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The Effect of Local Governance on Firm Productivity and Resource Allocation: Evidence from Vietnam¹

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Abstract

Governance quality plays a key role in private sector development: competent bureaucrats not only create good policies and regulations but also effectively implement them to shape the business environment. We exploit Vietnam's decentralization of administrative tasks since the early 2000s to test this hypothesis. We examine how changes in the *provincial administration of national business regulations* affect firms through two channels: within firm productivity levels and resource allocation across firms. Our results show that better overall business environment has a positive impact on firm productivity, and this effect is driven by a reduction in corruption levels, the risks of land expropriation, and entry regulations. We also find that high productivity firms are generally more able to take advantage of the improvements in business environment. However, better implementation of entry regulations matters most for less productive firms. We do not find evidence for the impact of business environment quality on province-level market efficiency.

JEL Classification: L25, D24, D02, O53

Keywords: Productivity, resource allocation, Vietnam, business environment, governance.

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1 Introduction

The quality of governance affects the type of business environment a firm faces, resulting in direct and indirect effects on productivity outcomes both at the firm and aggregate levels. Firms in a weak business environment have to allocate resources away from productive to non-productive use to handle administration burdens or comply with excessive regulations. These activities reduce firm productivity.³ In contrast, a strong business environment can indirectly increase firm productivity as the firm experiences competition pressures, more flexible input markets, and knowledge spillovers when firms agglomerate in places with better functioning markets.⁴ In aggregate, the efficiency of the market also determines how resources are allocated across firms. A growing literature following Hsieh and Klenow (2009) documents how market distortions, which prevent inputs from being allocated to the most productive firms, can have important consequences on aggregate productivity across countries. Such market distortions occur, for example, when firms face differential tax, labor or capital costs due to either *de jure* or *de facto* regulations. In turn, efficiency of the business environment is dependent on how the government and in some cases, the local bureaucrat administer and interpret regulations and policies. The actions of these bureaucrats can promote or hinder firms, affecting the levels of firm productivity.

This paper investigates the link between local governance – particularly as related to the local business environment – and aggregate productivity through two channels: within firm productivity levels and resource allocation across firms. We use firm-level data from Vietnam to answer this question by analyzing how variations in provincial administrative quality affect measures of (i) firm's productivity and (ii) province-level resource (mis)allocation. We focus on productivity because it has a straightforward interpretation of measuring the economic cost (through output distortions) of business procedures and the costs of doing business in the province (Greenstone et al., 2012).

Our main results suggest that a higher quality of the local governance has a positive impact on firm productivity. This result is driven largely by the level of corruption in the provinces, measured by the degree of informal charges paid to the provincial government, and to a lesser extent, by the risks of land expropriation and time required to complete business procedures. We also find that improvements in the business environment, as measured by different aspects of local governance, has a differential effect on firms depending on their productivity levels: a better business environment positively affects high productivity firms but not low productivity firms. While lower land expropriation risks and lower informality benefits high productivity firms, better entry regulations matter for the low productivity firms. We do not find any impact of improvements in the business environment on measures of resource allocative efficiency within the provinces and sectors. This could be driven by the fact that an increase in local governance only reflects the experience of a subset of firms in the economy. If these changes do not benefit the most productive firms, then we might not observe improvements in allocative efficiency.

³ Greenstone et al. (2012) find that the introduction of environmental regulations decreased productivity levels of U.S. manufacturing firms. Fisman et al. (2007) and De Rosa et al. (2010) find a negative impact of corruption and bribery on firms in Ugandan and Central European countries. Giordano et al. (2015) show that public sector inefficiencies reduce the labor productivity of Italian firms.

⁴ See Syverson (2011) for a comprehensive review. For individual studies that consider the effect of each factor, see Pavcnik (2002), Topalova et al. (2011) and Fernandes (2007) on trade competition, Amiti et al. (2007) on input market flexibility, Van Biesebroeck (2005) and De Loecker (2007) on learning through exporting, Greenstone et al. (2010) on agglomeration spillovers.

Our results are robust after controlling for firm selection into better performing provinces and performing falsification tests for a sub-sample of firms located in SEZs. We also address the issue of reverse causality, where improvements in the business environment, especially corruption levels, can be in response to firm outcomes. We exploit an institutional arrangement for revenue sharing between the Vietnamese central government and the provinces, and use the rate of revenue sharing as an instrument for the overall measure of local governance. In the robustness tests and the IV regressions, we find that our general results still hold: better governance and business environment still increases firm productivity.

There is a growing branch of literature that examines the effects of governance on firm performance but few have examined this relationship over time and in a developing country. The survey of the local governance indicators in Vietnamese provinces represents one of the few datasets on business environment and governance in a developing country collected over time. The closest study to our paper in terms of question and data is McCulloch et al. (2013). Using the enterprise survey and PCI over a 5 year period (2006-2010), McCulloch et al. (2013) examine how changes in provincial business environment affected firm investment levels. They find that firm investments are not affected by changes in the overall measure of business environment nor the individual aspects of business environment, with the exception of the transparency measure. Unlike our study which will use measures of productivity, the use of firm investments as a measure of firm outcome can be biased; outcomes such as investments and firm survival can be lumpy and difficult to observe in a short time period.⁵ Dell et al. (2015) also examines the effects of local governance on firm performance by exploiting the different governance norms across two regions separated by a historical boundary. They employ a regression discontinuity approach to find that foreign companies are less likely to invest in historically bureaucratic areas.

The rest of the paper is divided into five sections. Section 2 provides a brief background to the provincial governance structure in Vietnam and the data. Section 3 describes the empirical methodology used in the paper. Section 4 presents the descriptive statistics and the results. Section 5 contains the robustness checks and the IV regressions. Section 6 concludes.

2 Background and data

2.1 *Decentralization of business regulatory functions*

The main hypothesis of this paper is that local governance quality determines how national business regulations are interpreted and enforced, which will affect aggregate productivity through both individual firms' productivity as well as the efficiency of resource allocation across firms. Vietnam's decentralization of administrative tasks provides an ideal setting to test this hypothesis. Before the decentralization reforms began in 2004, the capital bore a large administrative burden as all approvals and negotiation of new projects were conducted in Hanoi irrespective of where the business was located (Schmitz, et al., 2012).

A key responsibility decentralized to the 63 provinces since 2004 is the ability to manage the development of the private sector. This decentralization devolved a lot of responsibilities to the provincial bureaucrats and increased the importance of the provincial bureaucracy. Provincial leaders and bureaucrats are now intimately involved in how firms operate: from obtaining business and tax registration certificates to

⁵ Previous papers have looked at firm survival, investments, and growth. However, these outcomes can be modelled as endogenous choices based on firm productivity in models such as Levinsohn and Pakes (1994).

registration with the Municipal Department of Labor and local trade unions. Vietnam's economic performance captured in the Doing Business indicators has dramatically improved since then: the number of days required to start a business reduced by half from 62 days in 2004 to 20 in 2016. McCulloch et al. (2013) also find that investment levels in Vietnamese provinces were positively associated with increased transparency. In this paper, we examine the effects of the quality of bureaucrats on productivity through two channels: firm-level productivity and province-level resource (mis)allocation.

2.2 Data

The paper uses two main datasets to investigate this relationship. Both datasets covers all 63 Vietnam provinces from 2009 to 2012.⁶ The first dataset is a panel of manufacturing firms from the Vietnam Enterprise Survey, which includes firm's location, economic activity, employment and financial information. The survey sample has two components: the first is the census component that contains the universe of all firms with 20 or more employees and the second is a random, representative sample of 20 percent of firms below 20 employees.⁷ There are 63 provinces and over 300,000 firms in the sample over the time period. The second dataset is the Vietnam Provincial Competitiveness Index (PCI) that surveys firms about the business environment (Malesky, 2006). The survey contains questions that examines eight broad modules: firm entry, land rights, transparency, administrative burden, informal payments, proactivity of bureaucrats, quality of labor, and quality of legal system. We will link these two datasets to explore the effects of the overall PCI index and the individual PCI modules on firm outcomes.

We encountered two issues when examining the PCI data. First, while both datasets contain information about firms prior to 2009, we focus on the period between 2009 and 2012 due to the availability and reliability of the data. In the enterprise survey, there are key financial information (such as investment amount and expenditure on materials) unavailable prior to 2009 so calculations of firm-level total factor productivity (TFP) will not be possible. More importantly in the PCI survey, there has been changes to the survey questions since the survey started in 2005. New questions were introduced and existing ones were removed during the period. In particular, the PCI questionnaire changed significantly in 2009 where many questions in the preceding two years were removed, and new ones introduced. For example in the module on entry costs, there were ten survey questions asked from 2006 to 2012, but three questions were dropped after 2008 and one was added from 2010, leaving six questions that were consistent throughout the period. Second, some questions in the PCI modules capture the general business environment which are not entirely within the control of the provincial government but can be influenced by firm's behavior. For example, the private sector development module contains questions are about the availability of trade fairs and whether firms intend to use certain business services provided by the provincial government. We selected questions that covers issues or areas that are within the control of the provincial governments. As a result, the number of questions that are included for each module differs and are listed in the appendix.

The construction of the PCI modules requires a standardization of the answers. The answers can range from numerical answers (for example, the number of days to register a business) to textual answers (for

⁶ There were 64 provinces before 2009. Ha Tay province was merged with Hanoi in 2008. For estimations using provincial data before 2009, we merge Ha Tay's data to Hanoi and treat them as one province.

⁷ The data does not include an indicator of whether the firm is in the census or the random sample component. All the firms are included in the estimation but with a firm fixed effect, the estimation results are effectively only for firms that appear at least twice in the data.

example, yes/no where yes can be a positive or a negative response depending on the question). Following the methodology of the PCI survey, the scores for each question are standardized to a 10-point scale.⁸ The unweighted average standardized score of the questions is taken to create a score for the PCI module, which gives a measure of the quality of that aspect of local governance. The scores of each PCI module are added up to create the overall PCI, which gives a measure of the overall business environment. The scores are also normalized so that a higher value indicates better quality of governance for that module in the province.

It is important to note that our construction of the overall PCI and individual PCI modules differs significantly from other studies in the literature. In general the other studies use the PCI to examine how the changes in provincial level changes affect firm level or province level outcomes but takes the PCI data as is (Dell, et al., 2015; Bai et al., 2013; Schmitz et al., 2012). To the best of our knowledge, these papers rely on the composite index calculated by the PCI team and did not recalculate, disaggregate the PCI into modules or account for the changes in survey questions over time. McCulloch et al. (2013) do acknowledge that there are inconsistencies in the questions for the individual PCIs. While they still use the composite index as provided in the website in their main estimation, they also use an alternative PCI measures that only contained a consistent set of questions over time. The changes in the questionnaire may not be an issue in these studies as they do not examine a particular aspect of governance or business climate. As such, these studies use the composite PCI as a general indication of the business environment across Vietnamese provinces similar to the World Bank's Doing Business index for cross-country comparisons. In our paper, we are interested in local governance and we want to focus on questions that capture aspects business environment controlled by local bureaucrats, to measure these aspects consistently over time and to examine which aspects of the business environment matter more to firms.

3 Empirical strategy

We are interested in how changes in local governance affects two main outcomes: firm-level productivity and resource allocation. First, we estimate a sector-level production function to estimate the firm-level productivity and indicators of market allocative efficiency. We estimate the revenue labor productivity and TFP (TFPR), including semi-parametric estimations, following Levinsohn and Petrin (2003) and the index approach as in Asker et al. (2014).⁹ Next, following Bartelsman et al. (2009, 2013), and Asker et al. (2014), we use the estimated TFPR and capital and labor coefficients to calculate at the industry-province level: (i) dispersion in firm TFPR, and (ii) the covariance between firm size and TFPR. These two measures are our proxies for market allocation efficiency. Previous theoretical and empirical studies have shown that that the size of market distortions will be positively correlated with dispersions in TFPR and negatively correlated with the size-productivity correlation.¹⁰

Second, we exploit the variation in the quality of local governance, measured by the PCI modules, across provinces and over time to identify its effects on the productivity levels of firms. We control for firm,

⁸ For questions where a higher score indicates better outcomes like local governance and business environment, the formula used was: $9 \cdot (\text{Score of Province } n - \text{Min Score}) / (\text{Max Score} - \text{Score of Province } n) + 1$. For questions where a lower score indicates better outcomes, the formula used was: $11 - [9 \cdot (\text{Score of Province } n - \text{Min Score}) / (\text{Max Score} - \text{Min Score}) + 1]$.

⁹ Since our data is a mixed panel including a census of large firms and sample of small firms, we cannot use exits from data as measures of firm exits. As a result, we do not use the Olley and Pakes (1996)

¹⁰ Hsieh and Klenow (2009) and Bartelsman et al. (2013).

industry and province fixed effects and other observables at the firm levels.¹¹ The underlying identification assumptions are that, conditional on these controls, the quality of bureaucrats is exogenous to firm performance and that changes in their quality are not correlated with other unobserved time-varying characteristics that can affect firm performance. Thus, changes in firm productivity levels are attributable to changes in the quality of provincial bureaucrats.

The baseline empirical specification to examine the effects of local governance on firm productivity is as follows:

$$\ln A_{ijpt} = \beta X_{ijpt} + \delta PCI_{pt} + \mu_{tj} + \mu_j + \mu_p + \varepsilon_{ijpt}$$

where $\ln A_{ijpt}$ is the log of productivity levels for firm i in sector j and province p at time t , measured as labor productivity and Levinsohn-Petrin (LP) productivity levels; PCI_{pt} is the scores of the overall PCI and the individual PCI modules; and μ_t , μ_j , μ_p are time, sector and province fixed effects in the baseline regressions. We estimate the specification with the overall PCI and the individual PCI modules separately, and all the individual PCI modules together. We control for sector-specific time effects to absorb any time-variant unobservable effects at the sector level that could be correlated with our measures of local governance.¹² X_{ijpt} denotes the set of control variables. We control for capital intensity, particularly in specifications with labor productivity to account for the possibility that productivity overestimates TFP for capital intensive firms. Similarly, we control for firm size to account for the fact that larger firms are typically more productive. We also include a firm concentration measures as the shares of large firms (greater than 100 employees) in the province. This is motivated by Schmitz et al. (2015) who argue that in provinces with many small firms, it is harder for firms to organize to influence provincial policies towards the private sector. If the share of small (or large) firms is also correlated with local economic factors that could affect firm productivity, then failing to control for firm concentration will bias the results. We will also examine the differential effects of local governance on sub-samples on firms of different levels of productivity.

The empirical specification to examine the provincial resource allocation is:

$$AE_{jpt} = \beta PCI_{pt} + \mu_t + \mu_j + \mu_p + \varepsilon_{jpt}$$

where AE_{jpt} is the standard deviation of the TFP levels and the covariance between TFP and market shares in the provinces. We regress our measures of market allocation efficiency at the province-industry level on the PCI, controlling for time, sector and province-level FE similar to the firm-level specifications.

We verify our results by performing robustness checks and estimating an instrumental variable regression. We perform robustness checks by restricting the sample to a balanced panel of firms and a sub-sample of firms that are located in special economic zones (SEZs). The balanced panel of firms controls for the movement of firms and the selection of firms into better performing provinces. The sub-sample of firms in SEZs will provide a falsification test, where firms in SEZs are less likely to be affected by the changes in business environment in the province because they are subject to a separate set of regulations. In our

¹¹ An endogeneity issue might arise where productive firms decide to locate in a province with better governance. This issue is difficult to resolve in our dataset because we do not fully observe the firm's decision to locate in a particular province. We will examine the robustness of our results using a balanced panel of firms.

¹² We include 344 fixed effects in total, which differs significantly from Bai et al. (2016) that has a limited province-industry fixed effects where there are only 18 industries defined at a broad level.

instrumental variable regression, we use an institutional arrangement for revenue sharing between the central government and provinces to instrument the overall PCI. The business environment may be endogenous to firm performance, as better firms may push the local government to improve the business environment.

4 Estimation results

4.1 Descriptive statistics

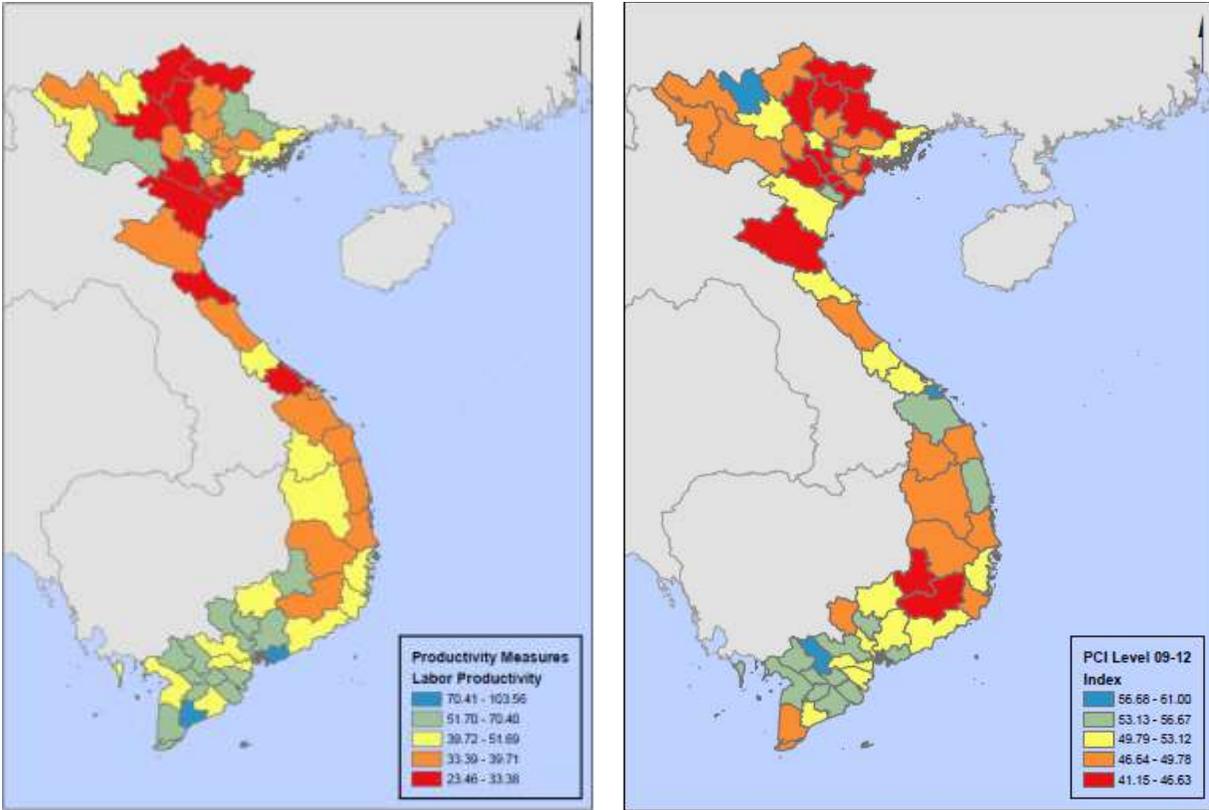
In this section, we examine the correlation and variations of the productivity measures and the measures of local governance. First, we examine the geographical variation in the measures of productivity and business environment (through the overall PCI) across the Vietnamese provinces. Then we consider the correlations between the productivity measures (labor productivity and TFP) and business environment (overall PCI and individual PCI modules). We show that the productivity measures and the business environment are positively correlated and is driven mainly by the fairness of the land and legal system, and the quality of the provincial government in aspects of proactivity of bureaucrats and extent of informal charges paid.

There is a general positive correlation between the levels of labor productivity and business environment. Figure 1 presents the average labor productivity and overall PCI across the 63 Vietnamese provinces. Provinces with higher average labor productivity generally have better business environment, as indicated by regions shaded in blue and green. There is a distinct geographical difference between the Northern and Southern provinces: both the average labor productivity and overall business environment indicators are higher in the South than the North. One reason can be the Southern provinces contains Ho Chi Minh City, the economic center of Vietnam, and is where many industrial centers cluster.

Figure 1: Geographical Variation of Labor Productivity and Overall PCI, 2009-2012

(a) Average Labor Productivity

(b) Average Overall PCI



The overall PCI captures many aspects of business environment in Vietnam and is constructed from eight modules. Table 1 presents the correlations between the outcome variables and measures of business environment. The outcomes variables are the two productivity measures: labor and TFP. The measures of business environment is the overall PCI and the individual PCIs. The correlation is performed on averages over 2009-2012 at the firm level.

Table 1: Correlation Between Productivity Measures (Labor and TFP) and PCI (Overall and Individual)

	TFP	Labor Prod.	Entry	Land	Transparency	Time	Informal	Proactivity	Labor	Legal	Overall PCI
TFP	1.0000										
Labor Prod.	0.1863*	1.0000									
Entry	0.0120*	-0.0162*	1.0000								
Land	0.0372*	-0.0056*	0.1310*	1.0000							
Transparency	-0.0211*	-0.0006	0.2815*	0.1014*	1.0000						
Time	0.0234*	-0.0041*	0.0113*	0.2628*	0.0784*	1.0000					
Informal	0.0352*	0.0017	0.4269*	0.3444*	0.2445*	0.4154*	1.0000				
Proactivity	0.0254*	-0.0039*	0.2084*	0.3707*	0.4475*	0.4631*	0.4841*	1.0000			
Labor	-0.0245*	0.0124*	0.3502*	0.0754*	0.4532*	0.1666*	0.5237*	0.2882*	1.0000		
Legal	0.0241*	-0.0017	0.0126*	0.2147*	0.0954*	0.3552*	0.2600*	0.4028*	0.1057*	1.0000	
Overall PCI	0.0225*	-0.0029*	0.5479*	0.4955*	0.5349*	0.5223*	0.8068*	0.7510*	0.6668*	0.4512	1.0000
										*	0

Note: Entry, land, transparency, time, informal, proactivity, PSD (private sector development), labor, and legal refer to the individual PCI as described in the Data section above.

The two productivity measures are positively and significantly correlated with each other. The two productivity measures are not fully correlated, as expected, because labor productivity is a broader definition of productivity than TFP. As such, the labor productivity calculations may not be accurate and the correlation of labor productivity and the overall and individual PCIs may be spurious. For example, labor productivity is negatively and significantly correlated with the overall PCI and many other individual PCI such as entry, land, time, and proactivity. In contrast, TFP is positively and significantly correlated with the overall PCI and most of the individual PCI modules. The positive correlation is driven by the fairness of the land and legal system in the provinces and the quality of the provincial government in aspects such as the proactivity of bureaucrats and the extent of informality charges paid by firms. Rather counterintuitively, TFP is negatively correlated with transparency of the provincial government and the quality of the labor market, i.e. firm productivity decreases as the provincial government provides more transparency and better training and education to workers.

The overall PCI is positively and significantly correlated with all of the individual PCIs modules. The individual PCIs can explain over 45 percent of the variation in the overall PCI. Some individual PCI, such as the informal and proactivity, explains over 75 percent of the overall PCI. There are also positive correlations between the individual PCIs as expected.

4.2 Baseline results

Results from the baseline regressions with the overall PCI are presented in Table 2. The coefficient on the PCI index is positive and significant, indicating that a better business environment in the province increases firm productivity. The positive relationship is true for both the labor productivity and TFP measures, and in the two regressions with different sets of fixed effects. The results suggest that an improvement of business environment as measured by a one unit increase in the overall PCI will increase TFP by 0.6 to 0.7 percent.

Table 2: Regression Results with Overall PCI

	(1)	(2)	(3)	(4)
	Labor productivity	Labor productivity	Log(LP TFP)	Log(LP TFP)
Overall PCI	0.382** (0.153)	0.435** (0.194)	0.007*** (0.002)	0.006*** (0.002)
Share of large firms in province	-0.183* (0.105)	-0.208* (0.110)	0.002** (0.001)	0.002** (0.001)
Capital intensity ln(K/L)	3.257*** (1.180)	3.309*** (1.017)	-0.162*** (0.038)	-0.162*** (0.037)
Firm size (ln employment)	-15.475*** (2.699)	-15.404*** (2.571)	0.012 (0.059)	0.011 (0.057)
Constant	61.076*** (10.530)	54.450*** (8.295)	3.630*** (0.308)	3.792*** (0.359)

Observations	1,130,468	1,130,468	662,732	662,732
R-squared	0.097	0.032	0.039	0.057
Adjusted R-squared	0.0968	0.0323	0.0387	0.0563
N-cluster (province level)	63	63	63	63
Number of firms	445,095	445,095	335,829	335,829
Sector, Year and Firm FE	Y		Y	
Sector-year and Firm FE		Y		Y

Note: Standard errors clustered at the province level, *** p<0.01, ** p<0.05, * p<0.1

Large firms are firms with at least 100 employees. A larger value of PCI index always indicate “better” business environment. Labor productivity is measured in 2010 constant ‘000 USD per worker

The overall PCI captures the general business environment in the province but does not inform us about which individual aspects of local governance affects firm productivity. To analyze which aspect of the business environment matters most for firms, we examine the relationship between individual PCI modules and firm productivity levels. The results for the regressions with each individual PCI separately are reported in Table 3. By disaggregating the effects of the overall PCI, we find that firm productivity levels, measured as labor productivity, increases with less land expropriation risks, less time spent on administrative procedures, less informal charges paid and better legal systems. Using TFP, we find that firm productivity levels increase when there are less expropriation risks and less informal charges paid. Unlike the labor productivity measure, TFP accounts for labor and capital input decisions and thus, is affected by a smaller set of local governance. Nonetheless, there is a strong and significant result in both productivity measures for the positive benefit to productivity when firms pay less informal charges.

Table 3: Regressions with separate individual PCI

Dependent variable:	Labor productivity	Log(LP TFP)
Entry	0.161 (0.824)	0.017 (0.012)
Land	0.938*** (0.348)	0.017** (0.006)
Transparency	-0.037 (0.941)	0.008 (0.013)
Time	1.670** (0.745)	0.014 (0.009)
Informal charges	1.065*** (0.315)	0.023*** (0.007)
Proactive	0.492 (0.305)	0.005 (0.007)
Labor	0.184 (0.480)	0.004 (0.006)
Legal	0.796* (0.451)	0.005 (0.006)

Note: Standard errors clustered at the province level, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Labor productivity is measured in 2010 constant '000 USD per worker. LP TFP refers to TFP calculated following Levinsohn and Petrin (2003).

The regression result with PCI modules, however, can be biased as different aspects of the business environment could be correlated with each other. By using the overall index, we take into account all the measured components of the business environment, but by construction, the linear aggregation of the overall PCI restrict the impacts of all sub-indices to be the same. To relax this restriction and explore the differential impacts of different aspects of the business environment, we examine the effects of the full set of PCI modules on firm productivity. The results are presented in Table 4.

We find that that, similar to the results using the PCI module in separate regressions above, the index for informality is positive and significant in both productivity regressions. A higher index for informality in a province represents a decrease in the amount of informal payment that a firms pays or the number of firms that pay informal charges in the province. Thus the positive and significant coefficient suggests that lower corruption rates in the provinces increase firm productivity. To a lesser extent in terms of the size of coefficient, lower risks of land expropriation can also increase firm productivity levels.

Many of the PCI modules are not significant in the productivity regressions but the signs are positive as expected. The PCI modules may be an imperfect measure of the underlying aspect of business environment or governance that is difficult to measure or observe directly.¹³ The aggregation of these individual PCI modules, however, may provide some indication of the business environment and hence the significant results in the regressions with the overall PCI.

The coefficients on the transparency and proactive in the TFP regressions are unexpected. The negative coefficients indicate a contrary result where more transparency and more proactive bureaucrats in the province will lead to lower firm productivity. A possible reason for this result is that the questions used to construct the PCI module may not be capturing the full extent of transparency and proactivity of local officials. An alternative reason may be that the coefficients represent an average effect on firms and the individual PCIs may only affect certain types of firms – small, more skill-intensive, manufacturing. We explore this hypothesis in our robustness checks below.

Another interesting result in the TFP regression estimation is the positive and significant coefficient related to the share of large firms in the province. The results suggest that with more large firms in the province, firm productivity increases. The original reason to include this variable is to control for the effect where large firms compete for resources and “crowd out” the smaller firms, thus reducing firm productivity. This hypothesis suggests that the coefficient will be negative, not positive. A possible reason for the positive coefficient may be that with more large firms in the province, there is more lobbying power or power to influence the provincial government to create a business-friendly environment. However, this effect would have been captured by the various PCI modules that measure the ability of the provincial government. Other possible reasons point towards the externalities and spillover effects of having large firms in the province. Large firms can attract more specialized labor and can create knowledge

¹³ This issue is discussed in Kaufman et al. (2010). They proposed a method to combine different measures of governance into one aggregate measure, but this method may be more useful in combining measures from different data sources.

spillovers, generating Marshallian externalities for firms in that province. These large firms will have vertical linkages with the local firms, causing these firms to be more productive.

Our results contrast significantly with McCulloch et al. (2013). While their results are not directly comparable as the dependent variable is investment levels, McCulloch et al. (2013) find that the business environment does not have any effect on firm investments. The only PCI module that does have a significant effect on firm investment is the transparency measure, which captures the amount of information the firm can obtain from the provincial government. The difference in results may be attributed to the different constructions of the PCI indices. While McCulloch et al. (2013) took the PCI data as is from the source, we were more circumspect in selecting survey questions that are consistently present in the time period and questions that are within the control of the provincial bureaucracy due to our focus on local governance.

Table 4: Regression Results with All PCI sub-indices

	Labor productivity	Log(LP TFP)
Entry	0.515 (0.534)	0.018* (0.010)
Land	0.612** (0.269)	0.012* (0.007)
Transparency	-0.179 (0.703)	-0.000 (0.011)
Time	1.262** (0.566)	0.008 (0.010)
Informal charges	0.821** (0.364)	0.018** (0.009)
Proactive	0.054 (0.304)	-0.001 (0.008)
Labor	-0.221 (0.317)	-0.005 (0.006)
Legal	0.815** (0.396)	0.009 (0.007)
Share of large firms in province	-0.177** (0.088)	0.002** (0.001)
Capital intensity ln(K/L)	3.268*** (1.180)	-0.161*** (0.036)
Firm size (ln employment)	-15.433*** (2.708)	0.013 (0.057)
Constant	55.956*** (10.881)	3.731*** (0.355)
Observations	1,130,468	662,732
R-squared	0.097	0.057
Adjusted R-squared	0.0969	0.0567

Number of firms	445,095	335,829
N-cluster (province level)	63	63
Sector*year FE	Y	Y
Firm FE	Y	Y

Note: Standard errors clustered at the province level, *** p<0.01, ** p<0.05, * p<0.1
Labor productivity is measured in 2010 constant '000 USD per worker. LP TFP refers to TFP calculated following Levinsohn and Petrin (2003).

While we may expect the overall business environment and different aspects of local governance to affect market efficiency, we do not find any effect of the improvements in PCI on market efficiency. The coefficients of the overall PCI are close to zero and insignificant in both regressions with the covariance between firm size and TFP and the dispersion of firm TFP in the provinces. Similarly, except for Entry, none of the other PCI modules have a significant effect on both measures of distortions.

The lack of a significant effect of the overall PCI on market efficiency might be driven by the fact that the PCI reflect the experiences of a subset of firms, and if the improvements of the business environment do not benefit the most productive firms, we will not necessarily observe an increase in allocative efficiency within provinces. For the individual PCI, only the reduction in the entry costs into a province is statistically significant and reduces both the covariance of firm size and TFP and the dispersion of TFP. The implied effects on the size of market distortions are ambiguous. Lower entry costs reduces the covariance of firm size and TFP, implying an increase in market distortion; conversely, lower entry costs reduce the dispersion of TFP, implying a decrease in market distortion. Another caveat with this specification is that our market distortion measures assume provinces present the appropriate level of market boundary. This assumption might not hold as firms are likely to compete outside the provinces they are located in.

Table 5: Regression Results of Covariance between TFP and Market Share

VARIABLES	(1) Cov(TFP,Y)	(2) Cov(TFP,Y)	(3) SD(TFP)	(4) SD(TFP)
PCI overall index	-0.002 (0.002)		0.000 (0.002)	
Entry		-0.019* (0.010)		-0.014* (0.008)
Land		0.003 (0.007)		0.004 (0.006)
Transparency		-0.003 (0.011)		-0.002 (0.010)
Time		-0.005 (0.011)		-0.007 (0.010)
Informal charges		0.000 (0.008)		0.005 (0.007)
Proactive		-0.002		-0.003

		(0.006)		(0.006)
Labor		0.004		0.004
		(0.006)		(0.006)
Legal		-0.004		0.005
		(0.009)		(0.008)
Constant	1.831***	1.914***	0.763***	0.827***
	(0.160)	(0.171)	(0.138)	(0.156)
Observations	12,382	12,382	9,730	9,730
R-squared	0.412	0.412	0.237	0.237
Adjusted R-squared	0.392	0.392	0.204	0.204
N-cluster	63	63	63	63

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.3 Which firm benefits from improvements in local governance?

The individual PCI modules can affect different types of firms. We explore whether firms of different productivity levels are affected by the different aspects of local governance. For example, we expect the PCI modules on entry and transparency to affect less productive firms as a reduction in red tape will be more beneficial to less productive firms who may not have the resources to deal with the bureaucratic burden. The sample of firms are divided into quartiles based on their initial productivity levels in 2009. The regressions are conducted for the four sub-samples: firms above and below the 50th percentile, firms above the 75th percentile and firms below the 25th percentile. The results are presented in Table 6.

Improvements in the overall business environment tend to benefit the more productive firms. The overall PCI has a significant and positive effect on all firms but this effect is not present in the sub-sample of low productivity firms, measured as those below the 50th or 25th percentile of the productivity distribution in 2009. This results suggest that more productive firms are better prepared and able to take advantage of the improvements in the business environment and increase their productivity levels. Similarly, when we examine the individual PCI modules, we find that high productivity firms enjoy the positive effect for lower land expropriation risks and lower informality. In particular the effect of lower informality has a larger and more significant effect for the most productive firms among firms with high productivity levels. Conversely, the positive and significant effect of lower entry costs for all firms is only present for low productivity firms. High productivity firms did not benefit when entry costs became lower in the provinces. This result will be consistent with a scenario where lower entry barriers introduces more competition at the lower end of the productivity distribution, inducing previously less productive firm to compete through enhancing productivity.

Table 6: Regression Results of Sub-samples based on Initial Productivity Levels

	(1) Full sample	(2)	(3) >=50 percentile	(4)	(5) <50 percentile	(6)	(7) 75 percentile	(8)	(9) 25 percentile	(10)
Overall PCI	0.006*** (0.002)		0.003*** (0.001)		0.002 (0.002)		0.002*** (0.001)		-0.002 (0.003)	
Entry		0.018*		0.004		0.019*		-0.001		0.026**

		(0.010)	(0.004)	(0.010)	(0.003)	(0.012)				
Land		0.012*	0.012***	-0.001	0.007**	-0.002				
		(0.007)	(0.004)	(0.007)	(0.003)	(0.010)				
Transparency		-0.000	-0.002	0.007	-0.001	0.011				
		(0.011)	(0.005)	(0.014)	(0.004)	(0.014)				
Time		0.008	0.009*	0.003	0.005	0.006				
		(0.010)	(0.005)	(0.011)	(0.004)	(0.011)				
Informal		0.018**	0.008*	0.013	0.010***	0.006				
		(0.009)	(0.004)	(0.008)	(0.003)	(0.009)				
Proactive		-0.001	-0.000	-0.005	0.004	-0.016*				
		(0.008)	(0.004)	(0.007)	(0.003)	(0.009)				
Labor		-0.005	-0.003	-0.010*	-0.003	-0.014**				
		(0.006)	(0.003)	(0.006)	(0.003)	(0.007)				
Legal		0.009	-0.001	0.006	-0.007**	-0.003				
		(0.007)	(0.002)	(0.009)	(0.003)	(0.010)				
Share of large firms in province	0.002**	0.002**	0.000	0.001*	0.003***	0.002**	0.000	0.001*	-0.002	0.002*
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.003)	(0.001)
Capital Intensity ln(K/L)	-	-0.161***	-	-0.073***	-	-0.142***	-0.042*	-0.042*	0.003**	-0.122***
	0.162***	(0.036)	0.073***	(0.024)	0.144***	(0.020)	(0.019)	(0.022)	(0.022)	(0.001)
	(0.037)	(0.036)	(0.024)	(0.024)	(0.020)	(0.019)	(0.022)	(0.022)	(0.001)	(0.016)
Firm size (ln employment)	0.011	0.013	-	-0.108***	0.018	0.020	-	-0.114***	-	-0.045
	(0.057)	(0.057)	0.110***	(0.038)	(0.042)	(0.042)	0.116***	(0.035)	(0.035)	(0.016)
	(0.057)	(0.057)	(0.038)	(0.038)	(0.042)	(0.042)	(0.035)	(0.035)	(0.016)	(0.041)
Constant	3.792***	3.731***	5.144***	5.122***	2.726***	2.622***	5.709***	5.723***	-0.048	1.775***
	(0.359)	(0.355)	(0.243)	(0.245)	(0.269)	(0.249)	(0.315)	(0.317)	(0.040)	(0.173)
Observations	662,732	662,732	325,625	325,625	337,107	337,107	158,791	158,791	162,304	162,304
R-squared	0.057	0.057	0.078	0.079	0.059	0.060	0.089	0.089	0.044	0.045
Adjusted R-squared	0.0563	0.0567	0.0771	0.0777	0.0586	0.0590	0.0868	0.0876	0.0420	0.0428
Number of firmid	335,829	335,829	179,696	179,696	223,609	223,609	94,194	94,194	128,587	128,587
N-cluster	63	63	63	63	63	63	63	63	63	63

5 Robustness Checks and IV Regressions

5.1 Robustness checks

We perform robustness checks on the results using a balance panel and examining firms that are in the special economic zone. First, the balance panel allows us to control for firms that may move in response to changes in the business environment. In these cases, a positive coefficient for the overall PCI might capture an improvement in the set of firms in the province rather than an improvement of the firm. Conversely, a poor business environment can cause firms to leave the province and bias the negative effect of the overall PCI on firm productivity. The enterprise survey does not provide information about the establishment year of the firms so we cannot control for the entry of firms into a province. We side-step the difficulty of modelling a firm's location choice by testing for the results in a balanced panel

instead. The results are presented in Table 7. The effect of the overall PCI index is very similar to the baseline results, suggesting that our results above are not driven by firm’s location choices.

Table 7: Regression results with balanced panel

	Labor productivity	Log(LP TFP)
PCI overall index	0.329** (0.151)	0.005** (0.002)
Share of large firms in province	-0.171 (0.117)	0.002** (0.001)
Capital intensity ln(K/L)	2.505 (1.660)	-0.178*** (0.040)
Firm size (ln employment)	-21.912*** (4.097)	-0.067 (0.061)
Constant	92.644*** (16.183)	4.588*** (0.400)
Observations	541,000	128,176
R-squared	0.028	0.076
Adjusted R-squared	0.0275	0.0738
N-cluster (province level)	63	63
Number of firms	135,250	32,044
Sector-year Fixed effects	Y	Y
Firm fixed effects	Y	Y

Second, we perform a falsification test by examining the firms that are located in special economic zones (SEZs). This test is based on the assumption that firms located in special economic zones are subject to a separate, and typically preferential, set of regulations and are unlikely to be affected by the quality of provincial bureaucrats. The results are presented in Table 8 and show that the overall PCI, while having a negative effect on productivity, is not statistically significant. The results in this sub-sample is consistent with the hypothesis that the overall PCI do not have any significant impact on productivity these firms.

Table 8: Regression results for firms in SEZs

	(1) Labor productivity	(2) Log(LP TFP)
PCI overall index	-0.475 (0.288)	-0.004 (0.003)
Share of large firms in province	-0.015 (0.105)	0.002** (0.001)
Capital intensity (K/L)	24.868*** (2.485)	0.140*** (0.052)
Firm size (log employment)	-15.956** (6.507)	0.318*** (0.052)

Constant	85.101*** (28.095)	2.270*** (0.678)
Firm fixed effects	Y	Y
VSIC*Year fixed effects	Y	Y
Observations	124,347	62,884
R-squared	0.065	0.120
Adjusted R-squared	0.0637	0.118
Number of firms	116,106	59,151
N-cluster	63	63

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 What drives changes in local business environment?

Our results show that corruption appears to consistently matter for firm productivity. This, however, raises concerns about a potential reverse causation problem if the provincial government changes corruption behavior in response to firm outcomes. In fact, Bai et al. (2016) find that provincial corruption in Vietnam decreases with firm growth. Schmitz et al. (2012) also show that the private sector played a large role in improving the level of efficiency and governance of the provincial bureaucracy in Vietnam. Hence our result on the positive impact of (less) informal charges on firm productivity could be driven by this relationship.

To investigate and control for this endogeneity problem, we utilize an institutional arrangement for revenue sharing between the Vietnamese central government and its provinces to construct an instrumental variable. More specifically, provinces in Vietnam are allowed to keep all or part of their corporate income tax revenues after the central government evaluates and redistributes revenues considering budget demands from all provinces together. The percentage of revenue that provinces are allowed to keep is fixed for every 3-5 year period – known as the Stability period - to maintain some degree of budget predictability (World Bank, 2015). Our 2009-2012 sample spans two Stability periods 2007-2010 and 2011-2015, allowing us to exploit the changes in revenue allocation to instrument for the PCI indices. The changes in the sharing rates are reported in Table 9. In total, 13 out of 63 provinces, covering more than 65% of our firm-level observations, experienced a change in the tax sharing rate.

Table 9: Tax sharing rates for provinces experienced a change between 2007-10 and 11-15

Province	Sharing rate 2004-06	Sharing rate 2007-10	Sharing rate 2011-15
Hanoi	32	45	42
Quang Ninh	98	76	70
Hai Phong	95	90	88
Vinh Phuc	86	67	60
Bac Ninh	100	100	93
Da Nang	95	90	85
Khanh Hao	52	53	77
Quang Ngai	100	100	61
Ho Chi Minh City	29	26	23
Dong nai	49	45	51
Binh Duong	44	40	40
Ba Ria – Vung Tau	42	46	44

Source: World Bank (2015).

Note: Tax sharing rate indicates the percentage of shared tax revenue (shared taxes are taxes shared between provincial and central governments, including VAT, PIT, and CIT) that a province can keep before returning to the central government. The rest of the provinces are “deficit” provinces, which imply they always retain 100% of their shared tax revenues. These 13 provinces out of the 63 in the table keep a portion of their shared taxes and transfer the rest to the center for redistribution across the country.

Our hypothesis is that as the residual claimants of corporate tax revenues, provinces have incentives to improve the business environment and encourage private sector activities to maximize revenues.¹⁴ However, in corrupt environments, provincial officials face a trade-off between reducing corruption to increase tax revenues through firm growth and increasing the amount of bribes/informal charges they can extract from firms.¹⁵ Therefore, the incentive to improve the business environment depends on the share of revenues that they are allocated, which affects the rate of returns from encouraging business activities. Consequently, a change in the allocation rules can have an impact on the quality of the business environment, especially as related to corruption. Since the allocation is determined centrally by taking into account revenue and budget demands of all provinces, the resulting share that each province can keep – after controlling for past firm performance within the province – is arguably exogenous to firm performance within the province. Therefore, our instrument is the *residual* from regressing the province-level revenue share on its lagged aggregate tax revenue, calculated from the Enterprise Survey.

IV results on the impact of the overall PCI and the Informal charges index on firm-level TFP are reported in Table 10.¹⁶ We do not use fixed effect IV as the strict exogeneity assumption in this case might not be satisfied if the tax sharing rate is correlated with past firm performance. The first-stage results in columns 1 and 4 show that the revenue share (net of the effect of own province’s past revenue) has significant predictive power on both overall PCI and the corruption index.¹⁷ Counterintuitively, this relationship is negative.¹⁸ Columns 2 and 4 show the IV results with the overall PCI and the Informal charges indices respectively. We find that overall PCI still has a positive and significant impact on firm TFP but the coefficient estimate on informal charges, while larger than in Table 3 and Table 4, is no longer significant. The result casts doubts on our earlier results that lower corruption along, as measured by the informal charges PCI, has a positive impact on firm performance.¹⁹

Table 10: Impact of overall PCI and corruption on firm TFP - IV results

	(1)	(2)	(3)	(4)
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¹⁴ Corporate income tax accounts for 53% of all tax revenues at the provincial level in 2015, representing a significant portion among all provincial revenue sources.

¹⁵ This is analogous to the golden goose effect (Niehaus and Sukhtankar 2013) when rent extraction is a dynamic problem and rent extracted in the current period has a negative impact on future rents.

¹⁶ These results will require further refinement as provincial public investment levels can be included as additional controls.

¹⁷ The Chi-sq and F-stat suggest that H0 of under identification and weak identification are rejected.

¹⁸ Theoretically, the relationship is ambiguous. This result would be consistent with a setting where the effort cost to improve provincial competitiveness is sufficiently high such that a higher tax sharing rate can reduce the optimal effort level.

¹⁹ The results require further examination as the regression may not be precisely estimated as it uses fewer clusters.

VARIABLES	First stage PCI overall index	IV results Log (LP TFP)	First stage Informal charges	IV results Log (LP TFP)
Tax sharing rate (residuals)	-13.822*** (4.815)		-3.345*** (0.997)	
PCI overall index		0.042** (0.020)		
Informal charges				0.173 (0.122)
Constant	30.221*** (2.335)	1.173* (0.708)	1.335*** (0.455)	2.206*** (0.346)
Sector*year FE	Y	Y	Y	Y
Observations	509,921	509,921	509,921	509,921
R2		0.0485		0.0471
Number of clusters (province)	63	63	63	63
Number of clusters (sector)	6	6	6	6
Chi-sq stat (Under id)	9.89		13.52	
F-stat (Weak id)	8.24		11.26	

The instrument is the *residual* from regressing a province's share of allocated revenue on lagged total tax revenue, where tax revenue total is aggregated from "Total tax paid" at the firm level in the database. Since this variable is only available for 2009-2012, we lose one year of data using its lagged measure.

Sector refers to 6 broad sectors (Agriculture, Mining & quarrying, Manufacturing, Utilities, Construction, and Services). Standard error are two-way clustered at the province and sector level: *** p<0.01, ** p<0.05, * p<0.1

6 Conclusions

Improvement in business environment in Vietnamese provinces has benefited firms in that province. The results show that an improvement in the overall business environment has increased firm productivity, and this effect is driven by a reduction in corruption levels (or the informal charges paid by the firm), the risks of land expropriation and entry regulations. We also see that the high productivity firms in the provinces are the ones who can take advantage of the improvements in business environment, but not the low productivity firms. The improvements in the business environment, however, did not improve the resource allocative efficiency in the province. We perform two robustness checks: we control for selection bias using a balanced panel of firms and firms that are located in SEZs. In order to address the issue of reverse causality, we also perform an instrumental variable regression exploiting the revenue sharing arrangement between the central government and provinces. We find that our results hold.

7 References

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Appendix 1: List of PCI questions for each module that are included in the analysis

PCI Module	Questions
Entry Costs	<ol style="list-style-type: none"> 1. Length of business registration in days (Median) 2. Length of business re-registration in days (Median) 3. Percentage of firms waiting over a month to complete all steps necessary to start operations 4. Number of licenses and permits necessary to start operations (Median) 5. Wait for Land Use Rights Certificate (Median Days)
Land	<ol style="list-style-type: none"> 1. Firm rating of expropriation risk (1: Very High to 5: Very Low) 2. If land expropriated, firms receive fair compensation (% Always or Usually)
Transparency	<ol style="list-style-type: none"> 1. Transparency of Planning Documents 2. Transparency of Legal Decisions and Decrees 3. Relationship important or very important to get access to provincial documents (% Important or Very Important) 4. Negotiations with tax authority are an essential part of doing business (% Agree or Strongly Agree) 5. Predictability of implementation of Central laws at the provincial level (% Usually or Always) 6. Openness of Provincial Web Page Score
Time	<ol style="list-style-type: none"> 1. Percentage of firms spending over 10% of their time dealing with bureaucracy or bureaucratic regulations 2. Median number of inspections (all agencies) 3. Median Tax Inspection hours
Informality	<ol style="list-style-type: none"> 1. Percentage of firms that felt that enterprises in their line of business were subject to bribe requests from provincial authorities 2. Percentage of firms paying over 10% of their revenue in extra payments 3. Government uses compliance with local regulations to extract rents (% Strongly Agree or Agree)
Proactivity	<ol style="list-style-type: none"> 1. Provincial officials are knowledgeable enough about present national law to find opportunities within existing law to solve firm problems (% Strongly Agree or Agree) 2. Provincial officials are creative and clever about working within the national law to solve the problems of private sector firms (% Strongly Agree or Agree)
Labor	<ol style="list-style-type: none"> 1. Services Provided by Provincial Agencies: General Education (% Very Good or Good) 2. Services Provided by Provincial Agencies: Labor Vocational Training (% Very Good or Good)
Legal	<ol style="list-style-type: none"> 1. Legal system provided mechanism for firms to appeal officials' corrupt behavior (% Always or Usually) 2. Firm confident that legal system will uphold property rights and contracts (%Strongly Agree or Agree)