

Unbundling Economic Institutions: A Firm-level Investigation

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Abstract

This paper evaluates the relative importance of two sets of economic institutions (property rights protection and contract enforcement) on economic performance at the micro-level. Using a World Bank survey data on private manufacturing firms in China, we find that property rights protection has a positive and statistically significant impact on firm productivity, but contract enforcement has no significant impact. We tackle the possible endogeneity issue by using the instrumental variable approach. The two-step GMM estimations reinforce our main results. In addition, we find that property rights protection has a relatively larger impact on productivity in poor cities. Interestingly, we find that property rights protection has a significant impact in slow-growing firms while contract enforcement has a significant impact in fast-growing firms.

Keywords: Economic Institutions, Property Rights Protection, Contract Enforcement, Labor Productivity, Total Factor Productivity

JEL Codes: P48, L25, K40, O12

1 Introduction

In the past decades, there has been a growing interest in economic institutions. More and more research has been asking *whether* better economic institutions can promote economic development. The results are uniformly positive: it has been shown that economic institutions play a fundamental role in promoting economic development (e.g., Knack and Keefer, 1995, 1997; Mauro, 1995; Hall and Jones, 1999; Acemoglu, Johnson, and Robinson, 2001, 2002), provide incentives for investment (e.g., Besley, 1995; Johnson, McMillan, and Woodruff, 2002), attract foreign direct investment (e.g., Wei 2000a, 2000b; Du, Lu, and Tao, 2008), and so on.

In their seminal paper, Acemoglu and Johnson (2005) address a deeper question. In addition to asking *whether*, they ask *which* types of institutions promote economic development at the macro-level. They evaluate the relative importance of two sets of economic institutions, namely, protection from the expropriation by government agencies and related parties (property rights protection) and protection of the private contracts (contract enforcement). Using an instrumental variable approach to tackle the endogeneity issues, they find that property rights institutions has first-order effects on economic performances, that is, long-run economic growth, investment, and financial development.

Similar to Acemoglu and Johnson (2005), this paper addresses both questions of *whether* and *which* but at a micro-level. Using a World Bank survey of private manufacturing firms in China, this paper evaluates the relative importance of two sets of economic institutions (property rights protection and contract enforcement) on economic performance at the firm-level.

Asking the same question as did Acemoglu and Johnson (2005), but at the micro-level is important for two reasons. First, it is interesting by itself to look into whether their macro-level results would still hold at the micro-level.¹ Second, a yet deeper question is to address how institutions promote economic development. Although neither Acemoglu and Johnson (2005) nor our paper document this question, combining empirical evidence at both the macro- and micro-level would guide researchers in constructing relevant theories to explain the underlying mechanisms.

We follow Johnson, McMillan, and Woodruff (2002), Cull and Xu (2005), and Laeven and Woodruff (2007) in constructing our measures of economic institutions. The measure of property rights protection is the opinions of the chief executive officers (CEOs) on whether government officials act as a

¹McMillan and Woodruff (2002) point to the importance of understanding of micro-level entrepreneurial activities as a lens for understanding economic development.

helping hand or a grabbing hand. The measure of contract enforcement is the opinions of the CEOs on whether the legal system can uphold contract and property rights in business disputes.

The ordinary least squares (OLS) estimations suggest that better property rights protection is positively and significantly associated with higher firm productivity. Such an association, however, is absent in contract enforcement. The results are robust to the inclusion of various firm and CEO characteristics as well as industry and regional dummies.

The potential endogeneity issues due to omitted variables bias and reverse causality call for caution in interpreting the association as causal. As in Acemoglu and Johnson (2005), we use the instrumental variable approach to deal with these possible endogeneity issues.

Motivated by the recent studies on institutions (e.g., Fisman and Svensson, 2007; Cai, Fang, and Xu, 2009; Lin, Lin, and Song, 2009), we use the industry-city average degree of property rights protection and effectiveness of contract enforcement as the instruments for the corresponding firm-level measures of economic institutions. The identification assumption is that the measures of economic institutions at the industry-city level are exogenous to the firm. Section 3.2 gives the detailed justifications for the assumption. In particular, we provide several checks in Section 3.2.1 to put the identification assumption under further scrutiny.

Various tests confirm that the instruments are strongly relevant. In addition, under our multiple instrumental variables setting, we test whether the instruments are separable as well (Acemoglu and Johnson, 2005). Our first-stage estimations give a positive answer: property rights protection perceived by the firm is only significantly correlated with the general level of property rights protection at the industry-city level, while contract enforcement perceived by the firm is only significantly related to the general level of contract enforcement at the industry-city level.

The second-stage estimations show that only property rights protection has a positive and statistically significant impact on firm productivity, a micro-level result consistent with the macro-level results of Acemoglu and Johnson (2005).

We also use an alternative set of instrumental variables. Inspired by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998) and Acemoglu, Johnson, and Robinson (2001, 2002), we compile historical indices as the instruments for the contemporary general level of economic institutions in each city. Specifically, we use *Logarithm of City Population in 1918-19* as the instrument for property rights protection and *Common Law Origin* (a dummy variable indicating whether a city was administered by Great Britain during

the late Qing Dynasty) as the instrument for contract enforcement.² Our results are robust with regard to the use of this alternative set of instrumental variables.

We also conduct three other sets of robustness checks. First, our results continue to hold when we use alternative measures of firm productivity. We use two alternative measures of firm productivity, the panel fixed-effect estimation specification of total factor productivity (TFP) and Levinsohn and Petrin (2003)'s estimation specification of TFP. Second, we ask if economic institutions are important for firm productivity, it would have been even more important for firms in areas with poorer institutions. We check whether such differential impacts of economic institutions on firm productivity exist. We find that property rights protection has a relatively bigger impact on labor productivity in poor cities than in rich cities. Third, we check whether there are differential impacts of economic institutions on firm productivity across different types of firms. We find that in slow-growing firms, only property rights protection has a positive and statistically significant impact on labor productivity; whereas in fast-growing firms, only contract enforcement has a positive and statistically significant impact on labor productivity. This is consistent with the conjecture by McMillan and Woodruff (2002). They argue that property rights protection affects the decision to start a business, while contract enforcement is crucial in firm growth and expansion.

In terms of how better institutions promote firm productivity, the dataset does not allow us to pin down specific mechanisms. We therefore do not claim any contributions here on this front. The intuition is that inadequate property rights protection is like taxing entrepreneurs informally. A worse one means a higher rate of tax. When expecting higher informal tax rate, not only would fewer potential firms enter, but existing firms would have less incentive to invest on assets, tangible and intangible, that would increase their productivity. Contract enforcement also potentially matters. With inadequate contract enforcement, firms tend to engage disproportionately in businesses with parties that they already have established long-term relationships or with someone they know very well. Refraining from developing their market further by doing businesses with someone they do not know well enough or would unlikely have a long-term relationship with would shrink their market reach. This may explain why contract enforcement is only relatively more important than property rights protection for fast-growing firms.

²Lu, Png, and Tao (2009) provided a detailed discussion on the rationale in and several validity checks on using *Logarithm of City Population in 1918-19* as the instrument for property rights protection, whereas Lu and Tao (2009a) provided a detailed discussion on the rationale in and several validity checks on using *Common Law Origin* as the instrument for contract enforcement.

Our paper is also closely related with Johnson, McMillan, and Woodruff (2002) and Cull and Xu (2005); both studies evaluate the relative importance of property rights protection and access to external finance on firms' reinvestment rate. Johnson, McMillan, and Woodruff (2002) find that property rights protection explains a large part of firms' reinvestment rate but not access to external finance, while Cull and Xu (2005) show that both property rights protection and external finance are important. Building on their framework, this paper directly tackles the endogeneity issues. Laeven and Woodruff (2007) also attempt to understand how economic institutions affect corporate decision making, but they only focus on the impacts of contract enforcement on firm size.

The rest of the paper is organized as follows. Section 2 describes the data and variables, while Section 3 discusses the empirical results. The conclusion is given in Section 4.

2 Data and Variables

Our empirical analysis drew on the data from the *Survey of Chinese Enterprises* (SCE) conducted by the World Bank in cooperation with the Enterprise Survey Organization of China in early 2003.³ For a balanced representation, the SCE selected 18 cities from 16 provinces located in five areas in China: Northeast area – Benxi, Changchun, Dalian, and Harbin; Coastal area – Hangzhou, Jiangmen, Shenzhen, and Wenzhou; Central area – Changsha, Nanchang, Wuhan, and Zhengzhou; Southwest area – Chongqing, Guiyang, Kunming, and Nanning; and Northwest area – Lanzhou and Xi'an. The survey covered nine different manufacturing industries, namely, garment and leather products, electronic equipment, electronic parts making, household electronics, automobile and automobile parts, food processing, chemical products and medicine, biotech products and Chinese medicine, and metallurgical products.

The SCE had two parts. One was a general questionnaire directed at the senior management seeking information about the enterprise, innovation, product certification, marketing, relation with suppliers and customers, access to markets and technology, relation with the government, labor, infrastructure, international trade, finance, and taxation, and the CEO and board of directors. The other questionnaire was directed at the accountant and personnel manager covering ownership, various financial measures, and

³Recently, the World Bank conducted a new survey of Chinese enterprise, covering firms in +100 plus cities in China (the third wave in 2005). However, this dataset is not yet publicly available.

labor and training. Most of the information from the first part of the SCE pertained to the survey year of 2002, while the second part pertained to the period of 2000-2002.

The SCE involved both state-owned enterprises and private firms. However, as state-owned enterprises conduct business under the auspices of the national and regional governments, they are much less subject to institutional environments, and consequently, there are not many variations in the quality of economic institutions among state-owned enterprises. Moreover, to compare our study with those in the literature (e.g., Johnson, McMillan, and Woodruff, 2002; Cull and Xu, 2005), we focus only on private firms defined as firms with shares of equity owned by parties other than government agencies exceeding 50% in 2002.

We are interested in firm productivity. One measure of firm productivity is labor productivity, which is denoted by *Labor Productivity*. It is the logarithm of firm's total output divided by its total employment.⁴ In addition, we also employ two measures of total factor productivity (TFP), estimated using either the panel fixed-effect estimation (denoted by *TFP FE*) or the methodology developed by Levinsohn and Petrin (2003) (denoted by *TFP LP*). As information about material inputs is fragmentary, we use *Labor Productivity* for the main analysis, and TFP measures as robustness checks. Table 1 reports the summary statistics of the data. The mean value of *Labor Productivity* is 4.428 (± 1.572), while those of *TFP FE* and *TFP LP* are 4.143 (± 1.083) and 3.499 (± 1.001), respectively. Table 2 reports the bivariate correlations.

According to North (1991), economic institutions include institutions constraining the expropriation by government officials and related agencies (property rights protection) and institutions supporting private contracts (contract enforcement). To measure the quality of economic institutions at the firm level, we follow the approach of Johnson, McMillan, and Woodruff (2002), Cull and Xu (2005), and Laeven and Woodruff (2007).⁵ Specifically,

⁴Note that the output is a revenue-based measure rather than quantity-based. In order to recover the quantity-based measure of output, we need the firm-level price to deflate the revenue. As firm-level prices are rarely available, a commonly used method in the literature is to deflate the revenue-based output by the industry average price index. This procedure, however, introduces omitted price bias (Klette, and Griliches, 1996). One way to address this problem is to assume a constant elasticity of substitution demand function and to include industry total output as an additional control (Klette and Griliches, 1996; De Loecker, 2008). Accordingly, in most of our regressions, we included industry dummies, which, in a cross-section analysis, is essentially the same as the method above for recovering the quantity-based output.

⁵At the macro-level, Acemoglu and Johnson (2005) measure the security of property rights protection by the constraint on the executive, and the effectiveness of contract

the SCE included the following question for the senior management: “Among the government officials that your enterprise regularly interacts with, what is the share that is oriented towards helping rather than hindering enterprises?” Accordingly, we constructed the measure *Property Rights Protection*, with the responses varying from 0% to 100%. The SCE also included the following question for the senior management: “What’s the likelihood that the legal system will uphold my contract and property rights in business disputes?” Accordingly, we construct the measure *Contract Enforcement*, with the responses varying from 0% to 100%. Table 1 shows that the mean values are 35.9% ($\pm 31.9\%$) for *Property Rights Protection* and 62.7% ($\pm 39.3\%$) for *Contract Enforcement*.⁶

We also control for other variables that may possibly affect firm productivity, including firm and CEO characteristics, as well as industry and region. The firm characteristics include *Firm Size* (measured by the logarithm of the employment), *Firm Age* (measured by the logarithm of the years of establishment by the end of 2002), and *Percentage of Private Ownership* (measured by the share of the equity owned by parties other than government agencies in 2002). The CEO characteristics include measures of human capital – *Education* (years of schooling), *Tenure* (years as CEO), and *Deputy CEO Previously* (a dummy variable indicating whether the CEO became the deputy CEO before becoming CEO);⁷ and his political capital – *Government Cadre Previously* (a dummy variable indicating whether the CEO previously became a government official) and *Communist Party Membership* (a dummy variable indicating whether the CEO was a member of the Chinese Communist Party).⁸ To capture regional characteristics, we include *Logarithm of City GDP per capita* in the sampled cities in 2002 and dummies of regions (either area dummies, province dummies, or city dummies). Finally, we include dummies of industry to account for the possible differences in firm productivity across industries.

In investigating the impact of economic institutions on firm productivity, the firm-level perception of economic institutions has some merits over the region-average perception. Firm productivity depends on various organizational and strategic decisions, including who to engage in as investors

enforcement by legal formalism, procedural complexity, and the number of procedures necessary to resolve a court case involving an unpaid commercial debt.

⁶Cull and Xu (2005) compared these measures with other measures of property rights protection and contract enforcement used in the literature.

⁷Cull and Xu (2005) used these variables to investigate the impacts of property rights protection and finance on reinvestment rate.

⁸Li, Meng, Wang, and Zhou (2008) used these variables to examine the impact of political connections on business performance.

and partners, whether to use capital or labor-intensive modes of production, whether and how much to outsource the production of inputs, and whether to distribute through direct or indirect channels, all of which depend on the management’s perception of economic institutions.

At the same time, using firm-level measures of economic institutions may introduce endogeneity in the form of omitted variables bias and reverse causality. For example, despite a long list of control variables, it is unlikely to exhaust all relevant controls. Furthermore, there are unobservables relevant to the firms. It can very well be that more productive firms have more resources, such as political connections, that lead to better de facto economic institutions.

To deal with these endogeneity issues, we use the two-step generalized method of moments (GMM) estimation with two different sets of instruments in the robustness checks. One set of instruments is the industry-city average of the responses to the SCE question regarding the degree of property rights protection and the effectiveness of contract enforcement. The other set of instruments is the logarithm of population in the respective city around 1918-19 and whether the respective city was administered by Great Britain during the late Qing Dynasty. Section 3.2 gives the motivations and more elaborated explanations on these instrument variables.

3 Empirical Analysis

3.1 OLS Estimates

To evaluate the relative importance of property rights protection and contract enforcement on firm productivity, we estimate the following equation:

$$y_{eic} = \alpha + \beta \cdot PRP_{eic} + \gamma \cdot CE_{eic} + X'_{eic}\zeta + \varepsilon_{eic}, \quad (1)$$

where y_{eic} is labor productivity in firm e belonging to industry i and located in city c ; PRP_{eic} is the degree of property rights protection as reported by the firm (*Property Rights Protection*); CE_{eic} is the effectiveness of contract enforcement as reported by the firm (*Contract Enforcement*); X_{eic} is a set of control variables; and ε_{eic} is the error term. To deal with the possible heteroskedasticity problem, we use the White-robust standard error.⁹

⁹The standard errors for micro-level data need to be adjusted for the possibility that error terms could be correlated within a cluster (Liang and Zeger, 1986). In our context, the possible clusters would be industries or cities. However, when the number of clusters is small (specifically, fewer than 42), the clustered standard errors could be misleading (e.g., Wooldridge, 2003, 2006; Angrist and Pischke, 2009). As our study included just

Table 3 shows the ordinary least squares (OLS) regression results. To account for the possibility that firms might differ in their scales, seniorities, and degrees of state ownership, we include *Firm Size*, *Firm Age* and *Percentage of Private Ownership* as controls. To account for the possibility that firms might differ in their CEOs' capabilities, we included CEO's human capital (*Education*, *Tenure* and *Deputy CEO Previously*) and political capital (*Government Cadre Previously* and *Communist Party Membership*). Industry dummies account for the possibility that firms might differ fundamentally across industries. To account for the possibility that firms might differ in their locations, we include logarithm of city GDP per capita and area dummies in Column 1, and then replace area dummies with more disaggregated province dummies in Column 2 and additional city dummies in Column 3.

Property rights protection is found to be a positively and statistically associated with labor productivity, but contract enforcement does not have such significant association. The results are reassuringly robust across columns. To gauge the economic significance of these results, we calculate that a one-standard-deviation increase in property rights protection is associated with an increase of $0.319 * 0.288 = 0.092 \sim 0.319 * 0.327 = 0.104$ in labor productivity or $5.8\% \sim 6.6\%$ of the standard-deviation of labor productivity.

The estimated coefficients of control variables also make economic sense. Among firm characteristics, firm size has positive and significant coefficients in all specifications. Apparently, firms with larger workforces exhibit relatively higher labor productivity, suggesting the likely presence of economies of scale. This also partially reflects the existence of local protectionism within China (Young, 2000; Bai, Du, Tao, and Tong, 2004), which would result in production at a sub-optimal scale. Older firms exhibit relatively lower labor productivity; the coefficients of firm age are negative and significant. This is consistent with the experience of economic transition that new firms drive economic development by creating jobs, supplying consumer goods, mobilizing savings, and ending the monopoly of state enterprises (McMillan and Woodruff, 2002). Among the CEO characteristics, the coefficients of CEO education are positive and significant in all specifications. Apparently, firms with better educated CEOs exhibit relatively higher labor productivity, which is consistent with the previous research on education and growth (e.g., Barro, 2001).

In summary, these findings imply that property rights protection is relatively more important to firm productivity than contract enforcement. This

18 cities and 9 industries, we did not use clustered standard errors but used the White-robust standard errors (White, 1980) instead. Nonetheless, the results with standard errors clustered at the industry-city level are similar, and they are available upon request.

is consistent with the findings in Acemoglu and Johnson (2005) at the macro-level. They found that property rights protection has a first-order effect on long-run economic growth, investment, and financial development, while contract enforcement only affects financial intermediation.

3.2 GMM Estimates

Despite a long list of control variables in the regression, one may still be concerned about omitted variable biases that cast doubt on interpreting the correlation as causal. For example, we are unable to rule out the possibility that there might still be some factors only observed by the firm but not by the econometrician. Another potential concern is the reverse causality. A more productive firm may have more resources, such as political connections, that lead to better de facto economic institutions.

To address these endogeneity issues, we adopt the two-step GMM using instruments for the firm-level perception of economic institutions. A valid GMM estimation requires the instrumental variables to be correlated with the endogenous explanatory variables (*Property Rights Protection* and *Contract Enforcement*), but orthogonal to the error terms, that is, the instrumental variables cannot affect the dependent variable through channels other than the endogenous explanatory variables. In addition, under the multiple instrumental variables estimation setting (i.e., with two or more endogenous variables), the instrumental variables need to be separable (Acemoglu and Johnson, 2005). Specifically, the instrument for property rights protection should only be correlated with the measure of property rights protection but not with that of contract enforcement, whereas the instrument for contract enforcement should only be correlated with the measure of contract enforcement but not with that of property rights protection.

Following the recent studies on institutions (e.g., Fisman and Svensson, 2007; Cai, Fang, and Xu, 2009; Lin, Lin, and Song, 2009), we use the industry-city average degree of property rights protection and effectiveness of contract enforcement as the instruments for the corresponding firm-level measures of economic institutions. The identification assumption is that the measures of economic institutions at the industry-city level are exogenous to the firm.

There are three justifications for this assumption. First, the industry-city general levels of economic institutions are determined by the behaviors of city government officials and related agencies. Here, we use the industry-city average rather than the city average to deal with the possibility that within a city, government officials and related agencies might have differential influences across different industries. Second, the protection of private

property has only been written into China’s constitution in March 2004, and hence, in our sample year, 2002, there were no formal channels through which any individual firm could influence the general level of economic institutions. Moreover, even some firms or CEOs might have some unobserved characteristics affecting the levels of economic institutions at individual the firm-level. For such individual characteristics to have any influence on the industry-city general levels of economic institutions require the collective action by all those firms with similar unobserved characteristics, a very unlikely event given that our firms are randomly sampled. Third, in the regression, we directly control for various firm and CEO characteristics (particularly, including CEOs’ human capital and political capital) as well as other industry-city factors (including both industry and regional dummies), which further alleviates the concern for any possible correlation between any uncontrolled firm-level characteristics and the industry-city general level of economic institutions.

The two first-stages of our two-step GMM estimations are as follows:

$$\begin{cases} PRP_{eic} = \delta_1 + \eta_1 \cdot PRP_{ic} + \lambda_1 \cdot CE_{ic} + X'_{eic}\theta_1 + v_{eir1}, \\ CE_{eic} = \delta_2 + \eta_2 \cdot PRP_{ic} + \lambda_2 \cdot CE_{ic} + X'_{eic}\theta_2 + v_{eir2}, \end{cases} \quad (2)$$

where PRP_{ic} is the average degree of property rights protection at the industry-city level, and CE_{ic} is the average effectiveness of contract enforcement at the industry-city level.

Table 4 shows the first-stage estimation results of the two-step GMM. Property rights protection perceived by the firm is positively and significantly related to the general level of property rights protection at the industry-city level, but insignificant to the general level of contract enforcement at the industry-city level (Panel A). Similarly, contract enforcement perceived by the firm is positively and significantly related to the general level of contract enforcement at the industry-city level, but insignificant to the general level of property rights protection at the industry-city level (Panel B). These results suggest that the two instruments are separable for the two endogenous variables, and they are not weak instruments. Panel C provides several statistical tests to examine further the validity of our instrumental variables: the Anderson canonical correlation LR statistic indicates that our instrumental variables are relevant, while the large Shea partial R2 and the Cragg-Donald F statistic rule out the concern for weak instruments.¹⁰

Table 5 reports the second stage estimation results of the two-step GMM. The estimated coefficients of property rights protection, instrumented by the average level of property rights protection at the industry-city level, are positive and statistically significant in all specifications, ranging from 0.720 to

¹⁰The F-statistic was significantly above the critical value of 10 (Staiger and Stock 1997).

1.307. Contract enforcement, instrumented by the average level of contract enforcement at the industry-city level, continues to be insignificant in all specifications. In terms of economic magnitude, the estimated impact of a one-standard-deviation increase in property rights protection on labor productivity is 14.6% \sim 26.5% of the standard-deviation of labor productivity, which is three-fourth times larger than that of the OLS estimations. Apparently, any bias due to endogeneity serves to bias the coefficient of property rights protection downward rather than upward.¹¹

The estimated coefficients of control variables are similar to those in the OLS estimations. Firm size and CEOs' education level continue to have positive and significant impacts, while firm age has a negative and significant impact.

3.2.1 Further Checks on the Identification Assumption

Our identification assumption is that the instrumental variables are orthogonal to the error term in the second stage. The inclusion of industry and regional dummies (particularly, the city dummies) controls for all the industry-specific and region-specific variables, leaving the possible violation of our identification assumption only with any of the firm-level or industry-city-level uncontrolled characteristics.

As the instrumental variables (industry-city levels of economic institutions) are determined by the city government officials and related agencies, and they are unlikely to be influenced by the characteristics of any specific firm, the only possible violation of our identification assumption is that there are some omitted industry-city factors correlated with both the instrumental variables and labor productivity. This concern is valid because government officials and related agencies may have influence on other aspects of local economy such as market competition, access to bank loans, and infrastructure, that may in turn affect firm productivity. Ultimately, data limitation precludes us from including all relevant industry-city factors to justify fully our identification assumption with absolute certainty. We do, however, try our best in this section to rule out as many industry-city factors as we can to put our instrumental variable approach under further scrutiny.

First, both anecdotal evidence and statistical analysis suggest that economic reform in China has led to the rise of local protectionism among China's various regions, which protects local state-owned firms and local industries from regional competition (Young, 2000; Bai, Du, Tao, and Tong, 2004). Following Bai et al. (2004) and Lu and Tao (2009b), we use the

¹¹Another possibility is that there are measurement errors that might have driven the OLS estimates towards zero.

average degree of state ownership at the industry-city level to proxy for the degree of local protectionism at the industry-city level.

Second, China has long maintained a financial repression regime by imposing a set of qualitative and quantitative administrative restrictions on the operation of financial markets and international capital flows (Li, 2001; Lal, 2006). The government regulations, in combination with the state ownership of China's banks, lead to discrimination in bank lending to private firms. In recognition of the importance of bank loans to firm performance (Demirgüç-Kunt and Maksimovic, 1996, 1998; Beck, Demirgüç-Kunt, and Maksimovic, 2004; Dyck and Zingales, 2004), we construct industry-city average of access to bank loans based on individual firms' status of having outstanding bank loans or not.

Third, with the fiscal decentralization policy initiated in 1994, local governments can keep all the business taxes and income taxes of local enterprises (all enterprises located in its regions except those state-owned enterprises affiliated at the central government level), and 25% of the value added taxes of all enterprises located in its regions (Bahl, 1999; World Bank, 2002; Jin, Qian, and Weingast, 2005). The fiscal decentralization policy provides the local governments with a strong incentive to collect taxes, and private firms are often disturbed by the capricious and discretionary taxes and levies imposed by the local governments (Asian Development Bank, 2003). To incorporate this possible side effect, we include the variable tax burdens at the industry-city level (measured by the industry-city average ratio of total taxes to total sales) in the regression analysis.

Fourth, infrastructure quality is notoriously poor in developing economies, which in turn imposes a constraint on firm growth and economic development. In China, regions differ much in their infrastructure qualities, with the coastal regions often having upgraded infrastructures and inland and mountainous regions having very poor infrastructures. To proxy for the infrastructure quality at the industry-city level, we create the average share of sales losses due to power outage and transportation theft at the industry-city level.

Fifth, firm productivity is largely affected by the local industrial structure, particularly the degree of market competition through entry and exit. To measure the regulation of entry, we follow Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2002) in using the number of days it took a firm to register a business and accordingly constructed the control variable, which is the regulation of entry at the industry-city level, by the average number of days it takes to register a business in that industry-city cell.

Finally, we include all these five industry-city level variables in the same regression.

Table 6 shows the two-step GMM estimation results. Consistent with our previous results, property rights protection has a positive and statistically significant impact on labor productivity, whereas contract enforcement does not have any significant impact in all these specifications. Meanwhile, with respect to the instrumental variables, Panels B-D show that they are strongly relevant and separable.

3.2.2 Alternative Instrumental Variables

We also use an alternative set of instrumental variables. Motivated by the literature on economic institutions (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998; Acemoglu, Johnson, and Robinson, 2001, 2002), we compile historical indices as the instruments for the contemporary general level of economic institutions in each city. Specifically, we use the *Logarithm of City Population in 1918-19* as the instrument for property rights protection, and *Common Law Origin* (a dummy variable indicating whether the respective city was administered by Great Britain during the late Qing Dynasty) as the instrument for contract enforcement. Lu, Png, and Tao (2009) provide a detailed discussion on the rationale and several validity checks on using *Logarithm of City Population in 1918-19* as the instrument for property rights protection, whereas Lu and Tao (2009a) provide a detailed discussion on the rationale and several validity checks on using *Common Law Origin* as the instrument for contract enforcement.

Table 7 shows the two-step GMM estimation results using the *Logarithm of City Population in 1918-19* and *Common Law Origin* as instruments. Referring to Panel B, *Logarithm of City Population in 1918-19* has a positive and statistically significant impact on property rights protection but not on contract enforcement. Referring to Panel B, *Common Law Origin* has a positive and statistically significant impact on contract enforcement but has no significant impact on property rights protection. The statistics reported in Panel D further lend support to the relevance of these two instruments. With respect to the central issue, as shown in Panel A of Column 1, both property rights protection and contract enforcement has positive and statistically significant impacts on labor productivity.

However, there are two concerns with the estimation results in Column 1 of Table 7. First, common law origin may affect economic outcomes through channels other than contract enforcement, for example, the development of financial institutions (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998) and regulation of entry (Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2002). This may lead to the violation of the orthogonality condition of our instrumental variables, thus over-estimating the impact of contract

enforcement on firm productivity. To alleviate this concern, in Column 2 of Table 7, we include the five additional controls we used in Section 3.3.2, that is, local protectionism, access to bank loans, tax burdens, infrastructure quality, and regulation of entry, all at the industry-city level. It turns out that property rights protection still casts a positive and statistically significant impact on labor productivity, but contract enforcement no longer has any significant impact.

The second concern is the weak instrument as the Cragg-Donald F statistic is only 4.19. To address this concern, we further report the Stock-Wright LM S statistics, which is the test for the statistical significance of the endogenous explanatory variable (*Property Rights Protection* and *Contract Enforcement*) under the weak instrument setting (Stock and Wright, 2000). It is clear that the test is statistically significant at the 1% level, implying that the weak instrument concern does not change our results.

3.3 Robustness

This section provides three sets of robustness checks.

First, we check whether our results are sensitive to the specific measure of firm productivity. We use two alternative measures of firm productivity, the panel fixed-effect estimation specification of total factor productivity (TFP), and Levinsohn and Petrin (2003)'s estimation specification of TFP. Table 8 shows the OLS and the two-step GMM estimations. Clearly, our previous findings on the relative importance of property rights protection and contract enforcement on firm productivity are robust to these alternative measures of firm productivity.

Second, we ask whether such differential impacts of economic institutions on firm productivity exist across different cities. In our data, poor cities have worse institutional quality (with a mean value of 0.331 and 0.598 for property rights protection and contract enforcement, respectively) compared with rich cities (with a mean value of 0.387 and 0.657 for property rights protection and contract enforcement, respectively).¹² It is thus expected that firms in poor cities should be more sensitive to the quality of economic institutions compared with their counterparts in rich cities. To check this, we divide the whole sample into two sub-samples, firms located in poor cities vis-à-vis those in rich cities, with a city defined as "rich" if its GDP per capita exceeds the median value among cities and a city defined as "poor" if otherwise. Table 9 shows the OLS and the two-step GMM estimations. Clearly, our previous

¹²The t-values for the two-group (poor vis-à-vis rich cities) mean value comparison are 3.07 for property rights protection and 2.51 for contract enforcement, both of which are statistically significant at the 1% level.

finding regarding the relative importance of property rights protection and contract enforcement on firm productivity is robust in these two sub-samples. Meanwhile, as expected, property rights protection has a bigger impact on labor productivity in poor cities (with estimation coefficient, 1.297) than in rich cities (with estimation coefficient, 0.874).

Third, we ask whether there are differential impacts of economic institutions on firm productivity across different types of firms. McMillan and Woodruff (2002) argue that property rights protection affects the decision to start a business, while contract enforcement is important in firm growth and expansion. This is because firms are found to be established largely in the localities where their entrepreneurs reside (Michelacci and Silva, 2007) and later expand to other markets along with their growth. The expansion of a business requires the firm to do business with people not located nearby or not familiar, making market-supporting institutions, especially contracting institutions, essential.

To the best of our knowledge, we do not know of any empirical research that indirectly tests this conjecture. Our dataset does allow us to shed light on this interesting issue. We divide the whole sample into two sub-samples, slow-growing firms vis-à-vis fast-growing firms, with the definition of a firm as “fast growing” if its growth rate (in terms of employment) in the past three years has exceeded the sample median value and as “slow-growing” if otherwise. Table 10 reports the OLS and the two-step GMM estimations. It is interesting that in slow-growing firms, only property rights protection has a positive and statistically significant impact on labor productivity, whereas in fast growing firms, only contract enforcement has a positive and statistically significant impact on labor productivity, which is consistent with the conjecture of McMillan and Woodruff (2002).

4 Conclusion

Numerous cross-country and within-country studies have addressed *whether* better economic institutions can promote better economic performance. Nevertheless, studies on *which* types of institutions have significant impacts are relatively few. Acemoglu and Johnson (2005) ask the *whether* and *which* at the macro-level, while our paper asks the same questions at the micro-level.

The OLS estimations show that property rights protection has a positive and statistically significant impact on firm productivity, whereas contract enforcement has no significant impact. The results are robust with regard to the inclusion of various firm and CEO characteristics, and industry and regional dummies. To address the endogeneity problem, we use the instru-

mental variable approach. The two-step GMM estimation results reinforce our findings that property rights protection is relatively more important for firm productivity than contract enforcement. Further robustness checks indicate that our results are robust with regard to alternative measures of firm productivity and different sub-samples. Interestingly, we find that property rights protection has a bigger impact on labor productivity in poor cities than in rich cities, and property rights protection has a positive and statistically significant impact on labor productivity in slow-growing firms, whereas contract enforcement has a positive and statistically significant impact on labor productivity in fast-growing firms.

We expect our micro-level results to complement the macro-level evidence in guiding theories and helping us to pin down exactly *how* better institutions help spur economic development.

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Table 1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Labor productivity	1268	4.428	1.572	-3.989	11.893
Property rights protection	1192	0.359	0.319	0.000	1.000
Contract enforcement	1101	0.627	0.393	0.000	1.000
TFP FE	1110	4.143	1.083	-0.311	11.040
TFP LP	1110	3.499	1.001	-0.845	10.487
Firm size	1275	4.970	1.321	0.000	9.649
Firm age	1275	2.349	0.702	1.099	3.970
Percentage of private ownership	1275	0.989	0.064	0.500	1.000
Education	1270	15.285	2.608	0.000	19.000
Tenure	1263	6.401	4.561	1.000	33.000
Deputy CEO previously	1265	0.248	0.432	0.000	1.000
Government cadre previously	1265	0.032	0.177	0.000	1.000
Communist party membership	1246	0.589	0.492	0.000	1.000

Table 2: Correlations among key variables

	Labor productivity	TFP FE	TFP LP	Property rights protection	Contract enforcement	Property rights protection at industry-city level	Contract enforcement at industry-city level	Logarithm of city population in 1918-1919	Common law origin
Labor productivity	1.0000								
TFP FE	0.8227	1.0000							
TFP LP	0.8353	0.9900	1.0000						
Property rights protection	0.1062	0.0920	0.0860	1.0000					
Contract enforcement	0.1264	0.0750	0.0698	0.2575	1.0000				
Property rights protection at industry-city level	0.1394	0.1423	0.1315	0.3975	0.1692	1.0000			
Contract enforcement at industry-city level	0.0841	0.0608	0.0547	0.1900	0.3938	0.4195	1.0000		
Logarithm of city population in 1918-1919	0.1329	0.1520	0.1379	0.0890	0.0667	0.2358	0.1495	1.0000	
Common law origin	0.0914	0.0847	0.0853	-0.0102	0.1534	-0.0220	0.3475	0.3275	1.0000

Table 3: OLS estimates

Dependent variable	1	2	3
	Labor productivity		
Property rights protection	0.327** [0.134]	0.326** [0.135]	0.288** [0.137]
Contract enforcement	0.158 [0.110]	0.125 [0.112]	0.126 [0.111]
Firm characteristics			
Firm size	0.199*** [0.044]	0.158*** [0.046]	0.147*** [0.045]
Firm age	-0.550*** [0.071]	-0.512*** [0.071]	-0.493*** [0.070]
Percentage of private ownership	-0.270 [0.498]	0.038 [0.481]	0.163 [0.464]
CEO characteristics			
Education	0.095*** [0.021]	0.086*** [0.021]	0.079*** [0.021]
Tenure	-0.001 [0.009]	-0.004 [0.009]	-0.008 [0.009]
Deputy CEO previously	-0.098 [0.099]	-0.063 [0.100]	-0.064 [0.099]
Government cadre previously	0.069 [0.192]	0.129 [0.193]	0.148 [0.200]
Communist party member	-0.070 [0.086]	-0.079 [0.087]	-0.062 [0.086]
Regional characteristics			
Logarithm of city GDP per capita	0.223*** [0.076]	0.447*** [0.105]	
Area Dummy	Yes	No	No
Province Dummy	No	Yes	No
City Dummy	No	No	Yes
Industrial characteristics			
Industry Dummy	Yes	Yes	Yes
Constant	3.834*** [0.641]	2.619*** [0.722]	2.517*** [0.648]
Observations	1034	1034	1034
R-squared	0.2762	0.3071	0.3224
F-test	15.96	13.27	13.62

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: GMM estimates, first stages

	1	2	3
Panel A: Dependent variable is property rights protection			
Property rights protection at the industry-city level	1.018*** [0.085]	1.007*** [0.105]	0.978*** [0.124]
Contract enforcement at the industry-city level	-0.079 [0.076]	-0.019 [0.105]	-0.027 [0.107]
Firm characteristics			
Firm size	0.007 [0.008]	0.007 [0.009]	0.007 [0.009]
Firm age	0.005 [0.014]	0.004 [0.015]	0.003 [0.015]
Percentage of private ownership	0.112 [0.147]	0.138 [0.148]	0.134 [0.149]
CEO characteristics			
Education	0.002 [0.004]	0.002 [0.004]	0.002 [0.004]
Tenure	-0.000 [0.002]	-0.000 [0.002]	-0.000 [0.002]
Deputy CEO previously	-0.032 [0.023]	-0.029 [0.023]	-0.029 [0.023]
Government cadre previously	-0.037 [0.050]	-0.037 [0.051]	-0.036 [0.051]
Communist party member	-0.011 [0.020]	-0.011 [0.020]	-0.012 [0.020]
Regional characteristics			
Logarithm of city GDP per capita	-0.002 [0.023]	-0.012 [0.032]	
Area Dummy	Yes	No	No
Province Dummy	No	Yes	No
City Dummy	No	No	Yes
Industrial characteristics			
Industry Dummy	Yes	Yes	Yes
Constant	-0.167 [0.164]	-0.196 [0.183]	-0.187 [0.195]
Panel B: Dependent variable is contract enforcement			
Property rights protection at the industry-city level	-0.015 [0.116]	-0.071 [0.137]	-0.127 [0.155]
Contract enforcement at the industry-city level	0.960*** [0.088]	0.992*** [0.136]	0.983*** [0.140]
Firm characteristics			
Firm size	0.028*** [0.011]	0.029*** [0.011]	0.030*** [0.011]

Firm age	-0.050*** [0.018]	-0.052*** [0.018]	-0.054*** [0.018]
Percentage of private ownership	0.120 [0.207]	0.130 [0.213]	0.117 [0.216]
CEO characteristics			
Education	-0.001 [0.005]	-0.000 [0.005]	-0.000 [0.005]
Tenure	0.003 [0.003]	0.004 [0.003]	0.004 [0.003]
Deputy CEO previously	-0.011 [0.028]	-0.010 [0.028]	-0.010 [0.028]
Government cadre previously	-0.074 [0.063]	-0.075 [0.063]	-0.074 [0.064]
Communist party member	-0.005 [0.025]	-0.004 [0.025]	-0.007 [0.025]
Regional characteristics			
Logarithm of city GDP per capita	-0.001 [0.027]	-0.019 [0.038]	
Area Dummy	Yes	No	No
Province Dummy	No	Yes	No
City Dummy	No	No	Yes
Industrial characteristics			
Industry Dummy	Yes	Yes	Yes
Constant	-0.099 [0.231]	-0.080 [0.257]	-0.077 [0.273]
Panel C: Various econometric tests			
Shea partial R-squared for Panel A	0.1156	0.0832	0.0582
Shea partial R-squared for Panel B	0.1005	0.0483	0.0453
Anderson canonical correlation LR statistic	[78.21]***	[41.94]***	[36.84]***
Cragg-Donald F statistic	56.54	26.93	25.18
Observations	1034	1034	1034

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: GMM estimates, second stage

Dependent variable	1	2	3
	Labor productivity		
Property rights protection	0.720*	1.307***	1.243**
	[0.411]	[0.464]	[0.563]
Contract enforcement	0.573	0.507	0.342
	[0.357]	[0.564]	[0.566]
Firm characteristics			
Firm size	0.180***	0.138***	0.134***
	[0.045]	[0.047]	[0.047]
Firm age	-0.525***	-0.494***	-0.481***
	[0.075]	[0.079]	[0.078]
Percentage of private ownership	-0.354	-0.089	0.063
	[0.500]	[0.502]	[0.491]
CEO characteristics			
Education	0.093***	0.081***	0.077***
	[0.021]	[0.020]	[0.020]
Tenure	-0.003	-0.006	-0.009
	[0.009]	[0.010]	[0.010]
Deputy CEO previously	-0.083	-0.041	-0.041
	[0.098]	[0.101]	[0.098]
Government cadre previously	0.092	0.182	0.183
	[0.186]	[0.186]	[0.193]
Communist party member	-0.060	-0.071	-0.047
	[0.087]	[0.089]	[0.088]
Regional characteristics			
Logarithm of city GDP per capita	0.218***	0.445***	
	[0.082]	[0.136]	
Area Dummy	Yes	No	No
Province Dummy	No	Yes	No
City Dummy	No	No	Yes
Industrial characteristics			
Industry Dummy	Yes	Yes	Yes
Constant	2.653***	2.442***	3.065***
	[0.651]	[0.798]	[0.835]
Observations	1034	1034	1034

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: GMM estimates, identification checks

	1	2	3	4	5	6
Panel A, second stage: Dependent variable is labor productivity						
Property rights protection	1.342** [0.595]	1.264** [0.563]	1.150** [0.562]	1.368** [0.576]	1.183** [0.595]	1.294** [0.620]
Contract enforcement	0.451 [0.567]	0.269 [0.609]	0.3 [0.562]	0.195 [0.563]	0.296 [0.593]	0.193 [0.611]
Local protectionism at the industry-city level	-0.910* [0.544]					-0.796 [0.560]
Access to bank loans at the industry-city level		0.177 [0.337]				0.249 [0.355]
Tax burdens at the industry-city level			-4.906*** [1.820]			-4.607** [1.892]
Infrastructure quality at the industry-city level				4.737 [3.342]		2.717 [3.400]
Regulation of entry at the industry-city level					0.004 [0.011]	0.003 [0.012]
Firm characteristics						
Firm size	0.127*** [0.048]	0.135*** [0.047]	0.128*** [0.047]	0.137*** [0.047]	0.135*** [0.047]	0.127*** [0.048]
Firm age	-0.470*** [0.078]	-0.485*** [0.080]	-0.461*** [0.077]	-0.485*** [0.078]	-0.484*** [0.078]	-0.465*** [0.079]
Percentage of private ownership	0.029 [0.501]	0.057 [0.490]	0.081 [0.464]	0.087 [0.486]	0.063 [0.491]	0.057 [0.468]
CEO characteristics						

Education	0.079***	0.075***	0.077***	0.075***	0.076***	0.077***
	[0.020]	[0.021]	[0.020]	[0.020]	[0.020]	[0.021]
Tenure	-0.009	-0.009	-0.009	-0.009	-0.008	-0.009
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
Deputy CEO previously	-0.039	-0.042	-0.047	-0.037	-0.044	-0.045
	[0.099]	[0.098]	[0.097]	[0.099]	[0.098]	[0.098]
Government cadre previously	0.219	0.182	0.196	0.182	0.217	0.257
	[0.197]	[0.194]	[0.194]	[0.195]	[0.197]	[0.203]
Communist party member	-0.036	-0.048	-0.046	-0.039	-0.05	-0.037
	[0.090]	[0.088]	[0.088]	[0.089]	[0.088]	[0.089]
Regional characteristics						
City Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industrial characteristics						
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.090***	3.114***	3.226***	3.021***	3.060***	3.264***
	[0.839]	[0.860]	[0.819]	[0.841]	[0.848]	[0.862]

Panel B, first stage: Dependent variable is property rights protection

Property rights protection at the industry-city level	0.972***	0.981***	0.985***	0.964***	0.998***	0.989***
	[0.125]	[0.125]	[0.125]	[0.127]	[0.132]	[0.134]
Contract enforcement at the industry-city level	-0.035	-0.034	-0.024	-0.012	-0.036	-0.033
	[0.110]	[0.115]	[0.108]	[0.110]	[0.112]	[0.122]

Panel C, first stage: Dependent variable is contract enforcement

Property rights protection at the industry-city level	-0.134	-0.133	-0.124	-0.137	-0.120	-0.137
	[0.155]	[0.156]	[0.155]	[0.160]	[0.165]	[0.169]

Contract enforcement at the industry-city level	0.974*** [0.141]	0.998*** [0.144]	0.984*** [0.140]	0.993*** [0.138]	0.975*** [0.145]	0.989*** [0.149]
Panel D: Various econometric tests for first stages						
Shea partial R-squared for Panel B	0.0568	0.0581	0.0588	0.0555	0.0557	0.0536
Shea partial R-squared for Panel C	0.0438	0.0431	0.0453	0.0441	0.0426	0.0392
Anderson canonical correlation LR statistic	[32.90]***	[36.04]***	[37.25]***	[38.15]***	[36.27]***	[33.09]***
Cragg-Donald F statistic	24.04	24.80	25.14	26.09	23.82	23.47
Observations	1034	1034	1034	1034	1028	1028

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. The first stages included the same control variables as those in the corresponding second stage and the estimated coefficients of these control variables were reported in Appendix A.1.

Table 7: GMM estimates, alternative instruments

	1	2
Panel A, second stage: Dependent variable is labor productivity		
Property rights protection	4.602** [2.331]	4.226** [1.803]
Contract enforcement	3.838** [1.764]	1.345 [1.196]
Local protectionism at the industry-city level		0.238 [0.718]
Access to bank loans at the industry-city level		0.985** [0.431]
Tax burdens at the industry-city level		-5.194** [2.584]
Infrastructure quality at the industry-city level		6.018 [5.448]
Regulation of entry at the industry-city level		0.018 [0.017]
Firm characteristics		
Firm size	0.045 [0.112]	0.086 [0.079]
Firm age	-0.331** [0.159]	-0.424*** [0.117]
Percentage of private ownership	-0.827 [1.324]	-0.631 [0.864]
CEO characteristics		
Education	0.057 [0.037]	0.067** [0.029]
Tenure	-0.015 [0.020]	-0.013 [0.015]
Deputy CEO previously	0.160 [0.224]	0.098 [0.168]
Government cadre previously	0.289 [0.432]	0.273 [0.328]
Communist party member	0.033 [0.187]	0.043 [0.142]
Regional characteristics		
Logarithm of city GDP per capita	0.688*** [0.263]	0.504** [0.211]
Industrial characteristics		
Industry Dummy	Yes	Yes
Constant	0.907 [1.617]	1.998* [1.191]

Panel B, first stage: Dependent variable is property rights protection

Logarithm of city population in 1918-1919	0.043*** [0.013]	0.047*** [0.014]
Common law origin	-0.037 [0.023]	-0.008 [0.025]
Panel C, first stage: Dependent variable is contract enforcement		
Logarithm of city population in 1918-1919	0.001 [0.015]	-0.008 [0.017]
Common law origin	0.101*** [0.029]	0.129*** [0.032]
Panel D: Various econometric tests for first stages		
Shea partial R-squared for Panel B	0.0118	0.0118
Shea partial R-squared for Panel C	0.0145	0.0191
Anderson canonical correlation LR statistic	[8.14]***	[9.59]***
Cragg-Donald F statistic	4.19	4.84
Stock-Wright LM S Statistic	[25.11]***	[15.00]***
Observations	960	954

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. The first stages include the same control variables as those in the corresponding second stage. The estimated coefficients of these control variables are reported in Appendix A.2.

Table 8: Robustness checks, alternative measures of productivity

	1	2	3	4
Estimation specification	OLS	GMM	OLS	GMM
Dependent variable	TFP FE		TFP LP	
Property rights protection	0.192** [0.093]	1.301*** [0.417]	0.184** [0.092]	1.271*** [0.415]
Contract enforcement	0.008 [0.081]	0.171 [0.365]	0.006 [0.080]	0.196 [0.364]
Firm characteristics				
Firm size	0.436*** [0.029]	0.422*** [0.031]	0.344*** [0.029]	0.330*** [0.030]
Firm age	-0.279*** [0.043]	-0.270*** [0.049]	-0.289*** [0.043]	-0.278*** [0.049]
Percentage of private ownership	0.188 [0.352]	0.024 [0.424]	0.279 [0.358]	0.113 [0.426]
CEO characteristics				
Education	0.031*** [0.011]	0.030** [0.012]	0.024** [0.011]	0.023* [0.012]
Tenure	-0.010* [0.006]	-0.008 [0.006]	-0.009 [0.006]	-0.008 [0.006]
Deputy CEO previously	-0.081 [0.063]	-0.052 [0.067]	-0.085 [0.062]	-0.057 [0.066]
Government cadre previously	0.033 [0.125]	0.044 [0.133]	0.007 [0.124]	0.018 [0.129]
Communist party member	-0.005	0.012	-0.01	0.007

	[0.057]	[0.062]	[0.057]	[0.061]
Regional characteristics				
City dummy	Yes	Yes	Yes	Yes
Industrial characteristics				
Industry dummy	Yes	Yes	Yes	Yes
Constant	-0.973*	-2.715***	2.994***	1.274**
	[0.552]	[0.539]	[0.553]	[0.540]
Observations	918	918	918	918
R-squared	0.4838		0.4059	
F-test	22.530		16.620	

Note: White-robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The instruments used in Columns 2 and 4 are property rights protection at the industry-city level and contract enforcement at the industry-city level. Columns 2 and 4 only report the second stage results of GMM estimation, and the first stages results and the associated econometric tests are reported in Appendix A.3.

Table 9: Robustness checks, poor cities versus rich cities

	1	2	3	4
Estimation specification	OLS	GMM	OLS	GMM
Subsample	Poor cities		Rich cities	
Dependent variable	Labor productivity			
Property rights protection	0.511** [0.215]	1.297* [0.759]	0.19 [0.174]	0.874* [0.509]
Contract enforcement	0.270* [0.160]	-0.017 [0.811]	-0.020 [0.155]	0.172 [0.518]
Firm characteristics				
Firm size	0.114 [0.071]	0.127* [0.073]	0.213*** [0.056]	0.207*** [0.057]
Firm age	-0.561*** [0.091]	-0.568*** [0.101]	-0.437*** [0.116]	-0.432*** [0.124]
Percentage of private ownership	-0.355 [0.747]	-0.524 [0.852]	0.273 [0.631]	0.451 [0.620]
CEO characteristics				
Education	0.085** [0.034]	0.081** [0.034]	0.091*** [0.024]	0.085*** [0.024]
Tenure	0.009 [0.014]	0.012 [0.014]	-0.022* [0.013]	-0.025** [0.013]
Deputy CEO previously	-0.070 [0.158]	-0.048 [0.158]	-0.065 [0.126]	-0.050 [0.127]
Government cadre previously	0.230 [0.236]	0.237 [0.234]	-0.238 [0.348]	-0.200 [0.355]

Communist party member	-0.079 [0.140]	-0.083 [0.142]	0.050 [0.110]	0.055 [0.115]
Regional characteristics				
Logarithm of city GDP per capita	-0.942** [0.437]	-0.845 [0.723]	0.194** [0.080]	0.186* [0.096]
Area dummy	Yes	Yes	Yes	Yes
Industrial characteristics				
Industry dummy	Yes	Yes	Yes	Yes
Constant	4.039*** [0.941]	3.603*** [1.004]	3.003*** [0.799]	2.233*** [0.836]
Observations	511	511	523	523
R-squared	0.2824		0.2747	
F-test	10.420		8.709	

Note: White-robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The instruments used in Columns 2 and 4 are property rights protection at the industry-city level and contract enforcement at the industry-city level. Columns 2 and 4 only report the second stage results of GMM estimation, and the first stages results and the associated econometric tests are reported in Appendix A.4.

Table 10: Robustness checks, slow growing firms versus fast growing firms

	1	2	3	4
Estimation specification	OLS	GMM	OLS	GMM
Subsample	Slow growing firms		Fast growing firms	
Dependent variable	Labor productivity			
Property rights protection	0.574*** [0.206]	1.427** [0.588]	0.048 [0.159]	-0.076 [0.599]
Contract enforcement	0.028 [0.164]	0.027 [0.507]	0.338** [0.138]	1.249*** [0.438]
Firm characteristics				
Firm size	0.162** [0.064]	0.169*** [0.063]	0.272*** [0.053]	0.254*** [0.055]
Firm age	-0.589*** [0.092]	-0.605*** [0.098]	-0.220** [0.110]	-0.161 [0.114]
Percentage of private ownership	-0.719 [0.607]	-0.682 [0.604]	-0.711 [0.654]	-0.695 [0.690]
CEO characteristics				
Education	0.103*** [0.036]	0.099*** [0.035]	0.079*** [0.023]	0.074*** [0.023]
Tenure	-0.008 [0.013]	-0.007 [0.014]	-0.009 [0.012]	-0.015 [0.013]
Deputy CEO previously	-0.039 [0.147]	-0.017 [0.146]	-0.102 [0.123]	-0.096 [0.125]
Government cadre previously	-0.019 [0.238]	0.016 [0.260]	0.022 [0.293]	-0.031 [0.272]

Communist party member	-0.135 [0.136]	-0.109 [0.140]	0.110 [0.105]	0.126 [0.108]
Regional characteristics				
Logarithm of city GDP per capita	0.225* [0.124]	0.309** [0.154]	0.156 [0.095]	0.130 [0.103]
Area dummy	Yes	Yes	Yes	Yes
Industrial characteristics				
Industry dummy	Yes	Yes	Yes	Yes
Constant	4.045*** [0.859]	3.220*** [0.834]	3.247*** [0.794]	2.004** [0.870]
Observations	509	509	512	512
R-squared	0.3167		0.2941	
F-test	11.980		8.247	

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. The instruments used in Columns 2 and 4 are property rights protection at the industry-city level and contract enforcement at the industry-city level. Columns 2 and 4 only report the second stage results of GMM estimation, and the first stages results and the associated econometric tests are reported in Appendix A.5.

Appendix A.1 : First stages for Table 6

	1	2	3	4	5	6
Panel A, first stage: Dependent variable is property rights protection						
Property rights protection at the industry-city level	0.972*** [0.125]	0.981*** [0.125]	0.985*** [0.125]	0.964*** [0.127]	0.998*** [0.132]	0.989*** [0.134]
Contract enforcement at the industry-city level	-0.035 [0.110]	-0.034 [0.115]	-0.024 [0.108]	-0.012 [0.110]	-0.036 [0.112]	-0.033 [0.122]
Local protectionism at the industry-city level	0.070 [0.118]					0.061 [0.125]
Access to bank loans at the industry-city level		0.017 [0.082]				0.001 [0.090]
Tax burdens at the industry-city level			0.367 [0.354]			0.330 [0.375]
Infrastructure quality at the industry-city level				-0.475 [0.792]		-0.280 [0.833]
Regulation of entry at the industry-city level					-0.002 [0.003]	-0.002 [0.003]
Firm characteristics						
Firm size	0.007 [0.009]	0.007 [0.009]	0.007 [0.009]	0.007 [0.009]	0.007 [0.009]	0.007 [0.009]
Firm age	0.003 [0.015]	0.003 [0.015]	0.001 [0.015]	0.003 [0.015]	0.004 [0.015]	0.002 [0.015]
Percentage of private ownership	0.135 [0.149]	0.133 [0.149]	0.134 [0.148]	0.132 [0.148]	0.136 [0.149]	0.135 [0.149]

CEO characteristics						
Education	0.002	0.002	0.002	0.003	0.003	0.003
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Tenure	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Deputy CEO previously	-0.029	-0.029	-0.029	-0.030	-0.030	-0.030
	[0.023]	[0.023]	[0.023]	[0.023]	[0.023]	[0.023]
Government cadre previously	-0.038	-0.036	-0.038	-0.037	-0.050	-0.053
	[0.052]	[0.052]	[0.051]	[0.052]	[0.052]	[0.053]
Communist party member	-0.013	-0.012	-0.012	-0.013	-0.012	-0.013
	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]	[0.020]
Regional characteristics						
City dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industrial characteristics						
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.187	-0.182	-0.201	-0.182	-0.176	-0.185
	[0.195]	[0.197]	[0.195]	[0.194]	[0.196]	[0.198]
Panel B, first stage: Dependent variable is contract enforcement						
Property rights protection at the industry-city level	-0.134	-0.133	-0.124	-0.137	-0.120	-0.137
	[0.155]	[0.156]	[0.155]	[0.160]	[0.165]	[0.169]
Contract enforcement at the industry-city level	0.974***	0.998***	0.984***	0.993***	0.975***	0.989***
	[0.141]	[0.144]	[0.140]	[0.138]	[0.145]	[0.149]
Local protectionism at the industry-city level	0.080					0.094
	[0.147]					[0.155]
Access to bank loans at the industry-city level		-0.038				-0.065

Tax burdens at the industry-city level		[0.104]				[0.113]
			0.162			0.158
			[0.505]			[0.529]
Infrastructure quality at the industry-city level				-0.338		-0.165
				[1.004]		[1.067]
Regulation of entry at the industry-city level					-0.001	-0.001
					[0.003]	[0.003]
Firm characteristics						
Firm size	0.030***	0.030***	0.030***	0.030***	0.030***	0.031***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Firm age	-0.054***	-0.054***	-0.055***	-0.054***	-0.054***	-0.055***
	[0.018]	[0.018]	[0.019]	[0.018]	[0.018]	[0.019]
Percentage of private ownership	0.118	0.120	0.117	0.115	0.119	0.122
	[0.217]	[0.216]	[0.216]	[0.216]	[0.217]	[0.219]
CEO characteristics						
Education	-0.001	-0.000	-0.000	-0.000	0.000	0.000
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Tenure	0.004	0.004	0.004	0.004	0.004	0.004
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Deputy CEO previously	-0.010	-0.010	-0.010	-0.010	-0.011	-0.010
	[0.028]	[0.028]	[0.028]	[0.028]	[0.029]	[0.029]
Government cadre previously	-0.076	-0.074	-0.074	-0.074	-0.077	-0.081
	[0.064]	[0.064]	[0.064]	[0.064]	[0.065]	[0.066]
Communist party member	-0.007	-0.006	-0.007	-0.007	-0.007	-0.008
	[0.025]	[0.025]	[0.025]	[0.025]	[0.025]	[0.026]
Regional characteristics						

City dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industrial characteristics						
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.076 [0.273]	-0.087 [0.273]	-0.083 [0.273]	-0.073 [0.274]	-0.072 [0.274]	-0.091 [0.278]
Observations	1034	1034	1034	1034	1028	1028

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.2: First stages for Table 7

	1	2
Panel A, first stage: Dependent variable is property rights protection		
Logarithm of city population in 1918–1919	0.043*** [0.013]	0.047*** [0.014]
Common law origin	-0.037 [0.023]	-0.008 [0.025]
Local protectionism at the industry–city level		-0.223** [0.109]
Access to bank loans at the industry–city level		-0.116 [0.076]
Tax burdens at the industry–city level		-0.250 [0.359]
Infrastructure quality at the industry–city level		-1.717** [0.751]
Regulation of entry at the industry–city level		-0.004 [0.002]
Firm characteristics		
Firm size	0.013 [0.009]	0.013 [0.009]
Firm age	-0.005 [0.016]	0.001 [0.016]
Percentage of private ownership	0.063 [0.150]	0.075 [0.145]
CEO characteristics		
Education	0.003 [0.005]	0.004 [0.005]
Tenure	0.000 [0.002]	0.001 [0.002]
Deputy CEO previously	-0.043* [0.026]	-0.043* [0.026]
Government cadre previously	-0.043 [0.057]	-0.053 [0.058]
Communist party member	-0.024 [0.022]	-0.022 [0.022]
Regional characteristics		
Logarithm of city GDP per capita	0.054* [0.031]	0.036 [0.034]
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	-0.388* [0.218]	-0.283 [0.231]

Panel B, first stage: Dependent variable is contract enforcement

Logarithm of city population in 1918–1919	0.001 [0.015]	-0.008 [0.017]
Common law origin	0.101*** [0.029]	0.129*** [0.032]
Local protectionism at the industry–city level		0.182 [0.148]
Access to bank loans at the industry–city level		0.021 [0.097]
Tax burdens at the industry–city level		-0.391 [0.512]
Infrastructure quality at the industry–city level		-2.244** [0.963]
Regulation of entry at the industry–city level		-0.001 [0.003]
Firm characteristics		
Firm size	0.029** [0.012]	0.030** [0.012]
Firm age	-0.049** [0.020]	-0.051** [0.021]
Percentage of private ownership	0.111 [0.207]	0.119 [0.209]
CEO characteristics		
Education	0.003 [0.005]	0.002 [0.006]
Tenure	0.002 [0.003]	0.004 [0.003]
Deputy CEO previously	-0.017 [0.032]	-0.016 [0.032]
Government cadre previously	-0.029 [0.071]	-0.035 [0.072]
Communist party member	-0.003 [0.027]	-0.016 [0.027]
Regional characteristics		
Logarithm of city GDP per capita	-0.062* [0.035]	-0.082** [0.038]
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	0.399 [0.275]	0.541* [0.293]
Observations	960	954

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.3: First stages for Table 8

	1	2
	Column 2 of Table 8	Column 4 of Table 8
Panel A, first stage: Dependent variable is property rights protection		
Property rights protection at the industry-city level	0.923*** [0.147]	0.923*** [0.147]
Contract enforcement at the industry-city level	0.019 [0.120]	0.019 [0.120]
Firm characteristics		
Firm size	0.009 [0.009]	0.009 [0.009]
Firm age	0.001 [0.017]	0.001 [0.017]
Percentage of private ownership	0.194 [0.156]	0.194 [0.156]
CEO characteristics		
Education	0.001 [0.005]	0.001 [0.005]
Tenure	-0.002 [0.002]	-0.002 [0.002]
Deputy CEO previously	-0.030 [0.024]	-0.030 [0.024]
Government cadre previously	-0.014 [0.060]	-0.014 [0.060]
Communist party member	-0.012 [0.022]	-0.012 [0.022]
Regional characteristics		
City dummy	Yes	Yes
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	-0.218 [0.211]	-0.218 [0.211]
Panel B, first stage: Dependent variable is contract enforcement		
Property rights protection at the industry-city level	-0.034 [0.174]	-0.034 [0.174]
Contract enforcement at the industry-city level	0.969*** [0.152]	0.969*** [0.152]
Firm characteristics		
Firm size	0.031*** [0.012]	0.031*** [0.012]
Firm age	-0.054*** [0.019]	-0.054*** [0.019]

Percentage of private ownership	0.194 [0.225]	0.194 [0.225]
CEO characteristics		
Education	-0.002 [0.005]	-0.002 [0.005]
Tenure	0.003 [0.003]	0.003 [0.003]
Deputy CEO previously	-0.019 [0.030]	-0.019 [0.030]
Government cadre previously	-0.056 [0.076]	-0.056 [0.076]
Communist party member	-0.001 [0.026]	-0.001 [0.026]
Regional characteristics		
City dummy	Yes	Yes
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	-0.199 [0.290]	-0.199 [0.290]
Panel C: Various econometric tests		
Shea partial R-squared for Panel A	0.0451	0.0451
Shea partial R-squared for Panel B	0.0416	0.0416
Anderson canonical correlation LR statistic	[36.68]***	[36.68]***
Cragg-Donald F statistic	21.07	21.07
Observations	918	918

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.4: First stages for Table 9

	1	2
	Column 2 of Table 9	Column 4 of Table 9
Panel A, first stage: Dependent variable is property rights protection		
Property rights protection at the industry-city level	1.091*** [0.166]	0.970*** [0.118]
Contract enforcement at the industry-city level	-0.162 [0.129]	0.017 [0.126]
Firm characteristics		
Firm size	0.004 [0.012]	0.007 [0.013]
Firm age	-0.002 [0.019]	0.012 [0.024]
Percentage of private ownership	0.430** [0.174]	-0.137 [0.213]
CEO characteristics		
Education	0.002 [0.006]	0.002 [0.006]
Tenure	-0.003 [0.003]	0.003 [0.004]
Deputy CEO previously	-0.035 [0.033]	-0.024 [0.032]
Government cadre previously	-0.032 [0.054]	-0.042 [0.109]
Communist party member	-0.016 [0.029]	-0.013 [0.029]
Regional characteristics		
Logarithm of city GDP per capita	-0.062 [0.118]	-0.015 [0.028]
Area dummy	Yes	Yes
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	-0.331 [0.241]	0.175 [0.253]
Panel B, first stage: Dependent variable is contract enforcement		
Property rights protection at the industry-city level	-0.136 [0.204]	-0.034 [0.174]
Contract enforcement at the industry-city level	0.925*** [0.160]	0.969*** [0.152]
Firm characteristics		
Firm size	0.046*** [0.015]	0.012 [0.016]

Firm age	-0.040 [0.024]	-0.069** [0.027]
Percentage of private ownership	0.415 [0.276]	-0.141 [0.302]
CEO characteristics		
Education	-0.005 [0.007]	0.005 [0.007]
Tenure	0.003 [0.004]	0.004 [0.004]
Deputy CEO previously	-0.015 [0.043]	-0.017 [0.038]
Government cadre previously	-0.052 [0.081]	-0.104 [0.100]
Communist party member	-0.035 [0.038]	0.023 [0.034]
Regional characteristics		
Logarithm of city GDP per capita	-0.047 [0.155]	-0.006 [0.035]
Area dummy	Yes	Yes
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	-0.352 [0.352]	0.251 [0.361]
Panel C: Various econometric tests		
Shea partial R-squared for Panel A	0.0784	0.1155
Shea partial R-squared for Panel B	0.0579	0.0643
Anderson canonical correlation LR statistic	[27.77]***	[29.55]***
Cragg-Donald F statistic	15.62	18.86
Observations	511	523

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A.5: First stages for Table 10

	1	2
	Column 2 of Table 10	Column 4 of Table 10
Panel A, first stage: Dependent variable is property rights protection		
Property rights protection at the industry-city level	1.065*** [0.132]	0.937*** [0.130]
Contract enforcement at the industry-city level	-0.115 [0.108]	-0.032 [0.113]
Firm characteristics		
Firm size	-0.004 [0.013]	0.018 [0.012]
Firm age	0.015 [0.019]	-0.003 [0.029]
Percentage of private ownership	0.065 [0.173]	0.149 [0.324]
CEO characteristics		
Education	0.005 [0.006]	0.002 [0.006]
Tenure	-0.001 [0.003]	-0.000 [0.003]
Deputy CEO previously	-0.036 [0.031]	-0.016 [0.035]
Government cadre previously	-0.082 [0.078]	-0.016 [0.068]
Communist party member	-0.021 [0.031]	-0.011 [0.027]
Regional characteristics		
Logarithm of city GDP per capita	-0.014 [0.032]	0.009 [0.033]
Area dummy	Yes	Yes
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	-0.121 [0.198]	-0.198 [0.360]
Panel B, first stage: Dependent variable is contract enforcement		
Property rights protection at the industry-city level	-0.104 [0.179]	0.052 [0.169]
Contract enforcement at the industry-city level	0.979*** [0.125]	0.949*** [0.134]
Firm characteristics		
Firm size	0.035** [0.016]	0.015 [0.016]

Firm age	-0.052**	-0.038
	[0.024]	[0.035]
Percentage of private ownership	0.097	0.010
	[0.248]	[0.386]
CEO characteristics		
Education	-0.007	0.004
	[0.007]	[0.007]
Tenure	0.001	0.005
	[0.004]	[0.004]
Deputy CEO previously	-0.007	-0.003
	[0.038]	[0.043]
Government cadre previously	-0.156	0.030
	[0.123]	[0.063]
Communist party member	0.015	-0.023
	[0.039]	[0.034]
Regional characteristics		
Logarithm of city GDP per capita	0.037	-0.035
	[0.037]	[0.039]
Area dummy	Yes	Yes
Industrial characteristics		
Industry dummy	Yes	Yes
Constant	0.054	-0.087
	[0.287]	[0.450]
Panel C: Various econometric tests		
Shea partial R-squared for Panel A	0.1154	0.0910
Shea partial R-squared for Panel B	0.1037	0.0935
Anderson canonical correlation LR statistic	[51.44]***	[30.08]***
Cragg-Donald F statistic	34.71	18.91
Observations	509	512

Note: White-robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.