristics, and thus the same reservation wage.

However, since the real world is much more complex than the model we could be skeptical about finding a negative correlation in the data. In particular, individuals are likely to be very heterogeneous regarding their preferences for certain job attributes and thus in their reservation wage, across cities and over time. Brazil is a very large country with several economic and cultural differences in its population across cities. Workers have significant different observable characteristics (e.g., education, age, gender and wealth) and unobservable characteristics (e.g., tastes) across cities. Moreover, worker preferences for given job attributes are likely to be time varying and themselves affected by the expectations of the future value of the benefits. For example, if there is an increasing belief that the social security system will not pay retirement pensions in the future, workers will value less this coverage. Moreover, firms in Brazil are also likely to be quite heterogeneous, with varying costs to provide job benefits across cities and over time. In particular, cities differ in the tax structure, factor prices and technology available. Therefore, firms located in different cities will have different cost of providing the same job attribute. In sum, in the real world significant differences across individuals and firms in their preferences and costs of providing certain job benefits could prevent us from finding the empirical contradiction of the model that wages and benefits correlate negatively. Nevertheless, we are confident that exploring within country and time series variation at the city level and conditioning for several city characteristics as well as year trends, we account for the large heterogeneity.

In the next section we relate the degree of enforcement of labor market regulations at the city level, which is a proxy for the cost of providing mandated job benefits, with the provision/supply of certain job benefits. Our empirical strategy will compare job benefits across cities and over time. We assume that the cost of evading the law and not providing mandated benefits is higher in cities with stricter enforcement of labor market regulations (which we will proxy with labor inspections). Thus, stricter enforcement should directly affect the provision of mandated benefits. The most important mandated benefits are observed in our data and include social security coverage, the worker formal registration with MoL, compliance with federal minimum wage, provision of transportation benefits and compliance with maximum working period.

As discussed in section 2, when labor inspectors visit the firms they check the compliance with a wide set of mandated benefits established in the labor code and which include all the dimensions reported above (e.g., Cardoso and Lage, 2007). Even though

the Brazilian labor law is set at the federal level, – and thus the cost of compliance with mandated benefits should not vary at the city level- it might change over time, i.e taxes rates, allowances, minimum wage etc<sup>24</sup>

All else constant, firms located in cities with stricter enforcement will face higher labor costs. They will have a lower demand for labor and thus may reduce employment, wages (of those covered or uncovered) or the provision of voluntary job benefits. Since wages and employment are likely to be more rigid in the short-run, firms may more easily adjust the supply of voluntary job benefits (like the provision of private health insurance, food or housing benefits). As wages and employment become easier to adjust downwards in the medium/long term, the effect of stricter enforcement on voluntary benefits should become smaller. However, in the long run, the effect stricter enforcement might not necessarily be associated with lower wages or with less employment. If stricter enforcement disproportionately affects the cost of employing the low skilled workers (e.g., because the minimum wage is a binding policy for firms paying wages at the minimum or just above), it is possible that in the long run the share high educated workers in total workforce increases. This change in the composition of employment could lead to higher mean wages in the economy for those who remain employed. Nevertheless, we still find it more plausible to expect that the first order enforcement effect dominates this composition effect and that, in the long run, stricter enforcement at the city level is associated with lower mean city wages.

A priori we also expect cities with stricter enforcement to have a smaller share of the workers in larger firms. First, strict labor regulations increase the cost of labor (because firms need to comply with payroll taxes, security and health regulations, worker's registration). This decreased labor demand and, all else constant will reduce total employment. Second, larger firms are more likely to be inspected simply because they are more visible. Therefore, stricter enforcement could lead to smaller firm size. Nonetheless, if larger firms are more likely to provide job benefits (either mandated or voluntary) they could be paying lower wages. Again, the overall effect on wages in large firms will depend on the wages of those who remain employed. In this case, because high earners are more likely to go unemployed than low earners, we expect wages of those who remain in the large firms to go down.

Finally, firms can hire workers in a full or in part-time. Workers in both types of jobs are subject to employment protection laws and both are entitled to mandated benefits. However, it more costly for a firm to hire a part-time worker than a full time worker on

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<sup>24</sup>In the period of the data 1996-2007, the MW has been not only adjusted for inflation but also had real increases. From 2002, only the State of Rio de Janeiro adopted different MW than that of the federal level. Rio de Janeiro state also allowed that to vary by occupation and sector. From 2007 onwards, other three states in Brazil – Sao Paulo, Parana and Rio Grande do Sul - joined Rio de Janeiro's policy and also have different MW by occupation and sector, not necessary the same as the ones defined in Rio de Janeiro.

an hourly basis. The reason is that the minimum wage in Brazil is set month and not per hour. Moreover, although some mandated benefits (like contributions to the severance fund) are proportional to wages, there are also fixed costs of hiring a worker. Therefore, with strict labor regulations, it is most likely cheaper to hire a full-time worker than a part-time worker and we would expect cities with stricter enforcement to have a higher share of full time workers.

Stricter labor regulation in a wage compensation framework may not always be desirable. Through the explanation above, it becomes clear that such policies would reduce the utility of workers who had chosen not to take a job with benefits but still had been compensated for such choice, thus in general inefficient enforcement levels<sup>25</sup> are expected to be welfare reducing according to this model. On the other hand, informality is often associated with low investment and low productivity jobs (Acemoglu, 2001), in which case stronger enforcement may promote more efficient markets.

## 5 Empirical Model

Section 4 discussed how, in theory, stricter enforcement at the city level could affect the provision of mandated and voluntary benefits, mean wages, employment and employment composition at the city level. In this section we present the simple empirical model that we estimate. Consider that in each city  $i$  and year  $t$ , the provision of job attribute  $k$  at the city level relates with enforcement at the city level in the following linear equation:

$$Y_{it}^k = \alpha^k + \beta^k E_{it-1} + X_{it-1} \delta^k + \eta_i + \mu_t + u_{it}^k \quad (1)$$

where  $Y_{it}^k$  is a proxy of the job attribute  $k$  in city  $i$  at time  $t$ ,  $E_{it-1}$  is the measure of enforcement of labor market regulation in the city  $i$  and time  $t-1$ ,  $X_{it-1}$  is a set of city and time-varying characteristics.  $\eta_i$  are the city time invariant effects,  $\mu_t$  are the year dummies and  $u_{it}$  is the (unobserved) time varying city level characteristics. We assume  $u_{it}$  is unrelated to the explanatory variables given city and year fixed effects, i.e.,  $E(u_{it} | \eta_i, \mu_t, E_{it-1}, X_{it-1}) = 0$ .

In  $Y_{it}^k$  we consider several outcomes of interest such as mean city level log wages, employment and employment composition (wage earners, self employment, domestic and unpaid workers), as well as alternative proxies for mandated and voluntary job benefits, which includes the shares of city population with social security benefits, with worker's formal registration with Ministry of Labor, with earnings complying with the minimum wage, with working period below the maximum, with housing benefits, with food benefits, with transport benefits, with health benefits, with education/child care benefits. For all

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<sup>25</sup> According to the Coase theorem, the mandate is efficient if workers value the mandate benefits at its marginal cost of provision.

those job benefits, we also look the share of population without the benefit.<sup>26</sup> Other job quality indicators include the share of population which works part-time(full-time), the share of population which does(not) work in the construction sector and finally the share of population which works in large(small) firms.

We measure enforcement of labor market regulation in  $E_{it-1}$  with the (log) number of labor inspections in each city in year t-1 (we use  $\log(\text{Inspections}/10,000+1)$ ). In  $X_{it-1}$  we include several lagged time varying city characteristics that are likely to be simultaneously correlated with job attributes and with the degree of enforcement of labor regulation in each city. These include the (log) city population, the average years of schooling of adults, the average age of the population, the share of urban population, the average per capita household income and the share of workers in agriculture, mining, trade, services, manufacturing, transport and telecommunications and in the construction sectors. Controlling for the share of urban population and for the composition of employment at the sector level is important because, over the last three decades, there has been a significant and increasing trend in the share of urban population and the services sector along the rising formality. Controlling for the average per capita city household income captures for cross city and time differences in city development.<sup>27</sup> <sup>28</sup> Finally, the year dummies  $\mu_t$  capture the effect of macroeconomic shocks or any other federal policies that could be simultaneously correlated with stricter enforcement of labor market regulations at the city level and with the different job benefits considered. For example, these could capture fiscal policy related with income tax rates, corporate tax rates, social security contributions or other federal level policies that could be correlated with the degree of enforcement of the labor law and also with labor market outcomes at the city level.

The main parameter of interest is  $\beta^k$ , which captures the effect of stricter enforcement on the labor market outcome,  $Y_{it}^k$ . The main challenge in this estimation is that the level of enforcement of labor market regulation is likely not to be exogenous. First, enforcement may be stricter in cities where violation of labor laws is more frequent. Second, enforcement of the labor law may be stricter in cities where institutions are more developed. Moreover, both violation of labor laws and better institutions are probably correlated with labor market outcomes. Actually, the descriptive statistics reported in Figures 1a and 1b (and 3a and 3b for PNAD cities) showed that the level of enforcement (captured by the number of inspections per 1,000 people in the city) was higher, between 1996 and 2007,

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<sup>26</sup>Instead of looking at the proportion of wage earners with a job benefit, we will look at the share of population (23-65) with and without the benefit, since we see exactly which group of population enforcement has an effect on and the direction of effect.

<sup>27</sup>Unfortunately, Brazil does not produced for all the time period covered in our sample estimates of the city level GDP.

<sup>28</sup>In the regressions of the share of construction workers, we had to exclude from the set of controls the shares of workers per industry.

among the more developed cities in the country. In particular, enforcement as proportion of population in a city was higher in the South, Southeast and Center states of Brazil which are relatively richer in the country. Likewise, Figures 2a and 2b also show that enforcement gradually became stricter among the southern Brazilian states of Minas Gerais and Rio Grande do Sul, who were already more developed back in 1996. Since we explore changes in the enforcement of labor regulation within each city, we already accounting for the systematic correlation between the level of enforcement of labor regulation at the city level and the level of development of cities. However, differences across cities in the trends of enforcement that correlate with city trends are worrisome, for example, many development indicators which belong to job quality regressions may have a similar pattern overtime as that of the enforcement variable.

To minimize the concerns with endogeneity of inspections we first take advantage of the panel structure of the city level data and estimate equation 1 with city level time invariant effects, captured by  $\eta_i$ .<sup>29</sup> Controlling for unobservable city heterogeneity, mitigates the endogeneity problem in levels as it assumes that cities can systematically differ in the degree of enforcement and in the levels of the labor market outcomes. Our identification comes simply from the time variation in the enforcement of labor market regulations across cities. Thus, it assumes that the trends in the labor market variables are common across all cities, independently of the degree of enforcement. However this could not be true for reasons we mentioned earlier. Thus we use the lag of enforcement and we also condition on a rich set of control variables. Exploring the lagged variation in the enforcement of regulation will reduce the likelihood that  $\beta^k$  is capturing the contemporaneous variation in other city level characteristics which are also correlated with labor market outcomes. Finally, controlling for lagged city level characteristics will also minimize the endogeneity concerns because it makes the assumption  $E(u_{it}|\eta_i, \mu_t, E_{it-1}, X_{it-1}) = 0$  more plausible.

Finally, it is worth stressing that the effects of labor regulation in our reduced form are identified with lagged enforcement. In the absence of labor market rigidities, the levels of wages and employment would adjust within one period, and the effect of lagged enforcement could be interpreted as the long-term effects on the economy. Alternatively, if wages and employment take a more than one period to adjust, the point estimates for  $\beta^k$  would sign the short rather than a long-term impacts. Moreover, our data on enforcement

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<sup>29</sup>Constructing a panel with averages of variables by city and year and using fixed effects in both dimensions follows closely the approach given by Meghir and Whitehouse (1996). Rather than using individual data, they use grouped data by cohort and year to study the behavior of wages (returns and differentials by occupation) of males living in UK. By doing so, they argue that they can control for the effects of self-selection into occupations by exploiting the changing occupational choices over time since grouping ‘averages out’ the idiosyncratic unobserved productivity components which may be correlated with occupations.

shows that only about 3% of formal firms are on average inspected per city.<sup>30</sup> Even though one could expect enforcement of labor market regulations to affect at most these 3% of firms straight away, since this is a rather small number of firms, there will hardly be an immediate effect in the city outcomes of interest.

## 6 Empirical Findings

### 6.1 Main Findings

Table 1 through 5 report the weighted least square estimates of equation 1 after clustering the standard errors at the city level and using as weights the inverse of the number of individuals in each city. For each regression we only report the coefficient of interest  $\beta^k$ . Our set of control variables in Panel A regressions include mean education, mean age and the log of population. In Panel B regressions, we also add the share of workers per industry, the share of urban population and the log of per capita family income. In general, the qualitative results remain across these two specifications. Most of our comments will be based on the second which uses a richer set of controls.

Table 1 reports the estimates of equation 1 when the dependent variable is the share of wage earners in total city population (registered and unregistered at MoL), share of self employed workers, share of non-employed (inactive and the unemployed), share of unpaid workers, share of domestic workers and the share of other workers (which include employers and workers for own consumption). The results of panel B show that while the share of wage earners increases by 0.19pp, the share of self-employed decreases by 0.16pp, if enforcement rises by 10%. By contrast, the share of unpaid workers increased significantly by 0.18pp, while the impact is negative on nonemployment, domestic and other categories but statistically insignificant. The increase in the fraction of unpaid workers supports the idea that firms may as well adjust wages down to zero instead of dismissing workers or shutting down if costs of compliance become prohibitive. This adjustment is likely to occur for the low skilled and agriculture workers who would be willing (at least temporarily) to face a pay cut and continue acquiring in-work experience rather than going into unemployment.<sup>31</sup>

Table 2 reports the effects on a set of mandated benefits. In column (1) the coefficient shows that an increase in labor inspections of 10% is associated with an increase in the share of workers with social security of 0.28pp. The effect is statistically significant but seems small in economic terms, depending on how much of enforcement can be increased

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<sup>30</sup>We divide the total number of inspections by the total number of formal firms in each city and year. Total number of formal firms is collected by IBGE (National Statistics Bureau).

<sup>31</sup>In future work, we could investigate the impact on the share of unpaid with low education, younger and also by sector (i.e in agriculture).



by the labor authorities. More inspections also led to positive and significant effects on the share of registered workers and on the share of workers earning above the minimum wage, which grew respectively by 0.35 and 0.38pp, if enforcement increases by 10%. On the contrary, the share of unregistered workers decreased significantly by 0.16pp. These results are expected since law should directly affect having mandated benefits positively and not having them negatively. By contrast, the share of workers without transport benefits and the share working by the legal working hours did not change significantly with enforcement. One possible reason could be because enforcement is not primarily used to monitor firm's compliance with transport benefits or with legal working period, as table 9 shows.

Table 3 reports the estimates of the effects on the voluntary benefits. Point estimates show that stricter labor inspections at the city level are associated with a larger share of the wage earners without voluntary benefits (including housing benefits, food benefits, education/child care benefits or without health insurance). A stricter enforcement at the city level is more negatively correlated with the provision of food and health benefits. Here cities with 10% higher labor inspections have a 0.5pp higher proportion of wage earners without food subsidies and without health benefits. These findings suggest that stricter enforcement of labor regulations pressure firms to reduce labor costs (or to cut employment). In the short-run, rigidities of wage contracts justify why firms may adjust voluntary benefits instead of wages. Firing costs may also play a role to explain why firms do not cut employment. This is especially true if the worker is not newly hired by the firm.<sup>32</sup>

Table 4 reports the effects of enforcement on additional proxies for job quality including share of workers working full time, share of workers in construction and the share of workers in firms with more than 11 employees (non-micro). Table 4 shows that positive and significant effects on the share of full-time workers in specification with basic controls (panel A) but not in the specification with all controls (panel B). That is not surprising because compliant firms offer long term contracts and also lower working time flexibility as hiring a worker is costly. In other Latin American countries however working full-time as opposed to part-time raises job satisfaction. That is consistent with working fewer hours being considered luxury consumption especially in lower income families. Columns (3) through (6) show that cities with stricter enforcement report a higher share of wage earners outside construction although there is no statistically significant effect on the distribution of workers across firm sizes.

Tables 5 report the effects of stricter enforcement on the wage levels. In theory, stricter enforcement at the city level should correlate with lower wages for those workers with

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<sup>32</sup>If the worker is newly hired, the contributions (8.5% of monthly wage) of the firm made towards the worker's severance fund were small enough such that the penalty (50% of contributions made by firm) the firm would face is negligible.

mandated benefits (at least in the long-run). Recall that in the short run, firms might not be able to adjust wages and could alternatively adjust voluntary benefits. However, stricter enforcement could also lead to reduction in labor demand and to higher non-employment as firms might have to dismiss workers or shut down in response to higher costs of labor. If this effect dominates and the reductions in employment affect disproportionately the lower skilled it is possible that the mean wages in the economy increase.

Tables 5 report the estimates of the effects of enforcement on the 10th, the 50th and on the 90th percentile of log monthly wages. Results show that a 10% increase in enforcement at the city level is associated with wages at the top of the distribution for workers with social security going down by 3.6pp while the top wages of workers without this benefit goes up by 2.4pp. Thus, enforcement is correlated with a wage compensation for workers with social security while wages increase at the top for workers without this benefit. Similarly for workers with formal registration. There is a significant wage de-compensation for registered workers at the top of the wage distribution (90th percentile) of 3.7pp, while top wages of unregistered workers increase by 1.8pp, if enforcement level in the city is raised by 10%.

Now if we look at the results on wages of workers who benefit and who do not from the mandate transport benefits, those suggest that the median wages of not benefited workers raises considerably vis-à-vis top wages of workers with benefits and is statistically significant. By contrast, the coefficient for the 90th percentiles suggests a different pattern which is wages of not benefits workers go down after more regulation. This could be due to composition effects caused by outgoing workers from jobs without benefits being the highest skilled in that group, which would bring top wages down. Nonetheless, the median wages in that same group indicate the compensation for working without the benefit, which is of 3.7pp. Similar effects as those for transport benefits were observed to wages of workers who work by the legal hours per week (44 hours) versus wages of workers who work above the legal hours. The median wages of workers working more than the legally permitted hours goes up significantly by 1.8pp, while no significant effect was observed for the other group. In general, there is a common result in terms of the effect of enforcement on wages. Those suggest that preferences and costs to provide each of those benefits seem to confirm predictions of the compensating wage differentials theory. Qualitative results are similar but quantitatively the results for social security and for registration are much more important, showing a relatively high de-compensation for having such benefits.

In the next section we conduct further tests since these results could be subject to bias of having better institutional environment (so, more benefits and more compliance) preceding labor inspections. The bias would have to be towards overestimating the impact on having benefits or underestimating the impact on not having benefits or being nonemployed, unpaid, or working without registration.

## 6.2 Robustness of Results

In this section we test the robustness of our main findings to controlling for state year trend in our reduced form. The reasoning is that there could be important policies across states in Brazil which led to a similar trend on the job quality measures to the trend of enforcement we observe across states. For instance, suppose that policies towards decreasing the bureaucracy cost to set up a formal firm in the state share a common trend with the enforcement policies. Lower costs to open up a compliant business and more enforcement could complement each other in terms of coordinated anti-evasion policies between the federal government which has the enforcement role and the state governments which collect a large fraction of the firms' tax bill. Low bureaucracy costs also incentivizes entry of formal firms in the market which should directly impact job quality. Because low bureaucracy cost is likely to be related to stricter labor regulatory environment and also to more job quality, it must potentially be an important omitted factor.

To reassure that our coefficients are not reflecting the common trend between enforcement in a state and omitted factors, we include in the regressions the year trends by state. We then add to the right hand side of equation 1 state dummies (minus one) interacted with a year trend.

The inclusion of state-specific trends makes our identification stronger as we rule out possible biases from common trend policies within a state, on the other hand, it is important to note that including the trends by state in the equation may have weakened the enforcement effects since it is possible that enforcement effects could be mainly explained by trends in each state.

Tables 6 (for the employment status and for the shares of workers with/out benefit) and Tables 7 (for wages) show results of our fixed effect specification with all controls, which also including the state-specific year trends.

In terms of employment composition, Table 6.1 shows higher coefficients for the share of self-employed and the share of unpaid workers. That suggests a potential bias downward of previous results of Table 1. The results show that enforcement, which previously had increased the share of wage earners and decreased self employment, now has insignificant effect on those categories. Interestingly, the share of unpaid now increases even more (by 0.21pp) and remains statistically significant.

Table 6.2 shows that having registration ('carteira') is the only mandated benefit for which the effect of enforcement remained positive and significant, however the impact of a 10% increase in enforcement was reduced to 0.23pp, i.e. confirming possible overestimation of previous results (Table 2). The fact that the share of unregistered workers is negative but now insignificant also indicates potential underestimated effect in the results of Table 2. It is curious that the share of employees earning below the minimum wage increases (by 0.14pp) vis-à-vis the share earning above (zero). It shows that although firms

comply more with registration (“carteira”) they might be complying less with the legal minimum pay.

Table 6.3 shows that, for the optional benefits, it remains that the effects are more pronounced for food and health benefits, with now 0.41pp and 0.37pp higher proportion of non-beneficiaries when enforcement rises by 10%.

As for the results of Table 6.4, the coefficient for the share of large firms is here significant and is negative. An increase in labor inspections by 10% reduces the share of employees in large firms by 0.32pp while the share in small firms remains unaltered. This confirms that higher enforcement may have induced firms to decrease size to be out of reach of labor inspections. Lower size might be an obstacle for firms to invest and improve in-work benefits, in that sense, there is here a trade off between more mandated benefits and benefits associated with a larger firm size. There is also less evidence that workers work more in less riskier occupations after more regulation as the coefficient on the share of workers in other occupations (which are not construction) is positive however this is insignificant.

By the results on wages in Tables 7.1 to 7.4, in general we confirm existence of a wage (de-)compensation for employees (with)out benefits. Differently from the results of the earlier specification, here we see an increase in the 10th percentile wages of workers with the benefits of social security and registration. We interpret these results as consequence of change in the composition of workers. Incoming workers into the formal sector have lower skill levels than the existing workers in that sector. That tends to move left the distribution of wages of registered employees, raising wages at bottom and contributing to reduce top wages in that group.

In Table 8, we also regress the wages (or earnings) of all workers in the city against enforcement using the specification in 1 with all controls and the specification with the year trends by state. The coefficients of the latter (Panel B) show that mean and median wages in the city increases significantly with more enforcement, while other percentiles remain unaltered.

Overall, our results suggest that stricter enforcement increases compliance with mandated benefits (‘carteira’) but there is a trade off between mandated and voluntary benefits and also between mandated benefits and wages. Despite higher fraction of unpaid workers, mean wages in the city increase, so net positive impact of enforcement on wages. Because there is tradeoff between wages and the registration benefit, and the proportion of workers with registration increased with enforcement, the result on mean wage is likely to be driven by an increase in the formal demand.

## **7 Conclusion and Policy Implications**

Growth in Brazil over the last years has translated into job creation, in particular across the formal sector. This has been followed by rising real wages (both in the formal and informal sectors), which could be interpreted as an improvement in job quality in the country. The debate whether good and bad jobs are rising has often been confused with identifying the trend of formal and informal jobs. However, even a formal sector job might not have the full set of job attributes that are mandated by the law (e.g., full mandated benefits, full severance pay or a minimum wage). The degree to which employers provide mandated job attributes to workers hinges on the whether there is enforcement of labor market regulations. This paper analyzes how changes in the enforcement of labor market regulation affect the provision of mandated and voluntary benefits.

We explore a unique administrative panel data on the enforcement of labor market regulations and detailed job quality proxies, at city level between 1996-2007. Our results show that stricter enforcement at the city level increases compliance with mandated benefits but there is a trade off between mandated and voluntary benefits and also between mandated and wages. Mean wages in the economy are however higher, due to increase in formal demand.

As a policy implication, while government can use enforcement policy to improve some mandated benefits, it may decrease provision of voluntary benefits which may be equally or more valued by workers. The welfare gains of stricter enforcement will then depend on whether higher salaries and less informality compensates for lower voluntary benefits.

TABLE 1  
*Effects of Enforcement of Labor Regulations on Employment Composition*

Dependent Variable:	Wage Earner	Self- Employed	Non- employed	Unpaid	Domestic	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: FE with basic controls						
Log # Inspections	0.023 (0.010)**	-0.019 (0.008)**	-0.005 (0.017)	0.012 (0.007)*	-0.006 (0.007)	-0.005 (0.005)
Obs.	4834	4834	4834	4834	4834	4834
Panel B: FE with all controls						
Log # Inspections	0.019 (0.010)*	-0.016 (0.009)*	-0.005 (0.018)	0.018 (0.007)**	-0.009 (0.007)	-0.008 (0.005)
Obs.	4834	4834	4834	4834	4834	4834

Note: Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the share of the population aged 23-65 whose employment status is: wage earner, self-employed, nonemployed, unpaid worker, domestic employee and other worker (employer or working for own consumption). In all specifications, we use city and year fixed effects. Panel A regressions include basic controls which are mean education, log of population and mean age at the city and year. Panel B includes controls in Panel A regressions plus the share of urban population, the share of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others), and finally the log of per capita income in the city and year. All independent variables are lagged. We use the inverse of the number of observations per cell as weights.

TABLE 2  
*Effects of Enforcement of Labor Regulations on Mandated Job Benefits*

Dependent Variable:	Social Security Coverage		Registration MoL		Compliance Minimum Wage		Transportation Benefits		Compliance Max. Working Hours	
	with (1)	without (2)	with (3)	without (4)	with (5)	without (6)	with (7)	without (8)	legal (9)	above legal (10)
Panel A: FE with basic controls										
Log # Inspections	0.033 (0.010) ***	-0.011 (0.007)	0.041 (0.012) ***	-0.018 (0.009) *	0.044 (0.016) ***	0.012 (0.005) **	-0.002 (0.014)	0.025 (0.011) **	0.011 (0.010)	0.011 (0.011)
Obs.	4834	4834	4834	4834	4834	4834	4834	4834	4834	4834
Panel B: FE with all controls										
Log # Inspections	0.028 (0.010) ***	-0.008 (0.007)	0.035 (0.010) ***	-0.016 (0.009) *	0.038 (0.019) **	0.014 (0.005) ***	0.000 (0.013)	0.019 (0.013)	0.011 (0.010)	0.008 (0.012)
Obs.	4834	4834	4834	4834	4834	4834	4834	4834	4834	4834

Note: Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The table reports the least squares estimates of equation (1) in the text when the dependent variable is the share of population aged 23-65 with(out) social security coverage, formal registration with the Ministry of Labor (MoL), minimum wage, transportation benefit and working by 44 hours/week). In all specifications, we use city and year fixed effects. Panel A regressions include basic controls which are mean education, log of population and mean age at the city and year. Panel B includes controls in Panel A regressions plus the share of urban population, the share of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others), and finally the log of per capita income in the city and year. All independent variables are lagged. We use the inverse of the number of observations per cell as weights.

TABLE 3  
*Effects of Enforcement of Labor Regulations on Optional Benefits*

Dependent Variable:	Housing		Food		Education/Child Care		Health	
	with (1)	without (2)	with (3)	without (4)	with (5)	without (6)	with (7)	without (8)
Panel A: FE with basic controls								
Log # Inspections	-0.005 (0.005)	0.028 (0.010) ***	-0.034 (0.014) **	0.056 (0.016) ***	0.003 (0.002)	0.020 (0.010) **	-0.027 (0.014) **	0.050 (0.015) ***
Obs.	4834	4834	4834	4834	4834	4834	4834	4834
Panel B: FE with all controls								
Log # Inspections	-0.006 (0.005)	0.026 (0.010) ***	-0.033 (0.015) **	0.053 (0.018) ***	0.002 (0.002)	0.017 (0.010) *	-0.030 (0.013) **	0.049 (0.016) ***
Obs.	4834	4834	4834	4834	4834	4834	4834	4834

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the shares of population aged 23-65 with or without the benefit of: housing, food, education/child care and employer provided health insurance. In all specifications, we use city and year fixed effects. Panel A regressions include basic controls which are mean education, log of population and mean age at the city and year. Panel B includes controls in Panel A regressions plus the share of urban population, the share of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others), and finally the log of per capita income in the city and year. All independent variables are lagged. We use the inverse of the number of observations per cell as weights.



TABLE 4  
*Effects of Enforcement of Labor Regulations on Other Job Benefits*

Dependent Variable:	Hours		Industry (Riskier occupation):		Firm size	
	Part-time	Full-time	Construction	Other industries	Large	Small
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: FE with basic controls						
Log # Inspections	0.007 (0.007)	0.015 (0.008)*	-0.005 (0.005)	0.027 (0.009)***	-0.018 (0.016)	0.005 (0.007)
Obs.	4834	4834	4834	4834	4834	4834
Panel B: FE with all controls						
Log # Inspections	0.008 (0.006)	0.011 (0.008)	-0.005 (0.005)	0.024 (0.010)**	-0.022 (0.015)	0.002 (0.007)
Obs.	4834	4834	4834	4834	4834	4834

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the shares of population aged 23-65 with or without the benefit of: working part-time, not working in the construction sector (*proxy* for lower risk), working in larger firms (11 or more workers). In all specifications, we use city and year fixed effects. Panel A regressions include basic controls which are mean education, log of population and mean age at the city and year. Panel B includes controls in Panel A regressions plus the share of urban population, the share of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others), and finally the log of per capita income in the city and year. In the regressions of the share of construction workers, we had to exclude from the set of controls the shares of workers per industry. All independent variables are lagged. We use the inverse of the number of observations per cell as weights.

TABLE 5  
*Effects of Enforcement of Labor Regulations on Wages*

**Effects of Enforcement on Wages, by Job Benefit**

Table 5.1. Social Security Coverage

Dependent Variable:	With Social Security			Without Social Security		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Panel A: FE with basic controls						
Log # Inspections	0.025 (0.113)	0.009 (0.098)	-0.351 (0.097)***	-0.087 (0.210)	0.281 (0.198)	0.321 (0.152)**
Obs.	4826	4826	4826	4791	4791	4791
Panel B: FE with all controls						
Log # Inspections	0.005 (0.099)	-0.011 (0.080)	-0.359 (0.085)***	-0.111 (0.189)	0.207 (0.168)	0.243 (0.139)*
Obs.	4826	4826	4826	4791	4791	4791

Table 5.2. Registration with the Ministry of Labor

Dependent Variable:	Registered			Unregistered		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Panel A: FE with basic controls						
Log # Inspections	0.034 (0.117)	0.030 (0.102)	-0.362 (0.095)***	0.088 (0.242)	0.186 (0.164)	0.284 (0.100)***
Obs.	4820	4820	4820	4806	4806	4806
Panel B: FE with all controls						
Log # Inspections	0.015 (0.105)	0.012 (0.083)	-0.367 (0.080)***	0.060 (0.216)	0.109 (0.126)	0.178 (0.087)**
Obs.	4820	4820	4820	4806	4806	4806

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the 10th, the median or the 90th percentile of log-monthly wages. We run separate regressions for the wage percentiles of employees with and without the mandated benefit, which is indicated on the first line of table. In all specifications, we use city and year fixed effects. Panel A regressions include basic controls which are mean education, log of population and mean age at the city and year. Panel B includes controls in Panel A regressions plus the share of urban population, the share of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others), and finally the log of per capita income in the city and year. All independent variables are lagged. We use the inverse of the number of observations per cell as weights.

Table 5.3. Transportation benefits

Dependent Variable:	With Benefit			Without Benefit		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Panel A: FE with basic controls						
Log # Inspections	-0.050 (0.110)	-0.031 (0.081)	-0.238 (0.128)*	0.208 (0.206)	0.431 (0.180)**	-0.157 (0.087)*
Obs.	4417	4417	4417	4832	4832	4832
Panel B: FE with all controls						
Log # Inspections	-0.049 (0.095)	-0.036 (0.073)	-0.231 (0.103)**	0.149 (0.175)	0.366 (0.147)**	-0.206 (0.092)**
Obs.	4417	4417	4417	4832	4832	4832

Table 5.4. Maximum Legal Working Period

Dependent Variable:	Legal Working Hours			Above Legal Working Hours		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Panel A: FE with basic controls						
Log # Inspections	-0.063 (0.134)	0.096 (0.123)	-0.079 (0.188)	-0.065 (0.106)	0.229 (0.094)**	-0.068 (0.101)
Obs.	4825	4825	4825	4798	4798	4798
Panel B: FE with all controls						
Log # Inspections	-0.093 (0.117)	0.065 (0.103)	-0.103 (0.159)	-0.111 (0.090)	0.184 (0.080)**	-0.100 (0.123)
Obs.	4825	4825	4825	4798	4798	4798

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the 10th, the median or the 90th percentile of log-hourly wages. We run separate regressions for the wage percentiles of employees with and without the mandated benefit, which is indicated on the first line of table. The maximum legal working period in Brazil is 44 weekly hours. In all specifications, we use city and year fixed effects. Panel A regressions include basic controls which are mean education, log of population and mean age at the city and year. Panel B includes controls in Panel A regressions plus the share of urban population, the share of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others), and finally the log of per capita income in the city and year. All independent variables are lagged. We use the inverse of the number of observations per cell as weights.

TABLE 6  
*Effects of Enforcement of Labor Regulations using State-specific Year Trends*

Table 6.1. Effect of Enforcement on Employment Composition

Dependent Variable:	Wage Earners	Self-Employed	Non-employed	Unpaid	Domestic	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Log # Inspections	0.008 (0.012)	-0.011 (0.012)	-0.000 (0.012)	0.021 (0.006)***	-0.012 (0.008)	-0.005 (0.008)
Obs.	4834	4834	4834	4834	4834	4834

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the share of the population aged 23-65 whose employment status is: wage earner, self-employed, nonemployed, unpaid worker, domestic employee and other worker (employer or working for own consumption). In this specification, we use city and year fixed effects, all the control variables used in the most complete specification: mean education, log of population, mean age, share of urban population, shares of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others) and the log income per capita in the city and by year. In addition, we also include the interactions between each state dummy (minus one) and a year trend. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.

Table 6.2. Effect of Enforcement Labor Regulations on Mandated Job Benefits

Dependent Variable:	Social Security Coverage		Registration MoL		Compliance Minimum Wage		Transportation Benefits		Compliance Max. Working Hours above legal	
	with	without	with	without	with	without	with	without	legal	legal
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log # Inspections	0.013 (0.012)	-0.005 (0.008)	0.023 (0.014) *	-0.015 (0.010)	0.017 (0.013)	0.014 (0.005) **	-0.005 (0.016)	0.013 (0.017)	0.000 (0.011)	0.007 (0.012)
Obs.	4834	4834	4834	4834	4834	4834	4834	4834	4834	4834

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the share of population aged 23-65 with social security coverage, formal registration with the Ministry of Labor (MoL), minimum wage, transportation benefit and working by 44 hours/week). In this specification, we use city and year fixed effects, all the control variables used in the most complete specification: mean education, log of population, mean age, share of urban population, shares of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others) and the log income per capita in the city and by year. In addition, we also include the interactions between each state dummy (minus one) and a year trend. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.

Table 6.3. Effect of Enforcement on Optional Benefits

Dependent Variable:	Housing		Food		Education/Child Care		Health	
	with (1)	without (2)	with (3)	without (4)	with (5)	without (6)	with (7)	without (8)
Log # Inspections	-0.002 (0.005)	0.011 (0.012)	-0.033 (0.018)*	0.041 (0.020)**	0.002 (0.002)	0.006 (0.011)	-0.029 (0.015)**	0.037 (0.019)**
Obs.	4834	4834	4834	4834	4834	4834	4834	4834

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the shares of population aged 23-65 with or without the benefit of: housing, food, education/child care and employer provided health insurance. In this specification, we use city and year fixed effects, all the control variables used in the most complete specification: mean education, log of population, mean age, share of urban population, shares of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others) and the log income per capita in the city and by year. In addition, we also include the interactions between each state dummy (minus one) and a year trend. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.

Table 6.4. Effect of Enforcement on Other Job Benefits

Dependent Variable:	Hours		Industry (Riskier occupation):		Firm size	
	Part-time (1)	Full-time (2)	Construction (3)	Other industries (4)	Large (5)	Small (6)
Log # Inspections	0.004 (0.006)	0.004 (0.009)	-0.004 (0.004)	0.014 (0.013)	-0.032 (0.015)**	0.000 (0.007)
Obs.	4834	4834	4834	4834	4834	4834

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The table reports the least squares estimates of equation (1) in the text when the dependent variable is the shares of population aged 23-65 with or without the benefit of: working part-time, not working in the construction sector (*proxy* for lower risk), working in larger firms (11 or more workers). In this specification, we use city and year fixed effects, all the control variables used in the most complete specification: mean education, log of population, mean age, share of urban population, shares of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others) and the log income per capita in the city and by year. In addition, we also include the interactions between each state dummy (minus one) and a year trend. In the regressions of the share of construction workers, we had to exclude from the set of controls the shares of workers per industry. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.

TABLE 7  
*Effects of Enforcement on Wages using State-specific Year Trends*

**Effect of Enforcement on Wages, by Job Benefit**

Table 7.1. Social Security Coverage

Dependent Variable:	With Social Security			Without Social Security		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Log # Inspections	0.129 (0.045)***	0.064 (0.063)	-0.257 (0.078)***	0.000 (0.123)	0.167 (0.139)	0.225 (0.142)
Obs.	4826	4826	4826	4791	4791	4791

Table 7.2. Registration with the Ministry of Labor

Dependent Variable:	Registered			Unregistered		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Log # Inspections	0.141 (0.046)***	0.090 (0.067)	-0.260 (0.066)***	0.153 (0.183)	0.124 (0.095)	0.209 (0.097)**
Obs.	4820	4820	4820	4806	4806	4806

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The table reports the least squares estimates of equation (1) in the text when the dependent variable is the 10th, the median or the 90th percentile of log-monthly wages. We run separate regressions for the wage percentiles of employees with and without the mandated benefit, which is indicated on the first line of table. In this specification, we use city and year fixed effects, all the control variables used in the most complete specification: mean education, log of population, mean age, share of urban population, shares of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others) and the log income per capita in the city and by year. In addition, we also include the interactions between each state dummy (minus one) and a year trend. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.

## Effect of Enforcement on Wages, by Job Benefit

Table 7.3. Transportation Benefits

Dependent Variable:	With Transport Benefit			Without Transport Benefit		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Log # Inspections	0.086 (0.066)	0.044 (0.061)	-0.136 (0.091)	0.222 (0.148)	0.394 (0.140)***	-0.147 (0.126)
Obs.	4417	4417	4417	4832	4832	4832

Table 7.4. Maximum Legal Working Period

Dependent Variable:	Working Legal Hours			Working Above Legal Hours		
	P10 (1)	Median (2)	P90 (3)	P10 (4)	Median (5)	P90 (6)
Log # Inspections	-0.002 (0.086)	0.118 (0.089)	-0.005 (0.121)	-0.067 (0.075)	0.221 (0.052)***	-0.091 (0.150)
Obs.	4825	4825	4825	4798	4798	4798

Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the 10th, the median or the 90th percentile of log-hourly wages. We run separate regressions for the wage percentiles of employees with and without the mandated benefit, which is indicated on the first line of table. The maximum legal working period in Brazil is 44 weekly hours. In this specification, we use city and year fixed effects, all the control variables used in the most complete specification: mean education, log of population, mean age, share of urban population, shares of workers per industry (i.e. shares in manufacturing, agriculture, trade, services, telecommunications and others) and the log income per capita in the city and by year. In addition, we also include the interactions between each state dummy (minus one) and a year trend. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.

TABLE 8  
*Effect of Enforcement of Labor Regulations on Labor Earnings of All Workers*

Dependent Variable:	Mean	P10	Median	P90
	(1)	(2)	(3)	(4)
Panel A: FE with all controls				
Log # Inspections	0.033	-0.054	0.098	-0.113
	(0.072)	(0.182)	(0.079)	(0.072)
Obs.	4834	4834	4834	4834
Panel B: FE with all controls + State-specific year trends				
Log # Inspections	0.095	0.105	0.140	-0.048
	(0.052)*	(0.122)	(0.079)*	(0.079)
Obs.	4834	4834	4834	4834

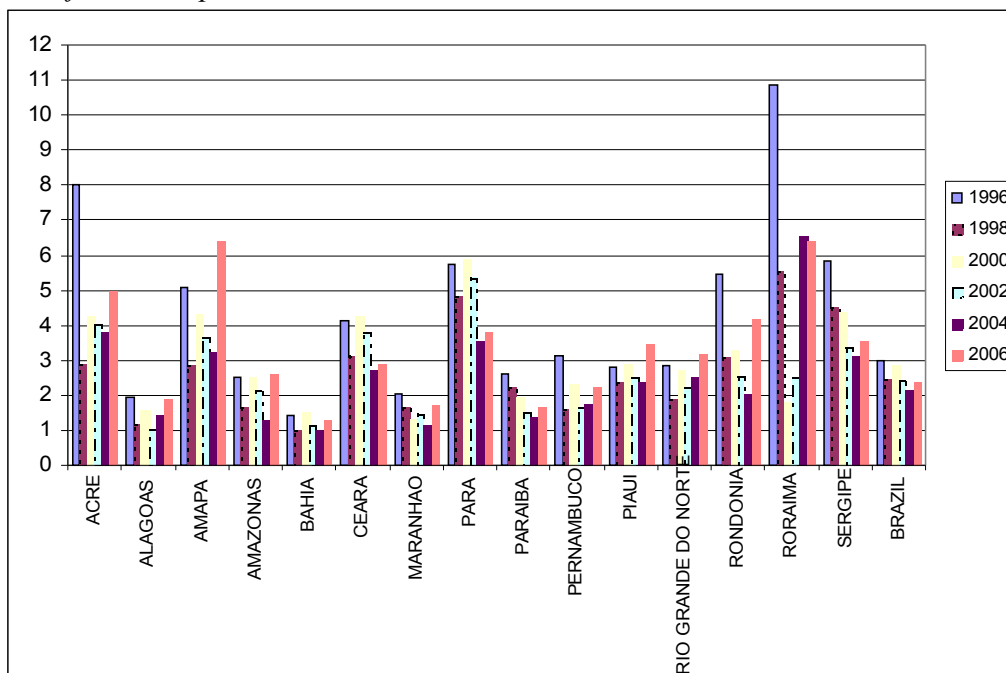
Standard errors in parentheses are clustered by city, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

The table reports the least squares estimates of equation (1) in the text when the dependent variable is the mean, the 10th, the median or the 90th percentile of log-monthly labor earnings of all workers in the city. In panel A, we use city and year fixed effects plus a set of control variables which include mean education, log of population, mean age, share of urban population, shares of workers per industry and the log income per capita in the city and year. In panel B, besides all variables included in A, we also include the interactions between each state dummy (minus one) and a year trend. All independent variables are lagged. We use the inverse of the number of observations per cell as weights in all regressions.



FIGURE 1  
Intensity of labor inspections in Brazil

(a) Intensity of labor inspections in Brazil and in the Northern and Northeast States – Total firm visits per 1,000 inhabitants



(b) Intensity of labor inspections in Brazil and in the Center, Southeast and South States – Total firm visits per 1,000 inhabitants

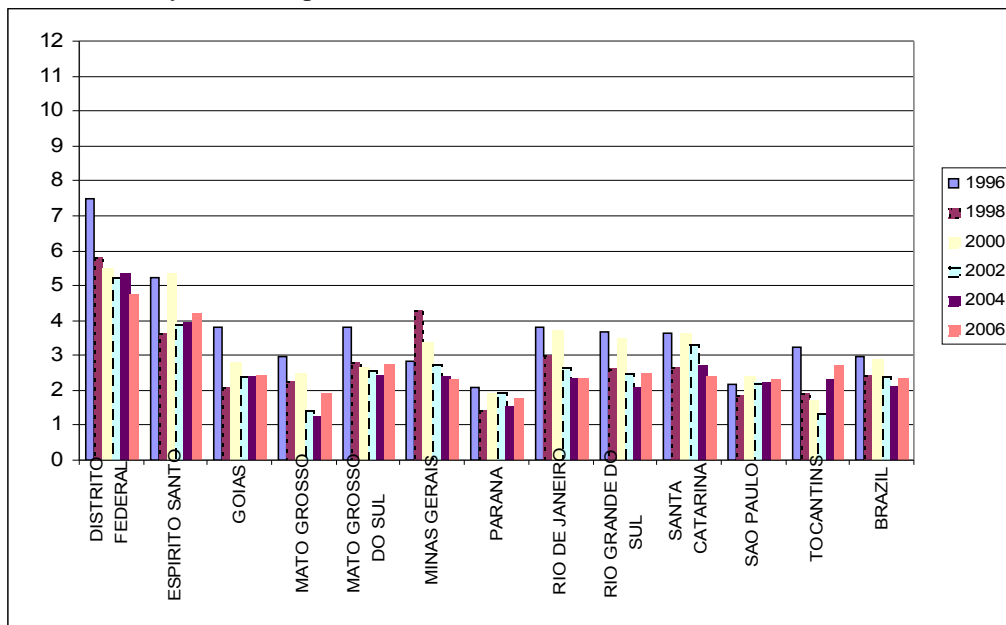
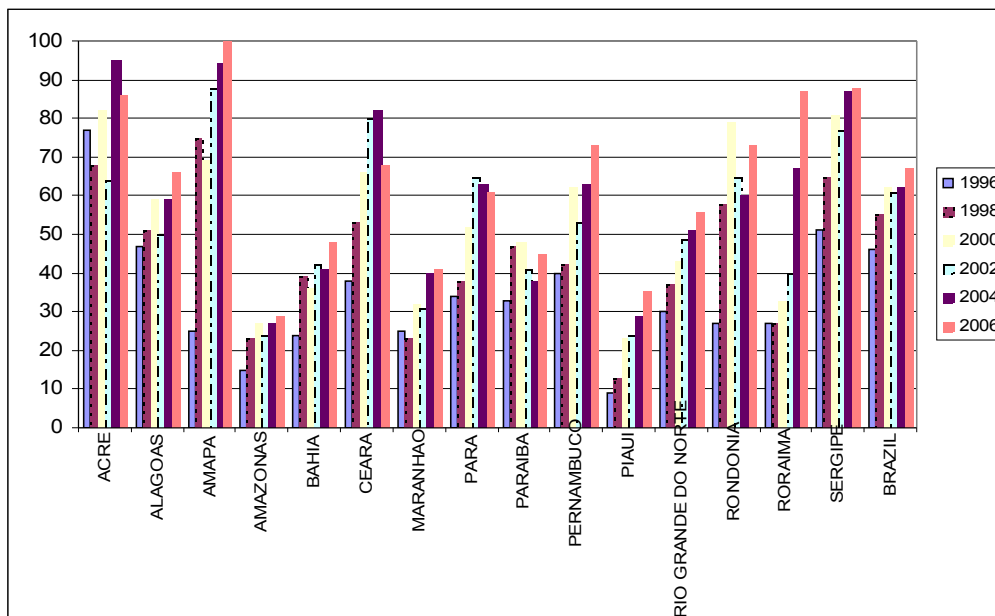


FIGURE 2

Percentage of cities with labor inspections between 1996-2006, in Brazil

(a) Percentage of cities with labor inspections between 1996-2006, in Brazil and across Northern and Northeast States



(b) Percentage of cities with labor inspections between 1996-2006, in Brazil and across Center, Southeast and South States

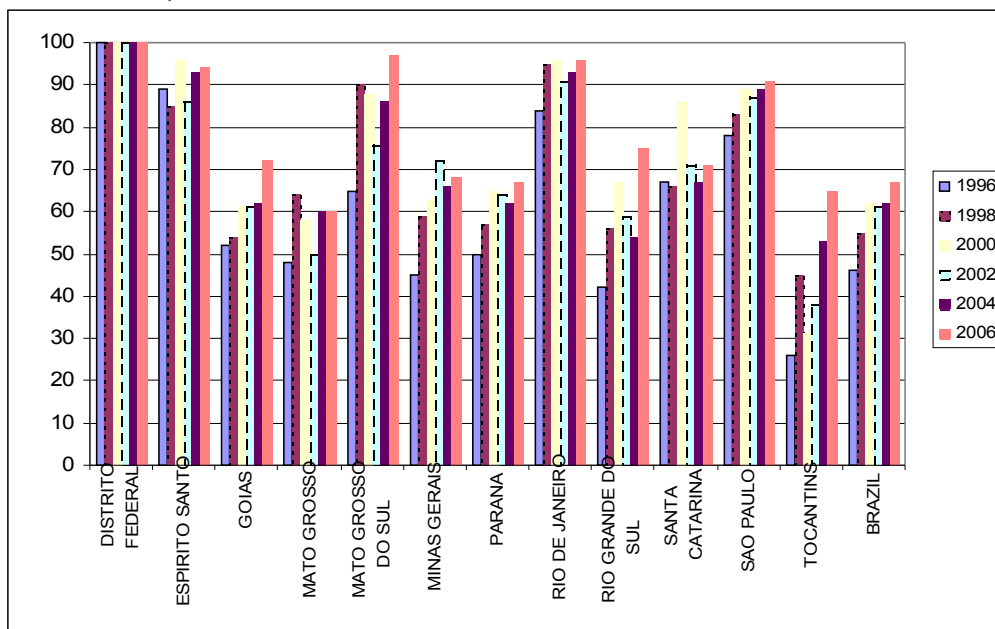
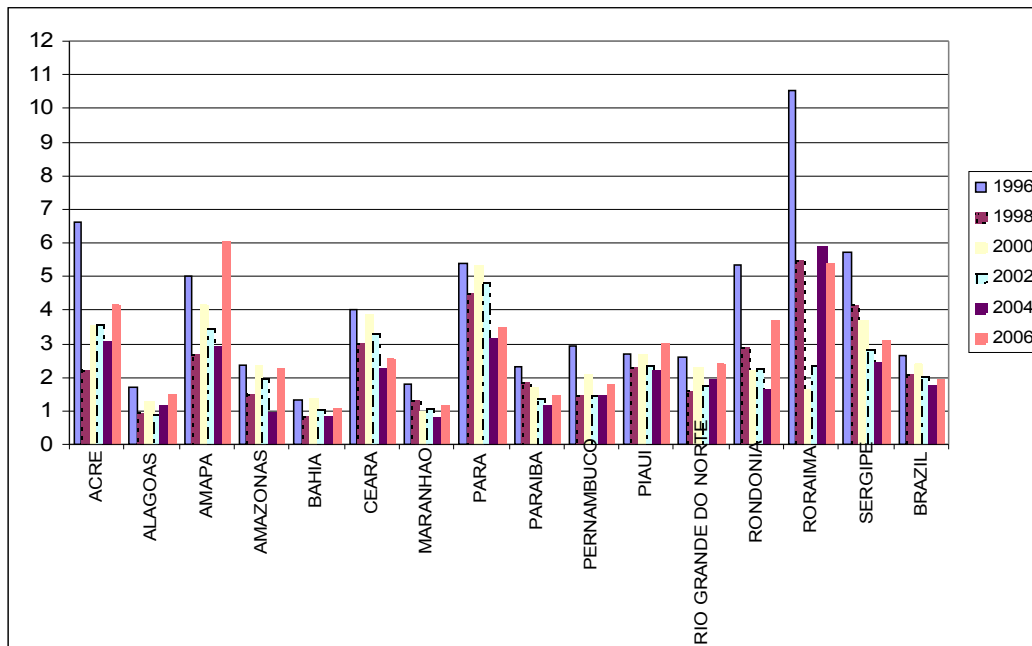


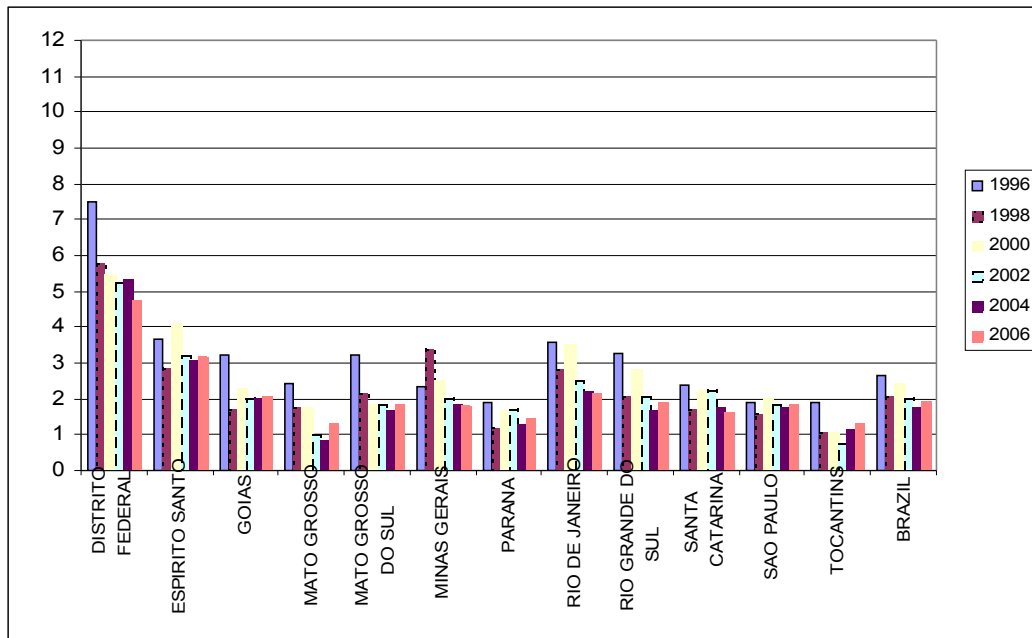
FIGURE 3

*Intensity of labor inspections in Brazil, cities sampled in PNAD survey*

**(a)** Intensity of labor inspections in Brazil and in the Northern and Northeast States – Total firm visits per 1,000 inhabitants



**(b)** Intensity of labor inspections in Brazil and in the Center, Southeast and South States – Total firm visits per 1,000 inhabitants



## Appendix

TABLE 9  
*Enforcement of Labor Regulations in Brazil: 1996-2006*

Variable	1996	1998	2000	2002	2004	2006
Number of Cities with Labor Inspections	2,560	3,079	3,456	3,429	3,473	3,773
Number of Cities with Labor Fines	2,554	2,642	2,639	2,622	2,627	2,628
Total Number of Labor Inspections	459,368	383,246	456,068	388,255	359,171	406,093
Total Number of Labor Fines	110,475	144,982	121,954	116,143	117,454	140,429
<i>Proportion of Fines, by type:</i>						
Worker's formal registration MoL	0.21	0.18	0.18	0.19	0.19	0.19
Contributions FGTS	0.18	0.16	0.16	0.16	0.15	0.16
Contractual Wages	0.17	0.15	0.15	0.15	0.15	0.15
Mandatory Working Period	0.10	0.13	0.13	0.12	0.12	0.12
Mandatory Rest Period	0.09	0.11	0.11	0.11	0.11	0.11
Transportation Benefits	0.04	0.05	0.04	0.03	0.04	0.03
Unemployment Insurance	0.03	0.04	0.03	0.02	0.03	0.02
Other (incl.safety, health and in-work benefits)	0.19	0.20	0.21	0.21	0.22	0.22
Correlation(Fines Worker's formal registration, Other Fines)	0.98	0.99	0.98	0.97	0.96	0.97
Correlation(Contributions FGTS, Other Fines)	0.95	0.97	0.95	0.94	0.95	0.95

Source: Brazilian Ministry of Labor. In 2009 there was a total of 5,596 cities in Brazil.

Note: Table reports aggregate statistics for the enforcement of labor market regulations in Brazil between 1996 and 2006. Last two lines report the correlation, at the city level, between the incidence of fines related with formal worker registration at the Ministry of Labor (*carteira de trabalho*) and other fines.

TABLE 10  
*Enforcement of Labor Regulations in Brazil: 1996-2006, cities sampled in PNAD*

Variable	1996	1998	2000	2002	2004	2006
Number of Cities with Inspection	619	655	683	696	693	702
Number of Cities with Fines	442	474	487	494	480	504
Number of Inspections	405,959	327,091	383,748	326,410	294,873	332,674
Number of Fines	84,198	112,392	90,520	84,370	82,149	96,138
<i>Proportion of Fines, by cause:</i>						
Worker's formal registration MoL	0.20	0.17	0.17	0.18	0.18	0.18
FGTS Contributions	0.18	0.16	0.16	0.16	0.15	0.16
Contractual Wages	0.17	0.15	0.15	0.15	0.14	0.15
Mandatory Working Period	0.09	0.13	0.13	0.12	0.12	0.12
Mandatory Rest Period	0.09	0.11	0.11	0.11	0.11	0.11
Transportation Benefits	0.04	0.05	0.05	0.04	0.04	0.04
Unemployment Insurance	0.03	0.04	0.04	0.03	0.03	0.02
Other (incl.safety, health and in-work benefits)	0.19	0.20	0.20	0.21	0.22	0.22
Correlation(Fines Worker's formal registration, Other Fines)	0.98	0.99	0.98	0.98	0.98	0.98
Correlation(FGTS Contributions, Other Fines)	0.97	0.98	0.98	0.98	0.98	0.98

Source: Brazilian Ministry of Labor. The total number of cities sampled for PNAD in 1996 is 808.

Note: Table reports aggregate statistics for the enforcement of labor market regulations in Brazil between 1996 and 2006. Last two lines report the correlation, at the city level, between the incidence of fines related with formal worker registration at the Ministry of Labor (*carteira de trabalho*) and other fines and the incidence of fines related with FGTS contributions (severance) and other fines.

TABLE 11  
*Descriptive Statistics for the Enforcement and Other City Level Characteristics*

Variable	Obs.	Mean	St.Dev.	Mean by year					
				1996	1998	2000	2002	2004	2006
Log (Labor Inspections/10,000+1)	4848	0.033	0.112	0.037	0.032	0.036	0.032	0.030	0.033
Log of Population	4834	11.81	0.75	11.78	11.80	11.80	11.79	11.82	11.85
Average Years of Schooling	4834	5.83	1.89	4.90	5.10	5.57	6.11	6.47	6.83
Average Age Population	4834	39.83	1.59	39.57	39.76	39.72	39.78	39.96	40.18
Proportion of Urban Population	4834	0.78	0.24	0.73	0.73	0.77	0.81	0.82	0.82
Average Log of per capita Family Income	4834	5.77	0.57	5.66	5.69	5.72	5.79	5.80	5.96
Share of workers in:									
Agriculture	4834	0.25	0.23	0.31	0.29	0.26	0.22	0.22	0.21
Mining	4834	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Manufacturing	4834	0.12	0.09	0.11	0.11	0.11	0.14	0.14	0.14
Trade	4834	0.13	0.06	0.11	0.11	0.12	0.14	0.14	0.14
Transport & Telecom.	4834	0.04	0.03	0.04	0.04	0.04	0.05	0.05	0.05
Construction	4834	0.07	0.04	0.07	0.08	0.07	0.08	0.07	0.07
Services	4834	0.17	0.08	0.17	0.17	0.18	0.17	0.18	0.18
Other Industries	4834	0.20	0.09	0.18	0.19	0.19	0.20	0.20	0.21

Source: Author's calculations (PNAD, Ministry of Labor, 1996 through 2006).

Note: Table reports the statistics of the enforcement measure and the control variables we use in our regressions which are the log of population in the city, average years of schooling of adult population (above 23), average age, the share of urban population, the average of log of per capita family income and the share of workers in agriculture, mining, manufacturing, trade, transport and telecommunications, construction, services and other industries.

TABLE 12  
*Descriptive Statistics of the Main Job Quality Measures at the City Level*

Job Benefit		Total Obs.	Mean	St.Dev.	Mean by year					
					1997	1999	2001	2003	2005	2007
Social Security Coverage	with	4834	0.265	0.108	0.228	0.234	0.262	0.271	0.289	0.308
	without	4834	0.105	0.058	0.116	0.111	0.106	0.102	0.100	0.095
Registration MoL	with	4834	0.252	0.108	0.224	0.222	0.246	0.257	0.271	0.290
	without	4834	0.119	0.060	0.120	0.122	0.122	0.116	0.118	0.113
Transportation Benefits	with	4834	0.113	0.094	0.087	0.086	0.117	0.119	0.132	0.140
	without	4834	0.257	0.088	0.257	0.258	0.251	0.254	0.257	0.263
Minimum Wage Coverage	eq/above	4834	0.329	0.112	0.309	0.303	0.327	0.329	0.347	0.358
	below	4834	0.039	0.048	0.033	0.040	0.039	0.042	0.040	0.042
Legal Working Hours	legal	4834	0.228	0.083	0.203	0.206	0.219	0.226	0.245	0.268
	above legal	4834	0.142	0.069	0.141	0.139	0.149	0.147	0.144	0.135
Housing Benefits	with	4834	0.029	0.043	0.037	0.035	0.029	0.026	0.026	0.024
	without	4834	0.341	0.096	0.307	0.310	0.339	0.347	0.363	0.379
Food Benefits	with	4834	0.123	0.082	0.106	0.101	0.120	0.120	0.143	0.147
	without	4834	0.247	0.079	0.238	0.244	0.248	0.253	0.246	0.256
Education/Child Care Benefits	with	4834	0.009	0.012	0.009	0.007	0.009	0.008	0.009	0.011
	without	4834	0.362	0.088	0.335	0.338	0.359	0.366	0.381	0.392
Health Insurance	with	4834	0.066	0.066	0.059	0.056	0.066	0.060	0.076	0.080
	without	4834	0.304	0.079	0.285	0.289	0.302	0.314	0.313	0.323
Full Time Work	full-time	4834	0.320	0.095	0.299	0.295	0.319	0.325	0.337	0.348
	part-time construc- tion	4834	0.050	0.032	0.045	0.049	0.048	0.048	0.052	0.055
Construction Sector Job	others	4834	0.024	0.021	0.023	0.025	0.025	0.022	0.023	0.025
		4834	0.347	0.090	0.321	0.319	0.343	0.351	0.366	0.378
Large Firms	large	4834	0.143	0.096	0.116	0.115	0.143	0.150	0.165	0.171
	small	4834	0.080	0.040	0.068	0.068	0.084	0.084	0.086	0.090

Source: Author's calculations (PNAD, Ministry of Labor, 1997 through 2007).

Note: Table reports the statistics of the job quality measures we use as dependent variables in our regressions. These are the share of population aged 23-65 with(out) the benefit of social security coverage, formal registration with the Ministry of Labor (MoL), minimum wage, transportation benefit, working by 44 hours/week), housing, food, education/child care, employer provided health insurance, working part-time, not working in the construction sector (*proxy* for lower risk) and working in larger firms (11 or more workers).

TABLE 13  
*Summary of the 50th Percentile of Log of Wages, by Job Benefit and for All workers*

Job Benefit		Obs.	Mean	St. Dev.	Mean by year					
					1997	1999	2001	2003	2005	2007
Social Security Coverage	with	4826	6.326	0.385	6.287	6.288	6.343	6.273	6.336	6.432
	without	4791	5.867	0.462	5.857	5.786	5.866	5.818	5.881	5.992
Registration MoL	with	4820	6.338	0.383	6.291	6.306	6.360	6.283	6.349	6.441
	without	4831	5.940	0.510	5.937	5.886	5.942	5.875	5.934	6.065
Transportation Benefits	with	4417	6.367	0.430	6.360	6.330	6.371	6.302	6.354	6.480
	without	4832	6.162	0.467	6.106	6.092	6.171	6.120	6.190	6.296
Legal Working Hours	legal above	4825	1.228	0.448	1.162	1.171	1.258	1.178	1.249	1.353
	legal	4798	0.849	0.436	0.802	0.773	0.842	0.799	0.895	0.984
All workers		4834	6.101	0.481	6.058	6.035	6.113	6.047	6.115	6.240

Source: Author's calculations (PNAD, Ministry of Labor, 1997 through 2007).

Note: The table reports statistics of the 50<sup>th</sup> Percentile of log wages. We use the sample of employees aged 23-65 to obtain the wages by job benefit and we use the sample of all workers aged 23-65 to obtain the wages (labor earnings) for all workers in the city. All wages are in Reais of Sept/2007 per month, except wages by the benefit "legal working hours" which is per hour.



TABLE 14  
*Summary of Workers by Employment Status*

Employment Status	Obs.	Mean	St.Dev.	Mean by year					
				1997	1999	2001	2003	2005	2007
Wage Earners	4834	0.370	0.091	0.344	0.345	0.368	0.373	0.389	0.403
Self Employed	4834	0.187	0.078	0.203	0.204	0.183	0.183	0.176	0.172
Nonemployed	4834	0.281	0.083	0.280	0.279	0.295	0.285	0.272	0.275
Unpaid Workers	4834	0.076	0.083	0.092	0.092	0.067	0.071	0.069	0.062
Domestic	4834	0.052	0.035	0.047	0.047	0.053	0.053	0.057	0.056
Other	4834	0.030	0.027	0.033	0.033	0.033	0.035	0.037	0.032

Source: Author's calculations (PNAD, Ministry of Labor, 1997 through 2007).

Note: Table reports the share of the population aged 23-65 whose employment status is: wage earner, self-employed, nonemployed, unpaid worker, domestic employee and other worker (employer or working for own consumption)

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