

The Efficiency-Equity Trade-off of Labor Market Regulations: Evidence from Brazilian Cities.

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Abstract

This paper investigates whether labor market regulations involve a trade-off between efficiency and equity. We use city level data on efficiency and equity outcomes, and we explore the regional variation in the enforcement of labor regulation across 5,513 Brazilian cities. Although not all of the variation in enforcement can be considered exogenous, we control for pre determined regional characteristics and instrument enforcement of regulation with the distance between each city and the location of an enforcement office, a measure of how costly is enforcement of labor regulations. Our findings suggest that a stricter enforcement of labor regulations is associated with a lower city level income inequality and/or poverty rates, although not with significantly lower labor productivity. The evidence also supports that stricter enforcement of labor regulation reduces the use of labor informality at the city level.

Keywords: Labor Regulations, Enforcement, Informal Sector, Labor Markets, Efficiency and Equity.

JEL Classification codes: H00, H10, J50,K20, L50, L60, O17,O40.

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1. Motivation

Several countries in Latin America have complex systems of labor market regulations and institutions. These are designed primarily to protect worker's rights and standards of living in case unexpected shocks occur (Blanchard, 2002). However, if labor regulations are too restrictive they can hinder economic performance by introducing rigidities in the labor market and increasing labor costs. As a result, regulation may end up hurting the individuals it was supposed to help. These labor market rigidities are often viewed as the major cause for the existence of large informal labor markets in developing countries. When compared with formal workers, informal workers are cheaper and can be more flexibly adjusted in the presence of adverse shocks. This additional flexibility given by the informal labor is likely to be translated into better firm (and regional) performance. Nevertheless, it might come at the cost of a higher regional vulnerability, poverty and/or inequality. Surprisingly, there is very little empirical work trying to quantify this efficiency-equity trade-off that is potentially implicit in labor market regulations. This paper will investigate this issue using city level data for Brazil. In particular, we will relate city level efficiency and equity outcomes with administrative data on the enforcement of labor regulations.

Brazil is an interesting case to study for several reasons. First, it has one of the most regulated labor markets in the world (e.g., Botero, Djankov, La Porta, Lopez-de-Silanes and Shleifer, 2003). Furthermore, the enforcement of labor regulation is apparently weak since 40% of total employment is in the informal sector (Soares, 2003). Moreover, even though labor regulation is the same across all Brazilian states, its enforcement is highly decentralized. This generates considerable variation in the compliance with the law across cities. Finally, we can construct measures of the enforcement of labor regulation at the city level (*município*) using administrative data collected by the Brazilian Ministry of Labor.¹

The paper will try to address some of the following questions: Do cities with a higher evasion of the labor market regulations have, all else constant, a better regional economic performance? In particular, do they have higher employment rates and higher productiv-

¹This is a major advantage since most of the literature analyzing the effects of labor market regulations (mostly on efficiency) explores cross country comparisons (e.g., Djankov et al, 2003).

ity? Is stricter enforcement of the labor market regulations associated with lower inequality and/or poverty rates? These are important and controversial issues which have not been adequately researched yet, mostly because of lack of suitable data. Most of the work analyzing the effects of labor regulation on labor and performance indicators, explores variation in the *de jure* labor regulation. However, specially in developing countries, the *de facto* regulation might be very different than what is stated in the books. Non-compliance with regulation tends to be quite large and the enforcement is imperfect because monitoring is costly. Following Almeida and Carneiro (2006) we analyze the effect of labor market regulations by exploring the fact that labor regulations are not enforced uniformly *within* Brazil. The enforcement of labor regulation is highly decentralized in Brazil, varying widely across regions. We measure enforcement of the labor regulations with administrative data on the number of firms inspected by labor inspectors in a given city (in 2002), as a proportion of the total number of firms in that city. We measure regional efficiency and equity using city level data for per capita GDP, the theil inequality index or the head count poverty ratio.

Unfortunately, not all the variation in our measure of enforcement across regions can be considered exogenous to our efficiency and equity outcomes. Some regions could have higher enforcement simply because they have a higher level of informality (reverse causality); or because they are more developed, and (due to a better institutional environment) economic performance could be positively correlated with enforcement and negatively correlated with informality (omitted variables). In order to address these problems, and following Almeida and Carneiro (2006), we instrument enforcement with a measure of the cost of enforcement: the average distance (measured in hours of travel) between each city and surrounding cities with a local office of the ministry of labour, which in Brazil is called the *subdelegacia*. Enforcement of labor regulation in Brazil is decentralized at the level of this *subdelegacia*, and each *subdelegacia* has the responsibility of maintaining compliance with the law in several surrounding cities.

Using this empirical strategy we do not find that labor market regulations involve a significant trade-off between efficiency and equity outcomes across Brazilian cities. In cities where the enforcement of labor regulations is stricter there is less poverty and inequality.

This could be to some extent explained by the lower levels of labor informality those cities with a stricter enforcement of labor regulations. However, we do not find robust evidence that a stringent enforcement of the labor regulation is associated with a significant efficiency loss at the city level, measured by lower per capita GDP at the city level. Our findings have important policy implications. They suggest that labor regulations protect some workers (possibly those who need the most) so that regional inequality and poverty are smaller in those regions where enforcement is stricter. Nevertheless, at the regional level these gains do not seem to be outweighed by large efficiency losses since the per capita GDP at the city level is not significantly affected by changes in the enforcement of labor regulation.

The reasoning behind our choice of instrument is that enforcement should be weaker where it is more costly, and the cost of enforcement depends on the distance to the enforcement office, which in this case is the *subdelegacia*. In our city level data covering all the Brazilian cities, a 1 hour increase in the distance to a city with an office of the ministry of labor leads to a decrease of 3 labor inspections per 100 firms in the city. We realize that our identification strategy may still suffer from an important problem, which we try to address. Enforcement offices are not randomly assigned across Brazil, but they tend to be located in developed cities. Alternatively, the demand for evasion might vary at the city level if firms choose their location based on a variety of reasons, and those wishing not to comply with labor regulation may want to locate in areas where enforcement is weaker. In order to minimize these problems we control for several city level characteristics, including measures of how costly is transportation between the city and a main economic center. We are currently testing the robustness of the main findings to the inclusion of other variables.

Our paper contributes to and integrates insights from the literature on regulation and informality. First, we are related with the literature that analyses the effects of labor market regulation on efficiency and equity outcomes. Several papers focus on specific changes in labor regulations (e.g., Barros and Corseuil, 2001) or social security payments (e.g. Gruber, 1997, Kugler and Kugler, 2003) within a country.² More closely related to our analysis is

²Part of this literature explores cross country variation in the labor regulation to identify the effects of more restrictive labor regulation on aggregate outcomes (e.g., Botero, Djankov, La Porta, Lopez-de-Silanes

Boeri and Jimeno (2005), Holmes (1998) and Besley and Burgess (2004). They both use regional level data to study the link between regulation and performance. Holmes (1998) looks at changes across US states and shows that those that enacted pro-business right-to-work laws had increases in manufacturing activity. Besley and Burgess (2004) also find important effects of labor regulation on output, employment, investment and productivity in Indian manufacturing. Unlike this literature we explore variation in the enforcement of labor regulation rather than using variation of the regulation itself. Almeida and Carneiro (2006) follow a similar approach, exploring changes in enforcement with city-level. They find that a stricter enforcement of labor market regulations decreases output, employment and capital at the firm level but that productivity (measured by output per capita) is not significantly affected. This work differs from Almeida and Carneiro (2006) because we explore the effects of regulation on efficiency and equity outcomes across all the Brazilian cities (5,513 cities). In the previous work, we restricted attention to a manufacturing survey across 13 Brazilian states and have only explored variation in enforcement across 300 Brazilian cities.

We also relate to the work relating labor market regulations with inequality outcomes. Most of the work relates measures of labor regulations with inequality indexes across different countries. Labor market regulations can help achieve socially desirable redistributive goals and they could be an effective tool for reducing inequality (Emerson and Dramais, 1988; Rama, 2001, 2003). However, there is increasing debate on whether regulations help achieve this goal in developing countries (e.g., Rama, 2001, 2003, Calderon, Chong and Valdes, 2004). Rama (2003) and Calderon, Chong and Valdes (2004) analyze the impact of labor market regulations on inequality across different countries. Rama (2003) finds some evidence that social security programs help reduce income inequality. He does not find evidence that ILO labor standards, higher minimum wages, or more government employment significantly affect income inequality. Calderon, Chong and Valdes (2004) find that compliance with labor regulations reduces income inequality but that higher minimum wages increase income inequality. Using micro data, Heckman and Pages (2003) give some evidence that labor

and Shleifer, 2004, Nickell and Layard, 2000 and Heckman and Pages, 2003, Lazear, 1990, Blanchard and Wolfers, 2000). These cross country studies suggest that stringent labor marker regulation hampers economic efficiency.

market regulations (particularly job security) increase income inequality. In particular, they find that labor regulations reduce the employment prospects of particular groups of workers such as young, female and unskilled workers. They also find that inequality increases because labor regulations increase the size of the informal sector.

Finally, our paper also relates to the literature linking regulation and informality. Direct and indirect tax rates as well as stringent labor regulations are usually found to be strong determinants of the size of the informal sector across countries (e.g., de Soto, 1989, Loayza, 1996, Schneider and Enste, 2000; see also de Paula and Scheinkman, 2006). However, enforcement of regulation and the quality of institutions are also important determinants of the way regulation affects informality (e.g., Johnson, Kaufmann and Zoido-Lobaton, 1998, Loayza, Oviedo and Serven, 2005). Some of the modern micro literature on informal labor markets (e.g., Maloney, 2004) suggests that we should look at the formal and informal sectors in an integrated way (as opposed to a segmented view of the labor market) and emphasizes the role of the informal sector as a source of unregulated labor to firms.

Our paper is organized as follows. In section 2 we describe the Brazilian labor market, the enforcement of regulation in Brazil, and the main data sets that we use. In Section 3 we analyze the relationship between strength of regional enforcement and city level outcomes. Section 3.1 discusses the main findings and section 3.2 tests the robustness of the main findings. Section 4 concludes.

2. Data

2.1. Enforcement of Labor Regulation

Brazil has one of the least flexible regulation of the labor market in the world (according to the Doing Business data set it ranks third, only below Portugal and Panama). The law establishes that all employees in Brazil must have a work permit on which the employment history of the worker is registered (*carteira de trabalho*). This permit officially entitles the worker to several wage and non-wage benefits paid for by the employer, such as retirement benefits, unemployment insurance, and severance payments. Traditionally, much of the labor law is written in the country's constitution, which is very detailed and stipulates very

specific legal provisions.³ This makes the amendment of these provisions very difficult. The constitution of 1988 introduced several changes to the labor codes that had been in effect since the 40's, but most of these changes increased the degree of worker's protection.

In Brazil there are very favorable working conditions for workers with formal contracts. These benefits imply a very high costs of employment for firms, which are well above the costs in other Latin American countries. In particular, the law establishes that workers can work at most 44 hours in a week, and that the maximum period for continuous shift work is 6 hours. The minimum overtime pay was is set at 1.5 times the normal hourly wage. Employers are also obligated to offer paid leave to their employees, which is at least 4/3 of normal wage, as well as a paid maternity period of 120 days. There also exists a paternity license but it is smaller than the maternity period (5 days).

Even though it is not much more difficult to fire a worker in Brazil relatively to other Latin American countries, it is definitely much more costly. Employers must give a prior notice to workers of the dismissal and, between this notice and the actual dismissal, workers are granted two hours a day to look for a job. This period is never smaller than one month and recently it became proportional to the worker's tenure. During this period, employers cannot adjust the worker's wage so this implies that 25% of the worker's hours are paid but are not worked. In practice the productivity of a dismissed worker also falls once he/she is given notice of dismissal so that the overall decline to production is well above 25% (Paes de Barros and Corseuil, 2001, argue that in most of the cases the fall in production is closer to 100%). Advance notice constitutes the bulk of dismissal costs in Brazil.

Moreover, workers with non-justified dismissals have the right to receive a monetary compensation paid by the employer, beyond that accumulated in the worker's job security fund (FGTS).⁴ In particular, the law establishes that a penalty equal to 40% of the job

³For a general description of the Brazilian labor regulation and its recent changes see Barros and Corseuil (2001)

⁴The *Fundo de Garantia por Tempo de Serviço* (FGTS) is a government administered fund paid by the employers that is accumulated while the worker is employed by the firm. Each worker in the formal sector has his own fund. The employer must contribute monthly with 8% of the employee's current wage to the fund. As a consequence the accumulated FGTS of a worker in a given firm is proportional to its tenure. Only workers that are dismissed for an unfair reason or those that are retired have access to this fund. Upon dismissal, workers have access to the entire fund, including all the funds accumulated in previous jobs, plus

security fund is to be paid to every dismissed worker without a just cause. The rate of accumulation of the fund is such that, for a tenure of 2.5 years on the job, this compensation reaches one monthly salary.

In the case of informal hires most of these benefits are negotiated on a case-by-case basis between the employer and the employee. Moreover, unregistered workers do not have access to unemployment benefits and severance payment. Neri (2002) argues that firms comply with most of the worker's rights relative to the minimum wage, hours of work and other employment practices, even for informal workers. Therefore, the major incentive for firms to hire informally is to avoid mandatory payments to the government (e.g., social security payments, FGTS contributions) which in Brazil can amount to 100% of the net wage paid to the worker (effectively doubling the cost of labor), the costs of advance notice, and severance payments. The increased flexibility associated with informal contracts coupled with a significantly lower cost are the most important advantages for employers to hire informally.

Nevertheless, when hiring informal workers, employers face a cost of being caught and having to pay a fine. The probability of being caught depends on the degree of enforcement in the region where the firm is located. Compliance with labor regulation in Brazil is enforced by the Ministry of Labor. Given the size of the country, enforcement is first decentralized at the state level (the state level labor office is called *delegacia or DRT*) and then at a more local level, the subregion (the local labor office is called *subdelegacia*). The concept of *subdelegacia* is administrative and does not correspond to any geographical unit. In particular, a *subdelegacia* includes more than one city (or *município*). In each state, the *delegacia* is always located in the state capital and the number of *subdelegacias* within the state is a function of the size and of the economic importance of each region. For example, the state of Sao Paulo has 21 *subdelegacias* while other smaller states, like Acre or Amapá, only have one *subdelegacia*, which coincides with the *delegacia*.

Labor inspectors are affiliated with a particular *subdelegacia* and report to the head of the *subdelegacia* (*subdelegado*). They periodically visit firms within the region, assessing the

a penalty in proportion to the fund accumulated in the firm from which they are being dismissed.

compliance with several dimensions of labor law (e.g., worker's formal registration, compliance with minimum wage regulation and hours of work). Very often, inspectors decide to visit a firm after having received an external accusation of illegal behavior in that firm.

There are different types of labor violations and all violations are punishable with fines. For example, if a worker is found not to be registered (informal), the inspector notifies the firm of the violation of the labor code. After receiving a notification, the firm has 10 days to present evidence in its defense. Because it is the firm's responsibility to register the worker's contract, once notified it is very difficult for the employer to prove its innocence.⁵ Therefore, even though a notification does not imply a fine, in the particular case of the registration of workers, it almost always does. A firm is fined 300 Reais (USD\$130) for each worker that is found unregistered during an inspection (which can occur more than once a year) but the fine is reduced by 50% if the firm pays within 10 days of the date of notification.

The Ministry of Labor makes an effort to apply an homogeneous criteria in the enforcement of labor regulation throughout the country, but in practice this is very difficult to achieve.⁶ Enforcement is not likely to be uniform across the country because Brazil covers a very large and diverse geographical area, the number of inspectors involved is also large. Inspectors are also probably very heterogeneous in their ability and honesty (which is important if inspectors are ever offered bribes).⁷ This gives rise to substantial regional variation in the degree of enforcement across cities, which we will explore econometrically. Since we study the effects of enforcement on firm performance, we measure enforcement with the number of firms inspected in each city (in 2002) as a fraction of the total number of firms in the city.

The transportation of inspectors from the *subdelegacia* to each inspected firm is made using ground transportation (usually by car). Hence, enforcement of the regulation will be

⁵Exceptions include the cases where a third party (such as a union) is responsible for the registration. But there are few of these cases.

⁶The Ministry of Labor continuously provides training to labor inspectors. Moreover, all inspectors have a common implementation manual and work with a similar software. At the end of 2002, there was a total of 2341 labor inspectors in Brazil.

⁷Up to 50% of the inspectors' wage is tied to their performance giving them a strong incentive to penalize all the infractions they can find. However, there is still an incentive to collect bribes.

easier and less costly when there is a *subdelegacia* in the city (or close to) where the firm is located. To measure the accessibility of inspectors to firms located in different cities, we compute two alternative measures of the cost of travelling from each city to the *subdelegacia*: (1) Distance from every city to the closest *subdelegacia* within the region (2) Average distance from the city to all the *subdelegacias* within the region. The latter is justified because, in theory, labor inspectors can be assigned to firms located in any city within the state, and not necessarily to the cities closest to the *subdelegacia*. When firms are located in cities that have a *subdelegacia* both measures assume the value zero. In the empirical work, we will instrument our enforcement measure (share of inspected firms in the city) with this second measure of the access of inspectors to firms in different cities, and we will check the sensitivity of results to the use of the first measure (and other alternative measures).⁸ More details on the construction of this variable as well as on enforcement are given in the data appendix.

2.2. City Level Characteristics and Informal Employment

We use alternative sources of city level data. First, we use above mentioned administrative data collected by the Ministry of Labor (2002). This data has information on different measures of the strictness of the enforcement of labor regulation across all the Brazilian cities. We have information for the number of regional offices, number of inspected firms and the number of fines issued in each city. Because some of our measures are defined per firm in the city we also construct the number of firms in the city in 2002. Information for the total number of firms, total wage earners, total number of employees and total wage bill at the city level comes from the firm level survey *Cadastro Central de Empresas* collected by the *IBGE*. Second, as variables of interest we consider different efficiency and inequality variables at the city level. In particular, we use per capita GDP, the head count poverty index and the theil inequality index at the city level. The city level inequality measures

⁸We use data on the distance between any two Brazilian cities from the website www.bbseguroauto.com.br. This website collects very detailed information on distances across cities and is of free access. We compute, the two distances using two alternative measures, one in kilometers and the other in travel hours using ground transportation. In section 4 we present the results for the average distance in hours but the results are robust to the other three measures. More details in the appendix.

including the share of income in the lowest decile of wealth, share of city population below one(two) dollar a day, Theil index of city income and the Gini index of city level income come from the *United Nations Statistical data base* (2002, 1980). Third, we also study the relationship between informal employment and enforcement of labor regulation at the city level. We compute the share of informal employment in total employment in the city using the 2000 Brazilian census. We define informal workers as those who report being employed without a work permit and the self employed. In the Brazilian Census there is a total of 5,513 cities in Brazil.

Finally, we also include in the analysis other city level characteristics as geographical area, total employment, average firm size, average wages, transportation costs, number of train stations and a human development index. These are constructed from several data sources and made available at the websites of two major statistical and analysis institutes in Brazil: the Instituto de Pesquisa Economica Aplicada (IPEA), and the Instituto Brasileiro de Geografia e Estatistica (IBGE). City level variables including geographical area, total employment, average firm size and average wages come from the Brazilian census data for the year 2000 collected by the IBGE. Information for per capita GDP in the city is collected by *IBGE*. Information on educational variables including average years of schooling at the city level comes from the *Atlas do Desenvolvimento Humano no Brazil*. Sample statistics for the main variables we use are presented in table 1.

3. Enforcement of Labor Regulation and City Level Characteristics

3.1. Main Findings

In this section we analyze the relationship between enforcement of labor regulation and city level measures of efficiency and equity. In particular, we estimate the following equation:

$$Y_c = \beta E_c + Z_c \delta + \varepsilon_c \tag{3.1}$$

where Y_c is the outcome of interest (e.g., GDP per capita or the poverty index) for city c , E_c is a measure of the enforcement of labor regulation in the city c (measured by the number of inspected firms per 100 firms in the city), Z_c is a vector of city level characteristics including

demographic, institutional and economic controls (e.g., lagged per capita GDP in the city, city geographical area). We assume ε_c is an i.i.d. error term.

Since E_c is potentially correlated with ε_c (either because more violations of labor law will attract more enforcement, or because more developed areas have better institutions and higher enforcement), we construct an instrumental variable which is correlated with E_c but uncorrelated with ε_c . In particular, our instrument is the average distance between each city and all the cities within the same state where a *subdelegacia* is located. Whenever the firm is located in a city where a labor office is located the distance is set to zero. Distances are measured in hours of travel (for a detailed description see the appendix).

Table 2 presents the results of a regression of the share of firms that were inspected in each city on the average distance to a labor office (the instrumental variable). All the specifications include state dummy variables. The city level controls in column (1) are the log of GDP per capita in 1980 and the population in 1980, column (2) adds urban population in the city and city area, column (3) adds an index of transportation costs and the number of train stations in the city and column (4) adds an index of human development in 1980. See appendices for the sources and definition of the variables. We chose to measure city level controls as early in time as we could (without losing too many observations), in an attempt to get predetermined variables. Contemporaneous measures of city characteristics are likely to be endogenously affected by current enforcement.

The coefficients in the table show how the probability of a firm being inspected changes with the city level characteristics. At the bottom of each column we present the F-statistic for the test of whether the instrument belongs in the regression, and the corresponding p-value. The results across columns show that the instrumental variable is a very strong predictor of the incidence of labor inspections in the city.

Table 3 reports the the least squares estimates for the outcomes of interest (log GDP per capita, Theil inequality index, Head count poverty ratio and the share of informal workers) using a reduced form regression. We control for state level dummy variables, city GDP per capita, city population in 1980, the share urban population in the city, log city area and a measure of the transportation costs in the city. We find that cities located far away

from the *subdelegacia* tend to have higher income inequality, higher poverty rates and more labor informality. We do not find significant evidence that output per capita is significantly different across cities located in different regions.

Table 4 presents the least squares estimates a regression of the outcomes of interest on the enforcement measure and on the city level controls. A stricter enforcement is associated with higher GDP per capita in the city, lower inequality, lower poverty rates and with approximately the same informality. However, the least squares estimates are likely to be biased although the sign of the bias is unclear. One one end, there can be more inspections (enforcement) in cities where informal employment is more prevalent. Since informal firms tend to be smaller and to have lower productivity, a high level of inspections will be associated with high levels of informality and lower productivity. However, it could also happen that inspections are more frequent where institutions are more developed, and this happens in richer cities with low levels of informality. In that case a high level of inspections would be simultaneously associated with low levels of informality and higher productivity.

In table 5 we attempt to address this problem by instrumenting enforcement with a measure of how costly it is to enforce labor regulation. Our assumption is that the instrument measures the cost of enforcement in each city, and that conditional on the city level controls we include in the regression the instrument is not correlated with any of the dependent variables of interest (except through enforcement). The table presents the instrumental variables estimates of equation (3.1) for the city level GDP per capita, city inequality (theil) index, city head count poverty rate and the city share of informal workers. Our estimates indicate that each additional labor inspection per 100 firms in the city leads to a fall in income inequality and in the city level poverty rates. There is also evidence that cities with a more stringent enforcement of labor regulation have a 1% higher GDP per capita and a 1.4% lower share of labor informality, although the coefficients are not statistically different from zero.

These estimates indicate that cities with high levels of enforcement tend to have approximately the same per capita GDP but a significantly lower income inequality and poverty rates. This happens possible through a smaller level of informality in these cities though

the results are not statistically strong. These findings tend to be in line with the cross country evidence relating labor regulations and income inequality (e.g., Calderon, Chong and Valdes). We do not find evidence that a more stringent enforcement of labor market regulations translates into significant efficiency losses at the regional level. Almeida and Carneiro (2006) find that Brazilian firms located in cities where enforcement is stricter tend to have lower output and employment levels. Consistent with our findings they also do find that labor regulations have statistically significant effects on firm level productivity (using as measure output per employee).

3.2. Robustness

TO BE COMPLETED

The validity of our instrumental variables procedure would be violated if the firm and city characteristics we include in the regressions were not enough to account for the fact that labor offices are not randomly distributed across cities. It is reassuring that the inclusion and exclusion of different control variables does not affect the employment regressions substantially (on going work). Also in on going work we are also testing the robustness of the main findings to the exclusion of the largest cities from the sample and to the exclusion of certain states.

4. Conclusion

This paper investigates whether labor market regulations involve a trade-off between efficiency and equity. We use city level data on efficiency and equity outcomes, and we explore the regional variation in the enforcement of labor regulation across 5,513 Brazilian cities. Although not all of the variation in enforcement can be considered exogenous, we control for pre determined regional characteristics and instrument enforcement of regulation with the distance between each city and the location of an enforcement office, a measure of access of labor inspectors to cities. Our findings suggest that a stricter enforcement of labor regulations are associated with a lower city level income inequality and poverty rates. This happens in part because labor informality is smaller in cities with a stricter enforcement

of labor regulation. However, consistent with previous work, we do not find evidence that a stricter enforcement of labor market regulations is associated with significantly efficiency losses (measured by city level output per capita).

Appendix - Enforcement of Labor Regulation

The Brazilian Ministry of Labor has the responsibility to enforce all the laws and regulations, including international conventions, related with labor and employment relations and contracts. The inspectors verify the enforcement of labor related laws and regulations. In particular, they verify whether workers are formally registered with the labor authorities, i.e., that they have a work permit (or *carteira de trabalho*). The Ministry of Labor is a decentralized structure with a regional branch in each state (*delegacia regional do trabalho*). Within each branch, there are several administrative units, or *subdelegacias*. The concept of *subdelegacia* is administrative and does not correspond to any geographical unit. In particular, a *subdelegacia* includes more than one city (or *município*). In each *subdelegacia* there are several regional offices (called *agencias de atendimento*), of which one is the headquarters. The regional offices are not decision units like the *subdelegacias*. They are designed for increasing the access of the public to the Ministry of Labor.

The inspector responsible for each *subdelegacia*, or the *subdelegado*, reports to the inspector responsible for the regional branch, the *delegado*. The labor inspectors are affiliated only with one *subdelegacia*. In general, each inspector works only for one *subdelegacia* and reports to the *subdelegado*. The inspectors visit the plants with the objective of evaluating the compliance with several dimensions of the labor laws and regulations. They administer different types of labor fines: informal worker fines, are fines related with the firm not registering the worker for a work permit, work load fines are fines related with the firm not complying with the official work load, wage fines are fines related with the firm not paying the minimum established by the law, hours of work fines are fines related with the firm not complying with the number of hours of work and the mandatory pauses, FGTS fines are fines related with the firm not making the mandatory discounts to the FGTS, transport subsidy fines are fines related with firm not paying the mandatory transport subsidy, and other fines are fines related with other mandatory obligations of the firm to their workers. Our measure

of enforcement will be based on the administrative data collected by the Ministry of Labor (2002) on the total number of inspected firms at the city level. To obtain our enforcement measure we divide the total number of inspected firms at the city level by the total number of firms in the city and multiply by 100.

To instrument enforcement we use a measure of how costly is the access of inspectors to firms in different cities. We compute the distance between any Brazilian city and a *subdelegacia* in the same state. We use data on the distance between any two Brazilian cities (in kilometers and in travel hours using ground transportation) from the website www.bbseguroauto.com.br. For each city we compute two alternative measures: (1) Distance to the closest *subdelegacia* within the region (2) Average distance to all the *subdelegacias* within the region. When the firm is located in a city with a *subdelegacia* both measures assume the value zero since there is no displacement cost for the inspectors. We also construct the distance (in hours) between each city and the state capital city.

We faced two obstacles in these computations that nevertheless affected very few cities. On the one hand, some of the firms in our sample are located in cities that only recently became officially recognized as cities. For these, we did not have information on the website. To fill out this gap, we have used maps to find the nearest city and then used their information as an approximation. (there were few of these cases and calculations are available upon request). On the other hand, the majority of cities in Amazonas use mostly the maritime transportation rather than the ground transportation both for goods or persons. Thus, for Amazonas there is also no information on the ground distance between cities. There were only two firms located outside Manaus. Since these cities were very close to Manaus, and in Manaus there is a *subdelegacia*, we assume that the distance is zero.

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Table1: Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
Log of GDP per capita	5,507	1.17	0.76	-0.77	5.20
Theil Inequality index	5,507	0.52	0.10	0.18	1.27
Poverty index	5,507	47.00	10.70	15.70	83.00
Share informal workers	5,425	0.34	0.25	0.00	1.00
Firms inspected by labor authorities / total number firms *100	5,505	3.50	6.80	0.00	118
Average distance to the subdelegacias (hours)	5,294	0.28	0.13	0.00	0.89
% Urban population (1980)	5,508	31	27	0.00	100
Log of GDP 1980	3,991	10.00	1.40	4.00	18.50
Log of Population (1980)	3,991	9.40	1.00	6.50	15.90
Number of train stations	5,508	0.32	1.33	0.00	63.00

Source: Brazilian Ministry of Labor (2002), IPEA, IBGE.

Note: Population is normalized by 1,000,000 inhabitants and % Urban population is the share of urban population in the total city population. Definitions and sources of all the variables in the appendix.

Table 2:
Enforcement of regulation and the location of the labor offices

Dependent Variable:	Firms inspected / total firms			
Method:	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Average distance to the subdelegacias	-5.577 [0.971]***	-4.75 [1.010]***	-3.266 [1.345]**	-2.985 [1.353]**
State level dummies included?	Yes	Yes	Yes	Yes
GDPpc, Population (1980)	Yes	Yes	Yes	Yes
% Urban Population, Area	No	Yes	Yes	Yes
Transp. costs, Nb. train stations	No	No	Yes	Yes
Human Development Index (1980)	No	No	No	Yes
Observations	3,868	3,868	3,848	3,848
R squared	0.30	0.30	0.29	0.29

Standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%. Table reports the least squares estimates of a regression of the share of firms inspected by labor authorities in the city, state dummy variables (unidade de fomento) and city level controls. The city level controls in column (1) include the log of GDP per capita in 1980, population in 1980, column (2) adds urban population in the city and city area, column (3) adds an index of transportation costs and the number of train stations in the city and the distance between the city and the state capital and column (4) adds an index of human development. See data appendix for the sources and definition of the variables.

Table 3
City level characteristics and the location of the labor offices

Dependent Variable:	Log GDP per capita	Theil Index of Inequality	Head Count Poverty Index	Share Informal Workers
Method:	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Average distance to the subdelegacias	-0.05 [0.070]	0.18 [0.018]***	7.46 [1.085]***	0.07 [0.041]*
State level dummies included?	Yes	Yes	Yes	Yes
GDPpc, Population (1980)	Yes	Yes	Yes	Yes
% Urban Population, Area, Transportation costs	Yes	Yes	Yes	Yes
Observations	3,868	3,868	3,868	3,832
R squared	0.73	0.20	0.68	0.09

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. The table reports the least squares estimates of a the city level outcomes reported

in each column on state level dummy variables (unidade de fomento) and on different city level controls. The city level controls include log of GDP per capita in 1980,

population in 1980, urban population in the city, city area and the number of train stations. See data appendix for the sources and definition of the variables.

Table 4

Enforcement of labor regulation and city level outcomes

Dependent Variable:	Log GDP per capita	Theil Index of Inequality	Head Count Poverty Index	Share Informal Workers
Method:	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Firms inspected by labor officials / total number firms	0.008 [0.001]***	-0.001 [0.000]***	-0.118 [0.015]***	0.001 [0.001]
State level dummies included?	Yes	Yes	Yes	Yes
City level controls included?	Yes	Yes	Yes	Yes
Observations	3,991	3,991	3,991	3,954
R squared	0.74	0.18	0.69	0.09

Standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%. The table reports the least squares

estimates of the outcomes in columns (1) to (4) on the share of firms inspected by labor officials, state level dummies, city population

in 1980, log of GDP per capita in 1980, city area, urban population and number of train stations.

Table 5

Enforcement of labor regulation and city level outcomes: IV estimates

Dependent Variable:	Log GDP per capita	Theil Index of Inequality	Head Count Poverty Index	Share Informal Workers
Method:	IV	IV	IV	IV
	(1)	(2)	(3)	(4)
Firms inspected by labor officials / total number firms	0.010 [0.014]	-0.036 [0.008]***	-1.529 [0.359]***	-0.014 [0.009]
State level dummies included?	Yes	Yes	Yes	Yes
City level controls included?	Yes	Yes	Yes	Yes
Instrument	Av. distance to subdelegacias			
Observations	3,868	3,868	3,868	3,832
R squared	0.73	0.00	0.17	0.00

Standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%. The table reports the instrumental variable estimates of the outcomes in columns (1) to (4) on the share of firms inspected by labor officials, state level dummies, city population in 1980, log of GDP per capita in 1980, city area, urban population and number of train stations. The share of firms inspected by the labor authorities in the city is instrumented with the average distance (in hours) from the city where the firm is located to all the subdelegacias in the state.

Table 6
Enforcement of labor regulation and city level outcomes: Robustness

Dependent Variable:	Log GDP per capita	Theil Index of Inequality	Head Count Poverty Index	Share Informal Workers
Method:	IV	IV	IV	IV
	(1)	(2)	(3)	(4)
Total number of labor fines / total number firms	8.85 [12.867]	-31.64 [10.374]***	-1345.64 [464.175]***	-12.36 [8.049]
State level dummies included?	Yes	Yes	Yes	Yes
City level controls included?	Yes	Yes	Yes	Yes
Instrument	Av. distance to subdelegacias			
Observations	3,868	3,868	3,868	3,832
R squared	0.72	0.00	0.00	0.00

Standard errors in brackets, * significant at 10%; ** significant at 5%; *** significant at 1%. The table reports the instrumental variable estimates of the outcomes in columns (1) to (4) on the total number of labor fines per firm in the city, state level dummies, city population in 1980, log of GDP per capita in 1980, city area, urban population and number of train stations. The total number of labor fines per firm in the city is instrumented with the average distance (in hours) from the city where the firm is located to all the subdelegacias in the state.