Ownership, investment climate and firm performance

Evidence from Chinese firms

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Abstract

The importance of a country’s ‘investment climate’ for economic growth has recently received much attention. In this paper we use a new survey of 1,500 Chinese enterprises in five cities to measure more precisely components of the investment climate and their effects on firm performance. Our firm-level analysis reveals that both ownership and investment climate measures matter for investment, productivity and growth. In particular, firm performance is positively correlated with foreign and domestic private ownership, light regulatory burdens, limited corruption, technological infrastructure and labour market flexibility. In contrast, gains from improving banking access and physical infrastructure are quite limited.

JEL classifications: D2, G2, L1, L2, O1, O5, P5.
Keywords: Investment climate, firms, China, finance, infrastructure, regulation, international integration, labour market, technology.

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1. Introduction

In recent years, policy-makers and multinational organizations have focused increasingly on the importance of a sound ‘investment climate’ in developing countries for economic growth (Stern, 2002b). Focusing on investment used to mean advocating increased investment quantities under the assumption that a financing gap was a barrier to development. Few accept this simplistic view anymore, and, indeed, recent research demonstrates surprisingly little correlation between investment levels and growth rates, at least in the short run (Easterly, 1999). Instead, a productive ‘investment climate’ can be broadly thought of as an environment where governance and institutions support entrepreneurship and well-functioning markets in order to help generate growth and development.²

It is difficult to define ‘investment climate’ precisely, but Stern (2002b) notes that it is the policy, institutional and behavioural environment, both present and expected, that influences the returns, and risks, associated with investment. In general, this includes three broad categories. The first includes macroeconomic or country-level matters, such as fiscal, monetary, exchange rate policies and political stability. The second includes governance and institutions, including bureaucratic harassment and the financial and legal systems. The final category includes infrastructure necessary for productive investment, including transportation, electricity and communications.³

While these categories seem straightforward, identifying their effects is not easy. In particular, the second category poses special difficulties. In addition to measurement problems (for example, eliciting truthful responses about bribery and corruption), another issue is that many of these factors affect individual firms and may not show up in useful ways in aggregate macroeconomic statistics. Moreover, as this paper will demonstrate, firms grow at quite different paces in the five Chinese cities even though they face similar macro and national political environments. Uncovering the factors underlying such large differences in growth rates requires microeconomic, as opposed to macroeconomic, data. Unfortunately, there is often very little firm-level data in developing countries. Indeed, while there is a good deal of country-level work on many of these issues, firm-level analyses are only now beginning to emerge.

This paper has three main goals. First, it attempts to build an empirical framework around the ‘investment climate’ typology with firm-level data. That is, there has been much discussion of the investment climate, but as yet few comprehensive measures of it. Second, it demonstrates the necessity of having more disaggregated

² Alternatively, we may view ‘investment climate’ as being synonymous to ‘business environment’. We choose the term ‘investment climate’ here since it has been frequently used in policy discussions of the World Bank.

³ There are several ways one might group various investment climate components. In this paper we generally follow the typology laid out by Stern (2002b).
data, as opposed to more aggregated or national-level data, to capture the impact of the investment climate on performance. Country-level, cross-country, empirical analyses implicitly assume that each investment climate measure has the same impact on each country when controlling for certain country characteristics. Such analyses are useful in that they can tell us what factors affect aggregated macro indicators on average. However, economies are heterogeneous and such aggregated analyses cannot tell us which factors may be important within different countries. Finally, we use a new enterprise-level dataset covering 1,500 Chinese enterprises in five cities to illustrate the above points, investigate the effects of various investment climate measures along with ownership on firm performance, and highlight areas in which reforms may most improve firm performance in China.

Strong firm performance can itself be measured on different dimensions. Here, we address four: sales growth, investment rate, productivity and employment growth. After discussing some investment climate measures, the strategy of this paper is to analyse the data at a disaggregated level; we estimate the effects of city–industry investment climate variables on firm performance controlling for firm characteristics and ownership.

The empirical results suggest that both ownership and investment climate matter for firm performance. Both domestic and foreign private ownership improves firm performance, but foreign ownership appears to matter even more. A flexible labour market increases a firm’s investment rate. Areas and industries with more skilled labour tend to have higher productivity and sales growth rates. Lower regulatory burden and less corruption increases firm growth. In contrast, we do not find evidence that bank finance and infrastructure matter that much for Chinese firms.

China is a particularly interesting country in which to study the impact of differing investment climates across regions. Overall, China’s growth performance has been impressive, but economic conditions vary across regions, with eastern and coastal areas generally having developed more quickly and attracted more investors than have central and western areas. Two broad factors help to explain this phenomenon. The first is differences in natural endowments, such as access to ports. The second is the nature of decentralization of the Chinese economy and of policy-making (Cao et al., 1999). For years, regional governments have been given different degrees of discretion in setting economic policy. Thus, some experimental provinces and cities were given greater freedom to choose more liberal policies to attract foreign capital. For instance, Guangdong has been at the forefront of pro-market reforms. Furthermore, the central and regional tax arrangements were negotiated province by province, giving regional governments different incentives for economic performance (Gordon and Li, 2005). These differences have also given rise to strong regional protectionism, as carefully documented by the State Development Planning Commission (2000). Together, the differences in initial endowments, regional discretion in policy making, tax arrangements, as well as leadership turnover patterns, have led to strong regional variations in the investment
climate; these differences will be exploited in the analysis presented here. To the extent that the subnational level analysis of investment climate is particularly important in countries that are large, decentralized and feature local discretion and non-integrated markets, China is an excellent country in which to conduct such an analysis.

2. Data and investment climate measures

A good deal of work has by now gone into measuring aspects of the investment climate. These include, for example, measures of investment risks (the International Country Risk Guide from the PRS Group), transparency (Transparency International), competitiveness (The Global Competitiveness Report from the World Economic Forum, 2002), governance (for example, in Kaufmann et al., 1999, 2002) and regulatory burdens (Djankov et al., 2002). Each of these indices has proven quite useful and informative. One notable feature, however, is that they are all at the country level. That is, each country receives one score for every indicator. Such indicators have limited potential in pinpointing obstacles to firm productivity and investment and are thus of limited use in contributing to specific policy advice.

More detailed analysis requires data at the firm, rather than the country, level. In order to uncover the effects of the investment climate on individual firms, the World Bank is conducting firm-level surveys in a number of developing and transition economies. An earlier World Bank initiative, the World Business Environment Survey (WBES), assessed manager’s opinions on obstacles their firms faced. The interest it generated in using microdata to analyse areas for reform helped stimulate the larger effort to collect more quantitative information that could allow for more rigorous assessments, larger sample sizes that could allow for subnational inferences to be drawn, and means for measuring how the obstacles directly affected firm performance. That effort became the investment climate survey work, which is now collecting detailed firm-level data in 15 to 20 countries a year, with China as one of the first countries to complete the survey.

In China, the investment climate (IC) survey was undertaken in collaboration with the Enterprise Survey Organization of the Chinese National Bureau of Statistics. The survey included 1,500 firms (300 from each of five cities surveyed) and ten industries. The cities include Beijing, Chengdu, Guangzhou, Shanghai and Tianjin. Two-thirds (998) of the firms are in manufacturing sectors, while 502 are in services. Table 1 lists the specific sectors and the number of firms surveyed in each. The survey aimed at being as comprehensive as possible, collecting information on, for example, inputs and outputs, suppliers and customers, finances, interactions

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4 In this study the five regions included are among the stronger performers so that the differences would be even starker should less industrialized or integrated regions be included in the comparison.
with the government, labour-market issues, technology, infrastructure and corruption. Moreover, rather than just asking managers for their opinions on certain issues, the survey collected factual information, providing more objective, quantitative measures of the investment climate. Thus, for instance, rather than asking managers to gauge on a scale of 1 to 6 the quality of the power supply as an obstacle to conducting business, they report the number of outages and the value of the production lost due to inconsistencies in the power supply.

The investment climate is composed of many factors, as discussed above. These include sound and stable macroeconomic policies, which are not our focus in this paper as those are truly macro, rather than micro, level indicators and as such will not vary across our sample. We can narrow the categories beyond the general ones listed above to include regulatory burden and corruption, labour-market flexibility, physical infrastructure, skills and technology endowment, and the functioning of financial markets.

### 2.1 Ownership

State-owned firms in developing countries were usually shielded from competition, inefficient, and often ended up receiving a constant flow of subsidies to stay afloat (World Bank, 1995). A great deal of research has found that private firms are more efficient than state-owned firms, and that firm performance improves after

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5 The China survey is one of the first completed under the new initiative. As the number of available country datasets grows, the role of different macroeconomic policies can be examined in cross-country comparisons.
Table 2. Summary statistics of used variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definitions</th>
<th>Obs</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP</td>
<td>Total factor productivity</td>
<td>1,217</td>
<td>1.996</td>
<td>1.983</td>
</tr>
<tr>
<td>Emp. growth</td>
<td>Employment growth rate from the previous to the current year.</td>
<td>1,344</td>
<td>0.087</td>
<td>0.519</td>
</tr>
<tr>
<td>Investment rate</td>
<td>Investment rate, constructed as the ratio of new investment to capital stock in the previous year. Capital stock is measured as the book value of fixed assets.</td>
<td>1,389</td>
<td>0.155</td>
<td>0.257</td>
</tr>
<tr>
<td>Sales growth</td>
<td>The growth rate in sales revenue from the previous to the current year.</td>
<td>1,319</td>
<td>0.243</td>
<td>0.598</td>
</tr>
<tr>
<td>Domestic private</td>
<td>The share of ownership that is domestic private, including managerial ownership and ownership by private individuals.</td>
<td>1,380</td>
<td>0.257</td>
<td>0.409</td>
</tr>
<tr>
<td>Foreign</td>
<td>The share of ownership that is foreign.</td>
<td>1,380</td>
<td>0.253</td>
<td>0.373</td>
</tr>
<tr>
<td>Mean share of non-permanent labour</td>
<td>The city–industry mean of the share of labour that is non-permanent. Proxies labour market flexibility.</td>
<td>1,412</td>
<td>0.150</td>
<td>0.070</td>
</tr>
<tr>
<td>Mean share of emp. that use computers</td>
<td>The city–industry mean of the share of firm employment that uses computers.</td>
<td>1,412</td>
<td>0.354</td>
<td>0.262</td>
</tr>
<tr>
<td>Mean share of R&amp;D personnel in employment</td>
<td>The city–industry mean of the share of firm employment that conducts research and development.</td>
<td>1,412</td>
<td>0.057</td>
<td>0.079</td>
</tr>
<tr>
<td>Mean bank access</td>
<td>The city–industry mean of the dummy variable of having access to bank loans.</td>
<td>1,412</td>
<td>0.460</td>
<td>0.201</td>
</tr>
<tr>
<td>Mean share of regulatory burden</td>
<td>The city–industry mean of the share of senior managers’ time in dealing with regulatory requirements.</td>
<td>1,412</td>
<td>0.118</td>
<td>0.032</td>
</tr>
<tr>
<td>Mean score of corruption</td>
<td>The city–industry share of the corruption score, which is constructed as the principal component of two variables: 0.58 * (bribe/sales) + 0.60 * (share of contract value used as bribe to get a business contract).</td>
<td>1,412</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Mean loss of sales due to transportation or power problems</td>
<td>The city–industry average of the firm’s loss of sales due to transportation or power problems (in percentage).</td>
<td>1,412</td>
<td>2.001</td>
<td>2.081</td>
</tr>
<tr>
<td>ln(firm age)</td>
<td>ln(firm age plus one).</td>
<td>1,411</td>
<td>2.131</td>
<td>0.977</td>
</tr>
<tr>
<td>ln(city pop)</td>
<td>ln(city population, in 0000).</td>
<td>1,412</td>
<td>6.513</td>
<td>0.433</td>
</tr>
<tr>
<td>ln(city GDPpc)</td>
<td>ln(city-level GDP per capita, in yuan of 2000).</td>
<td>1,412</td>
<td>10.206</td>
<td>0.282</td>
</tr>
</tbody>
</table>

Note: SD denotes standard deviation.
privatization (Li and Xu, 2004; Megginson and Netter, 2001; Xu et al., 2005). The difference between state-owned and private (or privatized) firms is most apparent in industries that are competitive in most of the world.

Private foreign ownership is given particular attention as it is usually associated with higher productivity. Foreign firms often have access to superior technology, greater access to export markets, and new management techniques. Moreover, foreign owners tend to be large shareholders, who can internalize the costs of monitoring and tend to devote greater efforts to monitoring (Shleifer and Vishny, 1986). As a result, the CEO works harder, and firm performance improves. Table 2 provides definitions and summary statistics for our key variables.

Table 3 shows that cities differ greatly in their ownership structure. While domestic private firms accounted for 46 percent of the total in Chengdu, they only account for 8 percent in Shanghai. Guangzhou is a particularly open city, having 41 percent foreign ownership. Chengdu, in contrast, has only 5 percent.

### 2.2 Regulatory and administrative barriers to firm operation

The large steps of opening or closing a business inevitably involve the regulatory and administrative authorities, but firms also deal with regulatory and administrative issues that also affect many day-to-day operations. Friedman et al. (2000) compile indices of taxation levels and ‘over-regulation’ (essentially, indices of the business environment) of firms in 69 countries. While they find no evidence that higher tax rates drive firms underground, ‘...every available measure of over-regulation is significantly correlated with the share of the unofficial economy and the sign of the relationship is unambiguous: more over-regulation is correlated with a larger
The survey makes several attempts to uncover information about administrative hassles and corruption. As one might expect, questions on these topics are the ones firms are least likely to answer, and most likely to respond to untruthfully when they do answer (see Recanatini et al., 2000, for a survey of the survey literature).

While few firms answered direct questions about side payments and bribes, many more firms answered indirect questions about red tape, bureaucratic hassle, and the potential need to pay bribes. Managers were asked how much time they spend with government officials dealing with business regulations. The reported numbers were somewhat surprising: managers in Beijing report spending the largest share of their time dealing with regulatory issues (15 percent). Chengdu appears to have the least government interference of the five cities (8 percent).

To elicit information about the potential need to pay bribes, firms were asked the following question: ‘We have heard that establishments are sometimes required to make gifts or informal payments to public officials to “get things done” with regard to customs, taxes, licences, regulations, services, etc. On average, what percentage of annual sales value would such expenses cost a typical firm?’ For firms that report such payments, they averaged 1.9 percent of sales. Another question asked ‘when establishments in your industry do business with the government, how much of the contract value is typically expected in gifts or informal payments to secure the contract?’ The average answer to this question is slightly higher at 2.13 percent of the contract. The incidence of such payments was highest in Chengdu and lowest in Guangzhou.

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6 This discussion should not be interpreted as implying that regulations in developing countries are always onerous and unnecessary. On the contrary, many regulations and regulatory agencies can be important for mitigating market failures (e.g., environmental problems), protecting consumers (e.g., against firms that can exercise market power), and ensuring safe working conditions. The issue is that regulations in developing countries tend to be more complex and bureaucratic than necessary, are associated with corruption, and often are not intended to correct market failures or protect consumers. Indeed, Djankov et al. (2002) find that more regulations are generally not associated with better societal outcomes in developing countries.
Regulations that have a particularly strong impact on firms are those covering the labour market. Restrictions on firing, hiring seasonal or contract workers, and provision of certain benefits can affect firm productivity as it affects a firm’s ability to adjust production to changes in demand. Moreover, while restrictions on firing may benefit employees already hired (as long as the firm remains in business), they can end up as obstacles to growth by creating an incentive for firms to not hire additional permanent labour. In the face of such constraints, firms may seek to use temporary labour rather than new permanent workers. Non-permanent workers allow firms flexibility to adjust to changing demand conditions, and when firms have the flexibility to hire non-permanent workers, firms also face lower exit barriers. As a result, these flexible firms may have stronger incentives to invest *ex ante*. Table 3 shows the average share of employment that is non-permanent by city. Chengdu has the smallest share of temporary workers at around 12 percent, while Guangzhou has the largest at 21 percent.

### 2.3 Quality and availability of physical and technological infrastructure

The quality and availability of infrastructure, including transportation, electricity and communications, can have a large impact on firm productivity and growth potential, as well as on the likelihood that new firms will locate in an area. Indeed, much research has linked these to economic growth in developing countries (Canning, 1999; Canning and Bennathan, 2000; Easterly and Rebelo, 1993).\(^7\) China’s physical infrastructure has undergone rapid improvements in the last decade. Compared to India, for example, power outages are rare and waits for phone lines (or mobile phones) practically non-existent. Moreover, improvements in those areas continue (World Bank, 2002a).

We measure the quality of physical infrastructure by the city–industry share of losses in sales due to power problems and to transport breakage or theft. As Table 3 shows, the mean loss due to infrastructure problems for all the five cities centre around 2 percent, with Chengdu being the worst (2.9 percent), and Shanghai being the best (1.8 percent). It is likely that physical infrastructure no longer constitutes a bottleneck to firms’ growth. Whether this is true, of course, remains an empirical question.

Firms’ access to information and computing technologies (ICTs) and their use may affect productivity and economic growth. Clarke (2002), for example, using enterprise-level data in Eastern European transition economies, finds that even controlling for endogeneity, firms that have internet access are more likely to

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\(^7\) It is not always clear, however, when public investment in infrastructure leads to economic growth. Under some conditions it may have large positive effects, under other conditions it crowds out private investment, and under other conditions (often when the investment was done for political reasons) it has no effect at all.
export than firms that do not. Bhavani (2002) finds that the use of technology is beneficial for firms in the Indian auto components industry. Moreover, ICTs (or, more accurately, involvement in ICT industries) have also been important in spurring regional economic growth in places such as Taiwan and Bangalore (Arora et al., 2001; Athreye, 2005; Saxenian and Hsu, 2001).

To compare the technological infrastructure across cities in our sample, we examine two variables: the share of a firm’s employees that use computers, and the share of employees that are R&D staff. Table 3 suggests that firms in Shanghai and Guangzhou have the best, while those in Chengdu have the worst, technological infrastructure.

2.4 Access to finance

Access to external finance can also affect growth and productivity. Businesses will invest in projects where the expected benefits exceed the costs. Efficient investment, however, can happen only when businesses do not face credit constraints unrelated to their own performance. Indeed, a great deal of research demonstrates the importance of well-developed financial markets for economic growth (see Caprio and Honohan, 2001 (for an extensive summary); Cull and Xu, 2005). In general, countries with deeper financial systems tend to grow faster than countries with shallower ones. Relative to other Asian countries, few firms in China have access to formal finance (World Bank, 2002b). Approximately half of the firms in our sample have neither a bank loan nor a loan from any other financial institution and on average only about 20 percent of firms’ working capital comes from bank loans.

A simple measure of firm access to external finance is simply whether a firm has access to bank loans. While firms in developed countries often resort to other financial intermediaries for financing, Chinese firms mainly rely on bank financing (Allen et al., 2005; Cull and Xu, 2005). The access to bank loans thus adequately captures the availability of external financing to Chinese firms. Because of the well-known problem of Chinese state-owned banks continuously providing loans to money-losing state-owned enterprises, and the general lack of confidence that the Chinese state-owned banking sector does a good job in allocating bank loans (Boyreau-Debray and Wei, 2004; Cull and Xu, 2000, 2003), it is unlikely that we shall find a strong positive contribution of the banking sector to firm performance. However, it remains an empirical question as to whether this conjecture is true with our data. Table 3 shows that Shanghai and Chengdu have the best access to external finance, while firms in Guangzhou and Tianjin have the worst access.

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8 In a complementary paper, Clarke (2001) finds that foreign-owned firms are more likely to have internet access. Moreover, he found evidence of spillovers from this access, with FDI increasing internet access among domestic firms other than firms receiving the FDI.
3. Empirical analysis

We now proceed to investigate the effects of ownership and particular investment climate measures on firm performance. We estimate the following simple reduced-form regression:

\[ y_{ics} = \beta_0 + \beta_1 \cdot (IC \ indicators) + \beta_2Z + \alpha_c + \alpha_s + \epsilon_i \]  

The dependent variable is firm performance, for which we use four measures: sales growth, employment growth, investment rate and total factor productivity (TFP). \(^9\) \(Z\) is a vector of firm-level control variables likely to influence firm performance. These include lagged sales or employment, log of the firm’s age (plus one) and the quadratic term of this variable, along with the shares of foreign and domestic private ownership (with state and institutional ownership as the default). \(^9\) To capture heterogeneity at the city level, we include log(city population) and log(GDP per capita) in one specification, and city dummies in another. We also control for sector \((\alpha_s)\) fixed effects. \(IC \ indicators\) include our investment climate measures, which relate to the discussion above. To avoid endogeneity at the firm level, all IC indicators are measured as the city–industry average. This way, because we have already controlled for sector dummies and city information, it is unlikely that our IC indicators are correlated with firm-specific determinants of firm performance. The IC indicators include the city–industry mean of the share of labour that is non-permanent, the mean access to bank loans, the mean share of employees that are R&D staff, the mean share of employees that use computers, the mean share of sales lost as a result of power outages or transport breakage or theft, the mean share of senior managers’ time spent dealing with government inspectors, and the mean score of corruption. The corruption index is constructed as a principal component index of two variables: bribe payments as a share of sales, and the share of a contract’s value used as bribes to secure getting the business contract. The two variables are highly correlated, with a correlation coefficient of 0.71. To reduce the multicollinearity problem, we use their principal component index to elicit the main variations contained in the two variables. Because all the IC variables are only answered once, we run the regressions using only data of one

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\(^9\) To derive the TFP measure, we first estimate a Cobb–Douglas production function by each sector, using relevant variables for the three years, and allowing for firm fixed effects. The residual (including the fixed effects) is then TFP. Estimates based on the translog production function estimates are similar. We have also tried a TFP measure using just the final year of data, and the qualitative results remain similar.

\(^10\) The two ownership variables have about 30 percent of observations missing. To avoid the loss of information, we adopt the standard imputation approach to impute their missing value. Specifically, the missing values are replaced with the predicted values using city–industry dummies and log(lagged employment) as explanatory variables.
year, namely year 2000. It is important to note that the survey contains two types of information, one concerning financial performance, for which we have information for three years, and the other concerning qualitative information (including the variables regarding the investment climate), for which we only have information regarding the final year. That is why we can compute measures such as growth rate and lagged quantitative variables, while only using cross-sectional specification for Equation (1).

Endogeneity is a serious problem in investment climate analysis. The direction of causality is often not clear, and competing hypotheses can sometimes explain a particular result. Unfortunately, the large number of issues and variables we deal with in this paper means that an instrumental variables approach to mitigating the endogeneity is not feasible. Instead, we deal with this in a few ways. First, our city-sector IC variables are more likely to be exogenous to the firm, because any given firm only weakly affects the city-sector average. Second, the inclusion of city information and sector dummies in the regressions helps control for those more macro issues that affect both the IC variable and the firm. Third, estimating the equation with all variables together helps eliminate problems of omitted variables, and finally, we rely on common sense, openly discussing the competing explanations for results and which explanations seem to best fit all the evidence. Of course, the caveat of omitted variable bias still applies, as in the case for most empirical designs short of random experiment: it is still possible that there are omitted aggregate-level variables that are correlated with our city–industry mean ICs, in which case, our IC effects may reflect those of these aggregate-level variables. An important omitted variable may be the regional tax rate. However, Cai et al. (2005) show that effective tax burdens and corruption are positively correlated in Chinese firms and regions. In light of this finding, it may be useful to view our results as having implications for both corruption and the tax burden.

3.1 Results

We use two ways to control for city characteristics. In columns (1) to (4) of Table 4, we control for the logarithm of city population and the logarithm of GDP per capita. In columns (5) and (8) of Table 4, we directly control for city characteristics using city dummies. The qualitative results are very similar. We shall therefore primarily focus on the results based on columns (1) to (4) since the results are less subject to the collinearity of city dummies and the city–industry investment climate variables.

As expected, ownership has strong effects on firm performance. Relative to state ownership, domestic private ownership is associated with a higher sales growth rate and investment rate. Panel A of Table 5 computes the changes in percentage of mean Y – the four outcomes – corresponding to a one standard deviation (SD) increase in the investment climate variable of interest. As Table 5 shows, a 1 SD increase in domestic ownership would increase sales growth by
Table 4. Effects of investment climate on firm performance

<table>
<thead>
<tr>
<th></th>
<th>(1) sales growth</th>
<th>(2) investment rate</th>
<th>(3) TFP</th>
<th>(4) employment growth</th>
<th>(5) sales growth</th>
<th>(6) investment rate</th>
<th>(7) TFP</th>
<th>(8) employment growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dom. private</td>
<td>0.149</td>
<td>0.071</td>
<td>0.148</td>
<td>0.023</td>
<td>0.140</td>
<td>0.072</td>
<td>0.144</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>(2.74)***</td>
<td>(3.53)***</td>
<td>(1.28)</td>
<td>(0.67)</td>
<td>(2.55)**</td>
<td>(3.54)***</td>
<td>(1.25)</td>
<td>(0.57)</td>
</tr>
<tr>
<td>Foreign</td>
<td>0.260</td>
<td>0.007</td>
<td>0.471</td>
<td>0.131</td>
<td>0.276</td>
<td>0.007</td>
<td>0.487</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>(4.02)***</td>
<td>(0.35)</td>
<td>(3.63)***</td>
<td>(2.02)**</td>
<td>(4.24)***</td>
<td>(0.32)</td>
<td>(3.74)***</td>
<td>(2.05)**</td>
</tr>
<tr>
<td>Mean loss of sales due to transport/power</td>
<td>0.008</td>
<td>−0.001</td>
<td>0.005</td>
<td>0.001</td>
<td>0.005</td>
<td>−0.001</td>
<td>0.000</td>
<td>−0.001</td>
</tr>
<tr>
<td>Mean share of labour that uses computer</td>
<td>−0.018</td>
<td>0.160</td>
<td>1.922</td>
<td>−0.182</td>
<td>−0.108</td>
<td>0.157</td>
<td>1.757</td>
<td>−0.223</td>
</tr>
<tr>
<td>Mean share of R&amp;D staff in labour</td>
<td>0.754</td>
<td>0.294</td>
<td>2.379</td>
<td>0.627</td>
<td>0.844</td>
<td>0.319</td>
<td>2.841</td>
<td>0.696</td>
</tr>
<tr>
<td>Mean regulatory burden</td>
<td>−3.233</td>
<td>−0.028</td>
<td>1.840</td>
<td>−1.271</td>
<td>−2.863</td>
<td>0.051</td>
<td>3.440</td>
<td>−1.014</td>
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<tr>
<td>Mean corruption</td>
<td>−0.060</td>
<td>−0.011</td>
<td>0.015</td>
<td>−0.003</td>
<td>−0.098</td>
<td>−0.022</td>
<td>−0.191</td>
<td>−0.032</td>
</tr>
<tr>
<td>Mean share of non-permanent labour</td>
<td>0.183</td>
<td>0.173</td>
<td>0.395</td>
<td>0.234</td>
<td>0.150</td>
<td>0.175</td>
<td>0.370</td>
<td>0.219</td>
</tr>
<tr>
<td>Mean bank access</td>
<td>0.105</td>
<td>0.003</td>
<td>0.307</td>
<td>0.101</td>
<td>−0.161</td>
<td>−0.019</td>
<td>−0.340</td>
<td>−0.040</td>
</tr>
<tr>
<td></td>
<td>(0.69)</td>
<td>(0.06)</td>
<td>(0.82)</td>
<td>(0.78)</td>
<td>(0.83)</td>
<td>(0.28)</td>
<td>(0.74)</td>
<td>(0.29)</td>
</tr>
</tbody>
</table>
Table 4. (cont) Effects of investment climate on firm performance

<table>
<thead>
<tr>
<th></th>
<th>(1) sales growth</th>
<th>(2) investment rate</th>
<th>(3) TFP employment growth</th>
<th>(4) sales growth</th>
<th>(5) investment rate</th>
<th>(6) TFP employment growth</th>
<th>(7) City dummies</th>
<th>(8) Ind dummies</th>
<th>Observations</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(firm age+1)</td>
<td>-0.776</td>
<td>-0.167</td>
<td>-0.218</td>
<td>-0.241</td>
<td>-0.788</td>
<td>-0.167</td>
<td>-0.222</td>
<td></td>
<td>1,318</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>(7.20)***</td>
<td>(4.23)***</td>
<td>(1.63)</td>
<td>(3.13)***</td>
<td>(7.29)***</td>
<td>(4.22)***</td>
<td>(1.67)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(firm age+1) square</td>
<td>0.130</td>
<td>0.025</td>
<td>-0.035</td>
<td>0.034</td>
<td>0.132</td>
<td>0.025</td>
<td>-0.033</td>
<td>0.035</td>
<td>1,318</td>
<td>0.047</td>
</tr>
<tr>
<td></td>
<td>(6.46)***</td>
<td>(3.43)***</td>
<td>(1.20)</td>
<td>(2.48)**</td>
<td>(6.54)***</td>
<td>(3.43)***</td>
<td>(1.14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(lagged sales)</td>
<td>-0.035</td>
<td>0.003</td>
<td></td>
<td>-0.038</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(3.85)***</td>
<td>(1.19)</td>
<td></td>
<td>(4.08)***</td>
<td>(1.21)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ln(lagged labour)</td>
<td></td>
<td></td>
<td></td>
<td>-0.045</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(3.09)***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(city population)</td>
<td>0.110</td>
<td>-0.004</td>
<td>0.088</td>
<td>0.020</td>
<td></td>
<td></td>
<td>1,318</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(1.35)</td>
<td>(0.14)</td>
<td>(0.45)</td>
<td>(0.41)</td>
<td></td>
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<td></td>
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<tr>
<td>ln(GDP per capita)</td>
<td>0.024</td>
<td>-0.015</td>
<td>0.401</td>
<td>0.051</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.54)</td>
<td>(1.84)*</td>
<td>(0.83)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City dummies</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind dummies</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>1,318</td>
<td>1,301</td>
<td>1,209</td>
<td>1,343</td>
<td>1,318</td>
<td>1,301</td>
<td>1,209</td>
<td>1,343</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.17</td>
<td>0.14</td>
<td>0.64</td>
<td>0.09</td>
<td>0.17</td>
<td>0.14</td>
<td>0.64</td>
<td>0.09</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: *, ** and *** represent statistical significance at the 10, 5 and 1 percent levels. White-heteroskedasticity-corrected standard errors in parentheses.
25 percent if evaluated at mean sales growth rate (0.243),\(^{11}\) and increase investment rate by 18.7 percent if evaluated at the mean investment rate of 0.155. These effects, by any reckoning quite large, cannot compare with those of foreign ownership. A 1 SD increase in foreign ownership would increase sales growth by 40 percent,  

\(^{11}\) That is, 0.25*0.243, or 6 percentage points.
productivity by 8.8 percent, and employment growth rate by 56.2 percent (or 5 percentage points).

While there is no evidence that physical infrastructure affects firm performance, the impact of technological infrastructure appears to matter significantly. The city–industry average of the share of losses in sales due to transport breakage or theft and power problems is never statistically significant in any of the four regressions, whether we include city dummies or not. In contrast, the mean share of labour using computers has a significant effect on TFP: a 1 SD increase would increase TFP by a quarter, or 50 percentage points. Similarly, a 1 SD increase in the city–industry mean of the share of R&D staff in total employment would increase sales growth by 24.5 percent (or 6 percentage points), and TFP by 9.4 percent (or 18 percentage points). These findings are quite interesting, and roughly conform to our casual impression about China: the major build-up of physical infrastructure means that access to roads and power are less likely to be bottlenecks for firm performance, while the underprovision of technological infrastructure is probably still a binding constraint.

Labour market flexibility matters weakly. The coefficient of the mean share of non-permanent workers is positively correlated with the investment rate, and close to being statistically significant (with a \( t \)-statistic of 1.61). This is consistent with the notion that a firm is more willing to invest \textit{ex ante} when it is located in a flexible labour market. Increasing this variable by 1 SD would increase the investment rate by 7.8 percent (or 1.2 percentage points).

We do not find evidence that the average access to finance in a region and industry affects firm performance. This is consistent with the previous studies on Chinese banks that point to the inefficiency of the state-owned banking sector (Boyreau-Debray and Wei, 2004; Cull and Xu, 2000, 2003). In contrast, the government regulatory burden and corruption matter a great deal. Mean regulatory burden is negative and statistically significant in both sales and employment growth equations. Reducing mean regulatory burdens by 1 SD would increase sales growth by 42.6 percent (or approximately 10 percentage points), and employment growth by 46.7 percent (or 4 percentage points). Reducing the mean score of corruption by 1 SD also has a positive effect on sales growth, by 24.7 percent (or 6 percentage points).

### 3.2 The potential improvements that a lagging city can expect from improving IC

To address this issue, we estimate \( \beta_k \Delta X_k / \text{mean}(Y) \), where \( \Delta X_k \) is the differences in the means of the best and the worst cities for the particular variable, and report the results in panel B of Table 5. Clearly, the biggest payoff from reforms in these cities is from (i) reducing regulatory burdens and corruption and (ii) further privatization, especially through allowing foreign entry. Reducing the mean regulatory burden from that of Beijing to that of Chengdu would increase the sales growth rate by 93 percent (or 22 percentage points), and double the employment growth rate...
to 17 percentage points). Reducing corruption from the level of Chengdu to that of Guangzhou would increase sales growth rate by 61 percent (or 15 percentage points). If Shanghai can increase its domestic private ownership to that of Chengdu, its sales growth rate and investment rate can both increase by approximately 20 percent (or 5 and 3 percentage points, respectively). If Chengdu can catch up with Guangzhou in foreign ownership, its sales growth rate can increase by 37 percent (or 9 percentage points), and its employment growth rate can further increase by 56 percent (or 5 percentage points). Some cities can also benefit significantly from improving their technological infrastructure. However, gains from banking access and physical infrastructure are quite limited. The finding that access to banking services is relatively less important, should be interpreted with caution: it only means that the state-owned banking sector has not contributed significantly to regional firm growth, and it does not imply that a drastic reform of this sector, for example through privatization and introducing competition, would not lead to significant performance gains across regions.

4. Conclusion

Using a new dataset of 1,500 firms in five Chinese megacities, this paper examines how ownership and the regional investment climate affect firm performance. The results of this analysis highlight both the importance of these investment climate indicators on firm performance and the necessity of firm-level data for rigorously exploring their effects. Nonetheless, this analysis barely scratches the surface of what can be done with this sort of data. Each variable we discuss above relates to large bodies of literature and deserves much more attention by itself.

The analysis finds that, overall, firm performance is closely correlated with foreign and domestic private ownership, regulatory burdens, corruption, technological infrastructure, and labour-market flexibility. In contrast, gains from improving banking access and physical infrastructure are quite limited. Our explorations suggest that constructing policies that can effectively promote growth requires firm-level data to truly understand bottlenecks to firm growth. While the results should be interpreted with caution, the analysis points the way to a great deal of additional research designed to uncover more details of each part of the investment climate discussed here.

References

Gambardella, A. (eds), Building High-Tech Clusters: Silicon Valley and Beyond, Cambridge: Cambridge University Press, pp. 78–120.


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