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Can corruption really function as "protection money" and "grease money"? Evidence from Chinese firms

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ABSTRACT

This paper directly investigates the "grease money" and "protection money" effects of corruption based on Chinese firm survey data. First, we identify a significantly positive effect of bribes on firm profitability only for non-state-owned enterprises (non-SOEs). Further empirical analysis shows that this positive effect mainly exists in less contract-intensive industries and simple goods industries. Then we find that corruption functions as "protection money" for non-SOEs by showing that bribes can lower effective tax rates. We further show that bribes can help non-state firms circumvent red tape and increase their probability of obtaining government procurement contracts, thus validating the "grease money" hypothesis. Our results suggest that both effects of corruption exist for non-SOEs in China, thereby identifying a new profit-enhancing factor in the non-state sector in recent years.

1. Introduction

China has long been plagued by corruption, which has become one of the country's central social and political issues, having increased to an epidemic level since the advent of the "reform and opening" policy in 1978.[1] Despite having achieved spectacular progress in economic development, China, as the current second largest economy, has always found itself stuck in an awkward position regarding its corruption ranking, taking only 100th place among the 175 countries in the 2014 "Corruption Perception Index".[2] In fact, especially in business circles, the networks of personal ties with government officials are viewed as a very important resource for obtaining government-related benefits such as access to political power, preferential treatment in the allocation of scarce resources and protection of property rights. That many firms invest time and money in creating and maintaining these networks is a common phenomenon in contemporary China.

However, it seems that not all countries suffering from widespread corruption experience poor economic development. This phenomenon, termed the "East Asia paradox" by Wedeman (2002), points to the fact that some East Asian countries like China, Indonesia and South Korea have displayed significant economic growth despite widespread corruption. Allen et al. (2005) argue that even without sound legal and financial institutions, China's non-state sector still grows much faster than the state sector and serves as the engine of the rapid economic growth. They attribute the astounding development of the non-state sector to the system of an alternative mechanism based on relationships. Blackburn and Wang (2009) ascribe this paradox to a more organized corruption

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[1] According to Blackburn and Wang (2009), corruption includes three categories in China − shouhui (the extortion and acceptance of bribes), tanwu (the misappropriation of public property) and tequan (seeking privileges and favors). As we focus mainly on corruption between firms and government officials through bribes here, corruption basically refers to the first category.

[2] Please see http://www.transparency.org/cpi2014/results for details.

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network in China, where the collective bureaucracy internalizes the negative externalities of increasing individual bribe amounts on the bribe-taking capacity of others with reduced uncertainty. Fan and Grossman (2001) argue that the central government of China actually uses corruption as a decentralized compensation scheme. Those local officials who have made larger contributions in the reform are likely to extract larger bribes and have more valuable public property to appropriate with smaller chances of being punished. In this sense it is rational to reconsider corruption as a growth-enhancing factor in order to shed new light on the business growth model in China.

This paper uses firm-level data from the 2005 Investment Climate Survey by the World Bank to explore the effect of corruption on firm development in China. Among the empirical literature that examines the effect of corruption by using firm-level survey data, some papers find that corruption is detrimental to firm performance (e.g., Fisman and Svensson, 2007; Cai et al., 2011; Nguyen and Van Dijk, 2012), while others identify a positive effect (e.g., Hellman et al., 2003; Vial and Hanoteau, 2010; Wang and You, 2012).[3] Especially in the context of excessive overregulation, rigid administration and lack of market-supporting mechanisms, corruption is argued to help overcome distortions caused by these and enhance efficiency in a second-best sense. In the literature, corruption promotes economic efficiency mainly through the channels of "grease money" and "protection money". Regarding "grease money", on one hand, bribery can function to help reduce red tape imposed on firms, such as circumventing cumbersome regulations, reducing long waiting times and speeding up the allocation of licenses and permits (Leff, 1964; Leys, 1965; Huntington, 1968; Lui, 1985). Lui (1985) established a queuing model where the opportunity costs of different agents are embodied in their size of bribery, with more efficient agents more able or willing to buy lower effective red tape, thus leading to Pareto efficiency. Dreher and Gassebner (2013), employing a dataset covering a maximum of 43 countries over 2003 to 2005, show that the existence of a larger number of procedures required to start businesses and larger minimum capital requirements prove to be detrimental to entrepreneurship, but corruption can reduce the negative impact and facilitate firm entry in those highly regulated economies. On the other hand, the "grease money" effect also refers to a mechanism where firms enjoy preferential treatment in the allocation of scarce resources through bribery, which eventually results in an efficient outcome as achieved by a competitive auction. In a bribery game characterized by competitive bidding for a crucial resource, such as government procurement contracts, the corrupt official awards the contract to the bidder willing to pay the highest bribe, leading to allocation efficiency (Bardhan, 1997).[4] The other channel, "protection money", can serve to lessen the risks of government predation, for example by protecting property rights and reducing tax burdens for firms. Hellman et al. (2003) show that captor firms experience more improvement in individualized protection for their own property rights in a high-capture economy. Cai et al. (2011) demonstrate that for firms with a higher lagged tax rate, the negative effect of corruption on productivity is smaller, thus indirectly verifying the "protection money" hypothesis.

We use entertainment and travel costs (ETC) to measure firm-level corruption, following Cai et al. (2011). We believe this proxy has some advantages. First of all, this expenditure item is publicly recorded and reported in the financial statements of Chinese firms, and therefore this data is very easy to access. Second, this data is more objective and accurate, without the biases involved in the subjective perception index. In fact, this item is unlikely to have measurement errors because each reimbursement requires a receipt. Last but not least, it can well reflect the nature and amount of corruption or, more specifically, bribes in each firm. In addition to the legitimate expenses of entertainment (e.g., meals, gifts, karaoke) and travel, managers of Chinese firms always use this item to cover considerable expenses spent in bribing government officials with fake or inflated receipts. Therefore, this expenditure item should be an appropriate indicator of corruption for firm-level studies.

This paper intends to directly investigate the "grease money" and "protection money" effects of corruption based on firm-level survey data. First, by using instrument variables to account for the possible endogeneity of ETC, we find that corruption has a significantly positive effect on firm profitability for the full sample and for non-state firms, while this effect is insignificant for SOEs. Further empirical analysis shows that this positive effect mainly exists in less contract-intensive industries and simple goods industries. Then, we proceed to directly test the "protection money" and "grease money" effects. By using the effective tax rates (ETR) to proxy state predation, our paper finds that ETC can significantly reduce ETR for non-state firms, whereas ETC significantly increases ETR for SOEs. Regarding the "grease money" effect, on the one hand, we use the time the CEO spends on government assignments and communications to proxy red tape, with the empirical result showing a significantly negative relationship between ETC and the wasted managerial time for non-SOEs. On the other hand, we also test whether corruption can help firms get favorable treatment in obtaining key resources. In this part we mainly focus on two resources: government procurement contracts and bank credit. Our empirical results demonstrate that the more ETC a firm spends, the higher the probability of having its products purchased by the government for non-state firms, albeit not for SOEs. However, corruption does not seem to have any effect in helping firms alleviate financial constraints or obtain bank loans, regardless of ownership type. To sum up, our conclusions suggest that corruption can enhance firm profitability for non-state firms by easing the tax burden, reducing red tape and obtaining government contracts, thus verifying most of the "protection money" and "grease money" hypotheses.

Our study extends the literature on corruption by demonstrating that the effects of corruption on firm performance and the related mechanisms are conditioned by the ownership structure. On the one hand, given the unique institutional characteristics in China, non-SOEs and SOEs face significantly different external environments. On the other hand, internal factors, such as firm objectives and CEO incentives, also differ greatly among them. These differences determine that the effects of corruption and the specific channels

[3] Most of the literature regarding this topic uses cross-country macro data to investigate the detrimental effect of corruption on economic growth, investment, FDI, innovation and entrepreneurial activities (e.g., Mauro, 1995; Wei, 1997; Mo, 2001; Keefer and Knack, 1997; Knack and Keefer, 1995; Anokhin and Schulze, 2009).

[4] Beck and Maher (1986) show that in an auction model with incomplete information about the cost levels of other bidders, the firm with the lowest cost can always win the contract by offering the highest bribe. Thus bribery can reproduce the efficiency consequences of a competitive bidding system even under imperfect information.

through which the effects take place should also be different and need to be treated separately in the research. Moreover, this paper directly investigates the "grease money" and "protection money" effects of corruption in a systematic manner. The study by Cai et al. (2011) might be most closely related to ours. However, the authors explore the functioning mechanisms of corruption *indirectly* by showing that firms with higher tax burdens and fewer helpful government officials suffer from a smaller negative effect of corruption on firm performance. In contrast, we *directly* test the "protection money" and "grease money" hypotheses by focusing on the effect of corruption on tax burdens,[5] red tape, access to government procurement contracts and financial resources. Thus, this paper provides more direct and specific evidence in testing the hypotheses. Finally, this paper provides new insights into profit-enhancing factors in the non-state sector and sheds further light on the role of the relationship-based system in China (Allen et al., 2005).

This paper is structured as follows. In Section 2, we introduce the institutional background and formulate the hypotheses. Section 3 discusses the research design, including the sample, variables and econometric specifications. Section 4 reports the empirical results and Section 5 performs robustness checks. Section 6 concludes.

2. Institutional background and hypothesis development

The non-state sector has played an exceedingly significant role in the growth of the whole Chinese economy. However, mainly due to ideological reasons, private enterprises were completely forbidden until around 1980 and it was not until 1987, the 13th National Congress of the Communist Party of China (CPC), that the private sector was acknowledged as a necessary supplement to the state sector. In fact, the real advancement of the non-state sector only occurred in the 1990s after Deng Xiaoping's 1992 south China tour, which in a real sense boosted the development of the private economy and initiated the restructuring of SOEs (Tsui et al., 2006; Gregory et al., 2000). Since then, the growth rate of the non-state sector has accelerated and outpaced that of the public sector. It grew from barely nothing in the first 20 years since the founding of the PRC to accounting for 49.7% of the total GDP with 29.3 million private enterprises registered by 2005 (Tsai, 2007). In 2004, the National People's Congress finally approved a constitutional amendment that clearly announced the protection of private property rights in the constitution for the first time in the history of Communist rule. Therefore, it took half a century for the legal status of private ownership to be officially endorsed by the CPC.

Given the sluggish and incomplete institutional improvements regarding the non-state sector, non-state firms, particularly private firms, have been confronted with adverse economic, legal and political situations. On the one hand, they are usually denied access to key resources, such as credit and land, because governments have strong monopolistic control over both input and product markets (Chang and Wang, 1994). A considerable amount of the literature finds that larger SOEs enjoy better access to bank loans due to the lending bias towards SOEs in the predominately state-owned banking sector (e.g., Cull and Xu, 2003; Cull et al., 2009). As a result, non-state firms in China are much more financially constrained than SOEs, especially private ones (Chen, 2008; Poncet et al., 2010). Also, non-state firms stand a very slim chance of getting government procurement contracts (Szamosszegi and Kyle, 2011). On the other hand, non-state firms are frequently subject to excessive red tape and arbitrary state predation (Pearson, 1997; Li et al., 2006). It is well known that it takes a very long time and cumbersome procedures for private entrepreneurs to start up new businesses and obtain the necessary licenses/permits in China (López de Silanes et al., 2002). Besides, corrupt bureaucrats usually have discretion over the nature and amount of harassment and extort bribes. Local bureaucrats often impose high tax rates, informal levies and extralegal payments on non-state firms to increase both budgetary and off-budgetary revenues, often in the name of fulfilling corporate social responsibilities or contributing to local public projects (Du et al., 2015). These impose heavy burdens and extra costs on non-state firms in China due to the inefficiency of the legal system in protecting property rights. However, as offering bribes is a well-accepted practice in business transactions in China that could function to help overcome market and legal failures and avoid ideological discrimination, it makes sense that corruption should have a very significant marginal effect on the performance of non-state firms by greasing the wheels of business and protecting property rights. Furthermore, private firms, as the engine of growth in China, prove to be more efficient and productive than SOEs (e.g., Guariglia et al., 2011; Poncet et al., 2010). Therefore, the "grease money" and "protection money" effects of corruption can contribute to helping non-state firms release more potential, which would otherwise be seriously suppressed by the external environment.

H1. In China, corruption can significantly improve the performance of non-state firms.

H2. For non-state firms in China, corruption can function as "grease money", namely, to reduce red tape and secure preferential treatment in the allocation of key resources, and as "protection money", namely, to get protection against government expropriation.

As SOEs have more direct and explicit ties with the government through shareholding, this indicates that they do not suffer from the aforementioned barriers and difficulties faced by non-state firms. This means that the role of bribery may not matter so much for them as for non-state firms, implying that the value of corruption is largely diluted by government ownership. Second, due to the lack of accountability and external monitoring, SOEs tend to have poorer corporate governance and thus their top managers or CEOs are more likely to expand managerial discretion and engage actively in empire building (Qian, 1996). Third, above all, the CEOs of SOEs face a different reward system and have strong incentives to use resources to bribe the specific government officials who may have an influence on their future careers rather than those who are crucial to the development of firms (Cull et al., 2015; Xu and Yano, 2017). Moreover, those CEOs who are more concerned about their future careers, thus committing more resources to bribe upper-level officials, have a stronger tendency to give top priority to social and political objectives rather than profit maximization. For example,

[5] We use effective tax rates, while Cai et al. (2011) use total tax rates.

Table 1
Summary statistics of ETC by province and industry.

Province	Mean	Freq.	Industry	Mean	Freq.
Anhui	0.012	400	agricultural and side-line food processing	0.007	969
Beijing	0.012	200	food production	0.010	243
Chongqing	0.007	200	beverages production	0.017	178
Fujian	0.008	500	tobacco production	0.006	46
Gansu	0.013	200	textiles manufacturing	0.007	952
Guangdong	0.007	900	garment, shoes and caps manufacturing	0.010	206
Guangxi	0.013	300	leather, furs, down and related products	0.011	139
Guizhou	0.018	200	timber processing, palm fiber and straw products	0.012	141
Hainan	0.024	100	furniture manufacturing	0.011	55
Hebei	0.010	800	papermaking and paper products	0.007	235
Heilongjiang	0.014	300	printing and record medium reproduction	0.015	62
Henan	0.010	700	cultural, educational and sports goods	0.008	41
Hubei	0.012	700	petroleum processing and coking	0.005	182
Hunan	0.018	600	raw chemical materials and chemical products	0.011	1441
Jiangsu	0.012	900	medical and pharmaceutical products	0.029	426
Jiangxi	0.010	500	chemical fiber products	0.003	47
Jilin	0.015	200	rubber products	0.011	21
Liaoning	0.013	600	plastic products	0.010	329
Inner Mongolia	0.014	200	nonmetal mineral products	0.010	1299
Ningxia	0.011	200	smelting and pressing of ferrous metals	0.004	491
Qinghai	0.018	100	smelting and pressing of non-ferrous metals	0.006	345
Shaanxi	0.015	300	metal products	0.010	366
Shandong	0.007	900	general machinery	0.018	1077
Shanghai	0.013	200	equipment for special purposes	0.018	486
Shanxi	0.011	300	transportation equipment	0.011	989
Sichuan	0.010	500	electrical equipment and machinery	0.013	864
Tianjin	0.012	200	electronic and telecommunications equipments	0.010	598
Xinjiang	0.016	100	instruments, cultural and office machinery	0.013	60
Yunnan	0.009	300	handicraft products and other machinery	0.009	109
Zhejiang	0.010	800	renewable materials processing	0.011	3
Total	0.011	12400	Total	0.011	12400

SOEs controlled by these CEOs may intentionally overinvest to increase output and reduce unemployment (Wu et al., 2012) or have higher effective tax rates (Bradshaw et al., 2012). This indicates that SOEs that devote more resources to bribes, which may indicate stronger ambitions of the CEOs for political promotion, may not perform better at all, or may even perform worse due to the conflicts of interest.

H3. In China, corruption can neither significantly improve the performance of SOEs nor exert “grease money” and “protection money” effects on the development of SOEs.

3. Research design

3.1. The sample

The data used in this paper come from the 2005 Investment Climate Survey of China conducted by the World Bank. It covers 12400 manufacturing firms from 120 cities in 30 provinces (including autonomous regions and directly administered municipalities) of China. Except for Tibet, Hong Kong, Macau and Taiwan, all provinces are included in the survey. In the 4 directly administered municipalities (Beijing, Shanghai, Tianjin and Chongqing), 200 firms are surveyed in each region, while in the other cities the sample number is 100. In order to enhance the consistency and credibility of the survey, all the enterprises are from manufacturing industries. The survey questionnaire consists of two parts. In the first part, the general manager or CEO is asked qualitative questions, mostly regarding the business climate faced by the firm in the survey year. The second part involves financial and accounting information, most of which goes back three years. This information is obtained directly from the firms' financial statements with the help of the firms' chief accountants.[6] Table 1 displays the distribution of the sample firms based on regions and industries.

3.2. Variables and econometric specifications

The first part of the paper investigates the effect of corruption on firm performance. The basic econometric model takes the following form:

[6] For more details of the survey, please refer to World Bank (2006) and other empirical studies using the same data (e.g., Cai et al., 2011; Wang and You, 2012; and Cull et al., 2015).

$$ROS_i = \alpha_1 + \alpha_2 ETC_i + \boldsymbol{X_i'}\theta + \boldsymbol{D_c} + \boldsymbol{D_d} + \varepsilon_i \quad (1)$$

We use industry-adjusted return on sales (*ROS*) to measure firm performance, calculated as the ratio of net profits to sales after subtracting its industry means.[7] This measure reflects the net profitability of firms, also properly taking into account industry heterogeneity. *ETC*, measured as the ratio of entertainment and travel costs to sales, is used in this study to proxy firm-level corruption in Chinese firms. On the basis of the analysis in the introduction, this is an appropriate indicator with many advantages compared to the ones used in the previous corruption literature. According to the hypotheses in Section 2, α_2 should be significantly positive for non-state firms, while for SOEs it should not be significantly different from zero. X_i' is the set of control variables that may both determine firm performance and be correlated with ETC. We control basic firm characteristics in X_i', including firm size, asset tangibility, age, export status, shares held by the state and foreigners, tax burden and government help.[8] In a less parsimonious specification, a firm's R & D spending intensity and the human capital of both employees and CEOs (i.e., employee schooling, CEO schooling and experience, and whether the CEO is appointed by the government) are further included in the model, as these have been increasingly popular explanations for firm behavior and performance (e.g., Bruhn et al., 2010; Li et al., 2008). To alleviate the potential endogeneity, we lag the control variables by one year as long as the lagged values are available in the dataset.[9] $\boldsymbol{D_c}$ and $\boldsymbol{D_d}$, representing 120 city dummies and 3 dummies for industry groups (bulk goods, low value and high value),[10] respectively, are also controlled for to account for the different location and industry effects.

However, using OLS to estimate Equation (1) can lead to biased results due to the problem of reverse causality, omitted variables and measurement errors (see Fisman and Svensson, 2007). In order to deal with potential endogeneity, we here use the median ETC in the firm's city-industry cell as the instrument for firm-level ETC. We believe that the industry-location median of ETC, as a proxy for general corruption status in the specific location and industry, should be highly correlated with each firm's ETC but does not directly or indirectly affect firm performance through variables other than its own ETC as long as the related regional and industry effects are properly controlled for (Fisman and Svensson, 2007; Cai et al., 2011). Besides, to conduct the overidentifying test, we employ another variable, a dummy variable indicating whether the firm has specialized staff to handle government relationships (*Special staff*), as a complementary IV, as did Wang and You (2012).[11]

In the second part, we focus on the specific channels through which the effect takes place. Regarding the "protection money" hypothesis, we employ the effective (income) tax rate (*ETR*) as a proxy for government expropriation. This variable is calculated as the ratio of income tax expenses over earnings before interests and tax (EBIT). In this context, ETR has several advantages compared with the total tax rate in terms of the purpose of our research. First of all, the value-added tax accounts for a large proportion in a firm's total tax payments. However, the policy for value-added tax is basically the same for all kinds of firms without preferential policies or treatment. Thus, the very existence of value-added tax in total tax blurs other tax benefits firms may obtain through bribes. Second, the Chinese government often uses income tax policies to implement various industrial policies to support the development of targeted industries (Wu et al., 2012).[12] Moreover, the corporate income tax is generally collected by officials in local tax bureaus,[13] and thus both the enforcement of tax law and tax collection efforts differ greatly across cities, which leaves more latitude for manipulation and corruption. The model specification is very similar to Eq. (1), only with the dependent variable replaced by ETR and some adjustments in the control variables.

Next we turn to testing the "grease money" hypothesis. On one hand, we use the time a CEO spends on government assignments and communications per month to measure red tape. This variable is derived from the question: How many days does the CEO or Vice CEO spend on government assignments and communications per month?[14] There are 8 answers listed below: (1) 1 day (2) 2–3 days (3) 4–5 days (4) 6–8 days (5) 9–12 days (6) 13–16 days (7) 17–20 days (8) > 21 days. We create the variable *Time* by taking the midpoint value of each interval.[15] On the other hand, we proceed to test the "grease money" effect that is presumed to enhance allocation efficiency for firms by focusing on two key resources: government procurement contracts and bank loans. We create the dummy variables *Selltogov* and *Loan Access* to indicate whether firms have gained access to these two resources respectively, i.e., whether a firm sells products to the government and whether firms have taken loans from banks or other financial institutions. Again, the specifications are very similar to Eq. (1), only with the dependent variable replaced by the above variables and some adjustments in the set of control variables.

Furthermore, we also examine whether bribes can help firms secure preferential treatment in obtaining financial resources by investigating the effect of bribes on the sensitivity of investment to internal cash flows. The econometric model is specified as follows:

[7] Information on assets or equity is not available in our dataset.

[8] Following Cai et al. (2011), to avoid endogeneity, we use the city-industry median of firm-level observations of tax burden and government help to measure the severity of government expropriation and the quality of government services, respectively.

[9] This applies to all regressions in this paper.

[10] Please see World Bank (2006) for details.

[11] Our results are robust to using only the city-industry median of ETC as the IV.

[12] For example, firms located in special economic zones for high-tech firms in China are given various tax incentives. However, some firms may bribe officials to locate in such zones to enjoy these preferential treatments even though they are not qualified as high-tech and do not engage in R & D activities.

[13] According to the "Notifications regarding the scope of collection and administration of corporate income tax" of the National Tax Bureau (1995, No.23), for firms established before 2002, corporate income tax is collected and administered by local tax bureaus, except for central SOEs and foreign firms. A dominant portion of our sample firms fit these criteria.

[14] Government agencies include Tax Administration, Customs, Labor Bureau, Registration Bureau, etc; assignments refer to handling the relationship with government workers, consolidating and submitting various reports or statements, etc.

[15] For the eighth interval, we take the value 25.5.

Table 2
Summary statistics for key variables.

Variable	Mean	Median	SD	Min	Max	N
ETC	0.011	0.005	0.023	0	0.540	12122
ROS	0.024	0.020	0.380	−19.21	3.413	12122
ETR	0.156	0.056	0.246	0	1	11915
Time	3.943	2.500	3.505	0.500	25.50	11991
Selltogov	0.153	0	0.360	0	1	12121
Loan Access	0.597	1	0.490	0	1	12122
ln(Firm size)	5.532	5.468	1.478	0	11.70	12121
ln(Fixed assets pc)	3.843	3.926	1.376	−0.157	7.013	12102
ln(Firm age)	2.108	2.079	0.857	0.693	4.043	12122
Sales growth	0.610	0.187	1.851	−0.584	14.50	12067
State ownership	0.130	0	0.311	0	1	12122
Foreign ownership	0.147	0	0.319	0	1	12122
Tax burden	0.043	0.040	0.032	0	0.864	12122
Government help	0.337	0.237	0.315	0	1	12098
R & D intensity	0.010	0.000	0.031	0	0.680	12112
Employee schooling	0.476	0.460	0.276	0	1	12118
Appointed CEO	0.115	0	0.319	0	1	12091
CEO experience	6.392	5	4.712	1	56	12107
CEO schooling	4.570	5	0.998	0	6	12108

$$\frac{Inv_{it}}{K_{it-1}} = \beta_0 + \beta_1 \frac{CF_{it}}{K_{it-1}} + \beta_2 \frac{CF_{it}}{K_{it-1}} * ETC_{it} + \beta_3 ETC_{it} + \boldsymbol{W_{it}'}\boldsymbol{\gamma} + \boldsymbol{D_c} + \boldsymbol{D_d} + \mu_{it} \quad (2)$$

Based on the framework of Fazzari et al. (1988) and Hadlock (1998), the dependent variable in Eq. (2) is measured as the ratio of fixed assets investment to lagged capital stock (the net value of fixed assets) and the key explanatory variable, $\frac{CF_{it}}{K_{it-1}}$, is calculated as the ratio of cash flows to lagged capital stock. If this variable has a significantly positive effect on investment intensity, this signifies the existence of financial constraints due to capital market imperfections under certain assumptions. In order to test whether corruption can indeed help firms ease financial constraints, we include an interaction term between *ETC* and $\frac{CF_{it}}{K_{it-1}}$. A significantly negative coefficient of this interaction ($\beta_2 < 0$) will empirically corroborate the above effect. Other control variables in $\boldsymbol{W_{it}'}$ closely follow the previous literature in this line of research (see Cull et al., 2015). For more detailed definitions of the variables used in this paper, please refer to Table A1 in the Appendix. Table 2 reports the descriptive statistics of the key variables.[16]

4. Empirical results

4.1. The effect of corruption on firm performance

Table 3 demonstrates the estimation results of Eq. (1), which investigates the effect of corruption on firm profitability for the full sample, non-SOEs and SOEs, respectively. Columns (1) and (2) adopt the two-step Generalized Method of Moments (GMM) to estimate the regression for the whole sample using the city-industry median of ETC and a dummy variable *Special staff* as instruments, with column (2) further controlling for a firm's R & D intensity and human capital. The coefficient of *ETC* is statically significant in both specifications, albeit only at the 10% level in column (2). Through columns (3)–(6), we repeat the estimations separately for non-state firms and SOEs.[17] We find that the effect of bribes on firm performance is significantly positive for non-state firms, but insignificant for SOEs. This verifies our previous hypotheses, given the fact that non-state firms and SOEs face significantly different external and internal environments. For non-state firms, one standard deviation (σ) increase in *ETC* increases *ROS* by 0.043 (0.113 σ of *ROS*), larger than that in the whole sample. The Durbin-Wu-Hausman (DWH) test strongly rejects the null hypothesis that ETC can be treated as an exogenous variable in all specifications except columns (5) and (6). Thus, the simple OLS estimation can lead to inconsistent coefficients. Both the weak identification test (Kleibergen-Paap rk Wald F statistic) and the overidentifying test (Hansen J test) verify the validity of our two IVs.[18]

The empirical results in Table 3 also show that for the whole sample and the non-state subsample, firms with higher asset tangibility, better historical profitability, more government help and better quality of human capital have significantly higher current ROS. Moreover, state shares and CEOs appointed by the government generally detract from firm performance. Finally, CEO

[16] To avoid outliers driving our results, we winsorize some variables with extreme outliers at the 1% and 99% percentiles, including *ln(Fixed assets pc)*, *Sales growth*, *CF/Lagged K*, *Inv/Lagged K*. We also drop two (one) observation(s) with the value of *ROS* (lagged *ROS*) smaller (larger) than −20 (20). Besides, in the survey, firms are asked to report the year they were established. Some firms reported a number smaller than 1000. Following Wang and You (2012), we trim off the highest 1% according to the empirical distribution of firm age.

[17] Similar to Cull et al. (2005), firms' ownership type is defined based on the response to the ownership type question in the questionnaire. If the answer is "state", the firm is classified as an SOE; if the answer is either "corporation", "collective", "private", "foreign" or "Hong Kong, Macao and Taiwan", the firm is categorized as a non-state firm. Our results remain robust to alternative definitions of firms' ownership type.

[18] In the unreported first-stage regressions, the coefficients of both excluded IVs are significantly positive at the 1% level.

Table 3
The effect of corruption on firm performance (Net income/Sales).

	Full sample		Non-SOEs		SOEs	
	(1)	(2)	(3)	(4)	(5)	(6)
ETC	1.699**	1.530*	1.800**	1.776**	8.662	8.244
	(0.824)	(0.849)	(0.807)	(0.829)	(10.724)	(10.918)
ln(Firm size)	−0.004	−0.005	−0.001	−0.001	−0.000	0.008
	(0.004)	(0.004)	(0.003)	(0.003)	(0.023)	(0.027)
ln(Fixed assets pc)	0.010***	0.008***	0.010***	0.009***	0.010	0.009
	(0.003)	(0.003)	(0.002)	(0.002)	(0.034)	(0.033)
ln(Firm age)	−0.008	−0.007	−0.004	−0.006	−0.018	−0.018
	(0.006)	(0.006)	(0.006)	(0.006)	(0.017)	(0.017)
State ownership	−0.071***	−0.060***	−0.066*	−0.062*	−0.051	−0.040
	(0.020)	(0.018)	(0.038)	(0.035)	(0.043)	(0.039)
Foreign ownership	0.001	−0.001	0.003	0.002		
	(0.008)	(0.008)	(0.008)	(0.008)		
Tax burden	−0.094	−0.092	−0.248	−0.276	0.352	0.310
	(0.233)	(0.230)	(0.306)	(0.304)	(0.309)	(0.279)
Government help	0.043***	0.041***	0.033**	0.033**	−0.030	−0.032
	(0.015)	(0.014)	(0.014)	(0.013)	(0.074)	(0.075)
Export	−0.006	−0.006	−0.005	−0.006	−0.026	−0.027
	(0.008)	(0.007)	(0.008)	(0.008)	(0.061)	(0.066)
Production capacity	0.054***	0.049**	0.023	0.020	0.131	0.115
	(0.020)	(0.021)	(0.023)	(0.023)	(0.142)	(0.146)
Lagged ROS	0.561***	0.557***	0.426***	0.427***	0.793***	0.791***
	(0.082)	(0.081)	(0.039)	(0.038)	(0.156)	(0.164)
ln(City GDP pc)	0.127	0.150	0.092	0.093	0.430	0.384
	(0.116)	(0.120)	(0.142)	(0.141)	(0.461)	(0.459)
R & D intensity		0.186*		0.028		−0.301
		(0.104)		(0.100)		(0.652)
Employee schooling		0.044***		0.016*		0.103
		(0.017)		(0.009)		(0.126)
Appointed CEO		−0.031*		−0.030*		−0.026
		(0.016)		(0.017)		(0.037)
CEO experience		0.000		0.001***		−0.006
		(0.001)		(0.000)		(0.011)
CEO schooling		−0.002		−0.000		−0.049
		(0.003)		(0.002)		(0.041)
Observations	12069	12036	11029	10999	1040	1037
Under-identification test (*p*-value)	0.001	0.001	0.001	0.001	0.001	0.001
F test of instruments	71.240	65.155	54.259	49.496	27.891	26.723
Hansen J test (*p*-value)	0.843	0.959	0.508	0.647	0.257	0.228
DWH endogeneity test (*p*-value)	0.002	0.003	0.010	0.011	0.262	0.340

Notes: a) All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The firm-level ETC is instrumented by the city-industry median of ETC and the dummy variable *Special Staff*. The robust standard errors (reported in parentheses) are clustered at the industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively. b) The Kleibergen-Paap rk LM statistic is used to test for the null hypothesis that the equation is under-identified and the Kleibergen-Paap rk Wald F statistic for the null hypothesis that the excluded instruments are weak. The 10% and 15% maximal IV size in Stock and Yogo (2005) are 19.93 and 11.59, respectively.

experience significantly increases firm profitability for non-state firms.[19]

4.2. The heterogeneous effects of corruption on firm performance among different industries

While we found in the previous subsection that corruption, measured by ETC, contributes to firm profitability in China particularly for non-state firms, we also suspect that this effect may vary greatly among different industries. Especially for contract-intensive industries and complex goods industries, investments tend to be highly relationship-specific and irreversible, and thus their production and profits can be jeopardized to a greater extent by a bad institutional environment under incomplete contracts.[20] The production of contract-intensive and complex goods in particular involves some degree of outsourcing, which makes virtually all production processes highly dependent on contracts and thus on contract-enforcing institutions. Corruption worsens the enforcement of contracts and significantly increases transaction costs (Berkowitz et al., 2006). We thus hypothesize that firms operating in less contract-intensive industries and simple goods industries benefit more from corruption than those in more contract-intensive

[19] In an unreported table, we further control for the wages of CEOs, a dummy indicating whether the firm has incentive plans for the CEO, local infrastructure quality and provincial-level institutional quality (Fan et al., 2006) both respectively and simultaneously. The regression results remain basically unchanged.

[20] We thank an anonymous referee for pointing this out, thus making our results more convincing.

industries and complex goods industries.

Rauch (1999) classifies the 4-digit SITC industries into 3 trading categories: (1) goods that are mainly traded on organized exchanges; (2) goods that are reference-priced; and (3) goods that are neither reference-priced nor traded on organized exchanges. Because the World Bank Enterprise Survey data we use are based on the classification very similar to the 2-digit ISIC industry codes, which means one 2-digit ISIC industry may include many 4-digit SITC industries, we assign the numbers 1, 2 and 3 to the corresponding three categories in Rauch (1999) mentioned above and use the average to measure goods complexity at our 2-digit industry level.[21,22] Industries with this value lower than the sample median are categorized as simple goods industries. Following Nunn (2007) and Ma et al. (2010), we measure contract intensity by the proportion of intermediate inputs for which relation-specific investments are required.[23] Industries where this measure is lower than the median are classified as less contract-intensive industries.

Table 4 shows the heterogeneous effects of corruption by industry among non-SOEs. As expected, the positive effect found in the previous subsection is only statistically significant for firms operating in less contract-intensive industries and simple goods industries.[24] The magnitude of this impact is larger than that in Table 3. For example, one σ increase in ETC increases ROS by 0.15σ and 0.17σ for less contract-intensive industries and simple goods industries, respectively. The results are consistent with economic theory and indicate that the effect of corruption is conditional on both ownership type and industry attributes.

4.3. Protection money − the effect of corruption on effective tax rates (ETR)

We make some adjustments on the original ETR according to the prior literature. We (1) exclude firms whose effective tax rate exceeds 1 (Zimmerman, 1983; Gupta and Newberry, 1997; Adhikari et al., 2006); (2) set ETR to 0 for firms with tax refunds and to 1 for firms with positive taxes but negative or 0 EBIT.[25] We employ the Tobit model to account for the large number of observations with 0 ETR.[26] In columns (1) and (2) of Table 5, we estimate the effect of ETC on ETR for the whole sample and find no significant effect. In columns (3)–(4) and (5)–(6), we repeat the estimation separately for non-state firms and SOEs. However, we get completely opposite results: a significantly negative effect for non-state firms and a significantly positive effect for SOEs. This result for non-SOEs corroborates our assumption that bribes can ease non-state firms' tax burdens in an economy characterized by weak protection of property rights. According to the result in column (4), increasing ETC by one σ decreases ETR by almost 1 percentage point (5.3% of the mean of ETR). However, the results for SOEs are consistent with Bradshaw et al. (2012), who find that SOEs have a significantly higher effective income tax rate than non-state enterprises, especially when the SOE managers are in the year of evaluation for political promotion and they are rewarded for the higher tax rate with a higher probability of being promoted. In our context, SOEs that devote more resources to bribes, which may indicate stronger ambitions for political promotion, accordingly have higher levels of ETR. Therefore, our results suggest that the managers of SOEs use tax payments as one of the tools for achieving promotion.

We also find that, for the whole sample and the non-state subsample, both asset tangibility and access to bank loans have a significantly negative effect on ETR. This is consistent with our expectation and the prior literature in that the accelerated depreciation of fixed assets and interest payments can be deducted from the taxable income. The coefficient of *Sales growth* is also statistically significant and negative, implying that growing firms may invest more in tax-favored assets. We also find that larger firms are subject to significantly higher ETR in all the columns (Zimmerman, 1983; Wu et al., 2012), and both state and foreign ownership can effectively lower firms' ETR.

4.4. Grease money − the effect of corruption on red tape

Table 6 shows the estimation results of the effect of ETC on red tape. We estimate the baseline specification for the whole sample and the non-state and state subsamples, respectively, in columns (1), (3) and (5) of Table 6. The empirical results show that the coefficient of *ETC* is negative and significant at conventional levels only for the non-state subsample and the full sample. Then, in columns (2), (4) and (6), we further control for three CEO characteristics that could have an influence on a firm's interaction time with the government. The results basically remain unchanged. We find that across columns (1)–(4), larger firms spend significantly more time on government assignments and communications per month. This is consistent with Kaufmann and Wei (2000), probably because larger firms may attract more attention from bureaucrats. Also as expected, firms with more licenses and permits in their operations have to spend significantly more time interacting with the government. Besides, foreign ownership can also shield firms

[21] The data of Rauch (1999) and the corresponding concordance table can be downloaded from http://econweb.ucsd.edu/~jrauch/rauch_classification.html and http://wits.worldbank.org/product_concordance.html, respectively.

[22] Ma et al. (2012) also explore the heterogeneous effects of corruption by goods complexity, but their focus is on the export volume rather than profitability.

[23] In this paper, we use the proportion of inputs that are not sold on an organized exchange to measure contract intensity. The results are robust to using only the proportion of inputs that are neither sold on an organized exchange nor reference priced. Nunn's (2007) data and the concordance table can be downloaded from http://scholar.harvard.edu/nunn/pages/data-0 and https://www.census.gov/eos/www/naics/concordances/concordances.html, respectively.

[24] Because it is not feasible here to cluster the standard errors at the industry level using the ivreg2 command, we instead cluster the standard errors at the city-industry level. The results are also robust to not clustering the standard errors.

[25] Gupta and Newberry (1997) and Adhikari et al. (2006) explain why these adjustments are necessary and appropriate.

[26] We also consider that ETC may be endogenous, as in the previous section. We thus use ivtobit to conduct the same regression and then apply the Smith-Blundell test (Smith and Blundell, 1986) to test the exogeneity of etc. However, the test fails to reject the null hypothesis that ETC can be treated as exogenous. We conduct similar tests for the following regressions and for all but one the null hypothesis of exogeneity cannot be rejected. Even though in the regression with *Selltogov* as the dependent variable ETC is endogenous, correcting this by ivprobit does not change the results qualitatively. Thus we just use the ordinary Tobit, OLS and Probit in this and the following part.

Table 4
The heterogeneous effects of corruption on firm performance by industry.

	Contract intensity		Goods complexity	
	(1) Low	(2) High	(3) Low	(4) High
ETC	2.322**	0.981	2.667**	0.180
	(0.995)	(0.608)	(1.120)	(0.276)
ln(Firm size)	−0.003	−0.000	−0.002	−0.001
	(0.003)	(0.003)	(0.003)	(0.002)
ln(Fixed assets pc)	0.009***	0.007***	0.009***	0.005**
	(0.003)	(0.002)	(0.003)	(0.002)
ln(Firm age)	−0.001	−0.004	−0.002	−0.006**
	(0.010)	(0.003)	(0.009)	(0.003)
State ownership	−0.011	−0.052***	−0.061	−0.026**
	(0.062)	(0.016)	(0.062)	(0.012)
Foreign ownership	0.014	−0.001	0.004	0.007
	(0.009)	(0.012)	(0.012)	(0.007)
Tax burden	−1.248***	0.412**	−0.999***	0.226***
	(0.206)	(0.175)	(0.162)	(0.066)
Government help	0.047**	0.004	0.046**	−0.004
	(0.021)	(0.017)	(0.022)	(0.011)
Export	−0.010	−0.004	−0.011	0.006
	(0.008)	(0.007)	(0.010)	(0.005)
Production capacity	0.018	0.026	0.013	0.041**
	(0.020)	(0.020)	(0.020)	(0.017)
Lagged ROS	0.476***	0.432***	0.426***	0.500***
	(0.138)	(0.057)	(0.074)	(0.098)
ln(City GDP pc)	−0.237	0.328	−0.225	0.431**
	(0.217)	(0.272)	(0.176)	(0.195)
R & D intensity	−0.095	0.068	0.092	−0.012
	(0.166)	(0.147)	(0.138)	(0.185)
Employee schooling	0.023*	−0.000	0.021	0.013
	(0.012)	(0.010)	(0.014)	(0.009)
Appointed CEO	−0.016	−0.014	−0.023	−0.013
	(0.027)	(0.011)	(0.025)	(0.011)
CEO experience	0.000	0.001***	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
CEO schooling	0.000	−0.001	0.001	−0.003
	(0.004)	(0.003)	(0.004)	(0.002)
Observations	5979	5017	6516	4480
Under-identification test (*p*-value)	0.000	0.000	0.000	0.000
F test of instruments	31.676	27.821	54.352	16.672
Hansen J test (*p*-value)	0.144	0.484	0.344	0.853
DWH endogeneity test (*p*-value)	0.010	0.003	0.002	0.073

Notes: a) All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The firm-level ETC is instrumented by the city-industry median of ETC and a dummy variable *Special Staff*. The robust standard errors (reported in parentheses) are clustered at the city-industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively. b) The Kleibergen-Paap rk LM statistic is used to test for the null hypothesis that the equation is under-identified and the Kleibergen-Paap rk Wald F statistic for the null hypothesis that the excluded instruments are weak. The 10% and 15% maximal IV size in Stock and Yogo (2005) are 19.93 and 11.59, respectively.

from red tape. Above all, we find that bribes can significantly help firms circumvent red tape. In other words, we indirectly prove that the cumbersome regulatory barriers may be exogenous rather than endogenous in China. On one hand, China is a very large country with very many firms requiring public services. Therefore, it is unnecessary for corrupt bureaucrats to customize the amount of harassment or red tape. They can still get a huge amount of bribes if they just establish similar red tape for each firm and then reduce it as long as a certain amount of bribe is offered. On the other hand, despite extorting bribes, the local officials still give priority to the local economic development because from a long-run perspective they can benefit more by doing so (Fan and Grossman, 2001). As the non-state sector serves as the growth engine of the Chinese economy, corrupt officials have incentives to reduce the red tape imposed on non-state firms after receiving bribes.

4.5. Grease money − the effect of corruption on the probability of obtaining government procurement contracts

Table 7 demonstrates the estimated effects of corruption on the probability of obtaining government procurement contracts. We estimate the baseline specification using the probit model for the whole sample, the non-state and the SOE subsamples, respectively, in columns (1), (3) and (5), while adding more controls for the respective groups in columns (2), (4) and (6). The empirical results show that there exists a highly significant and positive relationship between firm-level ETC and the probability of securing government contracts for both the full sample as well as the non-state subsample. For the latter group, increasing ETC by one σ increases the probability by 1.3 percentage points (8.5% of the average probability). This indicates that, in China, bribing the corresponding

Table 5
The effect of corruption on firms' ETR (Effective Tax Rate).

	Full sample		Non-SOE		SOE	
	(1)	(2)	(3)	(4)	(5)	(6)
ETC	−0.125	−0.139	−0.335*	−0.348*	1.741**	1.702**
	(0.237)	(0.239)	(0.203)	(0.207)	(0.759)	(0.756)
ln(Firm size)	0.014***	0.014***	0.012***	0.012***	0.045***	0.040***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.011)	(0.011)
ln(Fixed assets pc)	−0.007**	−0.007**	−0.008***	−0.008***	0.016	0.015
	(0.003)	(0.003)	(0.003)	(0.003)	(0.014)	(0.014)
ROS	0.032	0.031	0.063**	0.061**	0.031	0.029
	(0.026)	(0.026)	(0.025)	(0.024)	(0.037)	(0.037)
Sales growth	−0.006***	−0.006***	−0.006***	−0.006***	0.021**	0.020**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.009)	(0.009)
Loan access	−0.035***	−0.036***	−0.039***	−0.040***	−0.000	−0.001
	(0.008)	(0.008)	(0.008)	(0.008)	(0.040)	(0.039)
State ownership	−0.084***	−0.074***	−0.041**	−0.036*	−0.036	−0.038
	(0.012)	(0.014)	(0.020)	(0.021)	(0.064)	(0.063)
Foreign ownership	−0.075***	−0.076***	−0.076***	−0.076***		
	(0.019)	(0.019)	(0.018)	(0.019)		
Tax burden	0.277***	0.279***	0.560***	0.563***	0.184***	0.174***
	(0.077)	(0.076)	(0.170)	(0.170)	(0.057)	(0.056)
Appointed CEO		−0.024		−0.019		−0.004
		(0.015)		(0.017)		(0.027)
CEO experience		0.001		0.001		0.001
		(0.001)		(0.001)		(0.005)
CEO schooling		0.003		0.002		0.034
		(0.005)		(0.005)		(0.021)
Observations	11963	11932	10864	10836	1099	1096
Pseudo R^2	0.058	0.058	0.061	0.061	0.153	0.154
Left-censored	4309	4293	3718	3705	591	588
Non-censored	7654	7639	7146	7131	508	508

Notes: All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

Table 6
The effect of corruption on the time CEOs spend on government assignments and communications per month.

	Full sample		Non-SOE		SOE	
	(1)	(2)	(3)	(4)	(5)	(6)
ETC	−1.125*	−1.319**	−1.555**	−1.791**	0.735	1.079
	(0.655)	(0.640)	(0.722)	(0.714)	(3.660)	(3.923)
ln(Firm size)	0.145***	0.131***	0.137***	0.122***	0.179	0.225
	(0.022)	(0.021)	(0.020)	(0.019)	(0.131)	(0.150)
ln(Firm age)	0.033	0.019	0.030	0.009	0.020	0.021
	(0.045)	(0.039)	(0.048)	(0.039)	(0.155)	(0.158)
State ownership	0.132	0.059	−0.009	−0.107	0.036	0.101
	(0.103)	(0.112)	(0.195)	(0.187)	(0.468)	(0.472)
Foreign ownership	−0.180*	−0.200**	−0.168*	−0.189*		
	(0.091)	(0.096)	(0.092)	(0.095)		
ln(Licence)	0.324***	0.319***	0.329***	0.324***	0.357**	0.373**
	(0.047)	(0.046)	(0.044)	(0.043)	(0.169)	(0.170)
ROS	−0.234**	−0.235**	−0.173*	−0.168*	−0.239	−0.223
	(0.094)	(0.095)	(0.093)	(0.096)	(0.193)	(0.198)
Appointed CEO		0.190*		0.291**		−0.248
		(0.100)		(0.108)		(0.362)
CEO experience		0.004		0.006		0.007
		(0.007)		(0.007)		(0.035)
CEO schooling		0.074**		0.087**		−0.228
		(0.036)		(0.037)		(0.226)
Observations	11982	11952	10951	10924	1031	1028
Adjusted R^2	0.049	0.049	0.046	0.047	0.041	0.041

Notes: All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

Table 7
The effect of corruption on the probability of obtaining government contracts.

	Full sample		Non-SOE		SOE	
	(1)	(2)	(3)	(4)	(5)	(6)
ETC	0.598***	0.567***	0.573***	0.542***	1.014	0.966
	(0.154)	(0.148)	(0.141)	(0.135)	(0.715)	(0.707)
ln(Firm size)	0.019***	0.016***	0.018***	0.016***	0.033**	0.032**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.014)	(0.014)
ln(Firm age)	0.015***	0.011***	0.019***	0.015***	−0.006	−0.007
	(0.003)	(0.003)	(0.002)	(0.003)	(0.011)	(0.012)
State ownership	−0.001	−0.002	0.007	0.004	−0.019	−0.009
	(0.011)	(0.011)	(0.012)	(0.011)	(0.037)	(0.036)
Foreign ownership	−0.125***	−0.128***	−0.119***	−0.121***		
	(0.019)	(0.019)	(0.018)	(0.018)		
ROS	0.044***	0.041***	0.024*	0.022	0.183***	0.186***
	(0.012)	(0.012)	(0.015)	(0.014)	(0.050)	(0.051)
Sales growth	−0.001	−0.001	0.001	0.000	−0.084**	−0.088**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.035)	(0.035)
R & D intensity	0.408***	0.376***	0.448***	0.411***	0.010	−0.021
	(0.126)	(0.118)	(0.134)	(0.124)	(0.400)	(0.396)
Appointed CEO		0.008		0.009		0.021
		(0.014)		(0.015)		(0.031)
CEO experience		0.002***		0.002***		−0.001
		(0.001)		(0.001)		(0.003)
CEO schooling		0.015**		0.015**		0.011
		(0.007)		(0.007)		(0.015)
Observations	12065	12033	11018	10989	952	949
Pseudo R^2	0.061	0.063	0.064	0.066	0.120	0.125

Notes: All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The coefficients are the estimated effects of a marginal change in the corresponding regressors on the probability of obtaining government contracts, computed at the sample means of the regressors. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

officials in charge is an effective way for firms, especially non-SOEs, to get government contracts. This is consistent with the reality that in developing countries like China the government procurement tender has become a mere formality. On the surface, the tender seems to be conducted according to related rules and procedures, but in fact the process involves a "black-box operation" and collusion between the government and businessmen. Firms can bribe officials to win a bid and offer kickbacks to repay the bureaucrats in charge.[27,28]

Besides, from Table 7 we can see that firm size and profitability have a significant and positive impact on the probability of getting government procurement contracts. For the full sample and non-state firms, firms with older age, higher R & D investment and more experienced CEOs are more likely to have their products purchased by the government. However, foreign ownership is negatively correlated with this probability. This is perhaps due to the fact that the government procurement law of the PRC stipulates that governments should procure goods produced by domestic firms whenever possible.[29]

4.6. *Grease money — the effect of corruption on the sensitivity of investment to cash flows and on the probability of obtaining bank loans*

In Table 8, we empirically test whether bribes can function to alleviate firms' financial constraints by estimating Eq. (2). As a large proportion of firms do not engage in investment in the survey year, we use the Tobit model to account for this data structure in column (1). In column (2), following Poncet et al. (2010) and Cull et al. (2015), we treat the cash flow intensity as endogenous and use lagged cash flow intensity as an IV to conduct the GMM estimation. In columns (3)–(6) we repeat our estimation using the Tobit model and the GMM for non-state firms and SOEs respectively. However, none of the coefficients on the interaction term between ETC and cash flow intensity are statistically significant in Table 8. This does not seem to support the idea that firms can ease their financial constraints with bribes in China. However, except for the SOE group, the cash flow intensity has a significantly positive effect on investment intensity, indicating that Chinese firms in general, especially non-state firms, rely a lot on internal cash flows to fund investment, and are thus subject to significant financial constraints. The coefficients of *Sales/Lagged K*, *Sales Growth*, *Loan Access* and *Trade credit* all have the expected positive sign and are highly significant, particularly for the whole sample and the non-state group.

[27] The website of "News of the CPC" (http://fanfu.people.com.cn/GB/16014155.html) condemns the involvement of bribes in the government procurement process by citing the examples that the settlement price of the air-conditioning system in the Changsha administration building was 8 times higher than the tender price and that the fiscal bureau of Fushun procured the iPod touch 4 as a USB flash disk.

[28] This is also consistent with Du et al. (2015), who argue that the relationship-specific rights to do business, which were often nurtured by paying bribes to bureaucrats, can enable private entrepreneurs to be treated favorably in bidding for government procurement contracts.

[29] For more details on the law, please refer to http://www.gov.cn/english/laws/2005-10/08/content_75023.htm.

Table 8
The effect of corruption on the sensitivity of investment to internal cash flows.

	Full sample		Non-SOE		SOE	
	(1) Tobit	(2) GMM	(3) Tobit	(4) GMM	(5) Tobit	(6) GMM
CF/Lagged K	0.064***	0.059***	0.068***	0.062***	−0.002	−0.029
	(0.016)	(0.017)	(0.017)	(0.018)	(0.065)	(0.089)
ETC*(CF/Lagged K)	0.257	−0.077	0.241	−0.136	−3.678	−2.186
	(0.397)	(0.583)	(0.408)	(0.602)	(2.680)	(2.521)
ETC	0.176	0.675*	0.397	0.836*	−2.981**	−0.737***
	(0.434)	(0.396)	(0.444)	(0.457)	(1.156)	(0.258)
ln(Firm age)	−0.044***	−0.043***	−0.045***	−0.045***	0.015	0.002
	(0.011)	(0.008)	(0.012)	(0.008)	(0.024)	(0.018)
Sales/Lagged K	0.004***	0.004***	0.004***	0.004***	0.006*	0.006
	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)
Sales growth	0.015***	0.012***	0.015***	0.012***	0.015	0.007
	(0.004)	(0.004)	(0.005)	(0.004)	(0.019)	(0.009)
Loan access	0.167***	0.089***	0.166***	0.092***	0.139***	0.075***
	(0.021)	(0.014)	(0.020)	(0.014)	(0.028)	(0.019)
Trade credit	0.073***	0.045*	0.073***	0.048*	0.033	−0.000
	(0.027)	(0.024)	(0.027)	(0.025)	(0.029)	(0.028)
Appointed CEO	−0.106***	−0.069***	−0.093***	−0.061***	−0.081**	−0.064***
	(0.021)	(0.012)	(0.032)	(0.017)	(0.033)	(0.021)
CEO experience	0.001	0.001*	−0.000	0.001	0.004**	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
CEO schooling	0.069***	0.022***	0.070***	0.022***	0.048**	0.025
	(0.009)	(0.006)	(0.011)	(0.007)	(0.024)	(0.015)
Observations	12021	12008	10980	10967	1041	1041
Pseudo R^2	0.046		0.045		0.170	
Left-censored	3281		2973		308	
Non-censored	8740		8007		733	
F test of instruments		195.197		188.266		12.878

Notes: All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

In Table 9, we investigate the effect of ETC on the probability of getting access to bank loans by using the probit model. However, consistent with our previous results in Table 8, we fail to find a statistically significant and positive link between ETC and the probability of having access to bank loans. Similarly, Chen et al. (2013) also find that bribery is not sufficient to secure access to bank loans for private firms. As the authors explain, this result can be attributed to the separation of credit risk assessments and loan operations into different departments in Chinese banks required by the bank law. The former department, which has the final veto power on loan-making decisions made by the latter, is very strict regarding the performance criterions and actually has very little interaction with the applicant firms.[30] In China, non-state enterprises have serious difficulties in getting access to credit due to several reasons. On the one hand, non-state enterprises, especially private SMEs, have shorter life circles, higher mortality rates and less effective collateral. To make things worse, the lack of transparent financial information increases borrowing risks as well as transaction costs. On the other hand, due to the implicit guarantee from the government as well as the close connections between the dominant state-owned banks and SOEs, state-owned banks have strong incentives to lend to SOEs as a priority, albeit at the expense of non-state firms. The empirical results above suggest that bribes alone are not sufficient to help non-state firms overcome their own deficiencies and the institutional barriers. Therefore, improving the competitiveness of non-state firms as well as reforming the banking sector and SOEs may be more effective in dealing with the problem.

5. Robustness checks

In Tables 10 and 11, we further proceed to conduct several robustness checks. First, we replace ROS, which was calculated as the ratio of net income to sales, with the ratio of EBIT to sales. Our purpose is to test whether bribes can have a significantly positive effect on firm profitability through channels other than tax reduction. In other words, here we aim to indirectly separate the “grease money” and “protection money” effects. We present the results based on ownership, contract intensity and goods complexity in Table 10. The results are highly in line with the previous ones.

Furthermore, as explained above, ETC actually consists of both legitimate normal business expenditures (including entertaining suppliers and clients and travel cost) and bribes offered to government officials. Thus, we create a new variable, the business-unrelated ETC, which is presumed to contain only the “bribe” part. Following Cai et al. (2011), we construct this variable by first regressing ETC on several variables that can be regarded as business related, such as firm size, age, a dummy variable indicating

[30] In this sense, to some extent, this practice imposes an effective top-down discipline system to prevent corruption in granting loans.

Table 9
The effect of corruption on loan access.

	Full sample	Non-SOE	SOE
	(1)	(2)	(3)
ETC	0.223	0.236	0.569
	(0.181)	(0.179)	(0.664)
ln(Fixed assets pc)	0.061***	0.062***	0.036***
	(0.004)	(0.004)	(0.014)
ln(Firm size)	0.082***	0.081***	0.105***
	(0.005)	(0.005)	(0.013)
ln(Firm age)	−0.003	0.007	−0.015
	(0.005)	(0.005)	(0.013)
ROS	0.024	−0.010	0.060*
	(0.020)	(0.024)	(0.034)
Sales growth	0.003*	0.004**	−0.001
	(0.002)	(0.001)	(0.020)
Export	0.042***	0.039***	0.100*
	(0.014)	(0.013)	(0.057)
CEO experience	0.007***	0.007***	0.003
	(0.001)	(0.001)	(0.002)
Appointed CEO	−0.086***	−0.065***	−0.065***
	(0.014)	(0.016)	(0.025)
CEO schooling	0.004	0.004	0.013
	(0.006)	(0.006)	(0.018)
Observations	12018	10977	997
Pseudo R^2	0.151	0.154	0.210

Notes: All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The coefficients are the estimated effects of a marginal change in the corresponding regressors on the probability of getting access to bank loans, computed at the sample means of the regressors. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

whether a firm sells its products to other provinces (*Sellprov*), the logarithm of years of relationships with the firm's main clients and suppliers (*lnTotalyear*). Then the residual term is derived as the business-unrelated ETC (*NBETC*).

In Table 11, we use the business-unrelated ETC as the key explanatory variable of interest and repeat all the above regressions exploring the "protection money" and "grease money" effects. We only show the estimation results for non-state firms and SOEs. We can see from Table 11 that, across columns (1) to (8), the coefficients on the variables of interest remain very similar to the previous results in terms of both magnitudes and significance levels. The results of the above regressions confirm that our conclusions in this study are robust and convincing.

6. Conclusion

This paper directly investigates the "grease money" and "protection money" effects of corruption based on Chinese firm data from the 2005 Investment Climate Survey. After finding that bribes have a significantly positive effect on firm profitability for non-state firms but not for SOEs, we then directly test the "protection money" and "grease money" effects. By using the effective tax rate (ETR) to proxy government expropriation, this study finds that ETC can significantly reduce ETR for non-state firms, whereas ETC significantly increases ETR for SOEs. Regarding the "grease money" effect, on the one hand, the empirical results show a significantly negative relationship between ETC and red tape, which only holds for non-SOEs. On the other hand, we also test whether corruption can help firms get preferential treatment in obtaining key resources. Our results demonstrate that non-state firms that spend more on ETC have a significantly higher probability of obtaining government procurement contracts. Nonetheless, corruption does not seem to have any effect in helping firms alleviate financial constraints or obtain bank loans, regardless of ownership type.

This paper finds that corruption can enhance firm performance, especially for non-state firms, through the channels of "protection money" and "grease money" in China. This seems to contradict the common perception that corruption should impact economic development negatively. However, we should keep in mind that China is a huge transitional economy at present, where, although significant advances in economic liberalization and privatization have been achieved, the concomitant institutional reforms have lagged too far behind to support a proper legal and regulatory framework. Thus, in the process of unbalanced reforms, there exist a lot of incentives and opportunities for corrupt behavior. This is consistent with the literature finding that corruption is more likely to enhance economic development in economies with low quality institutions. Above all, firms in a transitional economy like China may view bribery as an important strategy for survival and development at the current stage. This implies that a series of thorough reforms

Table 10
Robustness tests: The effect of corruption on firm performance (EBIT/Sales).

	Ownership		Contract intensity		Goods complexity	
	Non-SOE	(2) SOE	(3) Low	(4) High	(5) Low	(6) High
ETC	1.660*	6.712	2.510***	1.393**	3.060***	0.157
	(0.869)	(10.566)	(0.958)	(0.711)	(1.043)	(0.279)
ln(Firm size)	−0.000	0.002	−0.002	0.002	−0.001	−0.001
	(0.003)	(0.018)	(0.003)	(0.003)	(0.003)	(0.002)
ln(Fixed assets pc)	0.010***	0.019	0.012***	0.009***	0.010***	0.007***
	(0.002)	(0.032)	(0.002)	(0.002)	(0.002)	(0.002)
ln(Firm age)	−0.004	−0.021	−0.003	−0.003	0.001	−0.006**
	(0.004)	(0.017)	(0.007)	(0.003)	(0.006)	(0.003)
State ownership	−0.047**	−0.022	−0.023	−0.050***	−0.043	−0.027**
	(0.022)	(0.039)	(0.043)	(0.015)	(0.041)	(0.012)
Foreign ownership	−0.004		0.007	−0.010	−0.003	0.003
	(0.010)		(0.009)	(0.011)	(0.012)	(0.007)
Tax burden	−0.143	0.298	−1.106***	0.415*	−0.924***	0.103
	(0.288)	(0.275)	(0.200)	(0.220)	(0.156)	(0.068)
Government help	0.031**	0.059	0.044**	0.007	0.044**	−0.004
	(0.014)	(0.074)	(0.020)	(0.019)	(0.021)	(0.010)
Export	−0.006	0.008	−0.009	−0.004	−0.012	0.005
	(0.007)	(0.042)	(0.007)	(0.007)	(0.008)	(0.005)
Production capacity	0.021	0.296	0.022	0.012	0.007	0.040**
	(0.024)	(0.193)	(0.019)	(0.021)	(0.023)	(0.017)
Lagged ROS	0.505***	0.081	0.438***	0.558***	0.568***	0.492***
	(0.068)	(0.134)	(0.128)	(0.061)	(0.100)	(0.089)
ln(City GDP pc)	0.087	0.965*	−0.252	0.250	−0.229	0.353**
	(0.102)	(0.549)	(0.223)	(0.216)	(0.174)	(0.138)
R & D intensity	−0.019	0.748	−0.083	−0.034	−0.055	0.033
	(0.091)	(0.675)	(0.172)	(0.132)	(0.138)	(0.171)
Employee schooling	0.012	0.107	0.025**	−0.006	0.021*	0.013
	(0.009)	(0.128)	(0.011)	(0.009)	(0.011)	(0.009)
Appointed CEO	−0.020*	−0.010	−0.021	−0.009	−0.016	−0.011
	(0.011)	(0.033)	(0.019)	(0.010)	(0.017)	(0.011)
CEO experience	0.001***	−0.007	0.001	0.001**	0.001	0.000
	(0.000)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)
CEO schooling	−0.001	−0.018	0.001	−0.001	0.001	−0.002
	(0.002)	(0.026)	(0.003)	(0.003)	(0.003)	(0.002)
Observations	10999	1037	5979	5017	6516	4480
Under-identification test (*p*-value)	0.001	0.000	0.000	0.000	0.000	0.000
F test of instruments	48.652	36.289	31.797	25.799	54.686	16.637
Hansen J test (*p*-value)	0.426	0.247	0.138	0.710	0.186	0.897
DWH endogeneity test (*p*-value)	0.029	0.361	0.003	0.003	0.000	0.110

Notes: a) All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The firm-level ETC is instrumented by the city-industry median of ETC and the dummy variable *Special Staff*. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level in columns (1) and (2), and at the city-industry level in columns (3)-(6). *, ** and *** indicate significance at 10%, 5% and 1%, respectively. b) The Kleibergen-Paap rk LM statistic is used to test for the null hypothesis that the equation is under-identified and the Kleibergen-Paap rk Wald F statistic for the null hypothesis that the excluded instruments are weak. 10% and 15% maximal IV size in Stock and Yogo (2005) are 19.93 and 11.59, respectively.

of the existing institutions, which aim to eliminate the incentives of engaging in corruption, might be more effective in combating corruption. These reforms should include further reducing the role of government in resource allocation by enhancing the role of the free market mechanism, establishing a more effective legal system to protect property rights, as well as removing unnecessary red tape and regulations. However, all these reforms may take a long time and great effort because they involve removing the vested interests of the privileged elite class.

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Table 11
Robustness checks: Non-business related ETC (NBETC).

	ETR		Time		Selltogov		Investment	
	Non-SOE (1)	SOE (2)	Non-SOE (3)	SOE (4)	Non-SOE (5)	SOE (6)	Non-SOE (7)	SOE (8)
NBETC	−0.385*	2.137***	−1.646**	2.990	0.563***	0.964	0.483	−2.455**
	(0.216)	(0.789)	(0.783)	(3.518)	(0.145)	(0.715)	(0.489)	(1.124)
NBETC*CF Int.							0.858	0.836
							(0.622)	(3.449)
ln(Firm size)	0.013***	0.030**	0.126***	0.221	0.014***	0.028*		
	(0.003)	(0.012)	(0.018)	(0.160)	(0.004)	(0.015)		
ln(Firm age)			−0.003	0.013	0.017***	−0.009	−0.044***	0.017
			(0.042)	(0.149)	(0.003)	(0.012)	(0.011)	(0.026)
ROS	0.053**	0.038	−0.183*	−0.128	0.023	0.190***		
	(0.025)	(0.038)	(0.105)	(0.160)	(0.014)	(0.055)		
Sales growth	−0.006***	0.017*			0.001	−0.077**	0.014***	0.017
	(0.002)	(0.009)			(0.002)	(0.037)	(0.005)	(0.018)
Loan access	−0.041***	0.029					0.166***	0.149***
	(0.009)	(0.040)					(0.020)	(0.031)
State ownership	−0.040**	−0.064	−0.132	0.055	0.002	−0.012		
	(0.020)	(0.078)	(0.177)	(0.478)	(0.011)	(0.036)		
Foreign ownership	−0.082***		−0.165*		−0.122***			
	(0.020)		(0.094)		(0.019)			
Appointed CEO	−0.019	−0.013	0.325***	−0.178	0.009	0.019	−0.092***	−0.088**
	(0.017)	(0.027)	(0.116)	(0.369)	(0.016)	(0.033)	(0.035)	(0.034)
CEO experience	0.001	0.001	0.005	0.014	0.002***	−0.000	0.000	0.005**
	(0.001)	(0.005)	(0.008)	(0.033)	(0.001)	(0.003)	(0.002)	(0.002)
CEO schooling	0.001	0.024	0.079**	−0.143	0.015**	0.015	0.067***	0.049**
	(0.005)	(0.022)	(0.038)	(0.218)	(0.007)	(0.016)	(0.012)	(0.024)
Observations	10454	993	10604	997	10653	917	10644	1007
Pseudo R^2	0.062	0.162			0.066	0.128	0.045	0.163

Notes: All the regressions include 120 city dummies and 3 dummies indicating industry groups (bulk goods, low value and high value), which are not reported for brevity. Constants are also not reported. The robust standard errors (reported in parentheses) are clustered at the 2-digit industry level. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

Appendix

Table A1
Definition of key variables.

Variable	Definition
ETC	The ratio of entertainment and travel costs to sales
ROS	The industry-adjusted ratio of net profits to sales
ETR	The effective tax rates (the ratio of income tax expenses to EBIT)
Loan Access	A dummy variable indicating whether a firm has access to bank loans
Time	The number of days a firm's CEO spends on government assignments and communications per month
Selltogov	A dummy variable indicating whether a firm sells to the government
ln(Fime size)	The logarithm of the number of employees
ln(Fixed assets pc)	The logarithm of capital stock per employee
Sales growth	Sales growth rate
Tax burden	City-industry median of the firm-level ratio of total tax to sales in the previous year
Government help	City-industry median of the firm-level share of government officials who are helpful to the development of the firm
Export	A dummy variable indicating whether the proportion of sales that are exported exceeds 5%
Production Capacity	The utilized percent of production capacity
ln(License)	The logarithm of the number of licenses and permits a firm needs
State ownership	The proportion of shares owned by the state
Foreign ownership	The proportion of shares owned by foreigners
Trade credit	A dummy variable indicating whether a firm buys from suppliers through trade credit
Inv/Lagged K	The ratio of fixed assets investment to lagged capital stock (the net value of fixed assets)
CF/Lagged K	The ratio of cash flows (sum of total profits plus interests and financial charges) to lagged capital stock
Sales/Lagged K	Sales over lagged capital stock

(*continued on next page*)

Table A1 (*continued*)

Variable	Definition
Special staff	A dummy variable indicating whether a firm has special staff to handle government relationships
Employee schooling	The ratio of employees with high school education or above
R & D Intensity	The ratio of R & D expenditures over sales
Appointed CEO	A dummy variable indicating whether the CEO is appointed by the government
CEO experience	The number of years the current CEO has held the position
CEO schooling	The education level of the CEO, ranging from 0 (without any formal education) to 6 (master degree or above)
ln(City GDP pc)	The logarithm of city-level GDP per capita

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