

Do institutions not matter in China? Evidence from enterprise-level productivity growth

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May 2008

Abstract

This study addresses the apparent puzzle that China achieved sustained and rapid economic growth despite weak institutions. From a World Bank survey of 1,616 manufacturing enterprises in 18 cities, we extracted two measures of institutional quality: property rights protection (share of government officials oriented toward helping rather than hindering business), and contract enforcement (likelihood that the legal system would uphold contract and property rights in business disputes). We found that enterprises that were more reliant on the external environment grew faster in regions with better institutions. To address concerns of endogeneity, we used the population in the respective city around 1918-19 as an instrument for property rights, and an indicator of whether the city was British administered in the late Qing Dynasty as an instrument for contract enforcement. Our results were more pronounced for private enterprises and in poorer cities.

Key Words: Institutions, Property Rights, Contract Enforcement, Productivity, China

JEL Codes: O43 P48 D21 L25 O12

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1. Introduction

Numerous cross-country and within-country studies have shown that institutions are fundamental to economic growth (Besley 1995; Knack and Keefer 1995, 1997; Mauro 1995; Hall and Jones 1999; La Porta et al. 1999; and Acemoglu, Johnson, and Robinson 2001, 2002). Indeed, the World Bank and International Monetary Fund have stressed the importance of sound institutions in the growth of developing economies (Carothers 2006; *Economist*, March 15, 2008)

However, the record of the Chinese economy over the past thirty years seems to contradict the scholarly finding that institutions are essential to economic growth. Until recently, China provided little formal protection of private property, and, moreover, its legal system was far from independent (Blanchard and Kremer 1997; Rodrik 2004a and 2004b; Allen, Qian, and Qian 2005; *Economist*, March 15, 2008). Nevertheless, the growth of the Chinese economy has been nothing less than spectacular.

Did institutions not matter for the growth of the Chinese economy? One possible explanation is that institutional quality varied widely across China (Du, Lu, and Tao, 2007 and 2008), and that China's growth was concentrated in the coastal regions, where institutions are reasonably good. Another possible explanation is that the importance of institutions varied across industries and that China's growth was concentrated among industries for which institutions are less important. These two explanations might possibly explain the apparent contradiction between the poor state of China's institutions and the country's rapid growth rate at the macro level.

To investigate if there is really a China puzzle (*i.e.*, the unimportance of institutions for economic growth), we studied the issue at the microeconomic level and applied the approach of Rajan and Zingales (1998) and Rajan and Subramanian (2007). Focusing on the variation of labor productivity growth among enterprises *within* China, we examined whether productivity growth was relatively higher among enterprises that were more reliant on the external environment in cities with better institutional quality.

First, using a simple analytical model, we showed that, if institutional quality is higher, the growth rate of productivity would be higher among enterprises that are more reliant on the external environment.

Then, we drew on the *Survey of Chinese Firms*, conducted by the World Bank with the Enterprise Survey Organization of China in early 2003.¹ The data set covered 1,616 manufacturing enterprises in 18 cities from 5 different regions of China. The dependent variable for our study was the growth of labor productivity, measured by the change of the logarithm of output per worker of an enterprise.

Following the literature (*e.g.*, North 1991; Johnson, McMillan, and Woodruff, 2002; Acemoglu and Johnson, 2005), we focused on two dimensions of institutional quality. As a measure of the quality of government or *property rights protection*, we used the perceived share of government officials oriented toward helping rather than hindering business (*Helping Hand*). As a measure of the effectiveness of *contract enforcement*, we used the perceived likelihood that the legal system would uphold contract and property rights in business disputes (*Legal System*). To measure reliance on the external environment, we used the number of outside suppliers.

Indeed, we found that enterprises which were more reliant on the external environment grew faster where economic institutions were perceived to be better. This result was robust to controls for enterprise and CEO characteristics, industry dummies, and city dummies. It was also robust to estimation by median regressions, which are less influenced by outliers.

To address concerns that the measures of economic institutions might be endogenous, we repeated the estimates using instrumental variables and found the same results.

Motivated by the literature on economic institutions (*e.g.*, Acemoglu, Johnson, and Robinson 2001, 2002; La Porta et al. 1997 and 1998), we used the population in the respective city around 1918-19 as an instrumental variable for property rights protection, and an indicator of whether the city was British administered in the late Qing Dynasty as an instrument for contract enforcement.

Finally, we investigated and found that the impact of institutional quality was more pronounced for private vis-à-vis state-owned enterprises and in poorer relative to richer cities.

¹ The data set has recently been used by Cull and Xu (2005), Ayyagari, Demirgüç-Kunt, and Maksimovic (2004), and Lu (2007), among others.

The remainder of the paper is structured as follows. Section 2 presents a simple analytical model to elucidate the impact of institutional quality on growth of productivity at the enterprise level. Section 3 introduces the data and variables for the empirical study, while Section 4 presents the main results. The paper concludes with Section 5.

2. Model

Consider a profit-maximizing enterprise that produces some item for sale at an exogenous market price which is normalized to 1. Production requires only labor, which is supplied at an exogenous wage, w . Production depends on the quality of local institutions, represented by $\lambda \geq 0$, with a higher value representing better institutions. Production also varies with the reliance of the enterprise on the external environment, represented by $\mathcal{G} \geq 0$, with a higher value representing greater reliance. The reliance of the enterprise on the external environment might vary with use of external distributors and suppliers, internal organization, management style and practices, and production technology.

For simplicity, we suppose that, at time t , the *effective output* is $s(\lambda, \mathcal{G}_t)Q(L_t)$, where

$$Q(L_t) = L_t^\alpha, \quad (1)$$

L_t represents the labor input, $\alpha \in (0,1)$, and the rate of successful production, $s(\lambda, \mathcal{G}_t) \in [0,1]$, is increasing and concave in λ , but decreasing and convex in \mathcal{G}_t , and conditional on λ , $s(\lambda, \mathcal{G}_t)$ is decreasing and convex in \mathcal{G}_t . Specifically,

$$\frac{\partial s}{\partial \lambda} > 0, \frac{\partial s}{\partial \mathcal{G}_t} < 0, \frac{\partial^2 s}{\partial \lambda^2} < 0, \frac{\partial^2 s}{\partial \mathcal{G}_t^2} < 0, \frac{\partial^2 s}{\partial \mathcal{G}_t \partial \lambda} < 0, \frac{\partial^3 s}{\partial \mathcal{G}_t^2 \partial \lambda} < 0. \quad (2)$$

Our key substantive assumption is that \mathcal{G}_t grows exogenously over time.²

$$\frac{d\mathcal{G}_t}{dt} > 0. \quad (3)$$

At time t , given the price of its product, institutional quality, and reliance on the external environment, the enterprise chooses the quantity of labor to maximize profit,

$$\pi_t = s(\lambda, \mathcal{G}_t)L_t^\alpha - wL_t. \quad (4)$$

² The assumption is similar to the exogenous growth of technology in the Solow growth model. Intuitively, as time goes by, both communication and transportation costs decrease, so, increasing more reliance on the external environment.

Using the first-order condition, the profit-maximizing quantity of labor is

$$L_t^* = \left(\frac{s(\lambda, \mathcal{G}_t)\alpha}{w} \right)^{\frac{1}{1-\alpha}}. \quad (5)$$

The issue that we would like to address is the impact of institutional quality on the growth of productivity. Intuitively, the impact of institutional quality should vary with the reliance of the enterprise on the external environment. We framed the empirics in terms of logarithms. Accordingly, the measure of the impact of institutional quality on the growth of productivity, as moderated by reliance on the external environment, was

$$\frac{\partial^2}{\partial \mathcal{G}_t \partial \lambda} \left[\frac{\partial}{\partial t} \ln \left(\frac{Q(L_t^*)}{L_t^*} \right) \right]. \quad (5)$$

In the following proposition, we show that, if institutional quality is higher, then the growth rate of productivity would be higher among enterprises that are more reliant on the external environment.

Proposition. *If institutional quality is higher, the growth rate of productivity is higher among enterprises that are more reliant on the external environment, i.e.,*

$$\frac{\partial^2}{\partial \mathcal{G}_t \partial \lambda} \left[\frac{\partial}{\partial t} \ln \left(\frac{Q(L_t^*)}{L_t^*} \right) \right] > 0. \quad (6)$$

Proof. From (1) and (5),

$$\frac{Q(L_t^*)}{L_t^*} = \frac{(L_t^*)^\alpha}{L_t^*} = \left(\frac{s(\lambda, \mathcal{G}_t)\alpha}{w} \right)^{-1} = \frac{w}{s(\lambda, \mathcal{G}_t)\alpha},$$

hence,

$$\ln \left(\frac{Q(L_t^*)}{L_t^*} \right) = \ln w - \ln s(\lambda, \mathcal{G}_t) - \ln \alpha.$$

Differentiating with respect to t , we have

$$\frac{\partial}{\partial t} \ln \left(\frac{Q(L_t^*)}{L_t^*} \right) = - \frac{1}{s(\lambda, \mathcal{G}_t)} \frac{\partial s(\lambda, \mathcal{G}_t)}{\partial \mathcal{G}_t} \frac{d\mathcal{G}_t}{dt}.$$

Differentiating further with respect to λ , and \mathcal{G}_t , and simplifying, we have

$$\frac{\partial^2}{\partial \mathcal{G}_t \partial \lambda} \left[\frac{\partial}{\partial t} \ln \left(\frac{Q(L_t^*)}{L_t^*} \right) \right] = \frac{1}{s(\lambda, \mathcal{G}_t)^2} \frac{\partial^2 s(\lambda, \mathcal{G}_t)}{\partial \mathcal{G}_t \partial \lambda} \frac{\partial s(\lambda, \mathcal{G}_t)}{\partial \mathcal{G}_t} \frac{d\mathcal{G}_t}{dt} - \frac{1}{s(\lambda, \mathcal{G}_t)} \frac{\partial^3 s(\lambda, \mathcal{G}_t)}{\partial \mathcal{G}_t^2 \partial \lambda} \frac{d\mathcal{G}_t}{dt}.$$

The result follows from (2) and (3). []

3. Data and Variables

Our empirical analysis drew on data from the *Survey of Chinese Firms*, conducted by the World Bank in cooperation with the Enterprise Survey Organization of China in early 2003. For balanced representation, the survey covered 18 cities from 5 regions of China: Northeast – Benxi, Changchun, Dalian, and Haerbin; Coastal region – Hangzhou, Jiangmen, Shenzhen, and Wenzhou; Central China – Changsha, Nanchang, Wuhan, and Zhengzhou; Southwest – Chongqing, Guiyang, Kunming, and Nanning; and Northwest – Lanzhou and Xi’an.

In each city, 100 or 150 enterprises were randomly sampled from 9 manufacturing industries (garment and leather products, electronic equipment, electronic parts making, household electronics, auto and auto parts, food processing, chemical products and medicine, biotech products and Chinese medicine, and metallurgical products), and 5 service industries (transportation service, information technology, accounting and non-banking financial services, advertisement and marketing, and business services). The total number of enterprises surveyed was 2,400.

The *Survey* comprised two parts. One was a general questionnaire directed at the senior management seeking information about the enterprise, innovation, product certification, marketing, relations with suppliers and customers, access to markets and technology, relations with 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 labor and training.

We focused on the manufacturing industries, as enterprises of these industries generally have more complicated supply chains than those of the service industries and furthermore their labor productivity is easier to measure and interpret. The *Survey* covered 1,616 manufacturing enterprises. We measured productivity growth as the growth of the logarithm of output per worker between 2001 and 2002. There was substantial variation in this measure. Table 1 reports summary statistics of the data, while Table 2 reports

bivariate correlations.³ Referring to Table 1, the mean value of the growth of labor productivity was 0.028 (± 0.739).

Following North (1991), Johnson, McMillan, and Woodruff (2002), and Acemoglu and Johnson (2005), we operationalized the quality of institutions, λ , in two ways. One focused on the state of institutions to protect enterprises from expropriation by government agencies and related parties. The senior management questionnaire included question H7, “Among the government officials that your enterprise regularly interacts with, what is the share that is oriented toward helping rather than hindering enterprises?” Accordingly, we constructed the measure, *Helping Hand*, with responses varying from 0% to 100%. The mean value was 35.5% ($\pm 32\%$).

The other operationalization of the quality of institutions, λ , focused on enforcement of private contractual arrangements. The senior management questionnaire included question H5, “What’s the likelihood that the legal system will uphold my contract and property rights in business disputes?” Accordingly, we constructed the measure, *Legal System*, with responses varying from 0% to 100%. The mean value was 63.4% ($\pm 38.9\%$).

As a preliminary, we verified that these measures of institutional quality were indeed grounded in geographical differences. Table 3 reports regressions of *Helping Hand* and *Legal System* on industry and city dummies. Evidently, there was substantial and statistically significant variation in institutional quality across China’s cities. Apparently, however, there was no significant variation in institutional quality across industries.

We operationalized reliance on the external environment, \mathcal{R} , in two ways. One was the number of suppliers, while the other was the number of distributors. An enterprise with more suppliers or distributors would have a more complex production system and supply/distribution chain, hence would be more reliant on the external environment. As suggested (Blanchard and Kremer (1997), page 1116; Rajan and Subramanian (2007) page 323), we used enterprise-level data to measure the reliance on external environment.⁴

³ We introduce two variables – logarithm of population in 1918-19 and indicator of whether the city was British administered in the late Qing Dynasty – in the next section. We used these two variables as instruments for property rights protection and contract enforcement respectively.

⁴ By contrast, owing to data limitations, Blanchard and Kremer (1997) and Rajan and Subramanian (2007) used industry-level measures of reliance.

Our results were quite similar with both measures of reliance on the external environment -- suppliers and distributors. For brevity, we focus our discussion on the results using the number of suppliers. This measure showed substantial variation, with a mean value of 42 (± 199).

In the empirical analysis, we also controlled for other factors that might possibly affect the growth of labor productivity, including enterprise characteristics, CEO characteristics, industry, and city. The enterprise characteristics included *Percentage of Private Ownership* (measured by the share of equity owned by parties other than government agencies in 2002), *Enterprise Size* (measured by the logarithm of employment in 2002), *Enterprise Age* (measured by the logarithm of years of establishment by the end of 2002), and *Bank Loan* (a dummy variable indicating whether the enterprise had outstanding bank loans at the end of 2002). The CEO characteristics were similar to those used by Cull and Xu (2005): *Education* (years of schooling), *Tenure* (years as CEO), *Deputy CEO Before* (dummy variable indicating whether the CEO had been the deputy CEO before becoming CEO), and *Government Cadre* (dummy variable indicating whether the CEO had previously been a government official). Finally, we included dummy variables for industry and city to account for possible differences in the growth of labor productivity across industries and cities.

4. Empirical Analysis

To investigate the impact of institutional quality on the growth of labor productivity, as moderated by the reliance of the enterprise on the external environment, we used the following basic empirical specification:

$$y_{eic} = \alpha + \beta R_{eic} + \eta S_{eic} + \mu R_{eic} S_{eic} + X'_{eic} \gamma + \varepsilon_{eic}, \quad (8)$$

where y_{eic} is the growth of the logarithm of output per worker in enterprise, e , belonging to industry, i , and located in city, c ; R_{eic} measures institutional quality as reported at the enterprise level (*Helping Hand* or *Legal System*); S_{eic} measures reliance on the external environment at the enterprise level (*Supplier*); X_{eic} is a vector of controls (enterprise characteristics, CEO characteristics, industry dummies, and city dummies); and ε_{eic} is an independently and identically distributed error with a normal distribution and mean zero, and which is uncorrelated with the explanatory variables.

We first estimated the basic specification using ordinary least squares (OLS). Table 4 reports estimates of the impact of the quality of institutions relating to property rights (*Helping Hand*). Referring to Table 4, column (i), productivity growth was positively associated with institutional quality. Importantly for our hypothesis, the impact of institutional quality was significant and increasing with reliance on the external environment as proxied by the number of outside suppliers.⁵

In the last row of Table 4, we report the economic impact of institutional quality. The impact of a one standard deviation improvement in property rights (*Helping Hand*) on the growth of the logarithm of labor productivity at the mean number of suppliers was $0.146 \times 0.320 = 0.047$. This was economically significant compared with the mean of the growth of the logarithm of labor productivity, which was $0.028 (\pm 0.739)$.

As reported in Table 4, columns (ii)-(v), these results were robust to inclusion of industry dummies, city dummies, and enterprise and CEO characteristics.

Table 5 reports estimates of the impact of the quality of institutions relating to enforcement of contract (*Legal System*). Referring to Table 5, column (i), productivity growth was positively associated with institutional quality. Importantly for our hypothesis, the impact of institutional quality was significant and increasing with reliance on the external environment as proxied by the number of outside suppliers.

In the last row of Table 5, we report the economic impact of institutional quality. The impact of a one standard deviation improvement in contract enforcement (*Legal System*) on the growth of the logarithm of labor productivity at the mean number of suppliers was $0.138 \times 0.389 = 0.054$. This was economically significant compared with the mean of the growth of the logarithm of labor productivity, which was $0.028 (\pm 0.739)$.

As reported in Table 5, columns (ii)-(v), these results were robust to the inclusion of industry dummies, city dummies, and enterprise and CEO characteristics.

⁵ In all regressions, in the interaction between the number of suppliers and the measure of institutional quality (whether *Helping Hand* or *Legal System*), the number of suppliers was specified as its difference from the sample mean (Wooldridge (2006) pp. 204-05). Hence, the coefficient of the measure of institutional quality represents the partial effect of the measure of institutional quality on the growth of the logarithm of output per worker at the mean number of suppliers.

To further check the robustness of these results, we considered various factors that might have possibly biased the estimated impact of institutional quality on the growth of labor productivity.

We first checked whether the results were sensitive to outlier observations. Table 6 reports the results of median regressions of the basic specification. Generally, the effect of institutional quality by itself was insignificant. The effect of institutional quality (*Helping Hand* or *Legal System*) interacted with reliance on the external environment (*Suppliers*) was diminished. However, importantly for our hypothesis, the interaction was still positive and significant.

Next, we checked whether our measure of reliance on the external environment – the number of suppliers (*Suppliers*) – might be subject to selection bias in any way. For example, enterprises that expect faster growth of labor productivity might choose to engage more suppliers. If so, the OLS estimates of the impact of institutional quality on growth of labor productivity, as moderated by the number of suppliers, would be biased upward.

To check for such selection bias, we regressed the number of suppliers on the growth of labor productivity. Table 7 reports the results. The number of suppliers was not related to the growth of labor productivity in a wide range of specifications, whether enterprise and CEO characteristics and industry and city dummies were or were not included.

Second, we ran a series of regressions at the enterprise level as in Tables 4 and 5, but using the mean number of suppliers across all enterprises in the industry level as the measure of reliance on the external environment for each enterprise in the industry. In the various estimates (not reported here but available upon request), the interaction between reliance on the external environment and the quality of institutions still had a positive coefficient, though not precisely estimated. The low precision could be due to the heterogeneity in dependence on external suppliers across enterprises in the same industry.

A more serious concern was that the measures of institutional quality – *Helping Hand* and *Legal System* – might be endogenous. We possibly omitted other important influences on the growth of labor productivity that were correlated with institutional quality or the causation was in the reverse direction. For example, in a region which, by geography, is more open, the government could be limited from expropriating enterprises and the legal system may also be more independent. Owing to the same geographic advantages, enterprises in this region may also enjoy faster productivity growth. Our

inclusion of city dummies would account for such effects to the extent that they arise by city. Another way would be to measure the impact of changes in institutional quality within enterprises. Unfortunately, this was not feasible as the data was a cross-section in a single year with no time variation. Moreover, it is unlikely that perceived institutional quality would vary much at the enterprise level within a short period of time.

Yet another way to account for endogenous or omitted variables is to use instrumental variables. Motivated by the economic literature on institutions (Acemoglu, Johnson, and Robinson 2001, 2002; La Porta et al. 1997 and 1998), we looked back into Chinese history for suitable instruments.

As an instrument for our measure of property rights (*Helping Hand*), we used the logarithm of population in the respective city around 1918-19. The source of data on city populations was a study conducted by the China Continuation Committee, an organization of Protestant churches and missions (Special Committee on Survey and Occupation of China Continuation Committee, 1987). The Committee based its estimates on various sources, including reports by police commissioners and local missions, the 1910 census by the Ministry of the Interior, and a 1919-20 census by the Post Office. Given the fragmentary state of information on China's population (Chen 1947; Ho 1959), we believe that the study by the China Continuation Committee is a reasonable source for information on the population of Chinese cities at the time.

During the late Qing Dynasty (1840-1911), China was defeated in a series of wars against foreign colonial powers, including two Opium wars with Britain, the Sino-Japanese War of 1894-95, and the Boxer Rebellion. In the wake of military defeats, the Qing government was forced to sign unequal treaties, conceding huge amounts of reparations as well as territorial and other concessions. For example, following the Boxer Rebellion, the military forces of eight colonial powers attacked Beijing. The Qing government capitulated and signed the Peace Treaty of 1901, which stipulated reparations of 450 million taels of silver (Fan, 1955).

The total amount of reparations over 1840-1911 amounted to about 30 times the annual treasury income in 1840 or around 15 times the annual treasury income in 1890 (Li et. al., 1982). In order to finance the war reparations, the Qing government was compelled to impose levies and taxes on its population, while delegating responsibility for collection to regional governors. Given the right to collect revenues, however, the regional governors

seized the opportunity to determine the size of levies and taxes, leading to variations in taxation across China's regions.

In 1911, the Qing Dynasty was overthrown and a republican government was established in Nanjing. The new government enacted statutes providing for the protection of private property (Dong, Zhang, and Jiao 2000). However, the republican government failed to secure national unity. Following the death of President Yuan Shih Kai in 1916, China split into north and south, with each part further divided into various regions.

The regional authorities were called "warlords" as they maintained their own armies and fought against rivals and one another. The regional wars caused widespread depredation of agricultural and other land. The warlords further increased taxes and levies to finance their expenditures. For instance, in some regions, after 1911, land taxes increased by over 50% (Li et al., 1982). The incessant fighting and the increasing burden of taxes and levies prompted internal migration of people away from war-ridden regions. This led to the concentration of population and wealth in areas that offered better security of person and property (Wu, 1955).⁶

Accordingly, the population of a city in 1918-19 could reasonably reflect the state of property rights at that time, with a larger population indicating better protection of property rights.⁷ As emphasized by Young (1994), Acemoglu, Johnson and Robinson (2001), and La Porta et al. (2007), while governments and politics might change, the fundamental culture, beliefs, ideologies, and informal institutions in the community do persist over time.⁸ To this extent, the state of property rights can be expected to have

⁶ See Rawski (1989) for the overall economic history of China during the Republican period.

⁷ Superficially, our argument may appear to differ from that of Acemoglu et. al. (2002), who argued that high population density in 1500 was correlated with weak property rights institutions. However, the underlying theory is the same. In Acemoglu et. al. (2002), high population density was a precondition for expropriation. By contrast, we use population to reflect the equilibrium state of property rights.

⁸ "[A]lthough we commonly described the independent polities as "new states", in reality they were successors to the colonial regime, inheriting its structures, its quotidian routines and practices, and its more hidden normative theories of governance" (Young 1994, page 283). Acemoglu, Johnson and Robinson (2001) discussed three mechanisms that would result in institutional persistence: (i) it was costly to set up institutions that restricted government expropriation; (ii) the formation of institutions was influenced by the elites which were quite persistent; (iii) the established institutions would induce some irreversible investments that were complementary to the existing institutions, which made people more willing to support those institutions. La Porta et al. (2007) argued that cultures, religions and ideologies are likely to persist over time despite regime change.

persisted from 1918-19, and hence, the population of each city during that time is a reasonable instrument for our measure of the state of property rights (*Helping Hand*) in the city in 2002.

Figure 1 depicts a scatter plot of *Helping Hand* against the instrument (logarithm of 1918-19 population). Table 2 reinforces the scatter plot: the instrument was correlated with *Helping Hand*, while poorly correlated with the dependent variable, growth of labor productivity.⁹

Table 8 reports the results of the corresponding two-stage least squares (2SLS) regressions. Compared with the OLS regressions (Table 4), the major differences were that the number of suppliers as a separate variable was negative and significant, while the coefficient of the interaction between the number of suppliers and *Helping Hand* was larger and significant.

The number of suppliers was our measure of reliance on the external environment. Apparently, enterprises that were more reliant on the external environment exhibited slower growth of labor productivity. More important, the 2SLS regressions confirmed that the impact of property rights (*Helping Hand*) on growth of labor productivity was significant and increasing with reliance on the external environment as proxied by the number of suppliers. These results were robust to the inclusion of industry dummies, and enterprise and CEO characteristics.¹⁰

According to the 2SLS regressions, a one standard deviation improvement in property rights would raise the growth of the logarithm of labor productivity at the mean number of suppliers by between 0.152 and 0.172.¹¹

Next, as an instrument for our measure of contract enforcement (*Legal System*), we used a dummy variable indicating whether the respective city was administered by Great

⁹ We excluded the cities of Benxi and Shenzhen from the instrumental variables analysis as, being founded in 1915 and 1979 respectively, they were not surveyed by the China Continuation Committee.

¹⁰ Each set of OLS regressions included a variation with city dummies, which would have reflected any impact of contemporaneous differences in population. Accordingly, we could distinguish the effect of the 1918-19 population from contemporaneous population differences. We could not use city dummies in regressions including the 1918-19 population as they were perfectly collinear.

¹¹ We discounted specifications (iii) and (iv) as they included additional explanatory variables which were insignificantly different from zero.

Britain in the late Qing Dynasty. We compiled historical information on control of the various cities from relevant texts on the modern history of China, e.g., Dong, Zhang, and Jiao (2000).

As recounted above, during the late Qing Dynasty (1840-1911), various parts of China were carved out by foreign powers through a series of unequal treaties. The wave of territorial partitioning climaxed at the end of nineteenth century, with Great Britain governing regions along the Yangzi River (Guizhou, Sichuan, Hubei, Hunan, Jiangxi, Anhui, Jiangsu, Henan, and Zhejiang provinces), France governing Yunnan, Hainan, Guangxi, and the majority of Guangdong province, Japan governing Fujian province, Germany governing Shandong province, and Russia governing Xinjiang, Mongolia, and the three north-eastern provinces (Qian, 1948). Shanghai and Tianjin, the two leading commercial hubs of China, were divided into various foreign concessions.

Within their respective domains of control, the foreign powers effectively established sovereign authority. Typically, the foreign power imposed its own civil and military administration, including legal system (Dong, Zhang, and Jiao 2000), police, utilities and transport infrastructure, and education.

The foreign powers imposed their own civil and military administration by force and hence, the administrative systems could be considered as being exogenous to the local community. Contemporary China is a united sovereign nation with a unified legal system. However, regional differences in culture, beliefs, and ideologies do persist. The various regions do differ in the rules and regulations by which national laws are interpreted and implemented. The foreign powers may have intended these persistent differences:

“in our school, we trained the China's future teachers and propagators, making them the leaders and comperes in the future and casting the greatest influences on the future China.”

F.L. Hawks Pott, president of Saint John's University, Shanghai.¹²

La Porta et al. (1997 and 1998) have shown that, at the national level, the origin of the legal system affects the effectiveness of contract enforcement and the development of financial markets. Further, various studies have pointed to a common law system as being more conducive to economic growth (e.g., Levine, 1999; Mahoney, 2001). China

¹² Speaking at the Second Protestantism Propagators Congress, Shanghai, China, 1890 (Yang and Ye 1993).

is rather unusual in that its various regions were subject to differing legal systems. Unique among the various occupying powers, Great Britain followed a common law system.¹³ Accordingly, we considered that whether a city was administered by Britain during the late Qing Dynasty to be a reasonable instrument for our measure of contract enforcement (*Legal System*) in the city in 2002.

Figure 2 depicts a scatter plot of our measure of contract enforcement (*Legal System*) against the instrument (*British administration*). Table 2 reinforces the scatter plot: the instrument was correlated with *Legal System*, while poorly correlated with the dependent variable, growth of labor productivity.

Table 9 reports the results of the corresponding 2SLS regressions. Compared with the OLS regressions (Table 5), the major differences were that the number of suppliers as a separate variable was negative and significant, while the coefficient of the interaction between the number of suppliers and *Legal System* was larger and significant.

The number of suppliers was our measure of reliance on the external environment. Apparently, enterprises that were more reliant on the external environment exhibited slower growth of labor productivity. More importantly, the 2SLS regressions confirmed that the impact of contract enforcement (*Legal System*) on growth of labor productivity was significant and increasing with reliance on the external environment as proxied by the number of suppliers. These results were robust to the inclusion of industry dummies, and enterprise and CEO characteristics.

According to the 2SLS regressions, a one standard deviation improvement in contract enforcement would raise the growth of the logarithm of labor productivity at the mean number of suppliers by between 0.059 and 0.210.¹⁴

Finally, in Table 10, we report OLS regressions on various sub-samples – private vis-a-vis state-owned enterprises (SOEs), and enterprises in rich cities vis-a-vis those in poor cities – to verify that our results were not sensitive to particular ownership structures or stages of overall economic development. We defined an enterprise as “state-owned” if the percentage of state ownership exceeded 50%, and as “private” otherwise. We defined

¹³ The U.S. also followed a common law system. However, the United States did not independently carve out any part of China.

¹⁴ We discounted specification (iv) as it included additional explanatory variables which were insignificantly different from zero.

a city to be “rich” if its GDP per capita exceeded the mean value among cities, and as “poor” otherwise.

We found the impact of institutional quality on labor productivity interacted with the enterprise’s reliance on external environment was only positive and significant in the sub-sample of private enterprises and in the sub-sample of poor cities. These findings are intuitive: private enterprises are more vulnerable to inferior institutional quality than state-owned enterprises, and institutional quality is relatively worse in poorer cities as compared with richer cities. These results add credence to our key conclusion – that institutions matter for growth of labor productivity among enterprises which are relatively more dependent on the external economic environment.

5. Conclusion

It is a widely held perception that China’s spectacular growth in the last thirty years contradicts the prevailing view of the importance of institutions to economic growth (Blanchard and Kremer 1997; Rodrik 2004a and 2004b; Allen, Qian, and Qian 2005; *Economist*, March 15, 2008). Indeed, protection of private properties was not formally written into China’s constitution until 2004, and its court system was not independent. However, China’s growth could have been concentrated in the coastal areas, where institutional quality is reasonably high, and in industries which are relatively less sensitive to institutional quality. Therefore, it is important to study the impacts of institutions on economic growth at a microeconomic level, utilizing the variation of institutional quality across regions and of industry dependence on institutional quality.

Using data from a World Bank survey of 1,616 manufacturing enterprises in 18 Chinese cities, we found that enterprises that were more reliant on external environment grew faster in cities with better institutional quality. This finding was robust to alternative specifications and estimation by instrumental variables. Finally, our results were more pronounced for private enterprises and enterprises in poor cities.

References

- Acemoglu, Daron and Simon Johnson (2005) "Unbundling Institutions", *Journal of Political Economy* 113, 949-995.
- Acemoglu, Daron, Simon Johnson, and James A. Robinson (2001) "The Colonial Origins of Comparative Development: An Empirical Investigation", *American Economic Review* 91, 1369-1401.
- Acemoglu, Daron, Simon Johnson, and James A. Robinson (2002) "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution", *Quarterly Journal of Economics* 117, 1231-1294.
- Allen, Franklin, Jun Qian, and Meijun Qian (2005) "Law, Finance, and Economic Growth in China," *Journal of Financial Economics* 77, 57-116.
- Ayyagari Meghana, Alis Demirgüç-Kunt, and Vojislav Maksimovic (2007) "Formal versus Informal Finance: Evidence from China," working paper.
- Besley, Timothy (1995) "Property Rights and Investment Incentives: Theory and Evidence from Ghana", *Journal of Political Economy* 103, 903-937.
- Blanchard, Olivier and Michael Kremer (1997) "Disorganization," *Quarterly Journal of Economics* 112, 1091-1126.
- Carothers, Thomas (2006) *Promoting the Rule of Law Abroad: In Search of Knowledge*, Washington, DC: Carnegie Endowment for International Peace.
- Chen, Ta (1947) "An Appraisal of China's Historical Population Data", *American Journal of Sociology* 52, Supplement: Population in Modern China, 1-6.
- Cull, Robert, and Lixin Colin Xu (2005) "Institutions, Ownership, and Finance: the Determinant of Profit Reinvestment among Chinese Firms", *Journal of Financial Economics* 77, 117-146.
- Dong, Shouyi, Lizhen Zhang, and Runmin Jiao (2000) *Lectures on Modern History of China* Volume I. Beijing, China: Chinese Social Science Press.
- Du, Julan, Yi Lu, and Zhigang Tao (2007) "Property Rights Protection and Firm Horizontal Scope: Evidence from China's Private Enterprise", working paper.
- Du, Julan, Yi Lu, and Zhigang Tao (2008) "Economic Institutions and FDI Location Choice: Evidence from US Manufacturing Firms in China", *Journal of Comparative Economics* forthcoming.
- Economist (2008) "Economics and the Rule of Law", March 15, 2008, 83-85.
- Fan, Wenlan (1955) *Modern History of China*. Beijing, China: People's Press.
- Hall, Robert E., and Charles I. Jones (1999) "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics* 114, 83-116.

- Ho, Ping-ti (1959) *Studies on the Population of China, 1368-1953*, Cambridge, MA: Harvard University Press.
- Johnson, Simon, John McMillan, and Christopher Woodruff (2002) "Property Rights and Finance", *American Economic Review* 22, 1335-1356.
- Knack, Stephen, and Philip Keefer (1995) "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures", *Economics and Politics* 7, 207-227.
- Knack, Stephen, and Philip Keefer (1997) "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation", *Quarterly Journal of Economics* 112, 1251-1288.
- La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer (2007) "The Economics Consequences of Legal Origin", *Journal of Economic Perspectives*, forthcoming.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1997) "Legal Determinants of External Finance", *Journal of Finance* 52, 1131-1150.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1998) "Law and Finance", *Journal of Political Economy* 106, 1113-1155.
- La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1999) "The Quality of Government", *Journal of Law, Economics and Organization* 15, 222-279.
- Levine, Ross (1999) "Law, Finance, and Economic Growth", *Journal of Financial Intermediation* 8, 8-35.
- Li, Kan, Shiyue Li, Dezheng Li, Ce Yang, and Shuduo Gong (1994) *Modern History of China*, Beijing, China: Zhonghua Book Company.
- Lu, Yi (2007) "Economic Institutions and Firm Behaviors: Evidence from Chinese Manufacturing Firms", working paper.
- Mahoney, Paul G. (2001) "The Common Law and Economic Growth: Hayek Might be Right", *Journal of Legal Studies* 30, 503-525.
- Mauro, Paolo (1995) "Corruption and Growth", *Quarterly Journal of Economics* 110, 681-712.
- North, Douglass C. (1991) "Institutions", *Journal of Economic Perspectives* 5, 97-112.
- Qian, Yishi (1978) *How China Degraded to Semi-colony*, Shanghai, China: Life Book Company.
- Rajan, Raghuram G., and Luigi Zingales (1998) "Financial Dependence and Growth", *American Economic Review*, Vol. 88 No. 3, June, 559-86.
- Rajan, Raghuram G. and Arvind Subramanian (2007) "Does Aid Affect Governance?", *American Economic Review Papers and Proceedings* 97, 322-326.

- Rawski, Thomas G. (1989) *Economic Growth in Prewar China*, Berkeley, CA: University of California Press.
- Rodrik, Dani (2004a) "Rethinking Economic Growth in Developing Countries", The Luca d'Agliano Lecture.
- Rodrik, Dani (2004b) "Getting Institutions Right", DICE Report 2/2004, CESifo, 10-15.
- Special Committee on Survey and Occupation of China Continuation Committee (1987) *Statistics of China Christianity (Revised Edition by Chinese Academy Of Social Sciences): 1901-1920*. Beijing: Chinese Academy of Social Sciences Press.
- Wooldridge, Jeffrey M. (2006) *Introductory Econometrics: A Modern Approach, Third Edition*, Mason, OH: Thomson.
- Wu, Jiang (1955) "Some Characteristics of China's Capitalist Economic Development", *Jingji Yanjiu (Journal of Economic Research, in Chinese)*, 5.
- Yang Zundao and Fengmei Ye (1993) *Studies on Semi-colonization of Qing Dynasty*, Beijing, China: Higher Education Press.
- Young, Crawford (1994) *The African Colonial State in Comparative Perspective*, New Haven, CT: Yale University Press.

Figure 1. Property Rights: Correlation between *Helping Hand* and instrument (*Logarithm of Population in 1918-19*)



Figure 2. Contract enforcement: Correlation between *Legal System* and instrument (*British administration*)

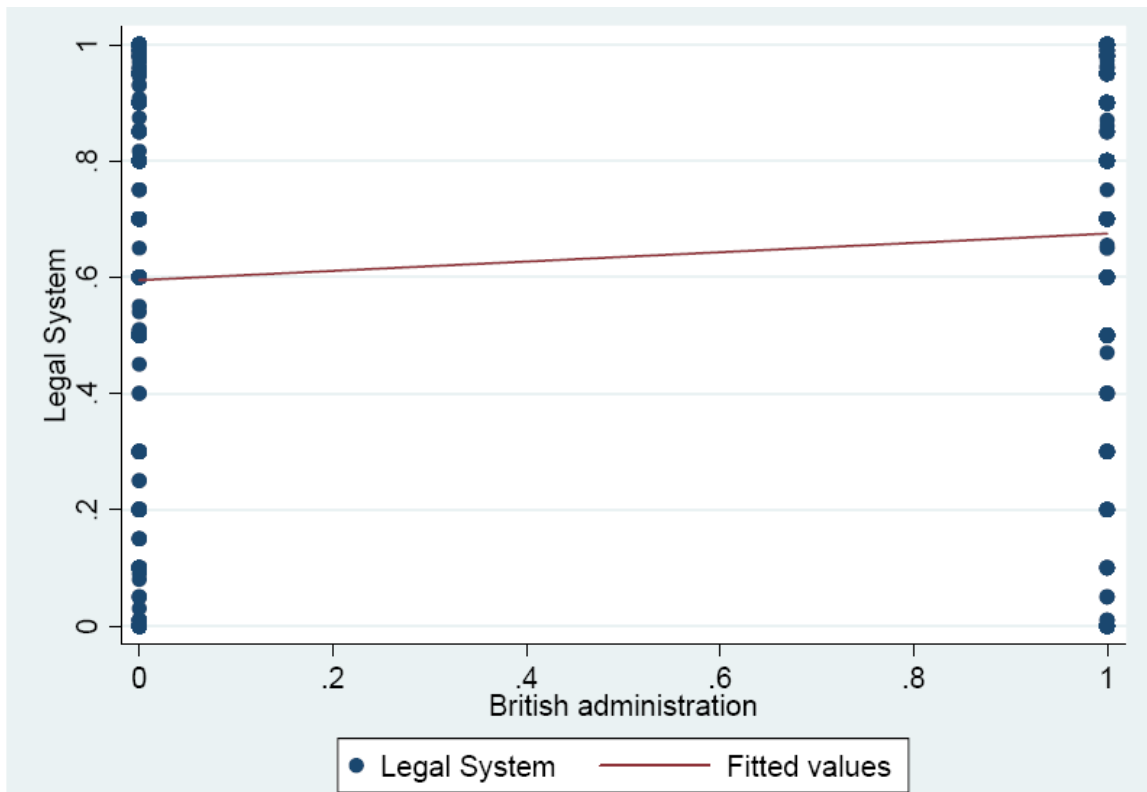


Table 1. Summary Statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|-------|--------|-----------|--------|--------|
| Growth of Logarithm of Output per Worker | 1,549 | 0.028 | 0.739 | -4.960 | 6.988 |
| Suppliers (in thousands) | 1,509 | 0.042 | 0.199 | 0 | 7.1 |
| Distributors (in thousands) | 1,434 | 0.174 | 0.897 | 0.001 | 15 |
| Helping Hand | 1,462 | 0.355 | 0.320 | 0 | 1 |
| Legal System | 1,361 | 0.634 | 0.389 | 0 | 1 |
| Suppliers * Helping Hand | 1,423 | 0.015 | 0.046 | 0 | 0.865 |
| Suppliers * Legal System | 1,316 | 0.027 | 0.069 | 0 | 1 |
| Initial Logarithm Output per Worker | 1,551 | 4.293 | 1.640 | -3.211 | 11.269 |
| Percentage of Private Ownership | 1,566 | 0.813 | 0.376 | 0 | 1 |
| Enterprise Size | 1,565 | 5.091 | 1.373 | 0 | 9.649 |
| Enterprise Age | 1,566 | 2.494 | 0.777 | 1.099 | 3.970 |
| Bank Loan | 1,540 | 0.273 | 0.446 | 0 | 1 |
| Education | 1,553 | 14.361 | 2.503 | 0 | 18 |
| Tenure | 1,548 | 6.240 | 4.580 | 1 | 33 |
| Deputy CEO previously | 1,566 | 0.277 | 0.448 | 0 | 1 |
| Government cadre previously | 1,566 | 0.035 | 0.184 | 0 | 1 |
| Logarithm of population in 1918-19 | 16 | 11.918 | 0.873 | 10.463 | 13.385 |
| British administration in late Qing dynasty | 18 | 0.444 | 0.511 | 0 | 1 |

Table 2. Correlations

| | Growth of Logarithm of Output per Worker | Suppliers (in thousands) | Distributors (in thousands) | Helping Hand | Legal System | Logarithm of population in 1918-19 | British administration |
|--|--|--------------------------------|-----------------------------------|-----------------|-----------------|--|---------------------------|
| Growth of Logarithm of Output per Worker | 1 | | | | | | |
| Suppliers (in thousands) | 0.046 | 1 | | | | | |
| Distributors (in thousands) | 0.029 | 0.0884 | 1 | | | | |
| Helping Hand | 0.0287 | 0.0621 | -0.0399 | 1 | | | |
| Legal System | 0.0732 | 0.0911 | 0.0535 | 0.2214 | 1 | | |
| Logarithm of population in 1918-19 | -0.0062 | 0.1397 | 0.0384 | 0.0844 | 0.0571 | 1 | |
| British administration | -0.0163 | 0.1051 | 0.0592 | -0.014 | 0.1153 | 0.3673 | 1 |

Table 3. Geographic difference of institutional quality

| | (i) Dependent Variable: Helping Hand | (ii) Dependent Variable: Legal System |
|---------------------|---|--|
| Controls | | |
| Industry dummies | Yes | Yes |
| City dummies | Yes | Yes |
| F-tests | | |
| Industry dummies=0 | [1.26] | [1.02] |
| City dummies=0 | [9.26]*** | [13.28]*** |
| No. of observations | 1,497 | 1,497 |
| R-squared | 0.1041 | 0.1083 |

Notes:

*, **, *** represent significance at 10%, 5%, and 1%, respectively.

Table 4. Property rights, OLS

| | Dependent Variable: Growth of Logarithm of Output per Worker | | | | |
|---------------------------------------|--|----------------------|----------------------|----------------------|----------------------|
| | (i) | (ii) | (iii) | (iv) | (v) |
| Initial logarithm output per worker | -0.170*** (0.022) | -0.185*** (0.024) | -0.214*** (0.026) | -0.215*** (0.026) | -0.230*** (0.027) |
| Suppliers | 0.030 (0.065) | 0.021 (0.059) | 0.001 (0.045) | 0.008 (0.046) | 0.005 (0.047) |
| Helping Hand | 0.146*** (0.054) | 0.142*** (0.054) | 0.121** (0.053) | 0.127** (0.054) | 0.109* (0.056) |
| Suppliers * Helping Hand ² | 1.507*** (0.363) | 1.377*** (0.364) | 1.028*** (0.319) | 1.016*** (0.321) | 0.998*** (0.309) |
| Enterprise Characteristics | | | | | |
| Percentage of Private Ownership | | | 0.052 (0.057) | 0.049 (0.059) | 0.040 (0.060) |
| Enterprise size | | | 0.070*** (0.017) | 0.067*** (0.017) | 0.046*** (0.018) |
| Enterprise age | | | -0.110*** (0.029) | -0.097*** (0.030) | -0.090*** (0.031) |
| Bank loan | | | 0.044 (0.041) | 0.040 (0.041) | 0.047 (0.041) |
| CEO Characteristics | | | | | |
| Education | | | | 0.003 (0.007) | 0.004 (0.007) |
| Tenure | | | | -0.004 (0.004) | -0.007 (0.005) |
| Deputy CEO previously | | | | -0.058 (0.043) | -0.055 (0.043) |
| Government cadre previously | | | | 0.106 (0.086) | 0.128 (0.089) |
| Industry dummies | No | Yes | Yes | Yes | Yes |
| City dummies | No | No | No | No | Yes |
| No. of observations | 1,413 | 1,413 | 1,393 | 1,375 | 1,375 |
| R-squared | 0.1392 | 0.1579 | 0.1821 | 0.1871 | 0.2030 |
| p-value for F-test | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Impact of Helping Hand ³ | 0.047 | 0.045 | 0.039 | 0.041 | 0.035 |

Notes:

1. Robust standard errors are reported in the parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.
2. Number of suppliers was specified as its difference from the sample mean.
3. Impact as measured by a one standard deviation increase in Helping Hand.

Table 5. Contract enforcement, OLS

| | Dependent Variable: Growth of Logarithm of Output per Worker | | | | |
|---------------------------------------|--|----------------------|----------------------|----------------------|----------------------|
| | (i) | (ii) | (iii) | (iv) | (v) |
| Initial logarithm output per worker | -0.180*** (0.023) | -0.196*** (0.024) | -0.220*** (0.027) | -0.222*** (0.027) | -0.236*** (0.027) |
| Suppliers | -0.013 (0.021) | -0.018 (0.017) | -0.031** (0.012) | -0.026** (0.013) | -0.029* (0.015) |
| Legal System | 0.138*** (0.051) | 0.130*** (0.051) | 0.103** (0.050) | 0.101** (0.050) | 0.096* (0.052) |
| Suppliers * Legal System ² | 1.330*** (0.201) | 1.229*** (0.200) | 0.974*** (0.202) | 0.987*** (0.203) | 1.022*** (0.213) |
| Enterprise Characteristics | | | | | |
| Percentage of Private Ownership | | | 0.045 (0.058) | 0.041 (0.060) | 0.033 (0.062) |
| Enterprise size | | | 0.057*** (0.018) | 0.052*** (0.018) | 0.029 (0.019) |
| Enterprise age | | | -0.100*** (0.030) | -0.087*** (0.031) | -0.075** (0.031) |
| Bank loan | | | 0.050 (0.043) | 0.046 (0.043) | 0.056 (0.043) |
| CEO Characteristics | | | | | |
| Education | | | | 0.005 (0.008) | 0.004 (0.008) |
| Tenure | | | | -0.005 (0.005) | -0.008* (0.005) |
| Deputy CEO previously | | | | -0.055 (0.044) | -0.049 (0.045) |
| Government cadre previously | | | | 0.115 (0.086) | 0.139 (0.091) |
| Industry dummies | No | Yes | Yes | Yes | Yes |
| City dummies | No | No | No | No | Yes |
| No. of observations | 1,307 | 1,307 | 1,290 | 1,274 | 1,274 |
| R-squared | 0.1522 | 0.1717 | 0.1895 | 0.1956 | 0.2121 |
| p-value for F-test | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Impact of Legal System ³ | 0.054 | 0.051 | 0.040 | 0.039 | 0.037 |

Notes:

1. Robust standard errors are reported in the parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.
2. Number of suppliers was specified as its difference from the sample mean.
3. Impact as measured by a one standard deviation increase in *Legal System*.

Table 6. Outlier check: Median regression

| | Dependent Variable: Growth of Logarithm of Output per Worker | | | |
|--|--|----------------------|----------------------|----------------------|
| | (i) | (ii) | (iii) | (iv) |
| Initial logarithm output per worker | -0.040*** (0.008) | -0.090*** (0.006) | -0.057*** (0.008) | -0.096*** (0.006) |
| Suppliers | -0.049*** (0.015) | -0.035*** (0.011) | -0.048*** (0.010) | -0.034*** (0.009) |
| Helping Hand | 0.015 (0.039) | 0.026 (0.028) | | |
| Suppliers* Helping Hand ² | 0.899*** (0.288) | 0.582*** (0.170) | | |
| Legal System | | | 0.036 (0.032) | 0.026 (0.022) |
| Suppliers* Legal System ² | | | 0.859*** (0.181) | 0.820*** (0.113) |
| Controls | | | | |
| Enterprise characteristics | No | Yes | No | Yes |
| CEO characteristics | No | Yes | No | Yes |
| Industry dummies | No | Yes | No | Yes |
| City dummies | No | Yes | No | Yes |
| No. of observations | 1,413 | 1,375 | 1,307 | 1,274 |
| Pseudo R2 | 0.0114 | 0.0430 | 0.0193 | 0.0487 |
| Impact of Helping Hand/Legal System ³ | 0.005 | 0.008 | 0.014 | 0.010 |

Notes:

1. Robust standard errors are reported in the parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.
2. Number of suppliers was specified as its difference from the sample mean.
3. Impact as measured by a one standard deviation increase in *Helping Hand* or *Legal System*.

Table 7. Endogeneity of number of suppliers

| | Dependent Variable: Suppliers | | | | |
|---------------------------------------|-------------------------------|------------------|------------------|------------------|------------------|
| | (i) | (ii) | (iii) | (iv) | (v) |
| Growth of logarithm output per worker | 0.001 (0.004) | 0.000 (0.004) | 0.000 (0.004) | 0.000 (0.004) | 0.001 (0.004) |
| Controls | | | | | |
| Industry dummies | No | Yes | Yes | Yes | Yes |
| City dummies | No | No | Yes | Yes | Yes |
| Enterprise characteristics | No | No | No | Yes | Yes |
| CEO characteristics | No | No | No | No | Yes |
| F-tests | | | | | |
| Industry dummies=0 | - | [6.10]*** | [4.16]*** | [2.39]** | [2.21]** |
| City dummies=0 | - | - | [2.79]*** | [1.55]* | [1.44] |
| Enterprise characteristics=0 | - | - | - | [15.21]*** | [12.97]*** |
| CEO characteristics=0 | - | - | - | - | [0.39] |
| No. of observations | 1,497 | 1,497 | 1,497 | 1,267 | 1,251 |
| R-squared | 0.0000 | 0.0000 | 0.0000 | 0.0354 | 0.0373 |

Robust standard errors are reported in the parentheses; *, **, *** represent significance at 1%, 5%, and 10%, respectively.

Table 8. Property rights, 2SLS

| | Second Stage: Dependent Variable: Growth of Logarithm of Output per Worker | | | |
|---|--|----------------------|----------------------|----------------------|
| | (i) | (ii) | (iii) | (iv) |
| Initial logarithm output per worker | -0.174*** (0.023) | -0.187*** (0.025) | -0.210*** (0.027) | -0.209*** (0.027) |
| Suppliers | -0.956*** (0.155) | -0.948*** (0.175) | -0.323*** (0.078) | -0.260*** (0.067) |
| Helping Hand | 0.475 (0.603) | 0.538 (0.646) | 0.538 (0.767) | 0.436 (0.758) |
| Suppliers * Helping Hand ² | 5.076*** (0.809) | 4.850*** (0.872) | 2.676*** (0.590) | 2.486*** (0.553) |
| Controls | | | | |
| Industry dummies | No | Yes | Yes | Yes |
| Enterprise characteristics | No | No | Yes | Yes |
| CEO characteristics | No | No | No | Yes |
| F-tests | | | | |
| Industry dummies=0 | - | [3.93]*** | [3.34]*** | [3.27]*** |
| Enterprise characteristics=0 | - | - | [1.83] | [1.67] |
| CEO characteristics=0 | - | - | - | [1.16] |
| No. of observations | 1,304 | 1,304 | 1,286 | 1,268 |
| R-squared | 0.1310 | 0.1500 | 0.1696 | 0.1742 |
| F-test | 21.05 | 7.90 | 9.42 | 7.84 |
| p-Value for F-test | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Impact of Helping Hand ³ | 0.152 | 0.172 | 0.172 | 0.140 |
| First Stage: Dependent Variable: Helping Hand | | | | |
| Initial logarithm output per worker | 0.015*** (0.006) | 0.016** (0.006) | 0.010 (0.007) | 0.010 (0.007) |
| Logarithm of population in 1920 | 0.034*** (0.010) | 0.033*** (0.010) | 0.028*** (0.011) | 0.029*** (0.011) |
| Suppliers | -0.027 (0.027) | -0.028 (0.028) | -0.040* (0.021) | -0.040** (0.019) |
| Controls | | | | |
| Industry dummies | No | Yes | Yes | Yes |
| Enterprise characteristics | No | No | Yes | Yes |
| CEO characteristics | No | No | No | Yes |
| F-tests | | | | |
| Industry dummies=0 | - | [0.64] | [0.49] | [0.57] |
| Enterprise characteristics=0 | - | - | [2.27]* | [1.83] |
| CEO characteristics=0 | - | - | - | [0.60] |
| No. of observations | 1,305 | 1,305 | 1,287 | 1,269 |
| R-squared | 0.0151 | 0.0192 | 0.0261 | 0.0289 |
| F-test | 7.29 | 2.41 | 2.45 | 2.16 |
| p-Value for F-test | 0.0001 | 0.0057 | 0.0016 | 0.0026 |

Notes:

1. Robust standard errors are reported in the parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.
2. Number of suppliers was specified as its difference from the sample mean.
3. Impact as measured by a one standard deviation increase in *Helping Hand*.

Table 9. Contract enforcement, 2SLS

| | Second Stage: Dependent Variable: Growth of Logarithm of Output per Worker | | | |
|---|--|----------------------|----------------------|----------------------|
| | (i) | (ii) | (iii) | (iv) |
| Initial logarithm output per worker | -0.189*** (0.027) | -0.197*** (0.027) | -0.220*** (0.028) | -0.221*** (0.028) |
| Suppliers | -2.313*** (0.346) | -2.232*** (0.354) | -0.609*** (0.120) | -0.544*** (0.113) |
| Legal System | 0.541 (0.557) | 0.151 (0.558) | 0.035 (0.572) | -0.019 (0.595) |
| Suppliers * Legal System ² | 5.185*** (0.773) | 4.867*** (0.776) | 1.993*** (0.402) | 1.898*** (0.397) |
| Controls | | | | |
| Industry dummies | No | Yes | Yes | Yes |
| Enterprise characteristics | No | No | Yes | Yes |
| CEO characteristics | No | No | No | Yes |
| F-tests | | | | |
| Industry dummies=0 | - | [3.20]*** | [3.46]*** | [2.97]*** |
| Enterprise characteristics=0 | - | - | [3.22]** | [2.50]** |
| CEO characteristics=0 | - | - | - | [1.22] |
| No. of observations | 1,307 | 1,307 | 1,290 | 1,274 |
| R-squared | 0.1480 | 0.1672 | 0.1869 | 0.1929 |
| F-test | 20.68 | 8.26 | 14.92 | 11.23 |
| p-Value for F-test | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Impact of Legal System ³ | 0.210 | 0.059 | 0.014 | -0.007 |
| First Stage: Dependent Variable: Legal System | | | | |
| Initial logarithm output per worker | 0.020*** (0.007) | 0.018** (0.007) | 0.009 (0.008) | 0.010 (0.008) |
| British administration | 0.069*** (0.021) | 0.074*** (0.023) | 0.071*** (0.023) | 0.070*** (0.023) |
| Suppliers | -0.033 (0.057) | -0.028 (0.058) | -0.049 (0.039) | -0.050 (0.037) |
| Controls | | | | |
| Industry dummies | No | Yes | Yes | Yes |
| Enterprise characteristics | No | No | Yes | Yes |
| CEO characteristics | No | No | No | Yes |
| F-tests | | | | |
| Industry dummies=0 | - | [1.10] | [1.08] | [0.45] |
| Enterprise characteristics=0 | - | - | [6.01]*** | [6.56]*** |
| CEO characteristics=0 | - | - | - | [0.51] |
| No. of observations | 1,308 | 1,308 | 1,291 | 1,275 |
| R-squared | 0.0167 | 0.0234 | 0.0426 | 0.0433 |
| F-test | 7.22 | 2.83 | 3.87 | 3.06 |
| p-Value for F-test | 0.0001 | 0.0012 | 0.0000 | 0.0000 |

Notes:

1. Robust standard errors are reported in the parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.
2. Number of suppliers was specified as its difference from the sample mean.
3. Impact as measured by a one standard deviation increase in *Legal System*.

Table 10. Sub-samples

| | Dependent Variable: Growth of Logarithm of Output per Worker | | | | | | | |
|--------------------------------------|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Private Enterprise | | SOE | | Poor Cities | | Rich Cities | |
| | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) |
| Initial logarithm output per worker | -0.232*** (0.030) | -0.238*** (0.030) | -0.218*** (0.056) | -0.218*** (0.058) | -0.242*** (0.039) | -0.247*** (0.039) | -0.215*** (0.034) | -0.223*** (0.036) |
| Suppliers | -0.011 (0.038) | -0.036** (0.017) | 2.277** (1.086) | 1.844 (1.730) | -0.026 (0.027) | -0.044** (0.017) | 0.661** (0.283) | 0.565** (0.277) |
| Helping Hand | 0.115 (0.063) | | 0.087 (0.123) | | 0.122 (0.079) | | 0.086 (0.081) | |
| Suppliers* Helping Hand ² | 1.012*** (0.323) | | -2.805 (1.934) | | 0.767** (0.365) | | 0.344 (0.647) | |
| Legal System | | 0.080 (0.058) | | 0.187 (0.141) | | 0.129 (0.078) | | 0.067 (0.063) |
| Suppliers* Legal System ² | | 0.951*** (0.221) | | -1.153 (2.127) | | 1.168*** (0.412) | | 0.369 (0.338) |
| Controls | | | | | | | | |
| Enterprise characteristics | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CEO characteristics | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| F-test | | | | | | | | |
| Enterprise characteristics=0 | [4.57]*** | [3.00]** | [2.15]* | [1.31] | [2.20]* | [1.45] | [2.89]** | [1.93] |
| CEO characteristics=0 | [1.56] | [1.96]* | [0.32] | [0.56] | [0.59] | [0.83] | [2.40]** | [1.94] |
| Industry dummies=0 | [2.86]*** | [2.50]** | [1.14] | [1.27] | [1.52] | [1.11] | [3.18]*** | [2.59]*** |
| City dummies=0 | [1.12] | [1.13] | [1.24] | [1.06] | [0.79] | [1.28] | [2.46]** | [2.27]** |
| No. of observations | 1,123 | 1,034 | 247 | 235 | 751 | 701 | 624 | 573 |
| R-squared | 0.2204 | 0.2253 | 0.2654 | 0.2794 | 0.2121 | 0.2194 | 0.2208 | 0.2260 |
| Impact of Helping Hand/Legal System | 0.037 | 0.031 | 0.028 | 0.073 | 0.039 | 0.050 | 0.028 | 0.026 |

Notes:

1. Robust standard errors are reported in the parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.

2. Number of suppliers was specified as its difference from the sample mean .
3. Impact as measured by a one standard deviation increase in *Helping Hand* or *Legal System*.