

Labor Market Regulations and the Investment in Job Training in Developing Countries ¹

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Abstract

The investment in human capital is key to understand differences in productivity across firms in the developing world. Policymakers throughout the world are increasingly interested in understanding the determinants of this investment. This paper explores a large micro data across more than 60 developing countries with detailed information on firm characteristics and on labor regulations and its enforcement to deepen our knowledge in this area. We find a large heterogeneity in the firm's provision of job training, even after controlling for country, industry and some firm characteristics. Part of this heterogeneity is explained by firm openness and technology adoption. More open and more innovative firms are more likely to invest in job training. We also find a robust positive correlation between the enforcement of labor regulations and the investment in job training. In particular, a stricter enforcement of labor market regulations, when the *de facto* labor regulations are more rigid, significantly increases the intensity to train, especially in the manufacturing sector and for low-tech industries. This effect works mostly through the rigidity and cost of hiring regulations rather than through the firing regulations.

Keywords: On-the-Job Training, Openness, Innovation, Labor Regulations, Enforcement, Firm Level Data.

JEL Classification codes: F2, J24, K31, L25.

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1. Introduction

In a context of increasing openness and international competition, several firms in developing countries struggle to constantly adapt their workforce to new technologies and organizational structures in order to remain competitive. Skill shortage has also been repeatedly pointed out as a severe constraint to growth in these countries. Hence, policymakers throughout the world are increasingly interested in understanding the determinants of the investment in skills by individuals and firms, in order for the countries to remain competitive in an international context. From the individual's perspective this investment in skills is also of most relevance. Even though the investment in human capital starts with the formal schooling, most of our human capital is accumulated throughout life, either on-the-job or outside (e.g., training for the unemployed) (Carneiro and Heckman, 2003). The accumulation of human capital throughout the adult life is particularly important for the older and less educated workers, whose skills accumulated at school, have substantially depreciated and run a higher risk of social exclusion. This paper will analyze the investment in formal training programs provided by the employers in developing countries.² We are interested in main two questions. First, how heterogeneous is the supply of training programs across and within countries? Is it closely linked to the firm's integration in the global markets and to its workforce characteristics? Second, do labor market regulations create an incentive for a larger investment in skills? When faced with the need to adjust worker's skills and a very costly adjustment of labor, resorting to new labor through hiring and firing might not be an attractive option and firms could have a greater incentive to invest in the accumulation of skills for the existing workers. Whether or not this happens is an empirical question.

This paper will present some empirical evidence on these two questions, exploring a large firm level data set across more than 65 developing countries all over the

² The analysis will not cover the investment in skills for the unemployed or nor the training that is provided by governments through active labor market policies. Moreover, we will also restrict the attention to formal training programs. The latter is a shortcoming of most of the literature since it is very difficult to gather data on the informal training that takes place on the job. However, the job training programs that we will analyze (i.e., offered by the firm) are not necessarily 100% financed by the firm. They could be subsidized by government or supported by the workers (through lower wages). The programs might also be organized by the firms themselves, by training institutes (e.g., public institutions) and its content can be general or firm specific.

world. The data we use has several advantages for studying this topic. It collects simultaneously information on the incidence and extent of job training and on several firm characteristics in a consistent way across countries. Most importantly, the surveys also collect data on the enforcement of labor regulations within each country. This is particularly important in the context of developing countries where there is a large gap between the *de facto* and *de jure* labor regulations and where regulations are not likely to be fully enforced.

Determining the effect of labor market regulations on the incentive to train is a difficult task because the *de jure* labor regulations are usually set at a national level and change very infrequently over time. Empirically, this implies that there is little variation in the *de jure* law - either over time, across workers, or across geographic locations - that could be used to identify the effects of changes in the law on the outcomes of interest. Moreover, it is very difficult to address the omitted variable and endogeneity problems involved in this empirical approach. On the one hand, it is very difficult to account for all the relevant (unobserved) country level regulations that are simultaneously correlated with labor regulations and with the investment in job training. On the other hand, it is possible that in countries that experience less training (e.g., due to higher worker turnover rates) have a lower/higher demand for employment protection legislation.

In this paper, we follow Almeida and Carneiro (2005, 2007) and explore *within* country variation in the enforcement of labor regulation faced by each firm. We measure enforcement of labor regulations with the number of visits made by labor inspections to a firm. The idea of this empirical approach is to compare the incentives of firms to invest in job training, when they are located in the same country and hence subject to the same *de jure* regulation, though not to the same degree of enforcement of the law. Our assumption is that, all else constant, labor regulations will be more binding when firms are facing a stricter enforcement of the labor law.³ The empirical approach we follow is similar in spirit to a differences-in-differences approach (e.g., Rajan and Zingales, 1998, Micco-Pages, 2006). Having all else constant, we compare the effect of labor regulations for firms subject to different degrees of enforcement. It is worth stressing that we will not be

³ Most of the literature on the effects of labor regulations has not emphasized the importance of enforcement of labor regulations. Exceptions include Boeri and Jimeno, 2005, Caballero, Cowan, Engel and Micco, 2006, Albrecht, Navarro, and Vroman, 2006, Almeida and Carneiro, 2005, 2007).

exploring the variation in enforcement alone. Rather, we are exploring the differential effect of enforcement in countries with different degrees of rigidities in the labor law, after controlling for country fixed effects, firm characteristics and the enforcement of regulations. By controlling for country level fixed effects we will be able to account for unobserved country characteristics that are likely to be correlated with *de facto* labor regulations and with training incidence (e.g., level of development in the country). By controlling for firm characteristics (e.g., age, size, sector composition) we account for the differences across firms that could be simultaneously correlated with training incidence and with the degree of enforcement in the country. E.g., larger and more visible firms could be more likely to be subject to labor inspections in countries where the labor law is more rigid.⁴ Finally, controlling for the degree of enforcement of labor and other types of regulations, we account for (unobservable) firm characteristics that could be simultaneously correlated with enforcement and with the investment in job training, in countries with different degrees of rigidities in the labor law. Using this empirical approach, which controls for the country fixed effects and for firm characteristics, we also hope to minimize the potential problem of reverse causality (i.e., causality running from incidence of training to strictness of enforcement of labor regulations) that plagues most of the cross country work.

We try to address different concerns by conducting several robustness checks. First, it is possible that country and/or regional policies or institutions, omitted from the analysis, could be simultaneously correlated with enforcement of the labor law as well as with training incidence. For example, assume that more productive firms invest more in job training and, all else constant, tend to be located in more developed regions with better institutions, where enforcement is tighter and regulations are stricter. In this case, there would be an upward bias in the correlation between enforcement of regulation and job training. To account for this, we test the robustness of our findings to country-region and to country-sector fixed effects. Second, it could also be argued that inspections are a poor proxy for the quality of the enforcement. In particular, it is possible that one of the

⁴ In the empirical work we will see that these characteristics are systematically correlated with the degree of enforcement of labor regulations that firms face. Nevertheless, in our reduced form, we will be exploring the interaction between the enforcement facing the firm and the *de jure* labor regulation. Therefore, even if larger and more visible firms are more likely to be inspected this will not necessarily bias our estimates of the effect of the *de facto* regulation on training.

motives for labor inspections (as well as other types of inspections) is related to corruption and bribery. In this case, one would expect that firms where it is easier for inspectors to extract rents are also more likely to be inspected (e.g., Svensson, 2003). Although one could observe that in these firms the number of inspections is greater, this does not necessarily translate into stricter enforcement of the labor (or other) law. This could lead to a spurious (positive or negative) correlation with job training.⁵ To minimize this problem, we control for several observable firm characteristics (like size, age, manager's education) that are correlated with the degree of enforcement and also with job training. Our assumption is that, by controlling for these firm characteristics, we are only exploring the variation in enforcement that is exogenous to the firm. Moreover, we will explore the variation in the enforcement of labor regulations (in countries with different *de jure* regulations), after controlling for the degree of enforcement of the other types of regulations (captured by the total number of inspections). Including the interaction of total inspections with the *de facto* labor law in the reduced form should account for this problem as long as the probability to inspect to extract rents is not higher for the labor inspections (relatively to the other inspections) in countries with more rigid labor laws. Third, one could think that the reduced form we explore could be capturing not the effect of the enforcement of labor regulations but rather the effect of enforcement of other regulations/policies or institutions, as long as their effect would also depend on the degree of enforcement of labor regulation. For example, if firms located in more developed countries (e.g., also with stricter labor regulations) and facing tighter labor inspections are also more likely to invest in training programs, we could be attributing this effect to labor regulations. Therefore, we test the robustness of our findings to the inclusion of the interaction of several measures of regulations and institutions (GDP, rule of law, regulatory quality, government control of corruption and regulations to start a business) with labor inspections. Finally, in ongoing work we also test how the effect of the *de facto* labor regulations differs in firms/sectors that are more likely to feel that the effect of these regulations is binding.

⁵ The direction of the bias is unclear though since the best firms might train more or less (although in the cross section the larger and more productive firms tend to train more).

The main findings can be summarized as follows. First, there is a large heterogeneity at the firm's decision to invest in job training in developing countries all over the world. This heterogeneity holds after controlling for country and industry fixed effects (which together account for approximately 13% of the total variation). Part of the remaining heterogeneity is explained by firm size and human capital composition of the workforce. For example, large firms are at least 38 percentage points more likely to invest in job training than micro firms. Second, there is a strong and positive correlation between firm openness and innovation and technology adoption, on the one hand, and the firm's intensity to training, on the other. For example, exporting firms are 7 percentage points more likely to invest in job training while firms with majority and full foreign ownership are 5 and 8 percentage points more likely to invest in job training than firms that only sell domestically or to domestic owned firms, respectively. These differences, though quantitatively important, could be upward biased if the "best" firms self-select into these activities and into job training. Although our robustness tests are restricted to the cross sectional nature of the data, the findings do not suggest that self selection explains all the positive correlation in the data. Third, we find evidence that a stricter enforcement of labor market regulations, when the *de jure* labor regulation is more rigid, significantly increases the intensity to train. In particular, we find that, after controlling for country and industry fixed effects, firms facing a stricter enforcement of the labor regulations tend to invest more in job training, relatively to firms facing a less strict enforcement, in countries with a more rigid employment protection. This happens especially in the manufacturing sector and for low-tech industries. We also find evidence that this effect works mostly through the rigidity and cost of hiring regulations rather than through the firing regulations.

This paper is related to different strands of the literature. On the one hand, it relates to the empirical work relating firm and worker characteristics with the incidence of job training.⁶ In the context of developed countries, the empirical findings suggest that larger and more productive firms tend to train more and that there is a complementarity between skills of the workforce and this investment (e.g., Black and Lynch, 1998,

⁶ A related question, which we will not address in this paper, is whether training has any effect on firm productivity (e.g., Barrett and O'Connell, 2001) or if the returns to job training are high (e.g., Almeida and Carneiro, 2006). Machin and Vignoles (2001), review some of this literature.

Bassanini et al, 2005). There is less evidence on the link between openness and training. For developing countries, one exception is Pierre and Scarpetta (2004). They also find that training incidence is related to firm size as well as to the sector of activity. However, their sample is considerably smaller (44 developing countries versus 66 in our paper) and they do not look specifically at the link between openness and technology adoption on the one hand, and training incidence and intensity, on the other.

On the other hand, the paper relates to the large literature quantifying the effects of labor market regulations on efficiency and equity outcomes. While the efficiency costs of labor regulations have been discussed and documented extensively, both in developing and developed countries, its effects on redistribution and equity effects have been much less studied.⁷ In particular, one possible channel through which regulations might affect welfare and redistribution in the economy is through the investment in job training.⁸ Wasmer (2003) argues that employment protection creates longer-term employment relationships, which are necessary to invest in job training specific to a firm or sector. This could actually be a potential benefit of having employment protection regulations if firms are under-investing in this area. To our knowledge, the potential benefits of this channel have not been rigorously explored empirically in the context of developing countries.⁹ For developed countries the evidence available is mixed. Acemoglu and Pischke (1998) argue that there are complementarities between regulation regimes and training systems, and that reducing firing costs and increasing employment flexibility could reduce the incentives to train. Their evidence focuses mainly on Germany versus the US. Bishop (1991) also finds evidence of a positive correlation between the incidence of formal training and the firm's firing costs. This evidence is consistent with labor

⁷ While there is some consensus that stricter labor regulations reduce unemployment turnover, there is more ambiguity on the overall effects of regulations on employment and unemployment levels. The effects of regulations on value added and productivity have been less studied but the evidence seems to suggest that there are also negative effects (e.g., Besley and Burgess, 2004, and Micco and Pages, 2006 and Almeida and Carneiro, 2005).

⁸ Alternatively, labor regulations might affect differently the job-to-job and activity-inactivity transitions. The little evidence available for developing countries suggests that regulations could affect disproportionately the most vulnerable groups of workers (see e.g., Heckman and Pages, 2004, and Almeida and Carneiro, 2007) for evidence in Latin America).

⁹ To our knowledge, Pierre and Scarpetta (2004) is one of the few papers analyzing also this link. However, they explore variation in the perception of labor regulations rather than variation in enforcement of the law. Their measure, because it is subjective, is more exposed to endogeneity criticisms. Reassuringly, both papers find that stricter labor regulations are associated with more job training.

regulations increasing the adjustment costs of firms through the hiring/firing of workers, and resorting to training instead. Moreover, it is also consistent with the argument that the stricter the labor regulations, the greater it will be the wage compression (i.e., the greater the wedge between the worker's productivity and the labor cost) and the more profitable would be the investment in job training for firms. Therefore, the combination of wage compression and high labor adjustment costs tends to favor job training. Alternatively, Bassanini et. al. (2005) using household level data across 15 European countries and exploring cross country-time series variation on *de jure* labor regulations, find evidence of a negative correlation between strictness of employment protection and incidence of job training. Their empirical findings are supportive of the view that those labor market reforms that accelerate the diffusion of temporary contracts and at the increase the protection of permanent employees produce negative effects on the accumulation of human capital taking place mainly in firms.¹⁰

The paper proceeds as follows. Section 2 describes the data and provides descriptive statistics for the incidence and intensity of job training in the sample. Section 3 documents the link between the firm's investment in skills and the degree of firm openness and technology adoption. Section 4 uses a differences-in-differences approach to estimate the effect of the *de facto* labor regulations on the incentive of firms to invest in job training. Section 5 discusses some robustness checks. Section 6 concludes.

2. Data and Descriptive Statistics

The main data set we use is a large firm level data collected by the World Bank, *Investment Climate Surveys*, covering 66 developing countries.¹¹ The surveys were conducted between 2002 and 2005 and the samples were designed to be representative of the population of firms according to their industry and location within each country. Table A2 in the appendix reports the countries included in the analysis. Although only

¹⁰ Their evidence also suggests that product market regulation affects training negatively and significantly (i.e., more product competition is conducive to a higher investment in training). They also find no evidence that union density is systematically correlated with job training and a positive correlation between training and the share of R&D in the country's GDP.

¹¹ This data set has been used for studying this and other topics (e.g., Svensson (2003), Almeida and Carneiro (2005), Almeida and Fernandes (2006), Pierre and Scarpetta (2004) and Aterido, Hallward-Driemeier and Pagés (2007).

one wave of data is included in our sample (the most recent wave), the information available in the survey has several advantages for analyzing these topics. First, the data is based on a common questionnaire across a large set of countries, yielding comparable information on several firm level characteristics. In particular, the survey collects information on age, size, geographical location, three-digit sector of activity, foreign and public ownership and human capital composition of the workforce. It also collects information on whether the firm participates in international trade. Table A1 defines all the variables used in the analysis. Our final sample includes 35,229 firms distributed across a wide range of sectors (Manufacturing, 73%, Construction, 4%, Services, 21% and Agro-Industry, 2%). Within Manufacturing several industries are covered – auto and auto components, beverages, chemicals, electronics, food, garments, leather, metals and machinery, non-metallic and plastic materials, paper, textiles, wood and furniture. Table A2 reports the country level composition of the sample, which covers 18 countries in Africa (10.5% sample) and 4 countries in the Middle East and North Africa (8% sample), 12 countries in East and South Asia (35% sample), 27 countries in Eastern Europe and Central Asia (27% sample), and 10 countries in Latin America (16% sample). Second, the data collects information on whether the firm provides training to their workers. This is based on the survey's question “Do you offer formal (beyond “on-the-job”) training to your permanent employees?”. For a fewer number of countries there is also information on the share of skilled and unskilled workers that are trained as well as some information on the average training hours. Third, the survey collects detailed information on the enforcement of regulation within countries. This is particularly important in the context of developing countries since there is a large gap between the law and its effective implementation, since enforcement is weak and evasion is large. We follow Almeida and Carneiro (2005, 2007) and proxy enforcement of labor regulations by the number of visits by labor officials to each firm over the last year. The survey collects information at the firm level on the number of labor inspections as well as on several other inspections (including fiscal, health and environmentally related).

We also use information on the *de facto* labor regulations collected by the World Bank Doing Business Data set (e.g. Botero et al, 2004). This data measures the regulation of employment, specifically as it affects the hiring and firing of workers and the rigidity

of working hours. In particular, we use information on 5 labor indices: rigidity of employment, a difficulty of hiring, rigidity of hours, difficulty of firing, non-wage labor costs and firing costs.¹² And all take values between 0 and 100, with higher values indicating more rigid labor regulation. Finally, we also explore country level information taken from governance indicators 200-2005 in Kaufmann and Kraay (2007)¹³, and number of procedures to Start a Business, taken from the World Bank Doing Business dataset 2003 to 2006¹⁴.

We define the incidence of training at the firm level with a dummy variable assuming the value one if the firm reports having offered a formal training program to its employees. The intensity of training is captured by the share of skilled and unskilled workers that are trained in each firm reporting training. Since the data set is harmonized across countries, we hope that the measurement error problems in the training variable are not too severe. However, the interpretation of what training programs means might

¹² The rigidity of employment index is the average of 3 sub-indices: a difficulty of hiring index, a rigidity of hours index and a difficulty of firing index. All the sub-indices have several components. The difficulty of hiring index measures (i) whether fixed-term contracts are prohibited for permanent tasks; (ii) the maximum cumulative duration of fixed-term contracts; and (iii) the ratio of the minimum wage for a trainee or first-time employee to the average value added per worker. The rigidity of hours index has 5 components: (i) whether night work is unrestricted; (ii) whether weekend work is un-restricted; (iii) whether the workweek can consist of 5.5 days; (iv) whether the workweek can extend to 50 hours (including overtime) for 2 months a year to respond to a seasonal increase in production; and (v) whether paid annual vacation is 21 working days or fewer. The difficulty of firing index has 8 components: (i) whether redundancy is disallowed as a basis for terminating workers; (ii) whether the employer needs to notify a third party (such as a government agency) to terminate 1 redundant worker; (iii) whether the employer needs to notify a third party to terminate a group of 25 redundant workers; (iv) whether the employer needs approval from a third party to terminate 1 redundant worker; (v) whether the employer needs approval from a third party to terminate a group of 25 redundant workers; (vi) whether the law requires the employer to consider reassignment or retraining options before redundancy termination; (vii) whether priority rules apply for re-dundancies; and (viii) whether priority rules apply for reemployment. The non-wage labor cost indicator measures all social security payments (including retirement fund; sickness, maternity and health insurance; workplace injury; family allowance; and other obligatory contributions) and payroll taxes associated with hiring an employee. The cost is expressed as a percentage of the worker's salary. Finally, the firing cost indicator measures the cost of advance notice requirements, severance payments and penalties due when terminating a redundant worker, expressed in weekly wages.

¹³ For a description of the methodology see Kaufmann and Kraay (2007). The three governance indicators are measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes. Rule of Law is the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence; Control of Corruption is the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests; and Regulatory Quality is the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

¹⁴ This indicator is based on the number of procedures required by law to start a business. A separate activity in the start-up process is a "procedure" only if it requires the entrepreneur to interact with outside entities: state and local government offices, lawyers, auditors, company seal manufacturers, notaries, etc.

differ across countries, though, or even within countries across firm size or sector. Since our analysis will always control for country and sector fixed effects, we hope that this problem is not too severe.¹⁵ To check whether our variable of interest is economically meaningful, we have analyzed the relation between the average propensity to train (at the country level) and different characteristics, like education, openness and technology adoption. The results (not reported) suggest that the micro data produces sensible patterns at the country level.¹⁶ We have also analyzed the link between training incidence and the labor productivity (measured as value added per employee) (not reported). The findings suggest that firms that so invest in job training tend to have higher labor productivity than those that do not (although this positive correlation obviously does not imply any causality). We interpret this as being suggestive that our job training measures an economically important activity.

Figures 1, 2 and 3 clearly document the heterogeneity in the incidence of training, by firm size, across regions and income levels in our sample. Training incidence is smaller among the smaller firms (across all the regions and income groups). These patterns hold separately for manufacturing and services, though training incidence in services is smaller than in manufacturing sectors (not reported). Across regions and income group, we also find that the incidence of training among innovative firms, exporters or firms with foreign participation is higher than in non-innovative, non-exporters and domestic owned firms (across all regions and income groups). Figures 4 and 5 also reinforce this heterogeneity by plotting the relation between training incidence (intensive margin) and training intensity (extensive margin). We measure training intensity using the share of skilled and unskilled workers trained in each firm. The figures clearly show there is positive correlation across countries between the two margins.

¹⁵ It is possible that managers interpret differently the meaning of formal training programs. This could introduce measurement error in the dependent variable in the regressions in Section 3. If this measurement error is classic, this is not a problem. However, biases could result if the measurement error is systematically related to firm characteristics of interest (like openness and innovation).

¹⁶ In particular, we find that at the country level, the share of exporters has a positive and significant coefficient when correlated with the share of firms that provide training; likewise, for the share of firms with foreign license and for the share of firms with an ISO certification. The correlations of propensity to train and education variables yield a negative and significant coefficient for the share of workers with less than 5 years of education, while positive and significant for the share of workers with 6 to 12 years of education and for the manager's level of education.

Countries with higher propensity to train also tend to train more intensively, both for the skilled and the unskilled workers.

Although firm characteristics like size or the human capital of the workforce, do explain some of the variation in the intensity to train, in our sample, country and industry fixed effects still account for approximately 13% of the explained variation in the decision to supply training.¹⁷ Part of this cross country variation could reflect measurement error and cross-country differences in the definitions/perception of what is a training program. For example, since the survey only covers formal sector firms, significant episodes of informal training are not considered. This will probably lead to some underestimation in the amount of training provided especially in small firms, where most of the training is likely to be informal. However, the residual cross country variation also includes differences in the institutional and social framework, in government policies and in the macroeconomic conditions. It is rather difficult to sort out the relative importance of each potential candidate, because some variables are hard to measure, and because of a large host of confounding factors. Figures 6 to 9 document a strong and positive correlation between investment in job training at the country level and the level of development in the country (proxied by GDP per capita), its human capital composition (proxied by years of schooling of the population)¹⁸, the degree of innovation and technology adoption (proxied by the investment in R&D as a percentage of GDP, dummy if the firm as an ISO certification and a dummy for whether a firm has a foreign license)¹⁹ and the degree of openness (proxied by the trade as a % of GDP). Finally, Figure 10 plots the link between labor rigidity and the intensity to train. At the country level, the correlation between labor regulations and the intensity to train is not strong and, if anything, tends to be negative (stricter regulations associated with a smaller proportion of firms training in the country). It is worth noting that while we cannot tell whether this relationship reflects a causal link (of no or a negative relation), the large differences in

¹⁷ Adding the sample of developed countries would not significantly change the share explained by these variables.

¹⁸ When we disaggregate the analysis only for firms in Manufacturing the correlation is even stronger and it remain robust even after controlling for GDP per capita.

¹⁹ These country level correlations are not robust to the inclusion of the GDP per capita as control since these variables are very correlated to the investment in R&D.

the average training incidence across countries tend to be matched by large differences in these characteristics at the country level.

In sum, this section documents the large heterogeneity in the developing world with respect to training incidence and intensity. Although some of the variation seems to be explained by cross country differences in institutions and policies, this only explains part of the total variation. In the next section, we proceed with a formal econometric analysis exploring the micro data.

3. The Incidence of Training

Firms decide whether or not to invest in on-the-job training, and how much to invest, looking at the benefits and the costs of this investment. The benefits of training are related to its overall effect on firm productivity while its costs depend on the monetary direct costs of training, on the foregone productivity of the hours trained and on training subsidies. We do not observe information on the costs of training for all the countries, therefore we will not be able to compute returns (or to compare the monetary advantage of training versus its cost).

Our empirical framework considers profit-maximizing firms deciding whether or not to provide on the job training to its workforce. A firm will decide to offer training if this decision is expected to increase its profits, i.e., if the benefits from this decision are larger than the costs. Let π^*_{ijc} be the profits of a firm i in industry j in country c . We assume that:

$$Train_{ijc} = \begin{cases} 1 & \text{if } \pi^*_{ijc} > 0 \\ 0 & \text{otherwise.} \end{cases} \quad (1)$$

where, $Train_{ijc}$ is a dummy variable that equals one if firm i , operating in sector j and country c , reports providing training. Since π^*_{ijc} is unobserved, equation (1) cannot be estimated directly. Therefore, we assume that π^*_{ijc} is a function of several firm, industry, and country characteristics. In particular, we assume that π^*_{ijc} is linear so that, $\pi^*_{ijc} = \beta X_{ijc} + \mu_j + \mu_c + \varepsilon_{ijc}$, where X_{ijc} is a vector of firm characteristics, μ_j are industry fixed effects, μ_c are country fixed effects, and ε_{ijc} captures unobserved firm

level characteristics. For this functional form, the probability that firm i offers training is given by:

$$\Pr(\text{Train}_{ijc} = 1) = \Pr(\varepsilon_{ijc} > -\beta X_{ijc} - \mu_j - \mu_c). \quad (2)$$

Assuming that the residuals ε_{ijc} are normally distributed, equation (2) can be estimated by maximum likelihood (probit). The standard errors are not clustered.²⁰

Table 2 reports the marginal effects at mean values of the variables of interest for different sets of variables in X_{ijc} . All the specifications control for country fixed effects and for 2-digit ISIC industry fixed effects. The latter is meant to account for differences across firms related with the production technology, product demand, or competition at the sector level. These are likely to affect the incentives of firms to invest, in general, as well as to invest in job training. Moreover, as argued above there could be more differences across industries in what managers define as on-the-job training. In column (1), we report the relation between training incidence and firm size. Firms with more than 100 employees are at least 40 percentage points more likely to offer training programs than small firms. This seems to be a universal finding across samples in developed and developing countries. This divergence in the incentives to invest is of an increasing concern given the rapid technological change. One potential explanation is that there are economies of scale in training provision that only larger firms can exploit. Almeida and Carneiro (2006) do find evidence that there are large fixed costs of providing training. In column (2) we add a dummy variable that equals one if the firm is located in a capital city or large city (defined as having more than 1 million inhabitants). We find that the location in this geographical area is also correlated with a greater propensity to train. Column (3) adds controls for age of the firm (and its square, not reported). The point estimates shows that older firms are less prone to train than younger firms (quadratic term not strong).²¹ Column (4) looks at the link between the degree of firm openness and its investment in human capital. The findings clearly show that the more open the firm is, the more likely it is to invest in the human capital of their employees. Moreover, the

²⁰ However, if we were to allow for a possible correlation in training incidence across firms in the same country and industry, the empirical findings reported in table 2 and 3 (with the additional clustering of the standard errors) would be very similar.

²¹ Not accounting for firm size, there is a positive correlation between age of the firm and the investment in job training.

greater the share of foreign capital in the firm's total capital, the more likely it is that firms offer training programs. For example, all else constant a firm that is fully foreign owned is 8 percentage points more likely to train than a fully domestic owned firm. Firms with a public ownership do not differ in their intensity to train. Finally, we find that there is a strong positive correlation between average schooling of the workforce and job training. This correlation is still positive (though it does not remain statistically significant) if we use share of skilled workers as a proxy for the worker's human capital (column 7). The complementarity between worker's skills and the firm's investment in training as been documented extensively in the literature for developing and developed countries (e.g., Basanini et al., 2005, Black and Lynch, 1998). Since there is a larger number of observations with information on the worker's skills rather than education, column (7) will be our base specification throughout the paper.

Although our results document a strong positive correlation between openness and the investment in skills, it is very difficult to disentangle correlation from causality since we only observe one wave of data for each firm. For example, if multinational parents tend to acquire the "best" domestic firms (and possibly more productive), the positive correlation between share of foreign ownership and the investment in technology could be driven by foreign multinationals cherry picking the best firms (see e.g., Almeida, 2007). Similarly, the investment in job training and/or technological innovations may improve the firm's ability to enter and remain in foreign markets as a buyer or a supplier. Hence, the positive correlations observed in table 2 could be the result of the investment in skills causing openness and not necessarily the other way around. Tables 3 and 4 explore the richness of the survey to test the robustness of our findings across industries, income groups, regions, and to the inclusion of other firm characteristics, which are likely to be simultaneously correlated with openness and the investment in skills. Nevertheless, in the absence of panel data or of valid instruments interest, it is impossible to rule out the importance of unobservable factors in driving the observed correlations in the data.

One of the reasons, why openness could be positively correlated with the investment in job training is related with the fact that the more innovative firms also tend to be more open (Almeida and Fernandes, 2007). To the extent that more innovative firms change their technology more often and/or are exposed to new production/management techniques that require a frequent update of the worker's skills, they could be more likely to invest in job training. To test whether most of the link is driven by innovation, columns (1) to (3) report specification (7) in table 2 after adding controls for whether the firm has recently adopted new technology, the share of R&D in total sales and whether the firm as an ISO certification.²² The results show that the positive correlation between openness and job training is robust to adding these controls on the propensity to innovate. The findings also show that there is indeed a positive link between technology adoption and the investment in human capital at the firm level and after controlling for country and sector fixed effects. This finding reinforces the idea that both investments are complementary. Columns (4) to (6) report the link between job training and other labor force characteristics, average years of schooling of the manager, share females and share of temporary workers in total workforce. The results once again show that the positive correlation between openness and the investment in human capital at the firm level is robust to the inclusion of these variables. Perhaps surprisingly, in columns (5) and (6), we find that the share of temporary workers in the workforce and the share of females in the labor force are positively correlated with the intensity to train. The findings for temporary contracts are opposite to Black and Lynch (1998) and Arulampalam and Booth (1998). In the latter study UK workers on temporary contracts, part-time jobs and non-unionized positions are less likely to receive job training than permanent workers.^{23 24} The findings on the link between share women in the workforce

²² The number of observations in table 3 is smaller than in table 2 because the additional variables included as controls were not asked in a consistent way across all the countries.

²³ Arulampalam and Booth (1998) study the link between skills acquisition and labor market "flexibility" (proxied by contract type, part-time employment, and lack of union coverage), using the five waves of the British Household Panel Survey over the period 1991-1995. The findings show that workers on short-term employment contracts, or who are not covered by a union collective agreement, are significantly less likely to be involved in any work-related training to improve or increase their skills. Moreover, part-time workers are also less likely to receive work-related training than their full-time counterparts. These findings suggest a trade-off between expanding more flexible employment arrangements and the investment in skills.

²⁴ Autor (2004) analyzes the effect of free general training (in portable computer skills) offered by the U.S. temporary help supply (THS) establishments. The findings suggest that in addition to skills formation,

and the intensity to train are very close to the ones found by Black and Lynch (1998). There the authors also find that the share of females is either not related to the intensity to train or it is positively related, although the magnitude of the effect is very small.

4. Incidence of Training and the Enforcement of Labor Market Regulations

As argued in the introduction, the investment in human capital is a key determinant of firm level productivity and growth. When technology and products are changing rapidly, human capital investments are important in maintaining high levels of firm competitiveness and of employment at the country level. Without a workforce that is continually acquiring new skills, it is difficult to reap all the returns from technological progress. The evidence in the previous section showed that there is a strong positive correlation between firm openness and the investment in skills, even after controlling for workforce and firm characteristics like the propensity to innovate and adopt new technology. In this section, we explore an additional factor that could explain the within country variation in the propensity of firms to invest in human capital. In particular, we compare the propensity to invest in human capital for firms facing different degrees of enforcement of labor regulations within a given country. As discussed in the introduction, neither theory nor the empirical work are consensual on the link between labor regulations and the investment in skills. Bishop (1991) reports that the likelihood of a firm to provide formal training is higher when firing a worker is more difficult. Acemoglu and Pischke (2000) also argue that there are complementarities between regulation regimes and training systems, and that reducing firing costs and increasing employment flexibility could reduce the incentives to train. Pierre and Scarpetta (2004) also find evidence across developing countries that the greater the manager's perception

training plays an informational role at THS firms by eliciting private information about worker ability. The model is built on the premise that training is more productive and therefore valuable to high ability workers. Firms offer a package of training and initially lower wages that induces self-selection. Workers of high perceived ability choose training in anticipation of a steeper wage profile while low ability workers are deterred by limited expected gains. Firms profit from their sunk training investment via their short-run informational advantage about ability and thereby limited monopsony power. Market competition among THS firms reduces employer rents, yielding higher wages and more training. The analysis demonstrates that beyond providing spot market labor, THS firms gather and sell information about worker quality to clients. The rapid growth of THS as a labor market information broker implies that the demand for worker screening is rising.

that labor regulations are a binding constraint for firm's growth, the greater is the incentive to train. On the other hand, Basanini et al (2005) explore household level data for European countries and find evidence that labor market reforms that accelerate the diffusion of temporary contracts and at the same time increase the protection of a limited core of permanent employees produce negative effects on the accumulation of human capital taking place in firms. However, as argued in the introduction, this cross country evidence is plagued by several omitted variables and endogeneity problems.

The empirical approach that we explore in this section is likely to mitigate these problems by exploring the within country variation in the enforcement of labor regulation. Let the probability of a firm i to offer training also depend on the degree of enforcement of labor regulations in the country so that equation (2) becomes:

$$\Pr(\text{Train}_{ijc} = 1) = \Pr(\varepsilon_{ijc} > -\delta R_c * E_{ijc} - \gamma E_{ijc} - \beta X_{ijc} - \mu_j - \mu_c). \quad (3)$$

where R_c is a measure of the *de jure* labor regulation in country, E_{ijc} is a measure of the enforcement of labor regulations in the region r where the firm j is located, X_{ijc} captures firm level pre-determined characteristics of interest of firm i (including firm size, age of the firm, firm location, exporter, foreign and public ownership dummies, country and sector dummies) and η_c and μ_j time invariant effects capturing country and sector unobserved characteristics.

The main coefficient of interest is δ . δ quantifies the differences in the probability of a firm offering job training to their employees depending on the degree of enforcement of labor regulation and on the strictness of the labor law, assuming that firms are all else constant. Since all the specifications include country fixed effects we are automatically accounting for differences in training intensity that are caused by differences across countries in their *de jure* regulations, including the *de jure* labor law. It is worth noting that if we were to identify the effects of regulation on the incidence of training using only information on the *de jure* labor regulation, the identification would come only from the cross country variation in the law (which in most cases does *not* vary within each country). With this approach it would not be possible to account for a number

of country level omitted variables, like institutions or policies, which could be simultaneously correlated with job training although not with labor regulations. In particular, countries with a lower employment creation or job turnover could demand stricter levels of labor regulation and also offer fewer training programs. In this empirical approach, the effects of the *de facto* regulations on job training are identified with the interaction term between the labor inspections and a measure of strictness of labor regulation. This approach will in part overcome the problem of unobserved country characteristics since we will explore *within country variation* in the enforcement of labor regulations.

This approach is similar in spirit to a differences-in-differences approach (e.g., Rajan and Zingales, 1998, Micco-Pages, 2005). Having all else constant, we compare the effect of labor regulations for firms subject to different degrees of enforcement. It is worth stressing that we are not exploring the variation in enforcement alone. Rather, we will be exploring the *differential* effect of enforcement in countries with different degrees of rigidities in the labor law, after controlling for country fixed effects, firm characteristics and the enforcement of labor and other types of regulations. By controlling for country level fixed effects we are able to account for unobserved country characteristics that are likely to be correlated with *de facto* labor regulations and with training incidence (e.g., level of development in the country). By controlling for firm characteristics (e.g., age, size, sector composition) we account for the differences across firms that could be simultaneously correlated with training incidence and with the degree of enforcement in the country. E.g., larger and more visible firms could be more likely to be subject to labor inspections in countries where the labor law is more rigid. Finally, controlling by the degree of enforcement of labor regulations, we account for (unobservable) firm characteristics that could be simultaneously correlated with the enforcement and with training in countries with different degrees of rigidities in the labor law. We hope that by controlling for the country fixed effects and the firm characteristics, we also hope to minimize the potential problem of reverse causality (i.e., causality running from incidence of training to strictness of enforcement of labor regulations) that plagues most of the cross country work.

Table 4 reports the main findings for alternative sets of controls. All the specifications include country and sector fixed effects as well as the basic set of pre-determined firm characteristics, captured by X_{ijt} (including size and age of the firm, regional location, degree of openness, share public ownership and share of skilled workers in the workforce).²⁵ Column (1) shows that after controlling for country and industry fixed effects, firms that are exposed to a stricter enforcement of labor regulations present higher levels of job training, relative to firms that are exposed to a less strict enforcement of labor regulations, in countries with more stringent employment protection laws (captured by the index rigidity of employment). The sign of the coefficient on the interaction terms is positive though it is not statistically significant. We quantify the differential in the incidence of job training by reporting that the magnitude of the impact of labor rigidity on training across firms and countries, using the point estimates in column (1), and we obtain the differential 0.0159. This number implies that the incidence of job training for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is 1.5 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of Doing Business Index) than in a country with a less rigid labor regulation (in the 10th percentile). These numbers are not particularly large if we consider that the average incidence of job training in our sample is 45%. This positive correlation will survive (and become statistically significant) to a large number of robustness tests, presented in columns (2) through (7) of table 4 as well as in table 5. The point estimate on the interaction between enforcement and regulation will be very stable across specifications (around 0.002). This magnitude implies that that the incidence of job training for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is 4.5 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of Doing Business Index) than in a country with a less rigid labor regulation (in the 10th percentile).

The first robustness check refers to inspections being a poor proxy for the quality of the enforcement. In particular, it is possible that one of the motives for labor inspections (as well as other types of inspections) is related to corruption and bribery. In

²⁵ Hence, we compare firms located in regions with different degrees of enforcement of regulation but that are similar in a number of ways.

this case, one would expect that firms where it is easier for inspectors to extract rents are also more likely to be inspected. Although one could observe that in this firms the number of inspections is greater, this does not necessarily translate into stricter enforcement of the labor (or other) law. This could lead to a spurious (positive or negative) correlation with job training. To minimize this problem, we are already controlling for several observable firm characteristics in X_{ijc} , which we know are correlated to the degree of enforcement and also with job training. In column (2) we also explore the variation in the enforcement of labor regulations, after controlling for the degree of enforcement of the other types of regulations (captured by the total number of inspections). The inclusion of this variable is likely to minimize this concern as long as the probability of having an inspection in order to extract rents is not higher for the labor inspections than for other inspections (including health and safety inspections) in countries with different degrees of rigidity of labor laws.

The second set of robustness check refers to the fact that these results could be driven by differences in the enforcement of labor regulations across countries with different levels of income per capita, which in turn are correlated with differences in regulatory levels. This is could be a plausible assumption because Heckman and Pagés (2004) and Botero et al (2004) show that the degree of stringency of employment protection laws decreases with income levels. To account for this we add to the regression the interaction between enforcement of labor regulation faced by each firm and the income per capita in each country. The point estimate for δ more than doubles, to 0.0002 in column 3 of table 4. In columns (4) and (5) we further test that the interaction effect is not driven by differences in the enforcement of labor regulations across countries with different levels of rule of law and regulatory quality, which are also likely to be correlated with cross country differences in regulatory levels of the labor law. Interestingly, the coefficient of interest does not change. We also proceed in a similar manner to investigate whether the effects attributed to stringency of labor regulations could be attributed to other country policies or institutions, omitted from the analysis but potentially correlated with labor market regulations. First, we investigate more directly whether we could be capturing the effect of corruption by considering an index of control of corruption, which captures the extent to which public power is exercised for private

gain. Second, we investigate whether the effect we identify with labor regulations, could be driven by entry regulations. Indeed, it is quite plausible that across countries the political economy that leads to the enactment of job security regulations also leads to the ratification of regulations on entry. If that is so, our estimates may be capturing the effects of other regulations, rather than the effect of labor regulations. To assess whether this is the case, we control for a measure of the cost of entry at the country level (number of procedures to start a business) multiplied by the enforcement of labor regulations. Columns (6) and (7) report the findings. The results show that our main results for the effects on job training are unchanged if such regulations are controlled for.

Interestingly, throughout table 5 we always find that the effect of the interaction term of country policies/institutions and the enforcement of labor regulation is always positive although not statistically significant. This implies that firms subject to a stricter enforcement of labor regulations and located in countries with higher GDP, better rule of law and more entry regulations are more likely to offer job training to their employees.

Table 5 presents additional robustness checks, which try to address the problem of omitted variables, potentially correlated with enforcement of regulations and also with the incidence of training. The basic specification is the one reported in column (3) of table 4, after controlling for the interaction between the per capita GDP and the enforcement of labor regulations. On the one hand, it is possible that firms differ in their propensity to bribe and this could be simultaneously correlated with the incentives to invest in job training as well as with the enforcement of labor regulations. We proxy the propensity to bribe with the management time that is spent dealing with government officials (not necessarily labor inspectors). On the other hand, it is possible that the firm's perception of the extent to which the degree of property rights is enforced in the country also affects its incentives to investment as well as the degree of enforcement of the law. The findings, reported in columns (1) and (2) of table 5, again suggest that the effect of labor regulations on the incentive to train is not significantly affected. Nevertheless, we do find evidence that firms that report spending more time with labor inspectors (possibly involved with more bureaucracy and eventually bribery) are more likely to train. We also find evidence that the greater the perceptions that property rights are enforced the less likely are firms to train.

Finally, in columns (3) to (5) we investigate whether the effects of labor regulations are robust to the inclusion of different combinations of country, sector and regional time invariant effects. The idea is that, within each country, there might be unobserved (time invariant) effects simultaneously correlated with the intensity to train as well as with the enforcement of labor regulations and that their effect could be different depending the degree of labor regulations. In particular, we worry that the degree of enforcement of labor regulations is correlated with the regional location of the firm (e.g., capital or large cities versus other locations) and that their effect on the incentives to invest might differ depending on the strictness of labor regulations. The findings after controlling for country-city-sector, country-size-sector and country-city-size are reported in table 5. Again, we do not find any evidence that accounting for these effects significantly affects the main coefficient of interest.

5. Sensitivity Analysis

One of the main shortcomings of this approach is that the degree of enforcement of regulation could be endogenous, in the sense that it could be itself determined by the characteristics of the firms in the region. One of the ways to overcome this problem is to find an instrument that is simultaneously correlated with enforcement of labor regulation and is reasonably exogenous to the outcomes of interest. One possibility is to follow Almeida and Carneiro (2006, 2007) and compute a measure of how costly is enforcement in each region.²⁶ Since, unlike in the case of Brazil, we do not know with detail the cities where each firm is located, it will be difficult to find an analogous instrument. Alternatively, in ongoing work, we are refining the analysis with respect to the measure of enforcement of labor regulations. In particular, we test whether our findings are robust to a broader measure of enforcement of labor regulations, which could arguably be more exogenous to the firm. This measure is being computed as a mean value of labor inspections in the region where the firm is located.²⁷ Finally, in preliminary work we are

²⁶ Almeida and Carneiro (2006) use as instrument the average distance between the city where the firm is located and all the cities within the same state where an office of the Ministry of Labor is located.

²⁷ One can actually argue that the number of inspections is also a function of firm size and sector of activity. We are also testing the robustness of our findings in this respect. E.g., enforcement is likely to be

also exploring the fact that the intrinsic input and labor reallocation needs of each sector are likely to lead to differentiated effects of regulations on the outcomes of interest. This idea was first developed by Rajan and Zingales (1998) and implemented in this type of literature by Micco and Pages (2007).²⁸ Micco and Pages (2007) argue that sector differences in the intrinsic volatility of demand and supply of shocks lead to differential effects of employment protection across sectors. In particular, labor regulations will be more binding in more volatile sectors, where the needs for labor reallocation are greater. To identify an industry's intrinsic demand for adjustment, they study the rank correlation of industry job flows of excess reallocation across countries and find that correlations tend to be positive, statistically significant, and large. Across countries, some industries exhibit higher levels of job reallocation than others. This suggests that there are important technological or product market characteristics that determine the relative volatility of employment in a sector.

Table 6 tests the robustness of the results when we restrict the sample only to manufacturing (approximately 73% of the final sample). In column (1) we consider only firms in manufacturing while in columns (2) and (3) we report the findings for high tech and low tech industries. The reason for separating the sample is that manufacturing industries with a higher degree of technological sophistication (so called high-tech) might face and take advantage of more innovation opportunities than traditional industries with a lower degree of technological sophistication (so called low-tech). To the extent that this happens, the former might be more likely to invest in job training and they could be differently affected by the effects of labor regulations.²⁹ The findings in table 6 show that the effect of *de facto* labor regulations on the incidence of training increases when we restrict the sample to manufacturing firms. This is suggestive that firms in manufacturing are more constrained by the effects of regulation than non-manufacturing firms. In particular, the point estimate implies that the incidence of job training for a firm facing

different depending on firm size. In particular, smaller firms might be less visible to the authorities and hence, they could be more likely to evade the regulation.

²⁸ This methodology has been applied in other fields namely in the finance literature (e.g., Claessens and Laeven, 2003, Galindo et al, 2002, Galindo and Micco, 2004, Raddatz, 2002, and Rajan and Zingales, 1998).

²⁹ Notice that the fact that high tech industries have a greater propensity to innovate and to invest in job training is accounted for by the sector time invariant fixed effects but this does not account for the fact that the effect of the *de jure* regulation is different by sector of activity.

the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is approximately 6 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of Doing Business Index) than in a country with a less rigid labor regulation (in the 10th percentile). Moreover, the effect seems to be mostly focused on the low tech industries rather than in the high tech.³⁰

Finally, table 7 disaggregates the effect of the rigidity of labor regulations into several more specific components of the labor law, which can be obtained from the Doing Business data set for the different countries. In particular, exploring the basic specification reported, we analyze separately the effects of the hiring regulations and firing as well as the rigidity of the work schedule, captured respectively by the following indices difficulty of hire, difficulty of firing, firing costs and rigidity of hours. The preliminary results suggest that most of the positive effect of the strictness of the *de facto* labor regulations on the incentive to invest in job training (presented in column 1) is driven by the rigidity in hiring regulations and by the rigidity in hours of work. In other words, the incidence of job training for a firm facing different degrees of enforcement of labor regulations is *higher* in a country with amore rigid hiring regulations than in a country with less rigid hiring regulations. On the other hand, the incidence of job training for a firm facing different degrees of enforcement of labor regulations tends to be *lower* in a country with a more rigid firing regulations (captured either by procedures or by the cost of firing) than in a country with less rigid firing regulations. This evidence suggests that the degree of stringency of hiring regulations might create longer-term employment relationships, which are necessary to invest in job training specific to a firm or sector. In ongoing work we are checking for the plausibility of this channel by exploring information on tenure and labor turnover rates. This increasing investment in human capital is a potential benefit of having hiring regulations if firms are under-investing in this area (e.g., Wasmer, 2003).

6. Conclusion

³⁰ We follow Parisi et al. (2006) and consider low tech industries the following sectors: Beverages, food, garments, leather, non-metallic and plastic materials, paper, other manufacturing, textiles, and wood and furniture.

In a context of increasing openness and international competition, several firms in developing countries struggle to constantly adapt their workforce to new technologies and organizational structures in order to remain competitive. Policymakers throughout the world are increasingly interested in understanding the determinants of the investment in skills by individuals and firms, in order for the countries to remain competitive in an international context. In this paper we analyze the firm's incentives to invest in job training by exploring a large micro (firm level) data set across more than 60 developing countries. We ask two questions. First, how heterogeneous is the supply of training programs across and within countries? Is it closely linked to the firm's integration in the global markets and to its workforce characteristics? Second, to the extent does the *de facto* labor market regulations faced by firms create an incentive for a larger investment in skills? To investigate the latter, we follow Almeida and Carneiro (2007) and explore the variation in the enforcement of labor regulation within each country. We measure enforcement of labor regulations with the number of visits made by labor inspections to a firm. Our assumption is that, all else constant, labor regulations will be more binding when firms are facing a stricter enforcement of the labor law. The empirical approach we follow is similar in spirit to a differences-in-differences approach.

Our findings can be summarized as follows. First, there is a large heterogeneity at the firm level in the decision to invest in job training across in developing countries. This holds after controlling for country and industry fixed effects (which together account for approximately 13% of the total variation). Part of the remaining heterogeneity is explained by firm size and human capital composition. Second, there is a strong and positive correlation between measures of openness and innovation (technology adoption), on the one hand and the intensity to training at the firm level on the other. Third, we find evidence that a stricter enforcement of labor market regulations, when the *de jure* labor regulation is more rigid, significantly increases the intensity to train, especially in manufacturing sector and low tech industries. Moreover, the results also suggest that the effect works mostly through the hiring costs. In particular, we find that, after controlling for firm characteristics and country and industry fixed effects, those firms facing a stricter enforcement of stricter hiring regulations tend to invest more in job training, relatively to

firms facing a less strict enforcement, in countries where this regulation is more rigid and costly. The same does not happen with the firing regulations.

7. References

Acemoglu, D. and Pischke, J., 1998. "Why do Firms Train? Theory and Evidence" February 1998, Quarterly Journal of Economics, Vol. 113, No. 1, Pages 79-118

Albrecht, J., Navarro, L. and Vroman, S., 2006. "The Effects of Labor Market Policies in an Economy with an Informal Sector" IZA Discussion Paper No. 2141

Almeida, R., 2007. The Labor Market Effects of Foreign Owned Firms. Journal of International Economics, Vol. 72, Issue 1, Pages 75-96.

Almeida, R. and P. Carneiro, 2005. "Enforcement of Labor Regulation, Informal Labor, and Firm Performance" World Bank Policy Research Working Paper No. 3756

Almeida, R. and P. Carneiro, 2006. "The Return to the Firm Investment in Human Capital" IZA Discussion Paper No. 1937

Almeida, R. and P. Carneiro, 2007. "Inequality and Employment in a Dual Economy: Enforcement of Labor Regulation in Brazil" IZA Discussion Paper No. 3094

Almeida, R. and A. Fernandes. 2007, "Openness and Technological Innovations in Developing Countries: Evidence from Firm-Level Surveys". IZA Discussion Paper No. 2907

Aterido, R., M. Hallward-Driemeier, and C. Pagés, 2007. "Investment Climate and Employment Growth: The Impact of Access to Finance, Corruption and Regulations Across Firms" IZA Discussion Paper No. 3138

Barrett, A. and P. O'Connell, 2001, "Does Training Generally Work? The Returns to

In-Company Training”, *Industrial and Labor Relations Review*, 54 (3).

Besley, T. and Burgess, R. 2004. “Can Labor Regulation Hinder Economic Performance? Evidence from India”. *Quarterly Journal of Economics*, vol. 119(1), pages 91-134.

Black, S. and L. Lynch, 1997, “How to Compete: The Impact of Workplace Practices and Information Technology on Productivity”, National Bureau Economic Research Working Paper No. 6120.

Boeri, T. and J. Jimeno-Serrano, 2005. "The Effects of Employment Protection: Learning from Variable Enforcement" *European Economic Review*, vol. 49, Issue 8, Pgs 2057-2077

Botero, J., S. Djankov, R. La Porta, F. López-de-Silanes, and A. Shleifer. 2004. “The Regulation of Labor.” *Quarterly Journal of Economics* 119(4):1339-1382.

Carneiro, P. and J. Heckman, 2003. “Human Capital Policy” published in: J. Heckman and A. Krueger, *Inequality in America: What Role for Human Capital Policy?*, MIT Press.

Bassanini, A., A. Booth, A., G. Brunello, M. De Paola, and E. Leuven, 2005. "Workplace Training in Europe" *IZA Discussion Paper No. 1640*

Kaufmann, D., A. Kraay, and M. Mastruzzi, 2007. "Governance Matters VI: Governance Indicators for 1996-2006" *World Bank Policy Research Working Paper No. 4280*

Caballero, R., K. Cowan, E. Engel, and A. Micco, 2004 "Effective Labor Regulation and Microeconomic Flexibility". *Cowles Foundation Discussion Paper No. 1480*; *Yale Economic Growth Center Discussion Paper No. 893*; *MIT Department of Economics Working Paper No. 04-30*; *FRB of Boston Working Paper No. 04-6*

Claessens, S., and L. Laeven, 2003. "Financial Development, Property Rights, and Growth". *The Journal of Finance* LVIII (6): 2401–36.

Galindo, A., and A. Micco. 2004. "Do State-Owned Banks Promote Growth? Cross-Country Evidence for Manufacturing Industries." *Economic Letters* 84 (3): 371–76.

Galindo, A., A. Micco, and G. Ordoñez, 2002. "Financial Liberalization: Does it Pay to Join the Party?." *Economia LACEA* 3 (1): 231-261.

Heckman, J. and C. Pagés; editors, 2004. *Law and Employment: Lessons from Latin America and the Caribbean*. NBER Conference Series Report. University of Chicago Press, Chicago and London

Machin, S. and A. Vignoles, 2001, "The economic benefits of training to the individual, the firm and the economy", mimeo, Center for the Economics of Education, UK.

Micco, A. and C. Pages, 2006. "The Economic Effects of Employment Protection: Evidence from International Industry-Level Data" IZA Discussion Paper No. 2433

Pierre, G. and S. Scarpetta, 2004. "Employment Regulations through the Eyes of Employers. Do they Matter and How do Firms Respond to them?" World Bank Policy Research Paper No. 3463

Raddatz, C. 2002. "Liquidity Needs and Vulnerability to Financial Underdevelopment." Massachusetts Institute of Technology. Cambridge, Mass. Processed.

Rajan, R., and L. Zingales. 1998. "Financial Dependence and Growth." *The American Economic Review* 88 (3): 559–86.

Svensson, J.. 2003. "Who must pay bribes and how much? Evidence from a cross section of firms". *Quarterly Journal of Economics*, vol. 118, no. 1, pp. 207-230(24)

Wasmer, E., 2006. "Interpreting Europe-US Labor Market Differences: The Specificity of Human Capital Investments," forthcoming in the American Economic Review.

Wasmer, E., 2003. "Interpreting European and US Labour Market Differences: The Specificity of Human Capital Investments" CEPR Discussion Paper No. 3780

Table 1. Summary Statistics of the Main Variables

Variable	N	Mean	S.D.	Min	Max
Small (10-49)	35229	0.3744642	0.4839911	0	1
Medium (50-99)	35229	0.133867	0.3405142	0	1
Large (100-249)	35229	0.1361946	0.343	0	1
Very Large (+250)	35229	0.160067	0.3666734	0	1
Large City (dummy)	33722	0.5128106	0.4998433	0	1
Age firm	33964	17.16939	16.56304	0	215
Exporter	34689	0.2973565	0.4571013	0	1
Minority Foreign Ownership	35075	0.0280827	0.1652114	0	1
Majority Foreign Ownership	35075	0.0479259	0.2136125	0	1
Full Foreign Ownership	35075	0.0604704	0.2383597	0	1
Public Ownership	34959	0.0792357	0.2701101	0	1
Share Skilled Workers	34838	0.6369052	0.3204053	0	1

Source: Author's calculations based on the Investment Climate Surveys.

Table 2. Determinants of the Investment On-the-Job Training

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Small (10-49)	0.17 [0.009]***	0.17 [0.009]***	0.17 [0.009]***	0.16 [0.010]***	0.16 [0.010]***	0.18 [0.011]***	0.16 [0.010]***	0.16 [0.010]***
Medium (50-99)	0.32 [0.010]***	0.32 [0.010]***	0.32 [0.010]***	0.30 [0.010]***	0.30 [0.011]***	0.31 [0.011]***	0.30 [0.011]***	0.30 [0.011]***
Large (100-249)	0.41 [0.009]***	0.41 [0.009]***	0.41 [0.009]***	0.38 [0.010]***	0.38 [0.010]***	0.39 [0.010]***	0.38 [0.010]***	0.39 [0.010]***
Very Large (+250)	0.49 [0.008]***	0.49 [0.008]***	0.49 [0.008]***	0.45 [0.009]***	0.45 [0.009]***	0.46 [0.010]***	0.45 [0.009]***	0.46 [0.010]***
Large City (dummy)	-	0.02 [0.007]***	0.03 [0.007]***	0.03 [0.007]***	0.03 [0.007]***	0.01 [0.008]	0.03 [0.007]***	0.03 [0.008]***
Age firm	-	-	-0.001 [0.000]***	-0.001 [0.000]*	-0.001 [0.000]**	-0.001 [0.000]	-0.001 [0.000]**	-0.001 [0.000]**
Exporter	-	-	-	0.07 [0.008]***	0.08 [0.008]***	0.07 [0.009]***	0.07 [0.008]***	0.08 [0.009]***
Minority Foreign Ownership	-	-	-	0.04 [0.020]*	0.04 [0.020]**	0.01 [0.022]	0.04 [0.020]**	0.05 [0.021]**
Majority Foreign Ownership	-	-	-	0.05 [0.015]***	0.05 [0.015]***	0.02 [0.017]	0.05 [0.015]***	0.06 [0.016]***
Full Foreign Ownership	-	-	-	0.08 [0.014]***	0.08 [0.014]***	0.08 [0.016]***	0.08 [0.014]***	0.08 [0.015]***
Public Ownership	-	-	-	-	0.01 [0.013]	-0.01 [0.014]	0.01 [0.013]	0.02 [0.014]
Average Years Schooling Workforce	-	-	-	-	-	0.03 [0.002]***	-	-
Share Skilled Workers	-	-	-	-	-	-	0.01 [0.012]	0.01 [0.012]
Industry Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Country - Industry Fixed Effects?	No	No	No	No	No	No	No	Yes
Observations	34,135	32,746	31,491	30,918	30,824	25,860	30,664	30,151

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions. Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table 3. Determinants of the Investment On-the-Job Training: Additional Firm Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Exporter	0.15 [0.008]***	0.055 [0.009]***	0.082 [0.010]***	0.077 [0.010]***	0.082 [0.010]***	0.065 [0.010]***
Minority Foreign Ownership	0.019 [0.021]	0.239 [0.010]***	0.057 [0.024]**	0.047 [0.023]**	0.052 [0.025]**	0.039 [0.025]
Majority Foreign Ownership	0.05 [0.016]***	0.036 [0.016]**	0.088 [0.019]***	0.076 [0.021]***	0.104 [0.021]***	0.041 [0.018]**
Full Foreign Ownership	0.094 [0.015]***	0.083 [0.015]***	0.088 [0.018]***	0.046 [0.018]**	0.062 [0.018]***	0.002 [0.000]***
Innovator	0.153 [0.007]***	-	-	-	-	-
ISO certification	-	0.244 [0.009]***	-	-	-	-
Investment R&D	-	-	0.002 [0.001]***	-	-	-
Avg. Years Schooling Manager	-	-	-	0.128 [0.010]***	-	-
% Females Workforce	-	-	-	-	14274.000 [0.000]**	-
% Temporary Workforce	-	-	-	-	-	0.002 [0.000]***
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,499	27,843	21,227	20,143	18,447	20,993

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports

the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all

the variables in column (7) of table 2. Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at

1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table 4: Incidence of On-the-Job Training, Labor Regulations and Enforcement of Regulations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rigidity of Employment * Labor Inspections	0.00007 [0.00008]	0.0002 [0.00010]**	0.0002 [0.00010]*	0.0002 [0.00011]*	0.0002 [0.00010]*	0.0002 [0.00010]*	0.0002 [0.00010]*
Rigidity of Employment * Total Inspections	-	-0.00008 [0.00003]**	-0.00008 [0.00003]**	-0.00008 [0.00003]**	-0.00008 [0.00003]**	-0.00008 [0.00003]**	-0.00007 [0.00003]**
Labor Inspections	0.0004 [0.00255]	-0.009 [0.00326]***	-0.010 [0.00887]	-0.009 [0.00328]***	-0.009 [0.00325]***	-0.009 [0.00324]***	-0.014 [0.00469]***
Total Inspections	-	0.005 [0.00116]***	0.005 [0.00116]***	0.005 [0.00116]***	0.005 [0.00116]***	0.005 [0.00116]***	0.005 [0.00117]***
GDP pc * Labor Inspections	-	-	0.00018 [0.00106]	-	-	-	-
Rule of Law * Labor Inspections	-	-	-	0.00012 [0.00179]	-	-	-
Regulatory Quality * Labor Inspections	-	-	-	-	-0.00035 [0.00160]	-	-
Gov. Control Corruption * Labor Inspections	-	-	-	-	-	0.00044 [0.00168]	-
Procedures to Start a Business * Labor Inspections	-	-	-	-	-	-	0.00048 [0.00032]
Basic Firm Level Controls Included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,460	22,460	22,123	22,123	22,123	22,123	22,460

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the variables in column (7) of table 2 (including country and industry fixed effects). Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table 5: Job Training and Enforcement of Labor Regulations: Robustness Checks

	(1)	(2)	(3)	(4)	(5)
Rigidity of Employment * Labor Inspections	0.0003 [0.00010]***	0.0002 [0.00010]**	0.00025** -0.0001	0.00019* -0.0001	0.00020** -0.0001
Labor Inspections	-0.01016 [0.00890]	-0.00437 [0.00873]	-0.00997*** -0.00311	0.0088 -0.00844	0.00712 -0.00846
Rigidity of Employment * Total Inspections	-0.00007 [0.00003]**	-0.00005 [0.00003]	-0.00008** -0.00003	-0.00008** -0.00003	-0.00008** -0.00003
Total Inspections	0.00525 [0.00114]***	0.00415 [0.00124]***	0.00525*** -0.00112	0.00550*** -0.00109	0.00560*** -0.00108
Management Time Spent Dealing with Officials	0.00244 [0.00032]***	-	-	-	-
Property Rights Enforced in the Country	-	-0.0145 [0.00776]*	-	-	-
GDP pc * Labor Inspections	Yes	Yes	Yes	Yes	Yes
Basic Firm Level Controls Included?	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	No	Yes	Yes
Industry Fixed Effects Included?	Yes	Yes	No	Yes	Yes
Country-City-Sector Fixed Effects Included?	No	No	Yes	No	No
Country-Size-Sector Fixed Effects Included?	No	No	No	Yes	No
Country-City-Size Fixed Effects Included?	No	No	No	No	Yes
Observations	23,567	23,613	26,539	25,783	26,515

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the variables in column (7) of table 2 (including country and industry fixed effects). Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table 6 : Job Training and Enforcement of Labor Regulations: Manufacturing Sectors

	All	High-Tech Manufacturing	Low-Tech Manufacturing
	(1)	(2)	(3)
Rigidity of Employment * Labor Inspections	0.0003 [0.00011]***	0.0002 [0.00019]	0.0003 [0.00013]**
Labor Inspections	-0.00475 [0.00920]	-0.00375 [0.01571]	-0.00553 [0.01120]
Rigidity of Employment * Total Inspections	-0.00006 [0.00004]	-0.00012 [0.00006]*	-0.00002 [0.00005]
Total Inspections	0.00469 [0.00129]***	0.00590 [0.00190]***	0.00369 [0.00169]**
Basic Firm Level Controls Included?	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes
Industry Fixed Effects?	Yes	Yes	Yes
Observations	20,909	6,863	14,035

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the variables in column (7) of table 2 (including country and industry fixed effects). Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group. In column (3), the low tech industries include beverages, food, garments, leather, non-metallic and plastic materials, paper, other manufacturing, textiles, and wood and furniture.

Table 7: Job Training, Labor Regulations and Enforcement of Regulations: Different Dimensions of Labor Laws

	Rigidity of Employment	Difficulty of Hire	Difficulty of Firing	Firing Costs	Rigidity of Hours
	(1)	(2)	(3)	(4)	(5)
Labor Regulation * Labor Inspections	0.0002 [0.00010]**	0.0001 [0.00004]**	-0.0001 [0.00006]*	-0.0001 [0.00003]*	0.0002 [0.00006]***
Labor Regulation * Total Inspections	-0.00007 [0.00003]**	-0.00004 [0.00001]***	0.00003 [0.00002]*	0.00002 [0.00001]***	-0.00003 [0.00002]*
Labor Inspections	-0.00431 [0.00792]	0.00235 [0.00696]	0.01028 [0.00840]	0.00927 [0.00794]	0.00052 [0.00696]
Total Inspections	0.00493 [0.00105]***	0.00395 [0.00051]***	0.0017 [0.00070]**	0.00142 [0.00061]**	0.00385 [0.00069]***
GDP pc * Labor Inspections	-0.00069 [0.00095]	-0.00101 [0.00094]	-0.00127 [0.00102]	-0.00111 [0.00098]	-0.00105 [0.00093]
Basic Firm Level Controls Included?	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes
Observations	27,358	27,358	27,358	27,358	27,358

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the variables in column (7) of table 2 (including country and industry fixed effects). Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table A.1. Variables Definitions

Variable	Definition
Training	Dummy variable equal to 1 if the firm provides internal or external training to its workers.
Majority Foreign-Owned	Dummy variable equal to 1 if more than 50% of the firm's capital is owned by foreigners.
Minority Foreign-Owned	Dummy variable equal to 1 if more than 0% but less than 50% of the firm's capital is owned by foreigners.
Domestic	Dummy variable equal to 1 if 100% of the firm's capital is owned by domestic entities.
Exporter	Dummy variable equal to 1 if the firm exports directly or indirectly.
Age	Year of the survey minus the year when the firm started operations.
Micro, Small, Medium, and Large	Dummy variables equal to 1 if the total number of employees in the firm is between 1 and 10, between 11 and 50, between 51 and 150 or greater than 150, respectively.
Public Ownership	Dummy variable equal to 1 if the share of the firm's capital owned by the government or state is positive.
Skilled Workers	Percentage of the firm's workforce that are managers, professionals or skilled production workers.
Avg. Years Schooling Manager	Average years of education of the manager.
% Females Workforce	Percentage of women in the firm's total workforce
% Temporary Workforce	Percentage of temporary workers in the firm's total workforce.
High-Tech Industries	Auto and auto-components, chemicals and pharmaceuticals, electronics, and metals and machinery.
Low-Tech Industries	Beverages, food, garments, leather, non-metallic and plastic materials, paper, other manufacturing, textiles, and wood and furniture. These definitions follow Parisi et al. (2006).
R&D	Dummy variable equal to 1 if the firm has design and R&D expenditures (e.g., labor costs with R&D personnel, materials or subcontracting costs).
Average Years Schooling Workforce	Average years of schooling of the workforce.
ISO certification	Dummy if the firm has an ISO certification.
Labor Inspections	Number of visits to the firm by labor inspectors.
Total Inspections	Number of visits to the firm by all types of inspections (including taxes, health, safety and labor).
Rigidity of Employment	Rigidity of Employment Index (Doing Business)
Difficulty of Hire	Difficulty of Hiring Index (Doing Business)
Difficulty of Firing	Difficulty of Firing Index (Doing Business)
Firing Costs	Firing costs (weeks of wages) (Doing Business)
Rigidity of Hours	Rigidity of Hours Index (Doing Business)
Regulatory Quality	Government Regulatory Quality (Kaufmann & Kraay)
Rule of Law	Government Rule of Law (Kaufmann & Kraay)
Gov. Control Corruption	Government Control Corruption (Kaufmann & Kraay)

Note: Source is Investment Climate Surveys unless otherwise stated.

Figure 6

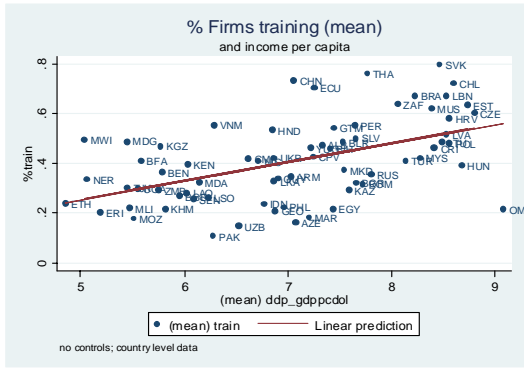


Figure 7

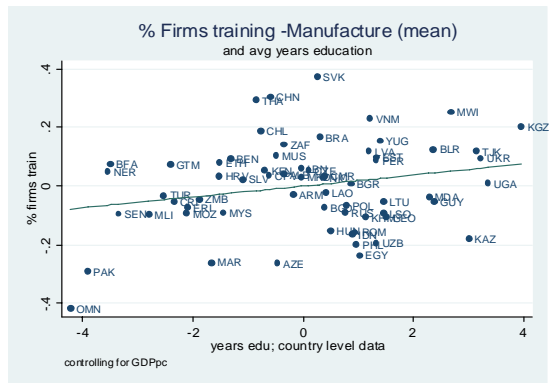


Figure 8

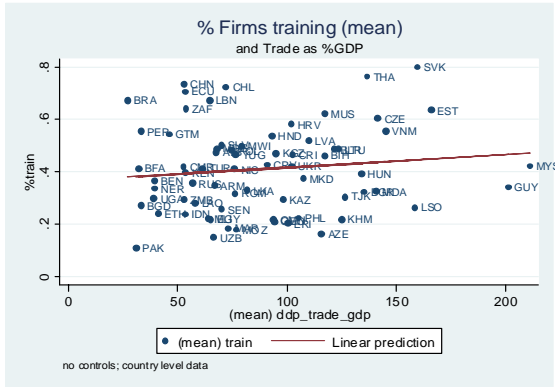


Figure 9

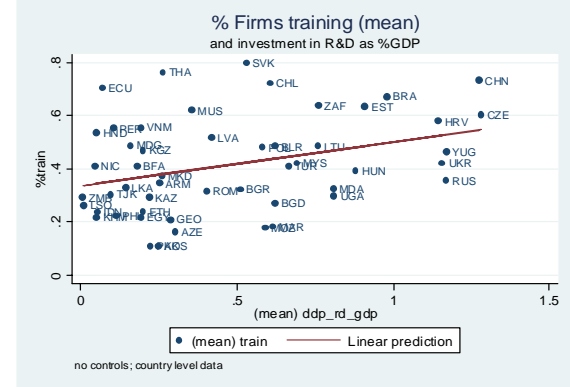


Table A2. Country/Year Composition of the Sample

	Obs	Freq.	% Firms train		Obs	Freq.	% Firms train
SUB-SAHARAN AFRICA				EAST & CENTRAL EUROPE			
Benin2004	192	0.58	0.36	Albania2005	198	0.60	0.47
BurkinaFaso2006	51	0.15	0.41	Armenia2005	329	0.99	0.35
Cameroon2006	117	0.35	0.42	Azerbaijan2005	290	0.87	0.16
CapeVerde2006	47	0.14	0.43	Belarus2005	296	0.89	0.49
Eritrea2002	74	0.22	0.2	BiH2005	180	0.54	0.46
Ethiopia2002	367	1.10	0.24	Bulgaria2005	279	0.84	0.32
Kenya2003	247	0.74	0.4	Croatia2005	207	0.62	0.58
Lesotho2003	57	0.17	0.26	Czech Rep.2005	262	0.79	0.6
Madagascar2005	279	0.84	0.49	Estonia2005	191	0.57	0.63
Malawi2005	155	0.47	0.5	FYROM2005	174	0.52	0.37
Mali2003	149	0.45	0.22	Georgia2005	171	0.51	0.21
Mauritius2005	179	0.54	0.62	Hungary2005	559	1.68	0.39
Mozambique2002	100	0.30	0.18	Kazakhstan2005	559	1.68	0.29
Niger2006	125	0.38	0.34	Kosovo2003	329	0.99	0.11
Senegal2003	244	0.73	0.26	Kyrgyzstan2005	185	0.56	0.47
SouthAfrica2003	587	1.77	0.64	Latvia2005	178	0.54	0.52
Uganda2003	298	0.90	0.3	Lithuania2005	175	0.53	0.49
Zambia2002	198	0.60	0.29	Moldova2005	335	1.01	0.33
Total	3,466	10.43	0.4	Poland2005	937	2.82	0.48
EAST ASIA & PACIFIC				Romania2005	582	1.75	0.32
Cambodia2003	486	1.46	0.22	Russia2005	539	1.62	0.36
China2003	3,403	10.24	0.73	Slovakia2005	193	0.58	0.8
Indonesia2003	596	1.79	0.24	Tajikistan2005	194	0.58	0.3
Laos2005	245	0.74	0.28	Turkey2005	1,810	5.45	0.46
Malaysia2002	892	2.69	0.42	Ukraine2005	543	1.63	0.42
Philippines2003	647	1.95	0.22	Uzbekistan2005	267	0.80	0.15
Thailand2004	1,385	4.17	0.76	Yugoslavia2005	259	0.78	0.46
Turkey2005	473	1.42	0.43	Total	10,221	30.77	0.4
Vietnam2005	1,168	3.52	0.61	LATIN AMERICA & CARIBBEAN			
Total	9,295	27.98	0.57	Brazil2003	1,634	4.92	0.67
MIDDLE EAST & NORTH AFRICA				Chile2004	945	2.84	0.72
Egypt2006	992	2.99	0.22	CostaRica2005	343	1.03	0.46
Lebanon2006	353	1.06	0.67	Ecuador2003	432	1.30	0.7
Morocco2004	835	2.51	0.18	ElSalvador2003	465	1.40	0.5
Oman2003	301	0.91	0.22	Guatemala2003	435	1.31	0.54
Total	2,481	7.47	0.27	Guyana2004	153	0.46	0.34
SOUTH ASIA				Honduras2003	450	1.35	0.54
Bangladesh2002	959	2.89	0.27	Nicaragua2003	452	1.36	0.41
Pakistan2002	950	2.86	0.11	Peru2002	121	0.36	0.55
SriLanka2004	419	1.26	0.33	Total	5,430	16.35	0.6
Total	2,328	7.01	0.22	TOTAL			
					33,221	100.00	0.46

Table A3. Determinants of the Investment On-the-Job Training: Robustness to Different Samples.

	Low Tech- Industries	High Tech Industries	East and South Asia	ECA	LAC	Africa & MENA	Low Income	Middle-Lower Income	Middle-Upper Income
	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)
Exporter	0.08 [0.011]***	0.05 [0.016]***	0.10 [0.015]***	0.04 [0.013]***	0.08 [0.018]***	0.07 [0.018]***	0.10 [0.016]***	0.08 [0.012]***	0.05 [0.014]***
Minority Foreign Ownership	0.00 [0.029]	0.10 [0.031]***	0.06 [0.029]**	-0.04 [0.039]	0.06 [0.075]	0.07 [0.042]*	-0.01 [0.041]	0.06 [0.026]**	0.04 [0.045]
Majority Foreign Ownership	0.05 [0.024]*	0.11 [0.025]***	0.08 [0.026]***	-0.02 [0.024]	0.08 [0.045]*	0.11 [0.036]***	0.04 [0.028]	0.08 [0.022]***	0.01 [0.030]
Full Foreign Ownership	0.01 [0.021]	0.10 [0.025]***	0.06 [0.025]**	0.13 [0.027]***	0.03 [0.036]	0.07 [0.029]**	0.05 [0.026]**	0.06 [0.022]***	0.13 [0.026]***
Industry Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,114	7,281	10,090	10,407	5,170	4,992	7,529	14,479	8,655

Source: Author's calculations based on the Investment Climate Surveys.

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the variables in column (7) of table 2. Robust standard errors are in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.