Does Labor Flexibility Affect Firm Performance? Evidence from Brazil*

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Abstract

This paper studies whether access to informality affects manufacturing performance using a cross section of firms in Brazil. We use (exogenous) regional variation in the enforcement of the labor law to identify the effects of more flexibility of firm outcomes. The preliminary findings suggest that firms with an easier access to informal labor tend to have a more educated workforce, higher capital-labor ratio and a more advanced technology. This translates into a higher output and value added per employee. Additionally these firms tend to pay higher average wages per employee. We find this is either caused by a higher firm productivity and by the labor tax savings being shared with informal workers. Moreover, we do not find evidence that informality increases firm's employment or employment turnover.

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1. Introduction

Throughout the world, governments and legislators trade-off the benefits of social protection against the efficiency costs of rigid labor markets when designing labor regulation. There is now important evidence that stringent labor market regulations have important efficiency effects both for developed and developing countries.[1] But a more stringent labor market regulations also increases the incentive of firms to avoid these regulations by hiring informal workers. The informal economy has a considerable size in most countries of the developing world. Informality may leave the poorest workers in the economy in a very vulnerable position since they cannot benefit from the social protection regulations established by the governments of their countries. This is a major source of preoccupation for policy makers. Moreover, any type of behavior that corrupts the rule of law is damaging of the institutions of an economy, and of its long run economic growth. Finally, the sustainability of informal markets is often associated with bribes being paid to corrupt public officials, which corresponds to a transfer of resources from the general public to government bureaucrats. There is, however, a neglected and positive aspect of informality. It is possible that if firms and workers were not able to escape taxes and regulations the output and employment of the economy would be much lower and that poor workers were not able to find employment although they cannot benefit from basic social protection. Informal workers are a source of unregulated employment for firms who benefit from low cost workers and flexible employment practices, which in general will contribute for better firms performance. The benefits of informality are in some sense the costs of regulation, which trades-off social protection and economic flexibility.

This paper quantifies the importance of access to informal labor markets for the performance of manufacturing firms in Brazil in 2002. Brazil has a large and increasing informal sector. Moreover, there is a close relation between informality and poverty.[2] The country

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[1] Heckman and Pages (2003) survey evidence for latin america. The evidence strongly suggests that a restrictive labor market regulation decreases labor flexibility and reduces employment, turnover and bias employment composition towards more skilled workers.

[2] According to the national statistics office, in 1999, there were 36 million of wage earners in the private sector, of which 40% were informal workers. About 51.3% of the poor belong to households whose head is

also has a long tradition in a very restrictive labor market regulation, which was reinforced by the 1988 constitution (annex 1 presents a description of labor regulations).[3] According to the *Doing Business* data set collected by the World Bank, Brazil ranks third in the least flexible economies labor regulations. The *de jure* labor regulation in Brazil (i.e., what the labor law prescribes) is set at the national level. However, the enforcement of the labor regulations, through labor inspections and fines, is done at the regional level by regional branches of the ministry of employment. Therefore, firms located in different regions are likely to face a very different enforcement of formal labor contracts. This gives rise to cross sectional variation in the *de facto* labor law that can be used to identify the effects of more flexibility of firm outcomes. We will use regional variation in the fines administered by labor market inspectors as a source of exogenous variation in the costs of informality. The intuition behind our procedure is simple. Assume that we were able to increase the cost of access of some firms to informal labor markets (say, by increasing the number of fines administered by public officials). This decrease in flexibility is likely to affect total employment and firm's investment decisions.[4] Ultimately, it will also affect the output and productivity.

Related to our paper is the literature that looks at the consequences of restrictive labor market regulations on aggregate performance. A large part of this literature uses cross country variation to identify the effects of more restrictive labor regulation on aggregate outcomes (see e.g., Boeri, Nicoletti and Scarpetta, 2000, Forteza and Rama, 2000, Botero, Djankov, La Porta, Silanes and Shleifer, 2003, Heckman and Pages, 2000). The findings suggest that stringent labor marker regulation hamper productivity growth. Scarpetta and Tressel (2004) suggest that this effect is stronger in the presence of wage rigidities and suggest that this happens through a reduction in the incentives for innovation and new technology adoption. More closely related with our work is Besley and Burguess (2003) that study the effects of labor regulation on firm output, employment investment and productivity in

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in the informal sector.

[3] This annex was prepared following closely Barros and Courseuil (2001)

[4] An increase in informal labor costs reduces the relative demand for informal workers. But it also increases the average cost of labor in the firm (assuming the firm employs both formal and informal workers). The overal effect on formal employment is ambigous but informal labor should decrease.

manufacturing using regional data. Like them we also explore regional variation within a country. However, we focus on differences in *enforcement* of the law (not differences in law itself) and we use firm level outcomes (not regional data). Our paper is also related to the micro literature that focus on specific changes in labor regulations (see e.g. Heckman and Pages, 2003, Grubber, 1997 or Kugler and Kugler, 2005). Unlike this literature we look at the firm's use of informal labor, which is triggered by an overall restrictive labor regulation. The incentives might come from avoiding labor taxes or social security contributions mandatory in formal contracts or by not having to pay dismissal costs. Similar to our approch is Barros and Corseuil (2001) which look at the effects of a worker oriented change in the constitution . They do not find evidence of changes in the wage elasticity of demand or on aggregate employment turnover.[5] Finally, and also related to our paper is the literature on the determinants and causes of business informality (see e.g., Loayza, 1997)[6].

We develop an econometric analysis to confirm whether access to informality affects manufacturing performance. The findings are consistent with the view that when labor market regulations are binding and law enforcement is not very restrictive, firms with an easier access to informal labor tend to have a more educated workforce, higher capital-labor ratio and a more advanced technology. This translates into a higher output and value added per employee. Additionally these firms tend to pay higher average wages per employee. We find this is either caused by a higher firm productivity and by the labor tax savings being shared with informal workers. Moreover, we do not find evidence that informality increases firm's employment or employment turnover. We use the Brazilian investment climate survey collected by the World Bank, which is unique to study this since it collects simultaneously information on firm performance and the use of informal workers by registered firms.

The paper is organized as follows. Section 2 describes the data used and validates the variables we use in the empirical work. Section 3 describes the reduced form equation. It

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[5]Labor market regulations underwent significant changes in 1988 when the new constitution was enected in Brazil. Most of the changes increased the degree of worker's protection. They find that separation rates decreased for short employment spells and increased for longer spells.

[6]Loayza finds evidence that the government imposed restrictions on labor markets are positively related to the size of the informal sector and that the strength and efficiency of government institutions are negatively related to it.

also motivates the use of an exogenous change in cost of informality at the regional level as instrument for the use of informal workers. Section 4 describes the preliminary results for several firm outcomes and discusses the robustness checks. Section 9 concludes.

2. The Data

We use two sources of data. The information for the labor fines administered by the ministry of employment comes from the 2001 financial report of labor inspections published by the Brazilian ministry of employment. This administrative data is available for each region ("Estado Federal") in Brazil. The other data source is the Brazilian investment climate survey which was collected in 2002 by the World Bank. This survey is available with a similar format for several developing countries. The survey is part of a large World Bank project to understand drivers for firm competitiveness in manufacturing. The first part of the survey, collects information on different topics: general information about the firm and its manager, business environment and business relations, services and government regulations, labor and human resources, production capacity, planning and innovations, supplier and client relations, infrastructure and services inspections, finance. The second part of the survey collects balance sheet information for the 2000-2002 period. Because the survey is very detailed and collects information on subjective indicators, it is answered by the firm's manager.[7] The sampling frame was based on an industrial census from year 2002 and was restricted to selected sectors [8]. Only registered firms were included in the population frame. The selected industries together account for more than 75% of the entire manufacturing value added and employment in Brazil. The sampling procedure was such that the sample

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[7]In the collection of this data the World Bank worked with a private survey firm to draw the sample and to train enumerators to visit the firms. The typical observation is based on a three-hour visit to the firm.

[8]The sectors included are food, textile, garments, chemicals, machinery, electronic equipment, auto components and wood products. Table A2 in the annex reports the distribution of firms that report information on informal workers by sector of activity. Sectors that report a higher incidence are low skilled/labor intensive sectors (clothing, shoes and furniture). Conditional on having informal workers, on average informality represents approximatly 36% of the permanent workforce. Informal workers are less likely to be found and are smaller proportion of the total employment in chemicals, machinery and electronic products. In our sample, these sectors are more likely to have a certificate of quality and are more likely to develop internally and /or jointly with costumers, suppliers new technology. These sectors also have more educated workers (40% of the workers have more than the bachelor degree vs 31% for the median in the sample) and higher wages.

of firms selected to be interviewed is representative of the industry, region and size. The final sample covers $1,642$ firms and 13 regions.[9]

One uncommon feature of the data is that it collects information on the use of informal workers. The question is phrased indirectly to avoid implicating the respondent of wrongdoing: *"Given the constraints to hire workers and the additional costs that it entails, in your opinion, what is the percentage of the permanent and temporary employment that is informal/unregistered in a typical firm of this size and in this industry?" (ICS).* We will use this information to measure the degree of flexibility in the labor market of the respondent firm. About 10% of the surveyed firms do not report this information. However, most of these firms report information on other questions as sales, capital and other inputs. This missing information raises some questions relative to a possible sample selection. To address this issue, we check whether firms with missing information also decline answering other questions that also would implicate them in wrong doing. We did not find evidence that firms were avoiding all wrongdoing questions.[10] We also compare the characteristics for responders and non-responders. Table A2 in the annex reports the coefficients of an OLS regression of a set of dependent variables such as firm age, size, value added, capital stock, profits and total investment. Firms that do not report data on informal workers do not statistically differ from firms that report this information. Together, we find this evidence suggestive of the representativeness of our sample.

We will assume that the answer is representative of the firm's *own* degree of labor informality. Similar questions have been used successfully in the micro corruption literature (Svensson, 2003), there may remain some doubts to the extent to which the answer to this question measures the degree of informality in the respondent firm. We present some pieces of evidence that support our use of this data. Firms are also asked to describe several business practices of major competitors. In particular, firms are asked to judge to what

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[9]In the final sample we cover 13 "Estados Ferderais": Sao Paulo, Rio de Janeiro, Minas Gerais, Santa Catarina, Rio Grande do Sul, Parana, Goias, Mato Grosso, Ceara, Paraiba, Maranhao, Bahia and Amazonas.

[10]In particular, the survey asks: *"Recognizing the difficulties that many firms have to comply with their taxes, what is the percentage of the total sales that you believe a typical firm in your sector would declare?"* About 70% of the firms that do not report information on informal workers do report information on this question.

degree their competitors comply with labor law. We find that several firms simultaneously claim that their competitors comply perfectly with labor law and declare that a similar firms would hire a positive percentage of informal workers. Such responses would be inconsistent unless firms that were similar to the respondent firm were not its major competitors (which is unlikely) or the percentage of informal workers reported correspondent to the degree of informality of the respondent. Firms are also asked whether they would like to change their workforce if they had no hiring or firing costs. We find that those firms that report that they would like to change their workforce (either increase or decrease) report a higher share of informal workers. Moreover, those firms that report that they do not change the workforce due to strict labor regulations are more likely to report informal workers. Finally, manager's are also asked to rank the importance of different obstacles to the firm's growth[11]. We find that those firms that report labor regulations as a severe obstacle are more likely to report informal behavior in the labor market. Finally, firms report how large are their labor costs, inclusive of a variety of taxes and social security payments. We find that firms that employ informal workers pay on average lower taxes and social security payments per employee than those that only hire legal workers according to our definition. If the answer to the question above were not the percentage of informal workers employed by the respondent firm this relationship would probably not take this form so clearly.

Table 1 presents the differences in our sample between firms that report a positive number of informal workers and those firms that report no use. The numbers in the table are the coefficients of a dummy variable that equals one if the firm reports using informal workers.[12] Approximately 65% of the firms report using informal workers. These firms tend to be younger and smaller in terms of total employment, physical capital, value added, and

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[11] In particular, the managers have to rank from 0 (no obstacle) to 4 (severe obstacle), among others, the following barriers: telecomunications, electricity, taxes, export regulations, labor regulations, corruption, crime, anti-competitive practices.

[12] We run a regression of the following form:

$$y_j = \beta D_j^{\text{inf}} + \sum \gamma_s D_s + \epsilon_j$$

where D_j^{inf} is a dummy variable that equals one if the firm reports using informal workers and D_s are sector dummies.

profits. This disadvantage seems to be driven by their smaller size even though there is still a disadvantage in per capita variables for those firms that use informal labor (although not statistically significant). The workforce in these firms does not differ significantly in the gender and schooling composition. However, they are less likely to provide formal training to their workers.[13] Firms with foreign ownership and that export are less likely to employ informal workers than firms that produce mainly for the domestic market. Firms that have quality certification for their products and firms that are licensed to use foreign technology are also less likely to hire informal workers. In sum, the results emphasize the fact that the larger and more technologically developed firms are less likely to hire informal workers. These results hold even after controlling for the 3-digit sector of activity, which suggests that is not driven by sector specific technology but it is rather related to firm specificities. Finally, firms which are more likely to hire informal workers report having had less labor inspections, are more likely to pay bribes to labor officials and pay less sales tax than firms that only hire formal workers.

3. Empirical Specification

We analyze the impact of flexibility of access to informal workers on a variety of measures of economic performance. We have data only for registered firms. We run cross section regressions of the following form:

$$y_j = \beta i_j + \gamma x_j + \sum \delta_s d_s + \varepsilon_j$$

where y_j is a (logged) outcome variable, i_j is a measure of flexibility in the labor market, x_j are exogenous firm variables that affect y_j, d_s is an industry fixed effects and ε_j are firm unobservable characteristics that determine outcomes y_j. We measure flexibility with the share of informal workers in the firm. x_j includes the share of foreign owned capital, the share of state owned capital and the age of the firm. The sector fixed effects will capture all factors that are sector specific and are common to all states. A priori, and based on

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[13] Only 91 firms in the sample report having temporary workers in 2002 so we do not use this information.

the sign of the simple correlations reported in table 1, we expect that the worst performers (measured for example by sales per employee, value added per employee or the capital labor ratio) have higher shares of informal workers. However, one problem of measuring flexibility in the labor market with the share of informal workers in the firm is that firms make joint decisions on how much to produce, invest and on how many employees to have (formal and informal). In other words, i_j is likely to be endogenous to measures of firm performance so that $E(\varepsilon_j \mid i_j, x_j) \neq 0$. In particular, if these performance measures are related with firm's exposure, we expect to least squares coefficient to be downward biased.

One possibility is to find an instrument for informality at the firm level. We know that the degree of informality chosen by the firm is determined by the firm's benefits and costs of hiring informally. Informal contracts have several advantages over formal contracts. In Brazil, the monetary costs associated with taxes and non-wage benefits of formal labor contracts can be as high as 102% of wages. Informal labor is also associated with more flexibility since formal labor contracts demand a notification period in case of dismissal and severance payments. Firms will demand more informal workers the larger is their benefit of avoiding the labor regulation. On the other hand, the higher is the direct or indirect exposure of firms to labor inspections, the lower will be their incentive to avoid regulation. If firms engage in informal activities and if they caught by public officials, they typically have to pay a fine. We will explore regional variation in the *costs* of hiring informal workers to overcome the endogeneity of i_j.[14] One solution could be to use variation in the costs of informality at the firm level since some variables are observed in our data (like number of labor inspections faced by each firm, or whether the firm pays any bribes)[15] But firm reported inspections are likely to

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[14]The idea is simple. We want to find an instrument z that so that $Cov(z, \varepsilon_j) = 0$. There is no formal way to test $Cov(z, \varepsilon_j) = 0$. In general, the sign of the bias of the IV estimator is given by:

$$\hat{\beta}^{IV} = \beta + \frac{Cov(z, \varepsilon_j)}{Cov(z, i_j)} \gtreqqless \beta.$$

Since the instrument is related with the costs of informality, we find that $Cov(z, i_j) < 0$. We can discuss the potential sources of the bias based on the sign of $Cov(z, \varepsilon_j)$. In particular we are more worried that $Cov(z, \varepsilon_j) < 0$ since then the IV estimate would be overestimated ($\hat{\beta}^{IV} > \beta$).

[15]There is a strong and negative correlation between the share of informality at the firm level and the number of labor inspections in the firm. There is also a positive correlation between bribes paid to public officials and incidence of labor informality. Even though the survey asks direct information on bribes to

be influenced through some form of firm behavior. Assume that larger and exporting firms are more exposed to labor inspections and, as a consequence choose fewer informal workers. This generates a negative correlation between firm performance and informality. However, this correlation does not mean that less informality *causes* better performance. The choice of labor inputs are jointly determined with firm performance so that it is very difficult to disentangle correlation from causality.

We propose as instrument for the degree of informality based on the *regional* variation in the costs of informality. In particular, we use the number of fines administered by the regional labor authorities. Our assumption is that fines at the regional level are correlated with the firm informality and that the level of informality at the firm level does not determine the level of regional fines. We lag one period to capture the gap between enforcement of the law and implementation. This regional variable that is likely to influence the institutional environment faced by firms operating in different geographical areas. Because regions with more firms will have more firms by construction, we normalize the enforcement measure by the number of firms [16].

Table 2 presents the results for the first stage regression of informality on regional fines. The model is of the the following form:

$$i_j = \theta Fines_r + \lambda x_j + \sum \rho_s d_s + \pi x_r + \epsilon_j$$

where $Fines_r$ is the logged number of fines per firm in the region, x_j includes the share of foreign ownership and the share of state owned ownership, d_s is a sector dummy variable and x_r controls for regional variables. The variable of interest is the effect of regional fines on the degree of informality. In column (1) we do not control for x_r and find that firms located in regions with more fines per firm have a lower share of informal workers. In particular, increasing fines per firm by one percent decreases the share of informal workers

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labor inspections it is likely that there is under reporting.

[16]We are also currently testing the robustness of the results to the instrument fines per employee. An alternative instrument could be firm level variables related to its past behavior, and that may influence the current cost of hiring informal workers. E.g., former state owned firms are unlikely to have employed informal workers in the past and inertia may make it costly to hire currently informal workers. Unfortunatly our data has only 9 firms that were previously state owned.

by 2 percentage points. But, since we are using regional variation in the costs as instruments, we also need to control for aggregate variables that are likely to be correlated with informality and with fines. In particular, one could expect that the variation in fines is capturing two different effects. On the one hand, fines in some regions might be higher simply because the composition of firms in the region is different and the potential informality would be higher. E.g., take a region where firms are smaller, have fewer sales and valued added. This composition effect would determine a higher degree of potential informality in the region and regions with higher potential informality would have more fines. In this case, the effects of fines on informality in column (1) would be overestimated. To control for this, we include in columns (2) through (4) measures of potential informality. Column (2) includes the logged per capita value added in the region[17], column (3) the logged regional population and column (4) a general regional index. The index uses information on per capita value added, share low educated workers in the region, share of whites and the average size of the firm in the region. [18] In sum, the results in table 2 suggest that regional fines explain variation in informality and that firms facing more fines tend to use less informal workers.[19]

4. Results

4.1. Basic Results

The preliminary evidence in this section suggests that firms with an easier access to informal labor tend to have a more educated workforce, higher capital-labor ratio and a more advanced technology. This translates into a higher output and value added per employee. Additionally these firms tend to pay higher average wages per employee. We find this is either caused by a higher firm productivity and by the labor tax savings being shared with informal workers. Moreover, we do not find evidence that informality increases firm's employment or

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[17]We conjecture that richer regions, have better performing firms that are less likely to engage in informal behavior since they are more exposed to being inspected and paying fines. Therefore, not controlling for this effect would generate an upward bias in our estimates of fines on informality.

[18]The reason we construct an index is because in our sample we only have 13 regions therefore we cannot have an instrument with regional variation and several other variables with regional variation. The share of females and whites is taken from the Brazilian household level data (PNAD, 2002).

[19]It is important to note that while informality ranges from 0 to 100%, regional fines per firm vary from 0 to 3.5 so that the support of our data only allows us to explore variations in informality from 0 to 7%.

employment turnover. [20] [21]

Table 3a presents the results for sales per employee, value added per employee, capital per employee and an index for technology.[22] Column (1) reports the OLS result. Columns (2) through (4) report the IV estimates. Column (2) controls for differences across regions in logged per capita value added, column (3) controls for logged population in the region and column (4) controls for the regional index. We find that in the least squares regression, firms with a higher share of informal workers tend to have slightly lower sales per employee, lower value added per employee as well as a lower capital stock per employee and a less advanced technology. Once we account for endogeneity, we find that firms with easier access to informal workers tend to have from 2% to 4% higher per capita sales. This advantage also translates into firms having a higher value added per employee (effect varies between 1.5% and 3.5%). Part of this advantage could be explained by firms having a better technology. We present suggestive evidence that this is the case. On the one hand, we find that firms facing lower costs for informal labor tend to have a higher ratio of capital per employee (even though this effect is never statistically significant at 10% level, the magnitude of the effect is large). We also find that firms with easier access to informal workers have a better technology, measured by the technology index.[23] Even though the capital - labor ratio and the technology index are endogenous in the productivity regressions, we included them just

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[20]We find three pieces of evidence that are closely related to employment turnover. First, the survey firms are asked how many additional workers they hire in their production peaks. We do not find evidence that firms facing fewer fines have higher share of additional workers hired in production peaks as a percentage of the overall employment of the firm. Second, we also do not find evidence that the variance of employment is higher in these firms. Third, if firms were to use informal workers mainly as a more flexible source of employment, they would be less likely to offer on the job training since the average tenure of the worker in the firm would be lower. Again, we do not find any statistically significant difference between firms that face very different costs of informality. The results are reported in the annex A3.

[21]Unlike Pierre and Scarpetta (2005), we do not find that firms that make more use of informal workers (and that are more constrained by labor regulations) invest more in training and make greater use of temporary employment. In our data, less than 10% of the firms use temporary workers.

[22]To quantify the effect of informality on the firm technology, we construct a technology index capturing different dimensions of informality. It is based on the share of workers using computers on the job, on a dummy variable that equals one when the firm uses a licensing technology from foreign firms, a dummy equal to one when the firm has an international quality certificate for their main product and a dummy equal to one when the most important way for the firm to acquire new technology is developed within the firm.

[23]We also quantified the effect of informality on investment at the firm level. The magnitude of the effect is also large but the coefficient, like in the capital-labor ratio, is never statistically significant. However, only approx. 60% of the firms report data for investment.

to see if the coefficient is significantly affected. We find that the effect on productivity is reduced even though it is still positive and quantitatively important. Using specification (2), the effect drops from the 3.9% reported to 1.7% when these two variables are included.

Table 3b presents the results for the relation between informality and the average cost of labor per employee, total employment and share workers with university degree. Preliminary evidence also shows that firms facing more (exogenous) inspections tend to pay higher wages per employee (these costs exclude labor taxes and social security payments).[24] We find that the association between the informality and the cost of labor becomes significant once we account for endogeneity of informality.[25] However, the magnitude of the effect seems too large to be plausible. According with specification (4), where the coefficient is smallest (=0.07), an increase in share of informal workers by 10 percentage points (aprroximately 50% median in our sample) increases wages per employee in 70%. Even though there is no formal way to test if part of this increase is driven by the increase in value added, and ultimately in productivity, we included as explanatory variable the firm's value added and the share of high educated workers [26]. The point estimate is reduced to approximately 5.5% but it is still statistically significant. Again, we find the effect still too high to be plausible. We are currently trying to reconcile the magnitudes involved since the values are clearly too large. One point that is worth stressing is that while informality ranges from 0 to 100, the instrument only ranges from 0 to 3.5, therefore, we can only identify effects of increasing informality from 0 to approx. 7%. Still, this translates into approx 21% higher value added and 77% higher wages.

4.2. Robustness

In this section we present the robustness of the results to the inclusion of other variables in the regression. A valid concern could be into what extent our results are actually driven

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[24]We do not find significant differences in the average number of hours worked.

[25]The ratio of indirect labor costs to wages in our data is approximatly 40%. Firms with more informal workers have lower labor costs in our data (since they save on taxes and social security payments). A regression of labor taxes and social security payments on the share of informal workers is negative and significant.

[26]Howevr, we are extreamlt cautious in reading these results since these variables are also endogenous and should not be included in the right hand side. We find this results merely suggestive.

by a more flexible access to labor informality and are not driven by other types of informal behavior in general. We address this concern in two ways. The first one is related to the manager's propensity to engage in informal behavior. This omitted effect would be positively correlated with informality and with performance so that our IV estimates would be overestimated. Column (1) of table 4 includes as explanatory variables human capital characteristics of the manager like gender, schooling, tenure and experience.[27] The second way to address this concern is to control for another types of informal behavior that are likely to be correlated with the outcomes and also with labor informality. The survey asks how much the firm reports for fiscal purposes and we include this as explanatory variable in the model.[28] We find that the two types of informal behavior, in the labor market and for fiscal purposes, are indeed positively correlated. Moreover, after instrumenting informality with labor fines, we find that fiscal evasion is not correlated with labor informality.[29] Column (2) reports the results after including this variable as explanatory variable and once again the results are robust. Finally, in columns (3) and (4) we include regional measures of the quality of the investment climate. We expect that firms located in regions with a better investment climate to be less likely to engage in informal behavior. To do this we use two subjective indicators. The first is the proportion of firms in the region reporting that the judiciary system does not accept bribes. The other is the proportion of firms in the region reporting that the regional government is effective in providing public services. We find that the higher are the proportion of firms the lower is the incidence of labor informality, controlling for other firm characteristics. Once again, the results are robust to the inclusion of these variables.

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[27]In the model are also included logged per capita value added, industry dummies, share foreign owned capital, share state capital and age of the firm.

[28]The question is also phrased indirectly to avoid the respondent in wrongdoing. Please see footnote 13.

[29]The fact that tax evasion is not related with labor informality after being instrumented strongly suggests that the fines are capturing the effect of enforcement of labor laws.

5. Concluding Remarks

This paper studies whether access to informality affects manufacturing performance using a cross section of firms in Brazil. We use (exogenous) regional variation in the enforcement of the labor law to identify the effects of more flexibility of firm outcomes. The preliminary findings suggest that firms with an easier access to informal labor tend to have a more educated workforce, higher capital-labor ratio and a more advanced technology. This translates into a higher output and value added per employee. Additionally these firms tend to pay higher average wages per employee. We find this is either caused by a higher firm productivity and by the labor tax savings being shared with informal workers. Moreover, we do not find evidence that informality increases firm's employment or employment turnover.

6. Annex

A. LABOR REGULATION IN BRAZIL AFTER 1988

The Brazilian constitution enacted in 1988 introduced several changes that affected labor market regulations. The new constitution gave more autonomy to unions, increased labor costs to the employer and the level of severance pay for unfair dismissals. [30] A worker with a legalized contract has several wage and non-wage benefits that must be supported by the employer. About 27.5% of the labor costs supported by the employer are in taxes plus the indirect benefits (e.g. contribution to social security, 30 days of paid holidays per year, contribution to the "FGTS"[31], maternity and paternity paid leave). Moreover, unregistered workers do not have access to severance payments in case of dismissal.

The cost of dismissals have two components: cost of advance notice and severance pay for unfair dismissals[32]. The notification period (between the notice and actual dismissal) is approximately one month. During this period, workers are given two hours per day to search for a new job. The firm still pays for the full wage but it is likely that the worker's productivity falls significantly. Workers that are unfairly dismissed must receive, according to the constitution, a severance payment made by the employer. In Brazil, there is a job security fund, FGTS, hat is accumulated while the worker is employed by a firm. The fund is administered by the government. Each month the employer contributes with 8% of current wage[33]. Therefore, the total amount in the fund at any given period is a function of tenure on the job and wage history of the worker. Workers have access to the money in the FGTS only if unfairly dismissed or upon retirement[34]. On dismissal, workers have access to their entire fund, including all funds accumulated in previous jobs, plus 40% of the employer's cumulative contribution to the worker's FGTS. After 2.5 years on the job the severance pay for unfair dismissals is approximately one monthly wage. Therefore, for job tenure smaller than 2.5 years the notification cost of dismissals tends to be larger than the severance payment.

The fact that dismissals are the only way to obtain the FGTS and that once dismissed, the worker receives immediately the severance pay, provides strong incentives for workers to induce dismissals whenever they want to quit. On the other hand, firms tend to reduce dismissals for large dismissals penalties (high wage - high tenured workers). The high firing costs also imply that firms become selective in the hiring process and this tends to reduce dismissals.[35] In sum, these extra labor costs and the increased flexibility of firing associated to formality become an incentive to the employer to hire informally.

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[30] See Paes de Barros and Corseuil (2001) for details on current worker rights and for the rules governing the unions.

[31] The "Fundo de Garantia por Tempo de Servico" (FGTS) is a employee fund that is accumulated over the worker's life. The employee makes a monthly contribution of 8% of wage. The worker as the right to receive a monetary compensation if dismissed without fair cause.

[32] We summarize dismissal cost for workers whose job tenure is larger than 3 months. Before that unfair dismissals do not imply any penalty.

[33] Therefore, FGTS accumulates at approximatly one full monthly wage per year on the job.

[34] Workers can also use part of the FGTS to pay morgage or to pay large health expenses.

[35] Barros, Corseuil and Foguel (1999) argue that firms and workers have incentive to collude to turn quits into dismissals. In this case, workers have access to the FGTS but firms do not have to pay any penalty. In this case, firms do not go to court.

TO BE COMPLETED...

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Table A1: Distribution of Firms by Sectors

	# firms	% firms with informal workers	Informal workers / total workers
Food products	115	49%	43%
Textiles	90	50%	32%
Clothing	412	78%	37%
Shoes	155	74%	36%
Chemicals	71	37%	33%
Machinary	160	54%	30%
Electronical equip.	67	51%	32%
Auto components	122	53%	37%
Wood related products	290	73%	39%
Total	1482	65%	37%

Table A2: Are firms not reporting information on informal workers different?

Dependent Variable:	Firms not reporting informal workers	N
Age firm	1.009	1642
	[0.462]	
Firm size	-12.017	1642
	[0.688]	
Value added	-288489.58	1486
	[0.919]	
Capital stock	-296720.049	1543
	[0.700]	
Profits	697047.329	1574
	[0.717]	
Investment	-354727.374	923
	[0.248]	

Source: Brazil Investment Climate Survey (World Bank, 2002)

Numbers are the coefficient on a dummy variables taking value 1 if the firm does not report information on informal workers in an OLS regression with all the firms.

Table 1: Summary Statistics

Dependent variable:	Firms reporting positive share informal workers	N
Share informal workers	0.36	1,482
	[0.011]***	
Age firm	-4.64	1,482
	[0.918]***	
Total workers	-129	1,482
	[20.252]***	
Capital	-1,597,639.40	1,396
	[514,631.301]***	
Value added	-6,493,163.12	1,343
	[1888036.496]***	
Profits	-3,491,685.60	1,422
	[1242191.117]***	
Value added / total workers	-44,874.93	1,343
	[40,411.424]	
Capital / total workers	-4,884.97	1,396
	[3,000.915]	
Profits / total workers	-3,084.13	1,422
	[4,040.129]	
Share high educated workers	-1.75	1,482
	[1.305]	
Share females	-0.01	1,473
	[0.010]	
On the job training (dummy)	-0.12	1,479
	[0.026]***	
Unionized workers (dummy)	-0.02	1,477
	[0.022]	
Foreign ownership (dummy)	-0.04	1,482
	[0.012]***	
Export Intensity (dummy)	-0.18	1,476
	[0.025]***	
Quality of technology (dummy)	-0.10	1,480
	[0.021]***	
Labor inspections (self reported)	-0.60	1,479
	[0.181]***	
Bribes to labor inspections	0.02	1,482
	[0.010]*	
Share Sales declared tax proposes	-14.0	1,404
	[1.347]***	

Source: Brazil Investment Climate Survey (World Bank, 2002)
Numbers are the coefiicients of a dummy variable that equal to one if the firm
reports a positive number of informal workers in an OLS regression on all the
firms with non-missing data for informal workers.

Table 2
The effect of regional labor fines on the share of informal workers

	(1)	(2)	(3)	(4)
Labor fines per firm in the region	-2.086	-2.162	-2.182	-2.436
	[0.001]***	[0.000]***	[0.000]***	[0.000]***
Logged per capita value added region	-	-0.774	-	-
		[0.189]	1.03	
Logged population region	-	-	[0.193]	-
Regional Index	-	-	-	0.76
				[0.146]
Share foreign owned capital, state owned capital and age firm	Yes	Yes	Yes	Yes
Sector dummies ?	Yes	Yes	Yes	Yes
R squared	0.06	0.07	0.07	0.07
N	1,477	1,477	1,477	1,477

The reported coeffciients in the first line are the first stage coefficients of the least squares regression of the share of informal workers on labor fines per firm in the region. Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Sector dummies, share foreign capital, share state owned capital and regional variables included. Column (2) controls for logged per capita value added, column (2) controls for the logged population and column (3) for the regional index. The index is the principal component of logged per capita value added, share low educated workers in the region, share of whites and the average size of the firm in the region.

Table 3a : The effects of Labor Flexibility on Firm Outcomes in E

	(1)	(2)	(3)	(4)	N
Model	OLS	IV	IV	IV	
Sales per empoyee	-0.007	0.039	0.04	0.02	1,420
	[0.000]***	[0.029]**	[0.027]**	[0.123]	
Value added per employee	-0.006	0.035	0.035	0.016	1,333
	[0.000]***	[0.028]**	[0.027]**	[0.180]	
Capital per employee	-0.004	0.031	0.03	0.029	1,370
	[0.020]**	[0.138]	[0.145]	[0.143]	
Technological Index	-0.003	0.024	0.024	0.01	1,471
	[0.010]***	[0.059]*	[0.059]*	[0.336]	
Regional variables	No	Logged value added	Logged population	Regional Index	

The coefficients in the table are the effects of having more informality on the different firm outcomes. p-values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Column (1) reports the OLS results and columns (2) and (3) report the results instrumenting labor informality with the regional fines per firm. Column (2) controls for the logged of value added in the region and column (3) controls for the logged population. Industry dummies, share foreign owned capital, share state owned capital and age of the firm are included but coefficients not reported.

Table 3b : The effects of Labor Flexibility on Firm Outcomes in E

	(1)	(2)	(3)	(4)	*N*
Model	OLS	IV	IV	IV	
Wages per employee	0.002	0.125	0.127	0.071	1,405
	[0.370]	[0.006]***	[0.006]***	[0.025]**	
Total employment	-0.008	0.006	0.005	0.01	1,477
	[0.000]***	[0.610]	[0.639]	[0.405]	
Share educated workers	0.011	0.362	0.365	0.22	1,472
	[0.217]	[0.007]***	[0.007]***	[0.041]**	
		Logged value	Logged		
Regional variables	No	added	population	Regional Index	

The coefficients in the table are the effects of having more informality on the different firm outcomes. p-values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Column (1) reports the OLS results and columns (2) and (3) report the results instrumenting labor informality with the regional fines per firm. Column (2) controls for the logged of value added in the region and column (3) controls for the logged population. Industry dummies, share foreign owned capital, share state owned capital and age of the firm are included but coefficients not reported.

Table 4 : The effects of Labor Flexibility on Firm Outcomes in Brazil

	(1)	(2)	(3)	(4)
Model	IV	IV	IV	IV
Sales per empoyee	0.03	0.035	0.044	0.029
	[0.051]*	[0.023]**	[0.030]**	[0.033]**
Value added per employee	0.027	0.035	0.039	0.028
	[0.055]*	[0.013]**	[0.029]**	[0.034]**
Capital per employee	0.024	0.029	0.036	0.031
	[0.219]	[0.150]	[0.120]	[0.092]*
Technological Index	0.017	0.018	0.029	0.018
	[0.140]	[0.092]*	[0.050]**	[0.090]*
Wages per employee	0.117	0.112	0.12	0.099
	[0.007]***	[0.004]***	[0.012]**	[0.004]***
Total employment	-0.002	0.003	0.013	0.003
	[0.859]	[0.728]	[0.326]	[0.776]
Share educated workers	0.296	0.334	0.383	0.3
	[0.013]**	[0.004]***	[0.012]**	[0.007]***
Manager human capital variables	Yes	No	No	No
Sales repoted tax proposes	No	Yes	No	No
Per capita value added region	Yes	Yes	No	No
Court Bribes region	No	No	Yes	No
Efficiency government region	No	No	No	Yes

The coefficients in the table are the effects of having more informality on the different firm outcomes. p-values in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. . Column (1) controls for the manager's human capital characteristics -- gender, schooling, tenure and experience -- also includes logged pc value added in region, column (2) sales reported for tax purposes at the firm level --also includes logged pc value added in region, column (3) controls for the corruption in the judicial system in the region (measured with a subjective question on bribes) and column (4) controls for the regional efficiency of the goverment in supplying public services. Industry dummies, share foreign owned capital, share state owned capital and age of the firm are included but coefficients not reported.