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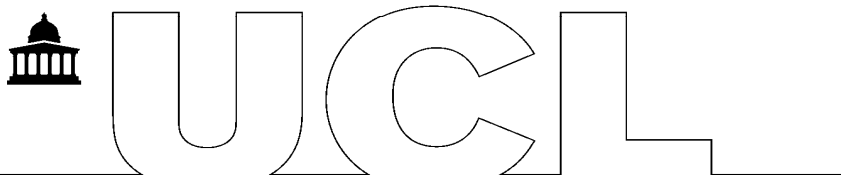

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Corruption and Firm Growth:

Evidence from China

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Corruption and Firm Growth: Evidence from China *

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Abstract

Corruption is one of the most pervasive obstacles to economic and social development. However, in the existing literature it appears that corruption seems to be less harmful in some countries than in others. The most striking examples are well known as the "East Asian paradox": countries displaying exceptional growth records despite having thriving corruption cultures. The aim of this paper is to explain the high corruption but fast economic growth puzzle in China by providing firm-level evidence of the relation between corruption and growth and investigating how financial development influences the former relationship. Our empirical results show that corruption is likely to contribute to firms' growth. We further highlight the substitution relationship between corruption and financial development on firm growth. This means that corruption appears not to be a vital constraint on firm growth if financial markets are underdeveloped. However, pervasive corruption deters firm growth where there are more developed financial markets. This implies that fast firm growth will not be observed until a later stage of China's development when financial markets are well-functioning and corruption is under control. Furthermore, the substitution relationship exists in the private and state-owned firms. Geographically, similar results can be seen in the Southeast and Central regions.

Keywords: Corruption, Firm growth, Chinese economy
JEL Classification Numbers: D73, O16, O53

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1 Introduction

Bureaucratic corruption is pervasive throughout the world.[1] The relationship between corruption and economic growth has been broadly studied in the literature. Corruption is one of the most pervasive obstacles to economic growth and social development, as it is well observed that some countries with poor economic performance also suffer from severe corruption. From the theoretical point of view, many researchers attempt to explain this phenomenon by addressing various issues in the macroeconomics of misgovernance (e.g., Ehrlich and Lui, 1999; Sarte, 2000). A considerable amount of empirical evidence shows that corruption directly deters economic growth and development (e.g., Keefer and Knack, 1997; Knack and Keefer, 1995; Li *et al.,* 2000; Méon and Sekkat, 2005). Others explore the principal transmission mechanism through which corruption reduces investment and hence, hampers economic growth (e.g., Mauro, 1995; Mo, 2001).

However, it is reasonable to be cautious about the strong negative correlation between corruption and growth. The incidence of corruption may vary markedly across countries, and significant diversity clearly exists conditional on other social and economic factors. Neeman *et al.* (2008) find that the negative relationship between corruption and growth holds only for countries with a high degree of financial openness. In contrast, for those countries with less financial integration, the negative relationship more or less disappears. Aidt *et al.* (2008) show that quality of institutions substantially affects the impact of corruption on economic growth: corruption is detrimental to growth where there are high-quality political institutions, but otherwise has no impact on growth. Similar results can also be seen in Méon and Weill (2010) who observe that corruption is less harmful to efficiency in countries with less effective institutions, and may even improve efficiency where there are extremely ineffective institutions. The results of Méndez and Sepúlveda (2006) indicate that the level of corruption which maximizes growth is significantly greater than zero. That is, corruption benefits growth at low levels of economic development and becomes detrimental to growth as the economy develops to a high level.

It seems that not all countries over the world have suffered from widespread corruption, while some countries have coped well. The most prominent examples form the basis of what Wedeman (2002) termed the "East Asian paradox": some countries in this region, such as China, Indonesia, South Korea[2] and Thailand, have grown remarkably well in spite of high

[1] This paper uses the most commonly used definition of corruption: corruption is defined as misuse of power by public officials for private gain (see Bardhan, 1997).

[2] For more details of corruption in South Korea, see Kang (2002). Corruption is inter-

levels of corruption.[3] Campos *et al.* (1999) show that corruption has less negative impact on investment when it is more predictable – being more organised with less uncertainty. Rock and Bonnett (2004) point out that the negative relationship between corruption and investment exists only in small developing countries, but displays positive correlation in the large East Asian newly industrialised economies (China, Indonesia, South Korea, Thailand and Japan). Given all the above, corruption appears to be less harmful to economic growth in "East Asian paradox" countries, among which China is the most striking example.[4] Since the early 1980s, China has been one of the most rapidly growing economies in the world with an average annual growth rate of around 10%. At the same time however, corruption continues to thrive in China along with economic reforms. Why does corruption not slow down economic growth in China? Would China grow even faster if corruption were lower? In this paper, we aim to investigate how corruption affects economic growth in China. In particular, we intend to see how financial development influences the former relationship.[5]

To our knowledge, empirical studies on corruption and growth in China remain scarce. A few cross country macro-level studies have China in their sample (e.g., Méon and Sekkat, 2005; Neeman et al., 2008; Rock and Bonnett, 2004), though the results are mixed as we mentioned above. Fisman and Svensson (2007) argue that cross country analysis is unable to tell us much about the effect of corruption on individual firms, which may lead to suspicion of the existence of the negative role of corruption for growth at the micro-level. Moreover, cross country studies neither allow us to analysis variation of corruption within country nor to examine individual heterogeneity. In addition, many factors affecting individual firms may not appear in aggregate macroeconomic statistics. It is possible, and has been proved

preted as "money politics", which highlights the interaction between public and private.

[3]Even some developed countries share the same notoriety, such as Italy.

[4]A few theoretical papers have also attempted to explain the puzzle of high levels of corruption but fast economic growth in "East Asian paradox" countries (see Blackburn and Forgues-Puccio, 2009; Blackburn and Wang, 2009).

[5]A country's financial development plays an increasingly important role in economic growth. There is not much doubt that better access to finance correlates with higher growth and investment in developing countries. A great deal of research demonstrates that a well developed financial market promotes economic growth (e.g., Guiso *et al.*, 2004; Levine, 1997). See also World Bank (2001) for a detailed review. In China, financial market liberalization started in the early 1990s, when the policy banks started to be separated from commercial banks. Despite the reforms, Chinese firms access less formal finance than other Asian countries according to the World Bank (2003). Many studies emphasize the prevalence of capital market imperfections in China, from both macro (e.g., Allen *et al.*, 2005; Guariglia and Poncet, 2008) and micro (e.g., Héricourt and Poncet, 2009; Guariglia *et al.*, 2011) perspectives.

by Svensson (2003), that though corruption deters economic growth at the macro-level, bribe payments correlate positively with a cross-section firm growth in Uganda. Recently, firm-level research of corruption in China has been conducted by the World Bank Group. Hallward-Driemeier *et al.* (2004) used firm-level data from five cities (Beijing, Chengdu, Guangzhou, Shanghai and Tianjin) in 2002 and found that external finance significantly improves firm performance and the total number of days in dealing with government inspectors positively affects firms' sales growth, though the magnitude is very small. By using the same data, World Bank (2003) shows that corruption, measured as an index comprising the governance effectiveness, regulatory burden, rule of law, the frequency and size of irregular payments, has negative impact on firms' growth rates of sales, but the impact is not statistically significant.

This paper aims to investigate the impact of corruption, together with the comovement of corruption and financial development, on firm growth in China. In the existing literature, only very limited cross-country studies attempt to investigate the interaction between corruption and financial development on economic growth. The empirical results of Ahlin and Pang (2008) show that corruption control and financial development both improve economic performance. The worse either of these, the greater the marginal benefit from an improvement in the other. Compton and Giedeman (2011) find similar results that banking development has reduced effect on growth when the institution quality is improved. The alternative results can be seen in Demetriades and Law (2006), who find that both institution improvement and financial development are necessary conditions for stimulating growth. In addition, their results show that institutional improvement would bring more economic growth in low-income countries, while financial development could generate more growth in middle-income and high-income countries but with smaller magnitude. There is no micro-level study paying attention to the influence of interaction between corruption and financial development on firm growth. We intend to fill this gap in the literature. We also aim to detect the impact of the interaction between corruption and financial development on firm growth cross ownership and regions. As economic reforms continue, various types of ownership flourish in China replacing unitary state ownership. In addition, there is a broad consensus that China is undergoing an uneven growth pattern in different geographic regions – Eastern and coastal areas being more developed than Western and landlocked areas. It is therefore worth investigating whether corruption and its interaction with financial development play a different role across types of ownership and regions.

Our empirical analysis shows that the growth of firm sales income per employee is likely to benefit from both financial development in terms of easier

access to formal loans and the presence of corruption, that is, corruption and financial development both appear to stimulate firm growth. Furthermore, there exists evidence of substitution between the growth-enhancing effects of corruption and financial development. Meaning that the slower financial development the less the marginal effect from an improvement in governance and so the greater is the marginal benefit from misconduct. However, the benefit from the presence of corruption diminishes as the improvement in financial market continues, and eventually it deters firm growth. Once we look at the different types of ownership and regions, results are consistent with the full sample estimation though the magnitude varies accordingly. The substitution relationship is particularly evident in the private and state-owned firms. Consistent results can also be seen in the Southeast and Central regions as well.

The remainder of the paper is set out as follows. Section 2 explores the data. Section 3 introduces the methodology. Section 4 reports the empirical results. We make a few concluding remarks in Section 5.

2 Data

2.1 Data Description

We use the Investment Climate Survey conducted by the National Bureau Statistics of China in 2005.[6] The survey interviewed 12,400 firms in 30 out of 34 Chinese provinces.[7] Those firms which could not supply data on key indicators (corruption and financial development) and reported unrealistic firm age are excluded.[8] As a result, the sample used in the empirical analysis contains 12,212 firms. Only Tibet, Hong Kong, Macau and Taiwan are not included in the sample. Therefore, our data represent geographical China. As Table 1 indicates, 1 to 9 sample cities are drawn from each province. There is only 1 sample city in Hainan, Qinghai and Xinjiang, except for 4 directly administered municipalities. Guangdong, Jiangsu and Shandong

[6]The corresponding data were downloaded from World Bank, Enterprise Surveys. In addition, we use the report of World Bank (2006) for helping us construct our variables. See Appendix, Table A1 for details.

[7]34 provinces consist of 23 provinces, 5 autonomous regions, 4 directly administered municipalities (Beijing, Tianjin, Shanghai and Chongqing) and 2 special administrative regions (Hong Kong and Macau).

[8]In the survey, firms are asked to report in which year they were established. Some firms reported a number smaller than 1000, which is unrealistic. We therefore trim off the highest 1% according to the distribution of firm age. In our constructed sample, the oldest firm was established in 1947 and the youngest in 2002.

Table 1: Distribution of sample cities

No. of cities	No. of prov.	Provinces
1	7	Beijing, Tianjin, Shanghai, Chongqing, Hainan, Qinghai, Xinjiang
2	5	Gansu, Jilin, Inner Mongolia, Ningxia, Guizhou
3	5	Guangxi, Shaanxi, Shanxi, Yunnan, Heilongjiang
4	1	Anhui
5	3	Fujian, Jiangxi, Sichuan
6	2	Hunan, Liaoning
7	2	Henan, Hubei
8	2	Hebei, Zhejiang
9	3	Guangdong, Jiangsu, Shandong

provide more sample cities than other provinces, with 9 cities in each. Following World Bank (2006), 30 sample provinces are divided into six regions (see Table 2). The Southeast includes the most sample cities, followed by Bohai and then the Central. As a result, the regional share of sample firms is highest in the Southeast. However, it seems that there is no substantial sample bias in terms of regions which can been seen from Column (3) of Table 2.

There are 31 industries in our data, among which the bulk-goods industry[9] accounts for the most, which is 73.6%. The low-value industry, agricultural and side-line food processing, follows (25.6%) and high-value industry has the smallest proportion in the entire sample at 0.8%. Small and medium sized firms, which are thought to be the "backbone" of the economy and to help reduce the bias of firm level studies of corruption (World Bank, 2003), are also well represented in the sample. In our sample, the median number of employees is 255, while only 10% recruit more than two thousand employees. The summary statistics of all variables are given in Appendix, Table A2.

Along with the decentralised enterprise reform in China, firms become increasingly hybrid. The cooperation and partial privatization of state owned enterprises (SOEs) in China has delegated authority by allocating managers some effective control rights such as production and income distribution, while leaving the ultimate power with the government such as the appointment and dismissal of the general manager and the approval of large investment proposals (e.g., Qian, 1996). The state-owned assets management

[9]Bulk goods industry includes the production of raw chemical materials and chemical products, nonmetal mineral products and smelting and processing of (non)ferrous metals.

Table 2: Descriptive statistics of main variables, by region and province

Region	Province	% firms	lnPGDP	g	FD	C
Southeast	Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong	26.75	9.509	0.146	3.209	0.130
Bohai	Beijing, Tianjin, Hebei, Shandong	16.84	9.228	0.190	2.967	0.176
Northeast	Liaoning, Jilin, Heilongjiang	8.66	9.168	0.187	2.908	0.149
Central	Anhui, Jiangxi, Henan, Hubei, Hunan	23.54	8.534	0.151	2.865	0.132
Southwest	Guangxi, Chongqing, Sichuan, Guizhou, Yunan, Hainan	12.87	8.528	0.161	2.813	0.161
Northwest	Shanxi, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Inner Mongolia	11.33	8.792	0.143	2.543	0.172

Note: The classification of six regions follows World Bank (2006).

departments or agencies also influence private firms by share trading, acquisitions or merger. There are fewer firms with private shares alone and these are usually smaller size. Our sample reflects this phenomenon. 53.2% of sample firms have a single kind of shares, the remaining are hybrid. The fully private-owned firms, accounting for 14.5% of the full sample, have 402 employees on average. In comparison, the average number of employee is 1,142 in purely state owned firms whose share is 29.9%. 8.8% of firms only have foreign shares. About 32% firms have three kinds of shares in their ownership. At the same time, it is also difficult to define the private sector in China. Some consider the nonstate sector is private sector. A better but narrow definition is given by Haggard and Huang (2008), where it is called the "de jure" private sector including firms registered as private entities under Chinese law. Taking into account this difficulty and firms' hybrid features, when classifying firm ownership, we do not refer to firms' registration type, but to their actual shareholder structure following Dollar and Wei (2007). A firm is considered to be a state-owned firm if the state shares dominate others. Privately-owned and foreign-owned firms are defined analogously.

2.2 Construction of Main Explanatory Variables

Before proceeding, it is useful to explore in-depth the features of key explanatory variables. Figures 1 and 2 provide the distribution of the presence level of corruption and financial development, respectively.

Figure 1: Distribution of corruption

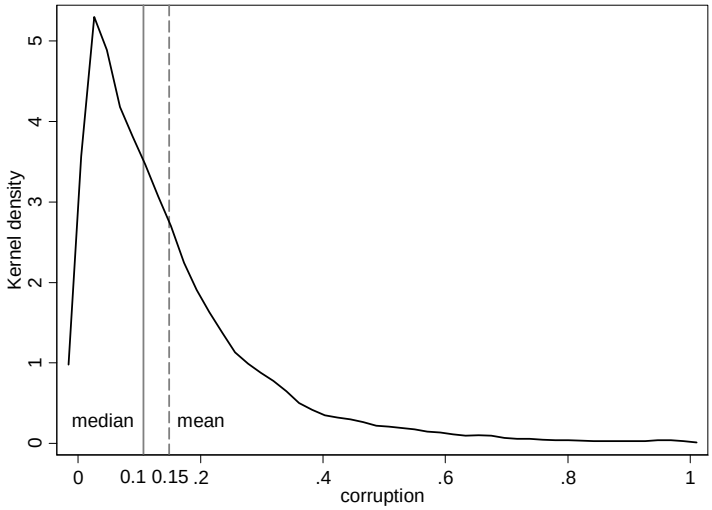
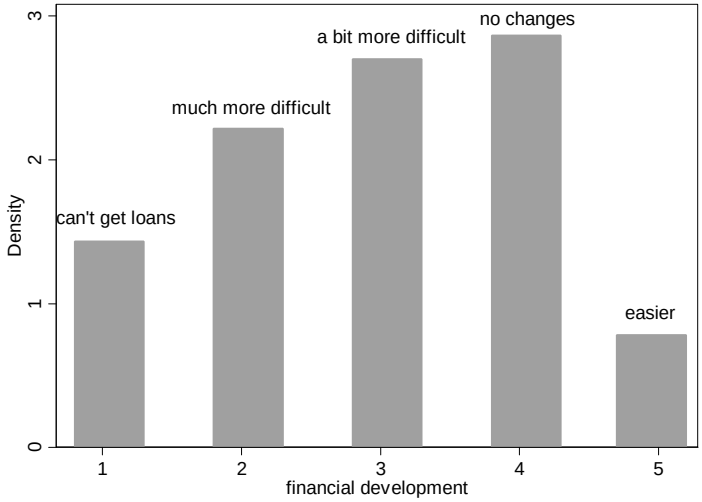


Figure 2: Distribution of financial development



Corruption is difficult to define as it can take various forms and is even more difficult to measure due to its inherent secrecy. In this paper, we use objective measure of corruption rather than subjective indicators which could be less precise and sometimes biased (see Dethier *et al.*, 2010). Among objective corruption indicators, some studies use the amount of bribery as a direct measure of corruption (e.g., Fisman and Svensson, 2007). Though these questionnaires are better designed and try to ask the quantity of bribes in a more implicit manner, such direct measurement still suffers from hidden information or even potential falsity due to moral hazard.

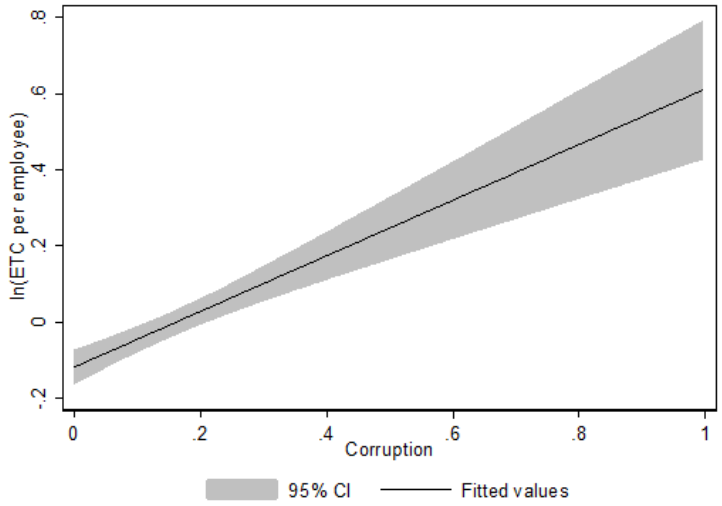
Our corruption is measured as the proportion of days within a year that a firm interacts with four government departments – taxation, public security, environment, labour and social security. We do so out of two considerations. For one thing, according to World Bank (2003), firm's cost which is induced by the share of time that senior managers spend receiving government officials can reflect the cumbersome nature of dealing with extensive regulations. This can be a further indication of corruption. For another, this measure broadly captures possible bureaucratic malpractice with easy and less biased responses from interviews. One may suppose that bureaucratic rent seeking only influences the fundamental decision of entrepreneurs, such as opening business, merging or claiming bankruptcy. However, corrupt practices may also be involved in firms' day-to-day operations, which can take many forms and shapes. For example, illegal payment to persuade tax inspectors[10], bribery to obtain and/or speed up the compulsory licenses (or permits) during production or for future production, entertainment spending to smooth relationships or build networks. As showned in Figure 1, 2.5% of firms did not spend any time on corrupt practices. If 0 indicates no time spent on corruption and 1 indicates the whole year dealing with corruption, the average corruption level across all firms is 0.15 (54 days) and the median time is 0.11 (39 days).

Our corruption measurement shows credibility. It correlates positively with firms' entertainment and travel costs (ETC) shown in Figure 3, which is demonstrated to be a proxy capturing some real bribes committed by Chinese firms in Cai *et al.* (2011).[11] In our questionnaire, firms are asked to evaluate (or predict) the role of local government, if they have made (or will carry out) acquisitions or mergers within a five-year window. We find a positive correlation between this indicator and our corruption measurement:

[10]The tax rate is not uniform for every firm in China. Firms pay tax to both central and local government. The tax rate also depends on firm types and regions. For more details, see Cai *et al.* (2011).

[11]We use ETC in our regression as a robustness check. More discussion will be given in Section 4.

Figure 3: The relationship between corruption and ETC

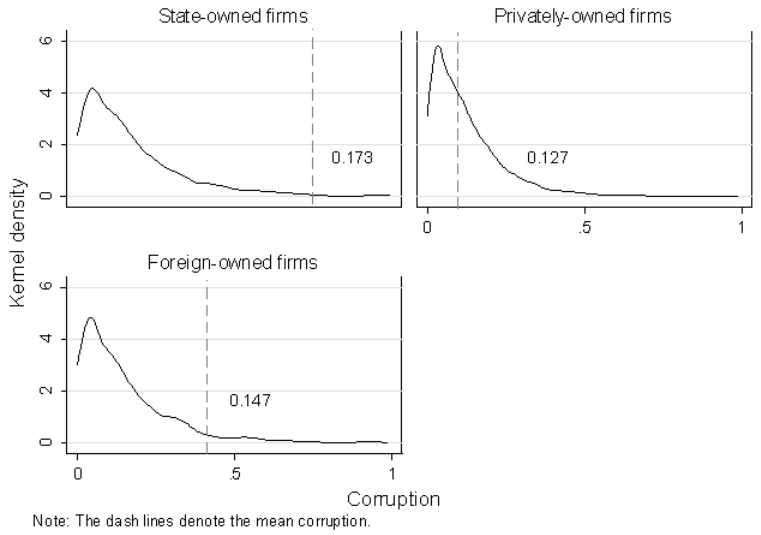


the better a firm's evaluation (or prediction), the more time the firm spends with government departments. This implies that some time might have been used to build networks with government in order to facilitate firms' production plans. Having said this, measurement errors are likely to persist to some extent in corruption research due to the secretive nature of corrupt behavior and the corruption data (e.g., Fisman and Svensson, 2007). Our measurement cannot cover every aspect, nor allow us to identify the purpose of corruption due to limited information.

Financial development is represented by how easy it is for firms to get formal loans compared with previous years. Informal loans, albeit widely existed, are not considered here, given that our aim is to study the impact of formal sector on firm growth. On average, finance is still under developed at the firm level, with the mean being 2.93. Only less than 10% of sample firms felt they had easier access to loans from legal financial and banking institutions. About half of firms found it more difficult to obtain loans and about 15% reported no access to loans at all, which is in line with Haggard and Huang's (2008) conclusion that firms found more difficulties in accessing formal finance in 1990s than in 1980s.

Substantial disparities appear, once we look at the distribution according to ownership. Figure 4 indicates that the highest corruption level can be seen in the state-owned firms, which is 36% and 18% higher than in the privately-owned and foreign-owned firms. The lowest corruption appears in the privately-owned firms, which is 0.127 and equivalent to 46 days. As with

Figure 4: Distribution of corruption, by ownership



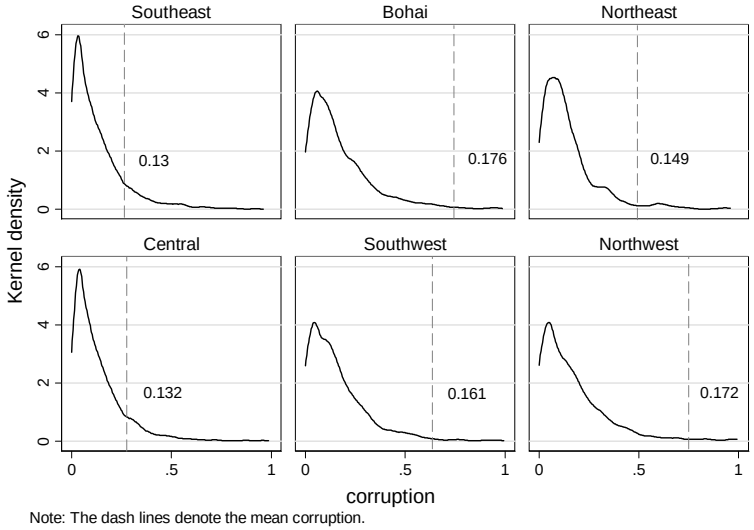
Note: The dash lines denote the mean corruption.

financial development (see Figure 5), foreign-owned firms account for most of those reporting easier access to loans, while the state-owned firms account for least. The distribution for foreign-owned firms is heavily skewed to the right, indicating a better financial environment. By contrast, many state-owned firms appear to have equally experienced 1 to 4 categories of financial development, from "can't get loans" to "no changes". Figure 5 also shows that the distribution for privately-owned firms is quite symmetric: most of them lie in category 3 (a bit more difficult), while those reporting 1 (cannot get loans) and 5 (easier to get loans) are less. Whatever groups we look at, the average financial development is less than 4, which indicates that firms, on average, did not perceive better access to loans compared with previous years.

Given the uneven progress of development in China, there are also substantial regional disparities in the level of corruption and financial development. The shapes of regional distribution of corruption, which are drawn in Figure 6, are very similar to the full sample, but distinct from each other in extent. The Southeast and Central areas have lower corruption than the sample mean: their average level of corruption is equivalent to 47 days. The highest corruption can be seen in Bohai and the Northwest, where the average number of days for interacting with the government departments is 64 and 62, respectively. By contrast, as shown in Figure 7, the Southeast (Northwest) that experienced the highest (lowest) financial development. Only firms in

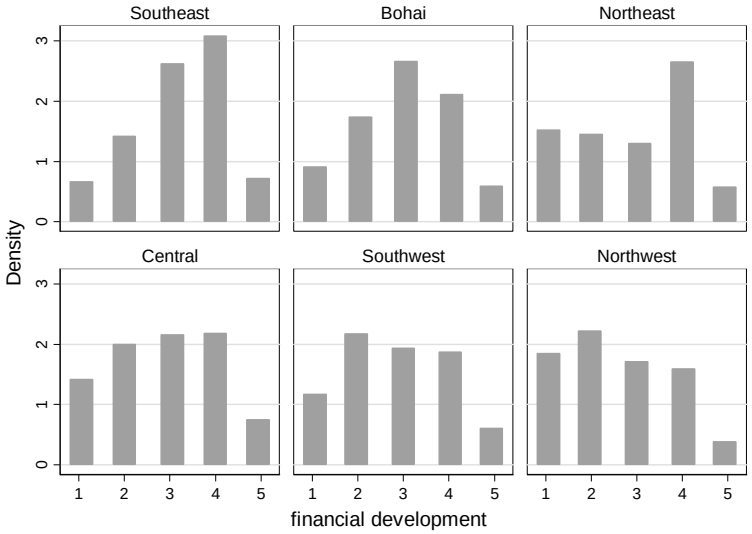
Figure 5: Distribution of financial development, by ownership

Figure 6: Distribution of corruption, by region



Note: The dash lines denote the mean corruption.

Figure 7: Distribution of financial development, by region



the Southeast on average reported "a bit more" difficulty in obtaining loans. In other regions, however, the average firm suffered "much more" difficulties in getting external finance. For more accurate numbers, refer to the average level of financial development at the regional level in Column (6) of Table 2.

2.3 Firm Growth Measurement

Firm growth can be measured by various indicators, such as growth rates of firm sales income, firm profits, employment and investment.[12] In this paper, we use the growth rate of firm sales income, which is in line with Fisman and Svensson (2007) and also due to the following considerations.

First, the combination of different types of shareholders in China could bring different objectives to Chinese firms. Shleifer and Vishny (1994) argue that controlling party may not have profit-miximizing objectives, especially for the state shareholders. State may put increasing social welfare for the public in priority. For China's case, especially local government, have incentives to extract revenue from firms on which they have control at their disposal and then maximize profit (e.g., Qian and Stiglitz, 1996). Private shareholders are more concerned with maximizing their share value in case of using shares as collateral, and/or firm's stock price if they wish to divest

[12]See Dethier *et al.*, (2010) for a comprehensive review.

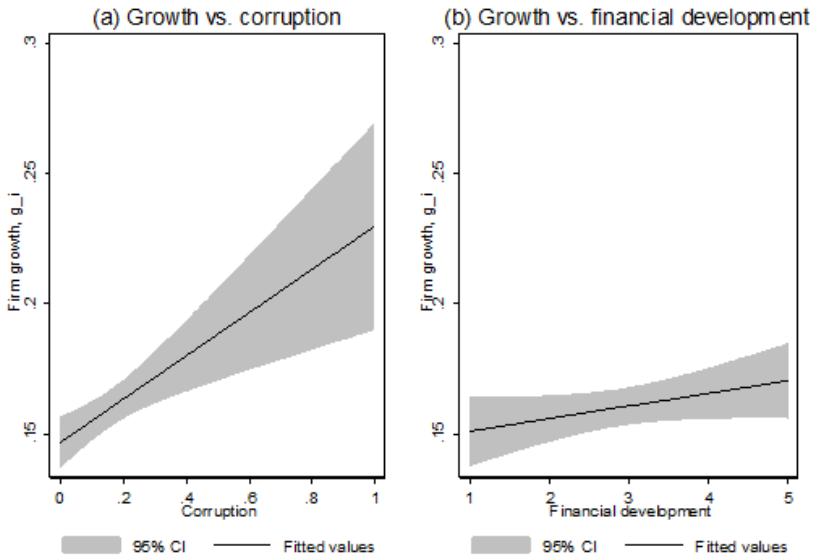
holdings in the stock market (Firth *et al.*, 2006). In general, maximization of growth rate of sales income could better proxy for the goals of many management groups (Baumol, 1962).

Second, given the hybrid ownership and managerial discretion in Chinese firms, managers' incentives are neither very transparent nor easy to measure as indicated in Cai *et al.* (2011). The compensation of top managers or CEOs are not always related to firm performance. Even for those where top managers' income and the firm's performance are correlated, expanding managerial discretion could be accompanied by high agency costs when managers tend to experience a lack of accountability and external monitor (Qian, 1996), and managers would rather seek unobserved income (Qian and Stiglitz, 1996). Hence, firm sales income is an appropriate indicator to capture the realities.

Third, Cai *et al.* (2011) conclude that estimation based on the firm's profits should be treated with caution as losses could be caused by a firm's genuine failure in business as well as a firm's false claim. Unfortunately, our data do not allow us to distinguish between them. Moreover, profit hiding has been a long and widespread phenomenon among Chinese firms. Qian and Xu (1993) state that profit hiding for state-owned firms stems from the multi-layer-multi-region (M-form) hierarchy in terms of both vertical and horizontal interdependence. As the M-form economy becomes more decentralized, the bottom level local governments are endowed with more autonomy in policy making and more responsible for local economic development. Consequently, competition of growing and getting richer rises across regions at the horizontal line, which then passes greater pressure on local governments along the vertical line (C. Xu, 2011). Therefore, as can be seen in Qian and Stiglitz (1996), the state shareholders, especially lower-level governments and their agencies, tempt to hide profits in order to avoid the interference and predation from higher-level governments. By doing so, lower-level governments are able to hold wealth and resources, which can be used to boost local economy. Better economic performance is in turn used to bargain with the higher-level governments along the vertical line for favorable offers and through bargaining to get ahead of other regions along the horizontal line. Privately-owned firms are worried more about the government's predation, hence rationally hide excessive revenue by engaging in short-term or liquid projects (Qian, 2002).

Given the mixed and sometimes unobserved incentives and profit hiding behavior, we therefore believe that an indicator like sales income would produce more reliable estimation results. Considering larger firms may be more visible to bureaucrats (e.g., Fisman and Svensson, 2007) and therefore have to spend more time dealing with government departments. We take

Figure 8: Corruption, financial development and firm growth



into account this size effect by using the number of employees to normalize firm sales income, and further including log of firm's initial sales and log of firm's age as control variables as suggested by Fisman and Svensson (2007). In addition, log of firm's size is also included as a regressor in the estimation which will be discussed more in Section 4.

The survey we used has only one cross section, however, the NBSC recorded the financial statements of firms for 2003, 2004 and 2005, which allows us to calculate firm growth. The firm is indexed by i and its average growth g_i over the period 2003-2005 is calculated as the log difference of its total sales income per employee:

$$g_i = (\ln income_{i,2005} - \ln income_{i,2003})/2$$

As the aim of this paper is to investigate the relationship between corruption and firm growth, it is useful to explore first whether they are correlated. Figure 8(a) clearly indicates that the more days spent with government departments, the higher the firm growth. This contradicts the general knowledge of corruption deterring growth. Somehow, corruption may be less harmful for firm growth in China, or may even help with firm growth. Figure 8(b) shows that the improved access to loans also assists firm growth and with a narrower confidence interval, which is consistent with the general lit-

erature of better finance promoting growth. Comparing (a) and (b), it seems that the effect of corruption on growth is much larger than that of financial development.

3 Methodology

Empirically, we begin by estimating a basic growth regression, in order to study the impact of corruption and financial development on firm growth, and further investigate the interaction between corruption and financial development on firm growth.

$$g_i = \alpha + \beta_1 C_i + \beta_2 FD_i + \beta_3 FD_i \times C_i + \beta_4 X_i + \beta_5 D_c + \epsilon_i \qquad (1)$$

where g_i denotes the two-year average growth rate of firm sales income. C_i measures the level of corruption, which is presented by the proportion of days within a year that the firm interacts with four government departments. FD_i denotes the financial development experienced by the firm, measured by how more or less difficult the firm finds obtaining loans from legal financial institutions compared with previous years. A set of dummies D_c controls for other unobserved covariates at the city level. ϵ_i is a white-noise error. X_i includes various firm characteristics and business climate indicators which are suspicious to be correlated with firm performance in terms of sales income. The selection of such variables are informed by the existing empirical literature through a "general-to-specific" approach suggested by Dethier et al. (2010).[13] Specifically, Fisman and Svensson (2007) provide the most relevant empirical study on corruption and growth of firm sales income. Among various control variables, they find that taxation, whether doing international trade and having foreign ownership account the most of firm growth. In their study, firms' initial sales income is used as an explanatory variables to control the possible correlation between firm size and future growth "as larger organizations are more visible to bureaucrats" (Fisman and Svensson, 2007, p.69). According to the comprehensive review conducted by Dethier *et al.* (2010) and L. Xu (2011), many other factors may also play a role in explaining firm performance, such as the firm age, the number of employees, industry type, capital stock, innovation and learning, openness in terms of both inter-provincial and international trade, human capital, labour relation and status, market competition and regulation, infrastructure, and characteristics of the city/region where the firm is located. We begin with estimating (1) by a complete set of the aforementioned variables and then, pick up sig-

[13]For more details of "general-to-specific" approach, see Doornik (2009).

nificant ones that best fit our data (i.e., a testing-down approach)[14]. Detailed construction and justification of finally included variables are spelled out in Appendix, Table A1.

Among all regressors, corruption is presumably positively correlated with firm growth in China. Therefore, one may expect a positive $\hat{\beta}_1$. Financial development are predicted to stimulate firm growth, which leads to a positive $\hat{\beta}_2$. The sign of $\hat{\beta}_3$, together with the former two estimated coefficients, points to either substituting or complementary roles of corruption and financial development on growth. More specifically, for each firm, the total marginal effects of corruption and financial development on growth conditional on the other can be calculated as follows.

$$\begin{aligned} \frac{\partial g_i}{\partial C_i} &= \hat{\beta}_1 + \hat{\beta}_3 \times FD_i \\ \frac{\partial g_i}{\partial FD_i} &= \hat{\beta}_2 + \hat{\beta}_3 \times C_i \end{aligned} \tag{2}$$

Nevertheless, there is a typical concern over the above growth regression on the endogeneity of corruption.[15] This problem might arise if those firms experiencing higher growth also devoted more efforts to handling relationships with government departments. A fair amount of empirical evidence suggests the reverse causation from economic growth to corruption, meaning that the incidence of corruption is determined by the level of economic development (e.g., Fisman and Gatti, 2002; Husted, 1999; Montinola and Jackman, 1999; Paldam, 2002; Rauch and Evans, 2000; Treisman, 2000). Kaufmann and Wei (2000) demonstrate that bureaucrats have discretionary power given a certain regulation and would extort bribes according to a firm's ability to pay. The empirical work of Svensson (2003) shows that the bribe payments are positively correlated with firm growth in Uganda.

We address the possible endogeneity issue by adopting two specifications. First, following Fisman and Svensson (2007), we use the industry-location averages of corruption (at the city level) as instruments of the presence corruption level. It is plausible that bureaucrats' preference and behaviour in extracting bribes differ across locations and industries. It is therefore supposed that industry-location averages are closely correlated with firms' practice of

[14]We select variables based on their t-tests. Those with p values greater than 0.1 are dropped, except for key explanatory variables.

[15]The endogeneity of corruption is found both by Wu-Hausman F test and Durbin-Wu-Hausman χ^2 test at the 5% significance level. According to C-test (Baum *et al.*, 2003), it is statistically proved that financial development can be treated as an exogenous variable at any conventional significance levels.

corruption but little with the growth of their sales.[16] A standard instrumental two-step least square (IV-2SLS) estimation is applied to (1). That is first estimating a corruption determination regression with the instruments and all other explanatory variables except for corruption itself, and then substituting the predicted values of corruption into the growth regression and using standard OLS. Second, considering the endogenous selection of firms on whether to be corrupt, we implement the Heckman two-step method. In the first step, let $c_i = 1$ ($c_i = 0$) denote engaging (not engaging) in corruption.[17] The probability of making such a decision for a firm is expressed by the following probit regression.

$$\Pr(c_i = 1) = \Phi(z_i^{'}\theta + u_i > 0) \tag{3}$$

where $z_i^{'}$ includes all explanatory variables in (1) except for corruption and interaction term of corruption and financial development, plus two additional instruments (whether the firm sells products to government and whether the general manager is directly appointed by government). $\Phi(\cdot)$ is the cumulative standard normal distribution function. Estimating (3) by maximum likelihood method, yields the inverse Mills ratio, $\lambda_i = \frac{\phi(-z_i^{'}\theta)}{1-\Phi(-z_i^{'}\theta)}$, where $\phi(\cdot)$ denotes the standard normal density function. The inverse Mills ratio indicates the conditional probability of undertaking corruption given that the firm i had not been corrupt. In the second step, inserting the inverse Mills ratio into (1) gives the new growth regression to be estimated by OLS.

$$g_i = \alpha + \beta_1 C_i + \beta_2 FD_i + \beta_3 FD_i \times C_i + \beta_4 X_i + \beta_5 D_c + \beta_6 \lambda_i + \epsilon_i \tag{4}$$

The error terms u_i and ϵ_i are jointly bivariate normally distributed, $N(0, 0, \sigma_\epsilon^2, \sigma_u^2, \rho_{\epsilon u})$. They are correlated through the correlation coefficient $\rho_{\epsilon u}$, but independent with both sets of explanatory variables in (3) and (4). Clearly, (4) makes firm growth depend on common factors that jointly affect firms' decisions on being corrupt and their growth rates. In other words, including λ_i allows the determinants of corruption to influence growth as well. Therefore, a statistically significant $\hat{\beta}_6$ indicates the existence of endogeneity.[18]

[16] The correlation coefficient between our instruments and the corruption variable is 0.46, while it is only 0.04 with firm growth.

[17] Given that our data do not directly record whether firms decide to be corrupt, a proxy of c_i is given as follows. First, $c_i = 1$ if the firm has specialised staff to handle government relationships. Second, $c_i = 1$ if the firm's corruption variable is higher than a certain percentile in the distribution of corruption across all firms. Specifically, we use 75th and 50th percentiles, respectively.

[18] Actually, $\widehat{\beta}_6 = \hat{\rho}_{\epsilon u}\hat{\sigma}_\epsilon^2$. Hence, a bigger $\hat{\rho}_{\epsilon u}$ also points to the endogenous selection.

One may also consider that more money needed to engage in corrupt practices could increase the demand for external funding and hence, corruption and financial development indicators are correlated. However, this is not a serious problem in our data as the correlation coefficient between corruption and financial development is very small, -0.026. The reason might be that our financial development indicator is not an "objective" measure of firms' financial constraints, but rather the perception and judgement of the difficulties in obtaining loans from formal financial institutions. Such "subjective" measures may be more relevant to the local banking system, but independent of the level of corruption that an individual firm commits.

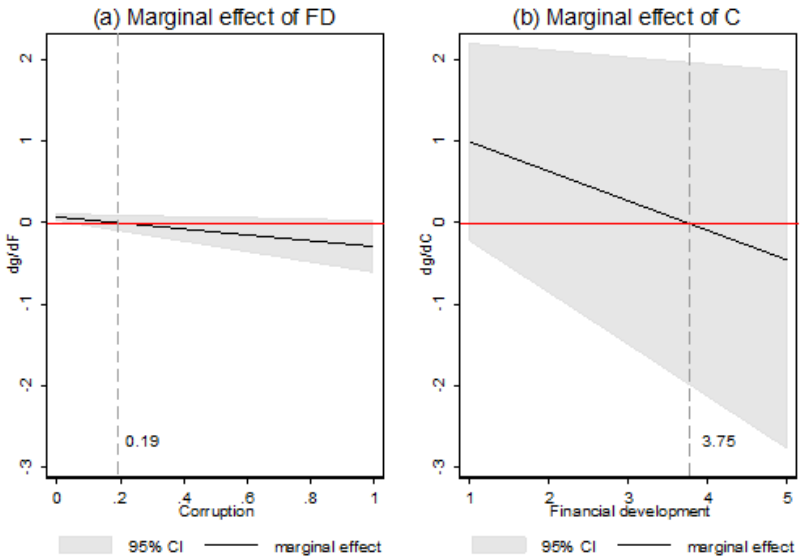
4 Empirical Results

4.1 Main Results

Our model specification has good acceptance. The statistically significant coefficients of λ_i in Columns (6) and (8), i.e., $\widehat{\beta}_6$ in (4), suggest that there exists a problem of endogeneity, meaning there are some common but unobserved factors simultaneously affecting a firm's decision on being corrupt and growth. Moreover, the positive value of $\widehat{\beta}_6$ implies that these unobserved or omitted factors that make firms more likely to corrupt also generate growth. To address the endogeneity issue, it can be seen that our choice of instrument, i.e., the industry-location (at the city level) averages of corruption, passes all instrument tests as indicated in the last three rows in Columns (1)-(3). In Columns (4) and (5), we further use whether the firm has specialized staff to handle the government relations as a complementary firm-level instrument to the industry-location averages of corruption. It appears to be valid as the Sargan test is passed with Sargan statistic 0.185 and 0.106 in Columns (4) and (5) respectively, i.e., the null hypothesis of exogenous instruments is confirmed. There are no distinct estimates across the first four columns.

Most explanatory variables suggest the expected signs and show high robustness across different model specifications. From the view of production, switching from either the low- or high-value goods industry to the bulk-goods industry and higher openness in terms of both exports and inter-provincial trade can bring more income for firms. A younger firm is more capable of generating more sales income, and so are those who accumulated more fixed assets in the initial year. A higher level of utilized production capacity is usually correlated with higher productivity and indicates that unproductive firms might have exited the market (Hallward-Driemeier *et al.*, 2004). A positive correlation between production capacity and firm growth is therefore

Figure 9: Total marginal effects, full sample



as expected. The negative estimated coefficient of sales income per employee in the initial year, implies that there might be a catch-up or convergence process across sample firms in the their sales income growth. Consistent with Fisman and Svensson (2007), a lower level of government expropriation in terms of less burden of taxes and fees stimulates firm growth. They also argue that greater foreign ownership would bring greater resources, access to markets and advanced technologies to firms and hence make them grow faster. The share of foreign ownership in our estimation provide further support to this argument. Moreover, a higher share of state ownership is likely to promote firm growth, which is consistent with Jiang *et al.* (2008) who find that share of state ownership tend to positively affect Chinese firm performance over the period 2001-2005. At the moment, the only seemingly unclear variable is firm size. Generally speaking, smaller firms intend to have faster growth. It may also be the case that bigger firms expand their sales income more due to the larger market power. We will return to this point later.

Both financial development and corruption are likely to push firms to grow further in all model specifications, which is consistent with exploratory analysis in Figure 8. Better chance to access external finance will promote firm growth due to the imperfection in Chinese capital markets as argued by Poncet *et al.* (2010). The positive effect of corruption is not only drawn

from the positive estimated coefficient, but also from the positive correlation between residuals in (3) and (4). The correlation coefficient $\widehat{\rho}_{eu}$ decreases slightly from 0.86 in Column (6) to 0.82 in Column (8). The LR test of zero correlation coefficient is rejected at the 1% significance level for all columns from (6) to (8). This indicates that the firms which elect to be corrupt do have higher growth rates relative to those with average characteristics randomly drawn from the population.

According to Hallward-Driemeier *et al.* (2004), the positive relationship between the presence of corruption and firm growth may have two reasons. First, the one who grows fast may attract more attention from public officials, hence need to spend more time on dealing with government departments. Second, the one who plans to grow fast may require new licenses (or permits) for future production and hence increase meeting time with public officials. The second point of view is also in alignment with Cai *et al.* (2011). They use a firm's ETC as the proxy for corruption and demonstrate that not all corruption components worsen firm growth, although finding an overall negative correlation between corruption and growth in 18 Chinese cities. More specifically, they find that the bribery component of ETC, which acts as the "grease" and/or "protection" money, brings positive returns to firms. Extended from the idea of Cai *et al.* (2011), if the proportion of "good corruption" components – the one used as "grease" and/or "protection" money to improve government efficiency – dominates the negative effect induced by the "bad corruption" components, it is possible to observe empirically a positive relationship between firm growth and the presence of corruption.[19] This is also consistent with the well-known "speed money" hypothesis (e.g., Huntington, 1968; Leff, 1964; Leys, 1970; Lui, 1985). Corruption may help circumvent cumbersome regulations (red tape), hence improve efficiency extended to stimulate economic growth.[20] The "good corruption" components are used as "speed money", which could promote firm growth by overcoming the less efficient regulations.[21] Our micro-level results in China provides further support to the macro-level study of Rock and Bonnett (2004).It also

[19] In Column (5) of Table 3, we experimented with ETC per employee as another proxy for corruption. Our previous finding still remain valid.

[20] The measurement of business entry by Djankov *et al.* (2002) shows that China required 12 procedures to start a business, more than the average of 10 in 85 sample countries. In addition, it takes 92 days to complete all procedures, which is far more longer than the sample average of 47 days.

[21] The nature of corruption may be another possible explanation. A few theoretical papers demonstrate that corruption is less harmful to economic growth in China because of the organised nature of corruption which internalises the externalities by reducing the uncertainty of rent seeking (see Blackburn and Forgues-Puccio, 2009; Blackburn and Wang, 2009).

turns out that the magnitude of the positive impact of corrupt practices is greater than that of financial development, which has also been illustrated earlier in Figure 8.[22]

Of particular interest is the fact that the estimated coefficient of the interaction term is statistically negative. This indicates that, given the positive influence of financial development (or corruption) on growth, more days spent in interactions with government departments (or better access to loans) tend to reduce the growth-enhancing effect of the other. In other words, there exists a substitution relationship between financial development and corruption. A corruption (or financial development) threshold, in which the positive impact of financial development (or corruption) on growth vanishes, can be calculated by using (2). In this sub-section, we use Column (3) of Table 3 which contains all three key explanatory variables. As shown in Figure 9(a), the corruption threshold is 0.19 (70 days a year) for the full sample. Hence, financial development can promote firm sales income growth only if a firm spends less than 70 days a year on dealing with government departments. About 73% firms in our sample devoted less than 70 days a year to corrupt practises. Among these firms, 72% are in the bulk-goods industry and 61% are located in the Southeast and Central. By analogy, the financial development threshold is found to be 3.75. This indicates that corruption is beneficial to firm sales income growth only if the level of financial development is lower than "no changes", i.e., still facing same level of difficulty for firms to obtain loans compared with previous years. From Figure 7, it can be seen that only a very small proportion of firms reported that it became easier to get loans in any region, meaning that there was no significant improvement in financial markets and banking systems in providing loans. However, as clearly indicated in Figure 9(b), the growth caused by corruption diminishes as financial markets become better functioned and there exists a growth-reducing effect once across the financial development threshold. This implies that if there exists a less restricted capital market, the presence of corruption is meaningless as "speed money" and ultimately destructive. This argument on the transitory role of corruption during different stages of financial development could be extended to the cases of other institutional development.

[22]The Wald test, $H_0 : \widehat{\beta}_1 = \widehat{\beta}_2$, is rejected at 1% significance levels from Columns (2) to (4).

Table 3: Impacts of corruption and financial development on firm growth, full sample

Independent	IV-2SLS[a]					Endogenous Selection[b]		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C	0.291	0.297	1.351	8.311		0.118	0.114	0.115
	(0.067)***	(0.066)***	(0.475)***	(2.714)***		(0.059)**	(0.059)*	(0.059)**
FD		0.018	0.070	0.095	0.009	0.019	0.016	0.017
		(0.003)***	(0.020)***	(0.028)***	(0.003)***	(0.004)***	(0.005)***	(0.004)***
C×FD			-0.361	-0.542		0.006	0.006	0.006
			(0.141)***	(0.195)***		(0.019)	(0.019)	(0.019)
ETC					0.283			
					(0.034)***			
ETC×FD					-0.068			
					(0.010)***			
ln(firm age)	-0.055	-0.053	-0.055	-0.054	-0.046	-0.057	-0.050	-0.050
	(0.004)***	(0.004)***	(0.004)***	(0.005)***	(0.004)***	(0.006)***	(0.004)***	(0.004)***
ln(firm size)	-0.012	-0.012	-0.013	0.146	0.010	-0.0002	-0.001	-0.002
	(0.004)***	(0.004)***	(0.004)***	(0.050)***	(0.004)**	(0.006)	(0.014)	(0.011)
share of state	0.035	0.035	0.034	0.033	0.039	0.031	0.039	0.039
ownership	(0.008)***	(0.008)***	(0.008)***	(0.010)***	(0.009)***	(0.009)***	(0.012)***	(0.009)***
share offoreign	0.071	0.064	0.065	0.024	0.075	0.080	0.070	0.070
ownership	(0.013)***	(0.013)***	(0.014)***	(0.021)	(0.015)***	(0.015)***	(0.017)***	(0.016)***
bulk goods	0.044	0.048	0.049	0.045	0.016	0.058	0.052	0.053
industry	(0.008)***	(0.008)***	(0.008)***	(0.009)***	(0.009)*	(0.009)***	(0.010)***	(0.011)***
production	0.185	0.172	0.168	0.176	0.163	0.170	0.173	0.173
capacity	(0.018)***	(0.019)***	(0.019)***	(0.022)***	(0.020)***	(0.019)***	(0.019)***	(0.019)***

ln(sales income per employee) in 2003	-0.132 (0.003)***	-0.134 (0.003)***	-0.133 (0.003)***	-0.139 (0.004)***	-0.172 (0.004)***	-0.128 (0.004)***	-0.133 (0.004)***	-0.133 (0.004)***
ln(fixed asset per employee) in 2003	0.126 (0.037)***	0.147 (0.038)***	0.150 (0.039)***	0.564 (0.142)***	0.160 (0.041)***	0.137 (0.039)***	0.142 (0.053)***	0.142 (0.051)***
share of tax & fees in sales income	-1.066 (0.087)***	-1.055 (0.088)***	-1.039 (0.089)***	-1.184 (0.116)***	-0.902 (0.097)***	-1.098 (0.100)***	-0.993 (0.117)***	-0.987 (0.127)***
export	0.038 (0.008)***	0.038 (0.008)***	0.039 (0.008)***	0.038 (0.010)***	0.022 (0.009)***	0.053 (0.011)***	0.044 (0.012)***	0.042 (0.010)***
share of inter-prov. sales	0.074 (0.010)***	0.070 (0.010)***	0.068 (0.008)***	0.067 (0.012)***	0.014 (0.011)	0.084 (0.011)***	0.079 (0.014)***	0.075 (0.013)***
C×ln(firm size)				-1.003 (0.325)***				
city dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
λ						0.145 (0.076)*	0.036 (0.087)	0.048 (0.025)*
No. of obs.	10,521	10,198	10,198	10,198	10,272	9,918	9,899	10,097
R^2	0.218	0.221	0.190	0.051	0.074	0.227	0.227	0.226
F-test of instruments (*p*-value)	1,383.36 (0.000)	1,374.15 (0.000)	159.13 (0.000)	12.58 (0.000)	138.17 (0.000)			
Under-identification test (*p*-value)[c]	1,315.20 (0.000)	1,305.12 (0.000)	159.99 (0.000)	25.47 (0.000)	276.27 (0.000)			
Sargan statistic (*p*-value)				0.185 (0.667)	0.106 (0.745)			

Note: a. Columns (1)-(3) use industry-location averages (at the city level) of the relevant corruption indicator as the instruments. Besides these, Columns (4)-(5) further uses whether the firm has specialised staff to handle government relationships as the additional instrument.

b. The first stage of endogenous selection model is not reported. Column (6) uses whether the firm has specialised staff to handle relationships withgovernment departments as the indicator of corruption in the selection equation. Column (7) (or 8) assumes that the firm is corrupt in the selection equation if its corruption variable is above the 75th (or 50th) percentile of the distribution of corruption across all firms.

c. Anderson canonical correlations likelihood-ratio is used to test for the null hypothesis that the equation is under-identified. The statistic follows a χ^2 distribution.

d. Constants are not reported. ***, ** and * denote 1%, 5% and 10% of significance levels. Standard errors are in the parentheses.

It is also interesting to explore the possible interplay between corruption and firm size that may alter the impact of corruption on growth. As seen in Columns (4) of Table 3, when including the interaction term of corruption and firm size, the estimated coefficient of firm size becomes positive, while the interaction term is negative.[23] This implies some degrees of substitutions between firm size and corruption on promoting firm growth. More specifically, increasing corruption brings more growth for small firms than for the large. One possible explanation is that big firms and public section may have involved in a "mutual hostages game" which is alignment with the South Korea case in old time as mentioned in Kang (2002). Small firms usually could not have this privilege. Therefore, once practicing the same amount of corruption, small firms could benefit more. When we control for this substitution effect, firm size positively affects the growth. The statistically negative estimates of firm size in Columns (1)-(3) are a net outcome of substitution effect of corruption and the growth-increasing effect of firm size *per se*.

4.2 Ownership Heterogeneity

We further detect whether a variety of ownership alters the estimation results revealed in the full sample. To see this, we use the specification of Column (3) of Table 3 to re-estimate the growth regression for sub-groups with different ownership. As we stated in Section 2.1, a firm's ownership is classified by the dominated share amount all. For example, if state share is dominant, the firm is marked as a state-owned firm. We find consistent results for both state-owned and privately-owned firms as in the full sample.

Corruption and financial development impose positive impact on firm growth and their interaction term appears to be negative in Columns (1) and (2) of Table 4. Our estimation results suggest stronger direct impact of corruption and financial development on firm sales income growth in the privately-owned firms than in the state-owned firms. One additional day spending in corruption increases privately-owned firm growth by 0.58%. In comparison, the magnitude of this direct growth-enhancing impact is only half of that, 0.29%, in the state-owned firms. In reality, most firms seem not to spend too many days a year dealing with government departments. As illustrated in Figure 1, the median corruption level in our sample is 39 days. Unlimited growth would not occur if firms simply resorted to increasing

[23]However, including the interaction term between corruption and firm size may cause misspecification. We find some correlations between this interaction term and a few independent variables. Therefore, we only use this regression to discuss the possible role of firm size in the corruption-firm growth nexus.

Table 4: Impacts of corruption and financial development on firm growth, by ownership and region

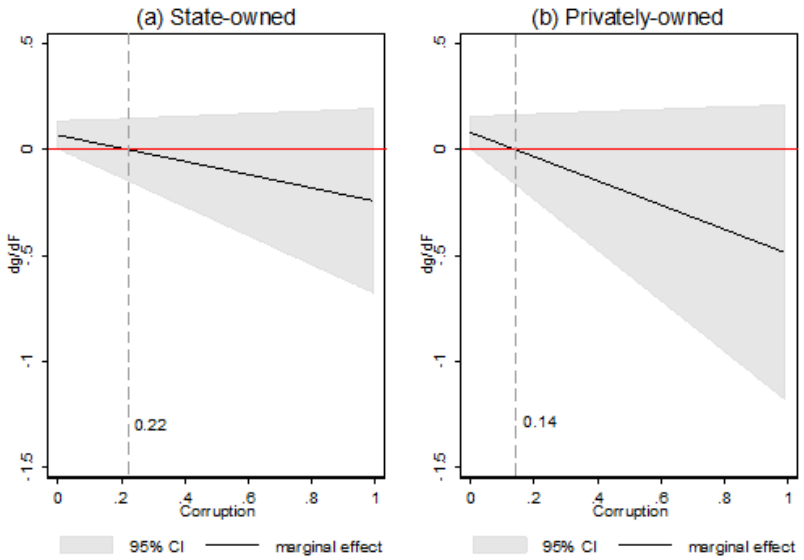
Independent Variables	State-owned (1)	Privately-owned (2)	Southeast (3)	Central (4)
C	1.044 (0.610)*	2.114 (1.073)**	8.801 (2.328)***	1.423 (0.737)**
FD	0.069 (0.033)**	0.080 (0.039)**	0.303 (0.080)***	0.061 (0.029)**
C×FD	-0.312 (0.190)*	-0.570 (0.319)*	-2.428 (0.655)***	-0.378 (0.224)*
ln(firm age)	-0.036 (0.008)***	-0.047(0.007)***	-0.081 (0.015)***	-0.042(0.007)***
ln(firm size)	-0.012 (0.008)	-0.018 (0.007)**	6.13e-06 (0.011)	-0.011 (0.009)
share of state ownership	0.022 (0.060)	0.036 (0.038)	0.055 (0.025)**	0.036 (0.015)**
share of foreign ownership	0.234 (0.098)**	-0.120 (0.107)	0.070 (0.030)**	0.082 (0.031)***
bulk goods industry	0.011 (0.018)	0.042 (0.011)***	0.110 (0.021)***	0.042 (0.014)***
production capacity	0.188 (0.033)***	0.167 (0.031)***	0.097 (0.062)	0.202 (0.035)***
ln(sales income per employee) in 2003	-0.083 (0.006)***	-0.129 (0.005)***	-0.171 (0.008)***	-0.112 (0.006)***
ln(fixed asset per employee) in 2003	0.063 (0.125)	0.097 (0.057)*	0.358 (0.097)***	0.214 (0.076)***
share of tax & fees in sales income	-0.669 (0.148)***	-1.324 (0.147)***	-2.076 (0.331)***	-1.098 (0.174)***
export	0.028 (0.017)*	0.040 (0.012)***	0.029(0.024)	0.0004 (0.015)
share of inter-prov. sales	0.064 (0.020)***	0.061 (0.015)***	0.075(0.032)**	0.053 (0.017)***
city dummies	Yes	Yes	Yes	Yes
No. of obs.	2,149	4,126	2,639	2,566
R^2	0.143	0.150	0.266	0.149
F-test of instruments (*p*-value)	46.43 (0.000)	43.33 (0.000)	27.26 (0.000)	62.95 (0.000)
Under-identification test (*p*-value)[b]	48.95 (0.000)	44.54 (0.000)	27.60 (0.000)	63.24 (0.000)

Note: a. All columns are estimated by IV-2SLS with industry-location averages (city level) of corruption being the instruments.

b. Anderson canonical correlations likelihood-ratio is used to test for the null hypothesis that the equation is under-identified. The statistic follows a χ^2 distribution.

c. Constants are not reported. ***, ** and * denote 1%, 5% and 10% of significance levels. Standard errors are in the parentheses.

Figure 10: Total marginal effect of FD on g conditional on C, by ownership



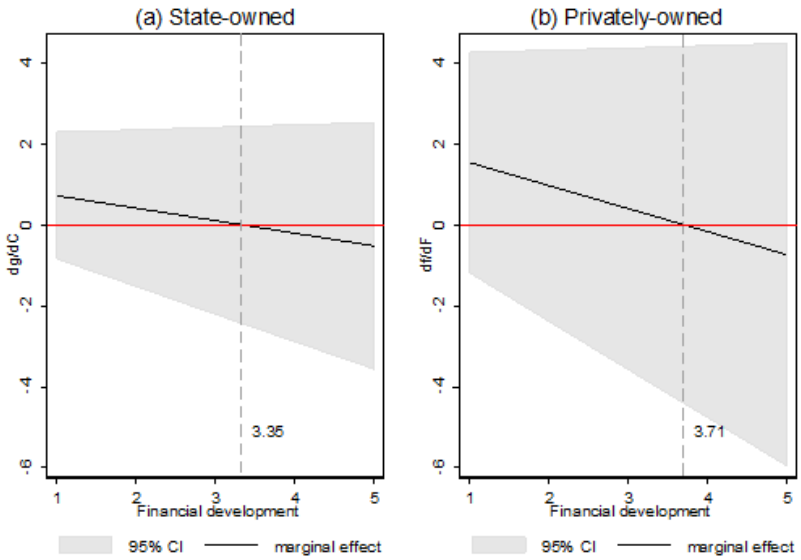
corruption. Though the slope for corruption is much steeper in Figure 8, a very large proportion is not achievable.

Hallward-Driemeier *et al.* (2004) state that firms require additional permits or licenses if they plan to expand or innovate and therefore, need to spend more time handling relationships with officials. This may be experienced by the private-owned firms rather than the state-owned ones as the latter have already established close relationships with the government.[24] Li *et al.* (2008) also demonstrates that government imposes heavy regulations (red tape) on private firms in China. However, the private firms are usually more efficient and productive than the SOEs and serve as the engine of growth in China (e.g., Guariglia *et al.*, 2011; Poncet *et al.*, 2010). Hence, if corruption effectively reduces the waiting time, extended to stronger positive effect on growth, it is reasonable to see that the former performs better than the latter when they both spend one additional day on corruption.

One may also consider that corruption should generate more growth in the state-owned firms, as managers have better relationships with government departments and get used to dealing with bureaucrats. In this case however, once there is less uncertainty of corrupt practices between managers and

[24] As can be seen in Figure 4, the average presence level of corruption in the SOEs is 35% higher than that of the private firms in our sample.

Figure 11: Total marginal effect of C on g conditional on FD, by ownership



relevant bureaucrats, corruption is equivalent to an additional tax. Therefore, it is less efficient as "speed money" extended to generate less growth for the state-owned firms.

The direct impact of financial development is also bigger for the privately-owned firms. One categorical increase in financial development for privately-owned firms brings about 8% more growth, while 6.9% in the case of state-owned firms. This may be due to the fact that state-owned firms have a better chance of getting soft budget, as argued in Qian and Roland (1998) that SOEs still experience soft budget constraint. The median loan quota enjoyed by state-owned firms per annum is about 30 million RMB, in sharp contrast to 9 million for privately-owned firms in our sample.[25] In the study of Allen *et al.* (2005), the SOEs in China received an increasing amount of state budget from 1994 to 2002. They are more able to get financial help from the government, but this is not the case for the private firms in Poncet *et al.* (2010). In addition, privately-owned firms are suffering from serve finanical constrains in the study of Haggard and Huang (2008). Among all types of ownership, Guariglia *et al.* (2011) find the private firms are most sensitive to external financial constraints. Therefore, improved financial markets would especially

[25]We further calculate the loan quota per employee considering the size effect. The median loan quota per employee is 42% higher for state-owned firms (47000 RMB) than for privately-owned firms (33000 RMB).

benefit private firms by loosening their external financial constraints.

Furthermore, as in the full sample, we consider the indirect influence and calculate the total marginal effects for state-owned and privately-owned firms, together with the corresponding corruption and financial development thresholds. Figures 10 and 11 indicate that financial development and corruption act as substitutes in promoting firm growth. It can be seen in Figure 10 that the corruption threshold for state-owned firms (0.22) is higher than that of privately-owned firms (0.14). Suppose the presence level of corruption is 0.14, financial development has no impact on privately-owned firms' growth, but still generates positive returns for the state-owned firms. Once surpassing corruption thresholds, the negative impact of financial development on firm sales income growth is bigger for the privately-owned firms, while for the state-owned firms are less responsive. This may be because corruption is more predictable for the state-owned firms like an additional tax. Hence, the external finance causes less growth-enhancing effect than for the privately-owned firms under the relatively lower level of corruption. Correspondingly, the growth-reducing effect induced by the finance is smaller for the state owned firms when corruption is pervasive.

By analogy, we compute the financial development thresholds in Figure 11. It is noticeable that the financial development thresholds are not very different between the state-owned and privately-owned firms: corruption imposes positive impact on growth for both types of firms when they encounter more difficulties in obtaining loans (i.e., FD<4) compared with the previous years. When the level of financial development is higher than the thresholds, corruption tends to hamper firm sales income growth and this influence is greater for the privately-owned firms. It becomes clearer that the total marginal effect of corruption on firm growth is more responsive in the case of privately-owned firms due to the higher uncertainty on corruption compared with the state-owned firms.

4.3 Regional Heterogeneity

Given the large regional disparities in China, it is also possible that the above substituting relationship might not be a common phenomenon across the country. Therefore, we continue using Column (3) of Table 3 to estimate each region. The Southeast and Central regions suggest the consistent and statistically significant estimated coefficients of corruption, financial development and the interaction term, shown in Columns (3)-(4) of Table 4, which is consistent with the estimation of full sample. In other regions, the estimates of these main variables are insignificant. It is therefore not of valuable to

investigate them further.[26]

The direct impact of corruption and financial development on firm growth is positive and much greater in the Southeast than in the Central region. The impact of corruption (financial development) on firm growth in the Southeast is about 6 (5) times that in the Central. This finding may be driven by the firm composition in the alternative regions. The proportion of the state-owned firms is 12.53% in the Southeast, while 29.77% in the Central region. As we have discussed in the previous subsection, the growth of the state-owned firms benefits less from an additional increase in either corrupt practices or financial development than do the privately-owned firms. This micro-level phenomenon appears to add up to the regional level. In addition, different degrees of competition for the limited available loans may also explain why Southeast is more responsive to external finance and corrupt practices. In our sample, 47.30% of firms in the Southeast are privately-owned and 40.18% are foreign-owned, in contrast to 61.17% and 9.06% in turn in the Central area. Referring back to Figure 5, more foreign-owned firms feel it easier to access loans than private firms. Banks are more likely to lend to foreign-owned firms compared to privately-owned firms. In our sample, the median loan quota enjoyed by foreign-owned firms is about 40 million RMB (compared with 9 million RMB for privately-owned firms as shown earlier), and the value per employee is also highest among three types of ownership. Hence, there is a possibility that the external finance for privately-owned firms has been crowded out by the huge amount of foreign-owned firms in the Southeast, while the situation is less severe in the Central where there are far fewer foreign-owned firms. This further supports the finding of Haggard and Huang (2008) that Chinese government gives priority to foreign firms rather than the domestic private firms. This is not seen in the experience of East Asian newly industrialized countries except in Singapore. The ownership structure within private firms may also play a role in their ability to obtain loans. Guariglia et al. (2011) find that private firms that have negligible foreign participation (lower than 10% of ownership) and operate in the coastal region are subject to the highest competition for external funds and therefore, benefit most from higher cash flow. In our sample, over 95% of the private firms in the Southeast have less than 10% foreign ownership.

[26]If not controlled for the interaction term, financial development suggests significantly positive impact on firm growth in Bohai, Northeast, Northwest and Southwest, while corruption is never significant. As the estimates are insignificant, the 95% confidence intervals for the interaction terms are wide with the upper and lower bounds being above and below the horizontal axes respectively and moving towards the alternative directions. A conclusive finding can not be made on how corruption affects firm growth conditional on financial development in these regions. Estimated results are available upon request.

Figure 12: Total marginal effect of FD on g conditional on C, by region

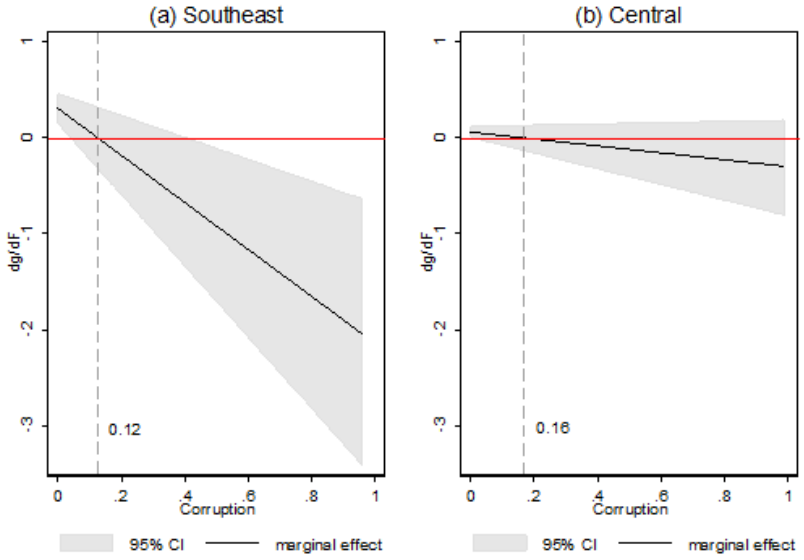
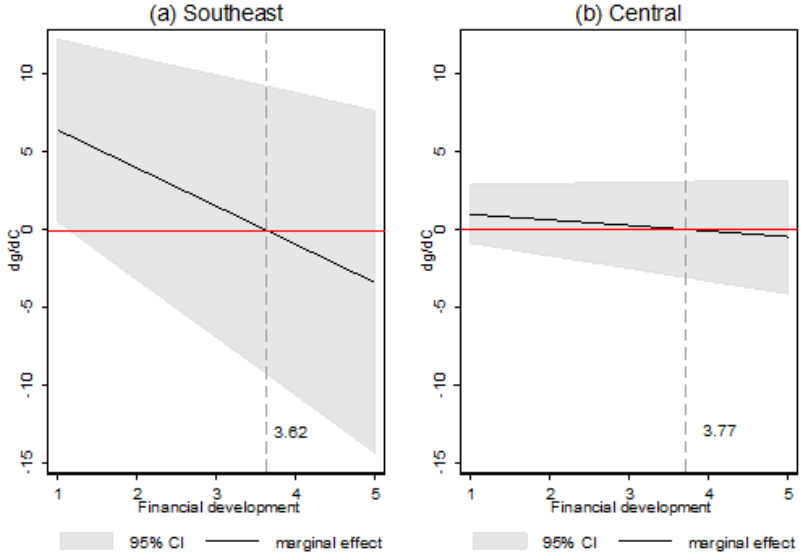


Figure 13: Total marginal effect of C on g conditional on FD, by region



With regard to the indirect effect, in terms of the interaction term of corruption and financial development, Figure 12 and 13 show that they appear to be substitutes in both the Southeast and Central regions. Similarly to the full sample case, we calculate the total marginal effects of corruption and financial development at the regional level and the corresponding corruption and financial development thresholds. Figure 12(a) suggests that if a firm in the Southeast spends more than 12% time of a year (44 days) handleing government relationships, easier access to loans would not bring more sales income, but rather deter its growth. Likewise, in Figure 13(a), if a firm in the Southeast finds it difficult to obtain loans (FD<3.62), the improvement in governance would provide lower benefit to its growth. This finding also underlines a nonlinear relationship between corruption and firm growth. Furthermore, it can be seen from Figure 12 that when the quality of governance is not very poor (below the corruption threshold in the Southeast, 44 days), better access to loans tends to bring a stronger growth-enhancing effect for the Southeast, the area with more foreign-owned firms, compared to the Central. Similarly, in Figure 13, if financial markets are not well functioned (below the financial development threshold, 3.62), the presence of corruption appears to promote firm growth more in the Southeast. Conversely, it is also worth noting that, when the financial markets are well developed (the quality of governance is very low), the presence of corruption (the finance) suggests a stronger growth-deterring effect for the Southeast. To conclude, compared to the Central, the richer Southeast seems to enjoy as well as suffer more from the impact of corruption on firm growth, which largely relies on the development of financial markets.

5 Conclusion

Corruption is detrimental to economic growth in the consensus view of development experts. Nevertheless, it may hamper growth to a lesser or greater degree depending on other social and economic factors. Empirical evidence suggests that not all countries with widespread corruption have suffered poor growth performance. China, as one of the "East Asian paradox" countries, has grown remarkably well in spite of high levels of corruption. This paper has sought to provide an explanation of the above puzzle from micro-level. We investigated how firm growth is affected by the presence of corruption and how the former relationship varies according to financial development. In addition, we examined in-depth whether the previous results change across types of ownership and regions.

Our results confirm the accepted facts that firm growth is promoted by

a well functioned financial market. Importantly, the high corruption but fast growth puzzle is resolved by the micro-level evidence that corruption committed by firms indeed enhances the growth of their sales income. This phenomenon has been further investigated by the interaction term of corruption and financial development. The negative impact of the interaction term on firm growth, indicates that corruption and financial development are substitutes to promote firm growth. Therefore, if one is worse, a stronger growth influence is caused by increasing the other. However, this substitution relationship does not always benefit firm growth. The growth-enhancing effect of corruption diminishes along with the financial development; financial development benefits firm growth more where there is less corruption. Similar results as full sample, can be particularly observed for the privately-owned firms and in the Southeast region. A slightly weaker effect is detected for the state-owned firms and in the Central region.

It is worth emphasizing that our results are context-specific, particular to China. This may not fit well with the conventional consensus of development experts. China is experiencing transition in its institutional and economic development, while the transition involves a variety of reforms. Some of the reforms happen more quickly than others, and many of them are cointegrated with each other in terms of influencing economic performance. Economic reforms create more opportunities and incentives to engage in corrupt practices (e.g., Bardhan, 1997), while improvements in institutions largely lag behind. Although low-quality institutions *per se* are bad for growth, their influence could be mitigated by the presence of corruption. At the current development stage, corruption helps circumvent cumbersome regulations as "speed money" and therefore, improves efficiency and extends to stimulate economic growth. However, as institutional improvements continue, the benefits of corruption will be reduced and eventually exhausted. This implies that corruption could bring some benefits during transition, but will ultimately be destructive unless anti-corruption policy is put into place. Additionally, the unique Chinese pattern is partly caused by the common feature of the "East Asian paradox" countries: having well-organised corruption networks. Shleifer and Vishny (1993) demonstrate that corruption is less damaging when it is more organised (or coordinated) because of the internalisation of externalities. Also, a more organised corruption network reduces the uncertainty that corruption generates and hence, causes less damage.

The above two conditions coexists and therefore, we observe the positive impact of corruption on firm growth during the transition. However, this growth-enhancing effect caused by corruption is transitory. Sustainable growth eventually requires well functioned institutions.

Appendix

Table A1 Construction and justification of variables

Variable	Definition
Firm growth	½[ln(firm total sales in 2005 per employee)-ln(firm total sales in 2003 per employee)]. Firms' total sales in 2003 are inflated to 2005 prices using provincial CPI.[a]
Financial development	1-5 categorical variable indicating how easily the firm is able to get loans since the macro policy changed in 2003, with 1 representing cannot get loans and 5 meaning easier.
Corruption	Share of days per year that the firm spends in dealing with four government departments: taxation, public security, environment and labour and social security. The higher the value, the higher the corruption.
ETC	Log expenditure in business travel, conferences and entertainment per employee, in 2005 prices.
Firm age	No. of years since the firm was established.
Firm size	No. of employees in 2005.
Bulk goods industry[b]	Whether the firm belongs to the bulk goods industry, yes=1.
Share of state ownership	Shares owned by governments or their agencies.
Share of foreign ownership	Shares owned by foreign investors and/or firms.
Production capacity	Share of real output in the maximum output if all input is used in production.
Sales per employee	Total sales per employee in 2003, inflated to the real term in 2005 prices by provincial CPI.
Value of fixed assets per employee	Value of fixed assets per employee in 2003, inflated to the real term in 2005 prices by provincial price indices of fixed investment.
Share of taxes & fees in sales	Share of all taxes and fees in the firm's total sales in 2005.
Export	Whether the firm directly exports goods, yes=1.
Share of inter-prov. sales	Share of the firm's inter-provincial sales in its total sales in 2005.

Note: a. Incomes are inflated to 2005 prices using provincial CPI. The value of fixed assets is inflated to 2005 prices using provincial price indices of fixed asset investment. Both kinds of price indices come from China Data Centre, University of Michigan.

b. This categorisation follows World Bank (2006). Low-value industry includes agricultural and side-line food processing, food production, and textile, garment, shoes and caps manufacturing. Bulk goods industry includes the production of raw chemical materials and chemical products, nonmetal mineral products and smelting and processing of (non)ferrous metals. High value industry includes pharmaceuticals and medical, electronics and telecoms equipment.

Table A2 Descriptive statistics, full sample

Variables	Mean	Median	S.E.	Min.	Max.	Obs.
g	0.160	0.123	0.362	-3.398	10.901	10753
C	0.148	0.107	0.149	0	1	12107
FD	2.935	3	1.179	1	5	11699
ETC	-0.002	0.129	1.760	-8	8.584	12089
ln(firm age)	2.112	2.079	0.856	0.693	4.043	12212
ln(firm size)	5.559	5.521	1.417	1.792	9.148	12089
share of state owned	0.465	0.483	0.439	0	1	12212
share of foreign owned	0.147	0	0.318	0	1	12212
bulk goods industry	0.736	1	0.441	0	1	12212
production capacity	0.828	0.900	0.180	0	1	12182
ln(sales income per employee) in 2003	5.229	5.191	1.287	-15.604	15.152	12212
ln(fixed assets per employee) in 2003	0.082	0.041	0.117	0.0001	2.572	12182
share of tax & fees in sales	0.037	0.030	0.039	0	1.169	10753
export	0.412	0	0.492	0	1	12212
share of inter-prov. sales	0.393	0.300	0.348	0	1	12211

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