The Externalities of Corruption: Evidence from Entrepreneurial Firms in China

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Abstract

Exploiting China's anti-corruption campaign, we show that following a decrease in corruption, firm performance improves. Small and young firms benefit more. We identify the channels through which corruption hampers firm performance. Following the anti-corruption campaign, the allocation of capital and labor becomes more efficient. Firms operating in ex ante more corrupt environments experience larger productivity gains, higher growth of sales, and lower cost of debt than other firms. Taken together, our results suggest that corruption is an inefficient equilibrium for an economy because it creates negative externalities.

Keywords: Corruption, corporate governance, capital and labor allocation, China

JEL Classifications: D22, D62, G30, L20, O12, P26

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Firms around the world attempt to obtain political favors, such as land and other natural resources, government contracts, lenient taxation, relaxed regulatory oversight, or generous financing, by hiring politicians to their boards and other posts, by providing financial support to different political factions, or by paying bribes. The costs and benefits of these behaviors, which can be assimilated to corruption, have been subject to intense debate.

On the one hand, corruption may represent a second-best equilibrium because it allows the interests of the private sector to prevail in highly regulated economies (Leff, 1964; Huntington, 1968). Empirically, a number of papers show that corruption benefits firm shareholders in a variety of countries (e.g., Fisman, 2001; Faccio, 2006). On the other hand, even if some firms appear to perform better than others, corruption may be harmful for the economy as a whole (Murphy, Shleifer, and Vishny, 1993). Firms with more resources to corrupt officials or stronger political connections may fare better than others, but ultimately most firms are compelled to make transfers to corrupt officials and end up having less resources to invest and to enhance their technologies. Even though engaging in corruption is optimal given other firms' behavior, all firms may be stuck in an inefficient equilibrium in which they have worse performance than in an equilibrium with no or less corruption (Fisman and Golden, 2017). Put differently, corruption creates negative externalities. Evidence on whether an environment of corruption hampers an economy's performance is, however, scarce.

In this paper, we ask whether corruption indeed causes negative externalities and inefficiencies that go above and beyond the benefits that it might yield to corrupting firms. Specifically, using China's recent anti-corruption campaign as a negative shock to officials' willingness to be corrupted, we investigate whether corruption stifles firm performance and whether it affects disproportionally small and young firms. We also explore whether corruption impairs an efficient allocation of resources between firms with different productivities and how corruption affects entrepreneurial entry and industrial structure.

China provides a unique setting to investigate these issues for several reasons. First, China experienced an exogenous shock to the extent and effectiveness of corruption. The Xi Jinping administration launched a major anti-corruption campaign in November 2012. This anti-corruption drive has been considered the most far-reaching and lasting than any previous attempts. Approximately 200,000 officials incurred sanctions for corruption or abuse of power in 2013 alone, dramatically affecting officials' risk of providing favors to corrupting firms and their willingness to bend the rules. By increasing the probability that government officials are investigated and convicted for corruption, the campaign made corruption less effective. The consequent drop in corruption was considerable and rapid (Chen and Kung, 2019). Largely unanticipated by market participants, the launch of the anti-corruption campaign was exogenous to firm performance and corporate policies. Thus, to gauge to what extent corruption hampers an economy's performance, we explore how the performance of firms, which operate in ex ante more corrupt environments, varies after the start of the campaign.

Second, we are able to access a large-scale proprietary dataset providing comprehensive information on a sample of public and private firms, which is representative of the distribution of firms in the Chinese economy across 31 provinces, 84 industries, and a variety of size classes. This allows us to test whether corruption results in a less efficient allocation of resources between firms and whether it affects disproportionately small and young firms. Small firms are particularly important in China, where they employ the overwhelming majority of non-agricultural workers and generate the largest increments in employment (Allen, Qian, and Qian, 2005). In addition, the creation of new firms is crucial for spurring creative destruction and sustained economic growth

(Akcigit and Kerr, 2018), especially in economies, such as China, which may otherwise fall into middle-income traps (Zilibotti, 2017). Since corruption is widespread, exploring its effects and economic consequences is particularly relevant to understand the process of development in emerging economies.

Third, while corruption is notoriously hard to measure (Olken and Pande, 2012), in China, an item on all Chinese firms' profit and loss accounts, the entertainment expenses, is highly correlated with the grease money firms spend to secure better government services and to lower tax payments (Cai, Fang, and Xu, 2011).[1] By increasing government officials' risks from providing favors to firms, the anti-corruption campaign decreased officials' willingness to bend the rules and, ultimately, the effectiveness of entertainment expenses.

Since firms compete in the product market with other firms in their industry and for resources with neighboring firms, we use entertainment expenses in the firm's industry and province, measured before the start of the anti-corruption campaign, to capture a firm's ex ante exposure to corruption. We ask how the performance of firms that operate in an ex ante more corrupt environment changes after the crackdown. Besides using entertainment expenses to capture a corrupt business environment, we show that our results are robust when we use more conventional proxies based on political connections.

Ultimately, we expect that a decrease in government officials' willingness to concede favors would be associated with weaker firm performance in ex ante more corrupt industries and provinces if corruption facilitated economic activity. Firm performance should instead improve in these industries and provinces if corruption can be viewed as an inefficient equilibrium.

[1] Entertainment expenses are often discussed in the news as being associated with favors firms are able to obtain from government officials and have been widely used in existing literature to measure corruption (e.g., Griffin, Liu, and Shu, 2016; Lin et al. 2016; Fang et al. 2018). We provide extensive validation of our proxy for the extent of corruption to which firms are exposed.

We find that the negative shock to the effectiveness of corruption is associated with an improvement in the performance of firms operating in ex ante more corrupt environments. The changes in performance following the anti-corruption campaign appear to be brought about by an improvement in technological efficiency, an increase in sales growth, and a decrease in the cost of debt. There are significant distributional effects as the profitability and total factor productivity of smaller and younger firms increase to a larger extent.

Importantly, the anti-corruption campaign improves the allocation of resources between firms. Estimating a model based on Wurgler (2000) and Bai, Carvalho, and Phillips (2018), we find that following the campaign, the speed of labor (capital) reallocation to firms with high marginal productivity of labor (capital) increases especially for firms that operate in ex ante more corrupt business environments.

Corruption also appears to have an effect on industry structure and the geographical distribution of entrepreneurial activity. Following the start of the anti-corruption campaign, the proportion of young firms increases particularly in the provinces and industries with ex ante high entertainment expenses. This is especially the case for young firms with high productivity, whose shares of employment, assets and sales also increase. Our results suggest that a corrupt business environment hinders an efficient allocation of resources, firm performance, and entry.

In most our empirical analysis, we exploit the anti-corruption campaign as an exogenous shock to corruption, which should have affected disproportionately firms in ex ante more corrupt industries and provinces. Therefore, our empirical strategy relies on the assumption that firms in such industries and provinces did not experience improvements in performance already before the start of the campaign. We show that this identifying assumption is satisfied. In addition, the ability to saturate the empirical models with high-dimensional fixed effects allows us to control non-parametrically for industry- and province-specific shocks and firm time-invariant characteristics.

Taken together, our results indicate that a negative shock to the effectiveness of corruption improves economic performance and benefits entrepreneurial activity. By increasing the rents of government officials, corruption appears to stifle technology adoption and to hamper the ability of small and young firms to grow. Such a mechanism may have potentially large adverse consequences on an economy's performance.

This paper belongs to a growing literature studying the effects of corruption and political connections. A strand of the literature documents a positive effect of political connections and firms' spending to obtain political favors, such as campaign contributions, lobbying expenses and bribes, on firm value and operating performance (Faccio, 2006; Amore and Bennedsen, 2013; Borisov, Goldman, and Gupta, 2016; Zeume, 2017; Schoenherr, 2019). A few papers explore the effect of corruption and political connections among Chinese listed companies. Calomiris, Fisman, and Wang (2010) show that political connections established through government ownership stakes benefit listed companies, confirming that political connections add value also in China. However, Fan, Wong, and Zhang (2007) find that IPO firms with politically connected CEOs underperform both in terms of returns and operating performance.

Other studies document that corrupt economic environments are associated with weaker firm performance (Fisman and Svensson, 2007; Dass, Nanda, and Xiao, 2016) and firms' attempts to shield their assets (Smith, 2016). These studies do not consider shocks to the effectiveness of corruption as we do and are therefore unable to evaluate whether a corrupt environment hampers firm performance.

Recent work studies the local consequences of anti-corruption audits in Brazil (Avis, Ferras, and Finan, 2018; Lagaras, Ponticelli, and Tsoutsoura, 2017; Colonnelli and Prem, 2017). To the best of our knowledge, we are the first to study the effects of a generalized decrease in corruption on firm performance. Going beyond audits and considering a generalized crackdown on corruption is important to evaluate the effects of anti-corruption campaigns, as not all firms can be audited. Even more importantly, firms can be expected to benefit if their competitors are fined or put out of business after an audit, whereas an increase in the perceived cost of corruption may in principle stifle firm performance if corruption facilitates economic activity.

A number of contemporaneous papers explore the effects of the 2012 anti-corruption campaign in China. For instance, Chen and Kung (2019) show that the discounts at which politically connected firms are able to obtain land decreased immediately after the announcement in November 2012, indicating that the anti-corruption campaign was effective from its onset. Griffin, Liu, and Shu (2016) show that the most corrupt firms are indeed targeted in the anti-corruption campaign. Lin et al. (2016) and Ding et al. (2020) perform event studies and show that the valuations of politically connected firms dropped in anticipation of future enforcement. While these studies highlight cross-sectional differences in announcement returns of listed companies, they do not distinguish whether differences in announcement returns are due to differences in the expected probability of detection of corporate malfeasance or to changes in allocational efficiency. Instead, we directly explore the consequences of operating in a corrupt environment. We also document for the first time the effects of the anti-corruption reform on unlisted companies, which are the vast majority of firms in any economy.

The rest of the paper is organized as follows. Section 1 discusses the institutional background. Section 2 introduces the conceptual framework and Section 3 describes the data.

Section 4 introduces the empirical models and presents the results. Section 5 explores the effects of corruption on the allocation of resources and industrial structure. Section 6 concludes. Variable definitions are in the Appendix. Additional robustness tests are in the Internet Appendix.

1. Institutional Background

1.1 Economic Growth and Corruption in China

China is the largest emerging market and has experienced spectacular economic growth following an overhaul of its economic system in the late 1970s. However, economic growth has been accompanied by widespread corruption. Thanks to extensive decentralization of administrative power, local party chiefs can allocate capital, award large contracts, and determine land use. Local party chiefs also have strong incentives to pick a few large firms that become local champions to further their political careers.

This way of allocating resources and contracts has given incentives to private businesses and state-owned enterprises (SOEs) to deploy large amounts of resources in securing favorable treatment and establishing close relationships with government officials. Firms appoint CEOs and directors who are former government officials to obtain direct connections to political power. Firms also spend in lavish banqueting, private club memberships, and expensive gifts, consisting of European luxury brands, jewelry, and artwork, to attract the favors of government officials.

These costs are recorded as entertainment expenses in Chinese firms' profits and loss accounts. Entertainment expenses are likely to include expenses for outright illegal activities, such as bribes, as well as borderline activities. The latter would encompass in advanced democracies (more or less corrupt) lobbying and campaign contributions. In the Chinese context, donations and other investments favoring the careers of local politicians play a similar role. Entertainment expenses, and the political connections they help establishing, have been shown to be associated with benefits for firms, including lower taxes, government subsidies, and preferential access to contracts and financing (Li et al. 2008; Cai, Fang, and Xu, 2011).

1.2 The Anti-Corruption Campaign

President Xi Jinping's administration viewed corruption as a threat to the Communist Party's survival. For this reason, on November 8th, 2012, only 19 days into the new administration, President Xi Jinping launched an anti-corruption campaign at the 18th National Congress of the Communist Party of China (CPC). Following the launch of the campaign, on December 4th, the Political Bureau of the Central Committee of the CPC formulated an eight-point policy document to cut corruption. Even more detailed rules were then specified by central and provincial governments. The CPC also launched a website in which whistleblowers could report violations of the rules.

Xi's anti-corruption drive has been considered the most far-reaching and lasting than any previous attempts. As a result of the campaign, approximately 200,000 officials incurred sanctions for corruption or abuse of power in 2013 alone. About 2,000,000 people have been investigated to date.[2]

There is ample evidence that these measures were effective from the onset. For instance, the discount at which provincial party leaders sold land to connected firms dramatically shrank right after 2012 (Chen and Kung, 2019). Moreover, firms with high entertainment and travel expenses, a common proxy for corruption efforts, experienced negative abnormal returns on November 8th, 2012, the day of the announcement of the campaign (Lin et al. 2016). Politically

[2] "China Focus: China's anti-graft drive wins people's trust", October 7, 2017, Xinhuanet.

connected firms also experienced negative returns in May 2013, when the actual inspections of provincial governments were announced (Ding et al. 2020), indicating that market participants continued to consider the anti-corruption drive credible. Importantly, firms in all provinces, not only those in the provinces that were singled out for the first round of inspections, exhibited market reactions. This evidence suggests that between the end of 2012 and the first half of 2013, officials' incentives dramatically and swiftly changed. The effectiveness of the campaign is also demonstrated by the fact that firms decreased their entertainment and travel expenses (Griffin, Liu, and Shu, 2016).

Given its sudden and swift announcement, the anti-corruption campaign came as a surprise event, largely exogenous to firms' policies and performance. Previous administrations had typically announced policy changes roughly one year after their installation. The new administration of President Xi Jinping in turn had been formed at the end of a fierce power struggle within the CPC, which had left uncertainty on whether an anti-corruption faction of the party would have prevailed. The swift policy change was not driven by the demands of small firms, but it rather was an attempt of preserving the legitimacy of the CPC.

International media outlets have advanced suspicions that the anti-corruption campaign may have been a way for Xi to consolidate power and to persecute political opponents.[3] However, there is little evidence supporting this view in the academic literature. Quite to the contrary, Fisman et al. (2020) find that there is a "connection penalty" in the selection of Central Politburo members. In addition, the representation of supposedly different factions of the Communist party across Chinese provinces is fairly broad (Francois, Trebbi, and Xiao, 2017). The factional balance in the administration makes it unlikely that the anti-corruption campaign could be targeting different

[3] "Charting China's 'great purge' under Xi", October 23, 2017, BBC.

provinces to purge Xi's opponents. Accordingly, Lu and Lorentzen (2018) provide evidence that the central figures of the crackdown cannot be viewed as competitors of Xi and that the most corrupt provinces were indeed targeted.

Overall, the anti-corruption campaign has increased the expected punishment associated with corruption, thus decreasing officials' willingness to be corrupted and concede political favors. In our empirical analysis, we exploit the anti-corruption campaign as an exogenous shock increasing the cost of corruption and decreasing the effectiveness of firms' efforts to obtain political favors. We expect firms in ex ante more corrupt industries and provinces to be affected by the shock to a larger extent. This allows us to evaluate the effects of a corrupt environment on firm performance and resource allocation.

Importantly, as effectively summarized in a New York Times' (2017) review of Xi Jinping's track record, there were no other major policy reforms that may have affected firms differentially.[4] In particular, Xi's administration continues to favor large companies and SOEs and has been ineffective in tackling their inefficiencies.[5] Thus, there were no changes in industrial policy that may affect our findings or account for cross-sectional differences in performance between large and small firms.[6]

In addition, our empirical analysis focuses on a relatively short window following the start of the campaign (two years). We thus capture the immediate effects, which have been shown to be substantial in a different context (Chen and Kung, 2019), while limiting the possible impact of other policies adopted by Xi's administration over the years.

[4] "China and Economic Reform: Xi Jinping's Track Record", March 4, 2017, The New York Times.
[5] "Xi Jinping's Dilemma", September 11, 2017, The New York Times.
[6] Any policy or other economy-wide changes would be a threat to the identification only if they benefited firms within industries and provinces that are ex ante more exposed to corruption.

2. Conceptual Framework and Empirical Strategy

Our objective is to test whether a business environment in which corruption is normal business practice hampers firm performance and economic efficiency. Put differently, we aim to shed light on whether corruption represents an inefficient equilibrium in which firms' selfish motives create negative externalities and undermine the common good similar to what occurs in a prisoners' dilemma (Fisman and Golden, 2017). Large firms with more resources to corrupt officials may fare better than others in such an environment, but ultimately, all firms are "taxed" and have less resources to invest and to enhance their technologies because corruption involves negative externalities.

There are several ways of rationalizing this view of corruption based on existing theories. On a general level, one can view a firm's decision to corrupt officials as an example of contingent behavior, theorized by Schelling (1978). That is, a firm corrupts because other firms are doing so. However, even if firms' decisions to engage in corrupt practices are optimal given the behavior of other firms, all firms may end up having worse performance.

Murphy, Shleifer, and Vishny (1993) model this view of corruption and show that any redistributive activity that takes up resources is costly for economic performance. Corruption in their model is redistribution from the private sector to government bureaucrats. It affects the fortunes of the private sector because it weakens entrepreneurial incentives to adopt a productive technology over a low-productivity subsistence technology. Thus, in an equilibrium with corruption, most firms are less productive than without corruption because they find it optimal to stick with the subsistence technology. Even the few firms that have chosen to upgrade their technology are less profitable than in an equilibrium without corruption because they have to share most of their surplus with bureaucrats restricting access to land, financial services, licenses, and permits.

Under this view of corruption, the anti-corruption campaign increasing the personal cost for officials to take bribes and to concede favors could induce a change in equilibrium leading to less corruption and an improvement in economic efficiency. If this were the case, we would expect most firms to perform better following the anti-corruption campaign. Firms with weaker political connections and firms that were less successful in corrupting officials, such as small and young firms, should benefit because they are better able to obtain resources or government contracts and are subject to less rent extraction for securing licenses and permissions. However, also large firms may benefit from allocating their resources to productive activities rather than to rent-seeking.

While the anti-corruption campaign constitutes an economy-wide shock, we expect the shock to have affected firms operating in ex ante more corrupt business environments to a larger extent. We conjecture that a firm competes in the product market with other firms in its industry, but also with firms in its province for land, financing, and other political favors. Therefore, to isolate the effect of the anti-corruption campaign on firm behavior and allocational efficiency, we explore how firms in industries and provinces, which are differently exposed to corruption, perform following the start of the anti-corruption campaign.

We expect that any negative externalities of corruption on firm performance should have decreased after 2012, when the campaign started. Empirically, if corruption indeed causes negative externalities, we should observe that the negative shock to corruption is associated with a positive effect on performance, especially for firms operating in ex ante more corrupt environments. We thus exploit predetermined variation in the expected intensity of the treatment (the anti-corruption campaign) to investigate the externalities of corruption.

A direct implication of the model of Murphy, Shleifer, and Vishny (1993) is that a decrease in corruption should lead to higher profitability and adoption of more advanced technologies for all firms. Hence, we consider the differential effects of the anti-corruption campaign on firms' profitability, measured by the ROA, and total factor productivity. We also expect firm sales to increase if corruption was hampering economic performance and depressing demand.

Besides the direct implications of Murphy, Shleifer, and Vishny (1993), we explore other mechanisms through which the anti-corruption campaign may have benefited firms that were ex ante more exposed to corruption. First, we expect all the effects to be stronger for firms that were unable to attract lucrative favors while being subject to officials' rent-seeking behavior. It seems plausible that large and established firms with more resources to transfer to officials obtained more advantages from corrupting officials. We thus expect small and young firms' performance to have improved to a larger extent after the anti-corruption campaign decreased the ability to reap favors.

Second, corrupt practices are known to confer an artificial competitive advantage to firms that bid the most for officials' favors (Shleifer and Vishny, 1993). One mechanism is that few firms obtain cheap financing from government banks, while other firms have to resort to more expensive sources of informal finance. As a consequence of this and potentially other distortions, firms with lower productivity of capital and labor may be able to invest and increase employment to a larger extent. We thus investigate whether corruption restrains the flow of capital and labor to the most productive firms in an industry and province and whether the effects are attenuated by the anti-corruption campaign. We also explore whether the cost of debt decreases for the average firm exposed to corruption. Cheaper debt and better allocation of the factors of production should also lead to higher firm profitability on average, as the most profitable firms are able to expand more.

In the final tests, we explore the effects of the anti-corruption campaign on industry structure. If corruption indeed stifles entrepreneurial activity, we should observe that following the anti-corruption campaign, more firms are able to enter in the most corrupt industries and provinces, thanks to the reduced extraction of rents by government officials. More entry and the enhanced ability of small and young firms to generate profits and adopt more advanced technologies should in turn lead to higher employment, investment, and sales by young firms.

In what follows, we introduce data and empirical tests. We discuss the empirical methodologies as we introduce the specific tests.

3. Data Sources and Sample Construction

3.1 Firm-Level Data

We use firm level accounting data extracted from tax files, which allow us to study both public and private firms and offer a more comprehensive view of the effects of the anti-corruption campaign than existing studies relying merely on listed companies. Specifically, our main data source is the Annual Tax Survey (ATS) Database, an annual survey administered by the Ministry of Finance and the State Administration of Taxation of China. The ATS was started in 2004 and is implemented by regional tax authorities. The survey is conducted using a uniform, comprehensive survey system. Firms provide detailed reports on their financial statements, tax status, operations, founding year, industry, and ownership characteristics. Survey answers are collected and subsequently verified by local tax authorities. The process is facilitated by the fact that all firms in China, even if unlisted, have to file annual accounting reports. All information reported is further verified using technical algorithms to minimize reporting errors. A special task force of the local tax authorities also audits survey respondents. Thanks to this process, the quality of the firm level financial information in the ATS database is higher than that of the Chinese Industrial Enterprises database, which is widely used in influential research (see, e.g., Hsieh and Klenow, 2009; Song, Storesletten, and Zilibotti, 2011).[7]

In particular, concerns that any improvements in firm performance derive from reduced underground activities due to the campaign are mitigated by the fact that firms in our sample were always audited by the tax authority. Our empirical models that rely on within-industry and within-province variation further help to assuage these concerns.

The ATS includes a unique tax ID for each firm. Since the first six digits of Chinese tax IDs refer to the city where a firm is headquartered, we can trace firms' locations. The survey covers two types of firms: the "key surveyed enterprises", which are relatively large firms, and a sample of entrepreneurial firms drawn from the tax collection and management system at the State Administration of Taxation with the goal of covering a representative sample of the local firm population.[8]

Our sample period spans from 2009 to 2014. We exclude firms in the financial industry, nonprofit organizations and social groups, firms missing information on industry, location and key variables, firms with negative assets or less than three employees, as well as industry-province-year bins with less than three observations. Our final sample includes 1,261,057 firm-year observations (405,892 unique firms) operating in 84 industries and located in 31 provinces, of which 1,181,818 firm-year observations (387,705 unique firms) refer to private firms. The sample thus provides comprehensive industry and geographical coverage.

[7] The ATS database also offers more extensive coverage and includes non-manufacturing firms.
[8] All firms in our sample are stand-alone companies. Differently from other Asian countries, business groups are not common in China. Thus, it is implausible that small unrelated firms pay bribes for larger private or public companies.

3.2 Exposure to a Corrupt Environment

We conjecture that industry and province are the most important determinants of the extent of corruption firms face in their day-to-day operations because firms compete in the product market with other firms in their industry and for resources, such as land, financing, and other political favors, with firms in the same province. Measuring how corrupt a firm's industry is in different provinces using the 84 three-digit industry codes allows us to control non-parametrically for industry- and province-specific shocks with high level of granularity.

We are able to do so thanks to our comprehensive sample. All firms report in their profit and loss accounts an item called entertainment expenses. Cai, Fang, and Xu (2011) show that a more comprehensive account consisting of entertainment and travel expenses is highly correlated with the grease money firms spend to obtain political favors and to pay lower taxes. From the Selling, General and Administrative expenses (SG&A) of the income statements in the ATS database, we observe firms' entertainment expenses. Since travel expenses may include legitimate business travel, entertainment expenses are arguably more correlated than entertainment and travel expenses with any money spent to obtain political favors and to corrupt officials. Entertainment expenses can be inferred not only from firms' profit and loss accounts but also from their tax returns. Therefore, if entertainment expenses are unavailable from the income statements, we use tax returns information.

We identify firms more exposed to corruption using the aggregate amount of entertainment expenses in their industry and province over the period 2009-2012, that is, the period preceding the reform. Since industries differ in size, we scale the aggregate entertainment expenses in an industry and province by the aggregate sales of firms in that industry and province over the same period. We label this variable EE_0(*Industry* × *Province*). Table I summarizes firm characteristics, for the 2009-2014 period including EE_0(*Industry* × *Province*).

According to this metrics, the most corrupt provinces include Tibet, Hunan, Guizhou, Hainan, and Yunnan, which are less developed and benefit from significant government subsidies. Not surprisingly, the latter are associated with more corruption and rent-seeking behavior. Among the most corrupt provinces, we also find Beijing, which housing central government agencies and regional representative offices tends to foster corruption.

As shown in Table IA.1 of the Internet Appendix, industry factors are an order of magnitude more important than province factors in explaining variation in our industry-province proxy for corruption. Among the most corrupt industries, we find industries that involve resource management, technological services and software, information technology, sport, and media, which also receive government subsidies and contracts, require government licenses, or are under strict government scrutiny, which again are likely to lead to corruption and rent-seeking behavior.

Table II validates entertainment expenses as a proxy for corruption. Panel A shows that the level of entertainment expenses in a province and industry is correlated with more conventional proxies for corruption. For instance, in columns 1 to 3, we correlate the proportion of politically connected listed firms in a province and industry with the level of entertainment expenses. We define a firm to be politically connected if it has a board chairperson who serves, or has served in the past, as government official. We are able to collect this information only for listed companies because unlisted firms do not disclose board information. Since many provinces do not have listed companies in a given three-digit industry, we are unable to measure the proportion of politically connected firms with the same level of granularity as EE_0(*Industry* × *Province*). Thus, to validate EE_0(*Industry* × *Province*), we compute both entertainment expenses and proportion of politically connected firms at the one-digit industry and province level over the 2009-2012 period. All specifications indicate that a higher proportion of politically connected firms is positively correlated with the proportion of entertainment expenses in that one-digit industry and province.

We also use the World Bank Enterprise Survey to compute the proportion of firms that consider corruption as an obstacle. The survey provides a much coarser industry classification for a sample of 2,700 firms in 11 provinces in 2012. Thus, in columns 4 to 6, we rely on the coarser classification of the survey and consider only a subsample of provinces. It is comforting however that our proxy for corruption based on entertainment expenses is positively correlated with the proportion of firms that consider corruption as an obstacle, whether we include province-industry controls or not.

Panel B provides an ex post validation for $EE_0(Industry \times Province)$. Column 1 shows that the proportion of politically connected firms decreased to a larger extent between the period before and the period after the anti-corruption campaign in provinces and industries with ex ante higher entertainment expenses. This result attains only after controlling for industry fixed effects, capturing the systematic differences in entertainment expenses between industries that emerge in Table IA.1.

We also explore whether higher entertainment expenses in a province during 2009-2012 are associated with measures of enforcement after the start of the anti-corruption campaign. In particular, we construct a provincial level index of enforcement from the websites of the Central Commission for Discipline Inspections (CCDI), its local agencies, and various internet search engines and news reports in the China Core Newspaper Databases. We identify 1,576 individuals that are investigated for corruption. Figure 1 illustrates the number of individuals in a given province being investigated for corruption during the 2013-2014 period.

Using this information, we construct the "Convicted Officials" index, defined as the average number of individuals investigated for corruption in a province during 2013-2014. In this test, we do not consider the industry dimension because convictions cannot be associated with corruption in a specific industry.[9] The estimates in column 2 show that higher entertainment expenses in a province during 2009-2012 are associated with more convicted officials during 2013-2014. This indicates that provinces with higher entertainment expenses were indeed more exposed to the anti-corruption campaign.

Finally, we consider media coverage of corruption. We consider all news articles published during the sample period in 23 major nationwide financial newspapers included in the China Core Newspaper Database. We construct a list of corruption terms in Mandarin. Since there is more than one way to refer to corruption, our list of words includes a large array of terms. For each sample firm and year, we count the number of news articles mentioning the name of the company in association with corruption. We then average the number of articles across firms in an industry-province and year. Figure 2 shows the intensity of media coverage for firms involved in corruption across different provinces. The estimates in column 3 show that following the start of the anti-corruption campaign, the increase in media coverage of corruption is larger in provinces and industries with ex ante higher entertainment expenses.

Panel C shows that all proxies for province-industry level corruption are consistent with a decrease in corruption and stronger enforcement after the start of the anti-corruption campaign, as captured by the dummy variable *Anti-corruption* that takes value equal to one in year 2013 and 2014. In particular, we observe a decrease in entertainment expenses and in the proportion of

[9] There were very few convictions of government officials before the start of the anti-corruption campaign. For this reason, we do not consider the increase in the number of convictions.

politically connected firms in an industry and province. Also, the number of convicted officials and media coverage of corruption increased after the start of the campaign.

4. Results on Firms' Performance

4.1 Main Findings

If corruption were indeed an inefficient equilibrium for an economy, the anti-corruption campaign should have brought about an improvement in firm performance, especially for firms operating in ex ante more corrupt environments. We rely on the following model to test this conjecture:

$$y_{f,i,p,t} = \alpha_1 + \alpha_2 EE_{i,p,0}(Industry \times Province) \times Anti\text{-}corruption_t + \boldsymbol{\gamma X_{f,t-1}} + \delta_f + \vartheta_{p,t} + \xi_{i,t} + \varepsilon_{f,i,p,t}, \quad (1)$$

where $y_{f,i,p,t}$ is a measure of performance of firm f belonging to industry i and based in province p during year t; $Anti\text{-}corruption_t$ is a dummy variable that takes value one for years 2013 and 2014 and zero during 2009-2012, the years preceding the anti-corruption campaign. We conjecture that firms in more corrupt industries and provinces, as captured by the magnitude of the entertainment expenses in that industry and province, $EE_{i,p,0}(Industry \times Province)$, are more exposed to the anti-corruption campaign. We control for a vector of time-varying firm characteristics, $\boldsymbol{X_{f,t-1}}$, firm fixed effects (δ_f), and interactions of province and time fixed effects ($\vartheta_{p,t}$) and of industry and time fixed effects ($\xi_{i,t}$). Firm fixed effects absorb the direct effect of $EE_{i,p,0}(Industry \times Province)$. We cluster standard errors at the industry and province level.

Table III shows how the anti-corruption campaign affected firm performance. We measure firm performance with profitability, captured by the firm's ROA, and total factor productivity (TFP), estimated using the Levinsohn and Petrin (2003) model, which considers labor, capital (fixed assets), and material as inputs in a log-linear production function, estimated for each industry and year.[10]

The results support the view that corruption is an inefficient equilibrium and hampers the performance of most firms. Both profitability and TFP increase following the anti-corruption campaign for firms in industries and provinces that were ex ante more exposed to corruption. This indicates that firms benefit from a reduction in corruption: Not only do they have to transfer less surplus to government officials, thus achieving higher profitability, but they also have stronger incentives to adopt more advanced technologies (Murphy, Shleifer, and Vishny, 1993).

We obtain these estimates with controls for firm and year fixed effects and interactions of province and year as well as of industry and year fixed effects. This allows us to control non-parametrically for industry-specific shocks as well as any shocks associated with the firms' local economic environment. In particular, we can exclude that the better performance of firms in industries and provinces with high entertainment expenses is driven by the new administration conveying resources to certain provinces or industries.

A possible concern is that we observe better performance in high entertainment expenses provinces and industries, because the less profitable firms exit. However, as we discuss in Section 5.2, high-entertainment-expenses provinces and industries do not experience higher exit rates after the start of the anti-corruption campaign.

The effects are both statistically and economically significant. The most conservative estimates in column 4 imply that following the start of the anti-corruption campaign, a one-standard-deviation increase in $EE_0(Industry \times Province)$ is associated with a 0.12 percentage

[10] In particular, we use the algorithm described by Petrin, Poi, and Levinsohn (2004). The summary statistics of the estimates of the TFP are broadly in line with the ones reported in other samples of Chinese firms using this methodology (see, e.g., Huang et al. 2016).

points increase in firm f's profitability, which is equivalent to a 3.45% increase in profitability for the average firm. Similarly, in column 8, a one-standard-deviation increase in EE_0(*Industry* × *Province*) is associated with an increase in TFP of 1.24 percentage points, which is equivalent to almost 1.6% of the TFP's standard deviation. We view these effects as sizable considering that we capture only the benefits accruing in the two years following the anti-corruption campaign.

Importantly, comparing the estimates in which we include interactions of industry and time fixed effects to those with just firm and time fixed effects suggests that negative spillovers within industries do not play an important role: If some firms in low-corruption provinces within an industry were negatively affected by competition from their peers in ex ante high-corruption provinces, the bias should have produced larger effects in the specifications with industry-time effects, in which we compare firms in the same industry across provinces. Figure 3 provides a graphical representation of the timing of the effects and confirms that all firms benefit. Importantly, firms that face higher corruption in their industry and province start to perform better only after the start of the anti-corruption campaign, indicating that our estimates do not capture any pre-existing trends.[11]

To further explore whether some firms are negatively affected or if rather all firms benefit albeit to different extent, Table IV presents the same specifications as in Table III for different subsamples of firms. Since large firms, thanks to their sheer size, can easily outspend small firms in attracting the favors of officials, we expect corruption to hamper the performance of small firms more than that of their larger peers. Also, old firms are likely to have established connections that facilitate their operations in a corrupt environment. This is less likely to be the case for new entrants. We thus expect the positive effects of the anti-corruption campaign to be stronger for

[11] Table IA.2 in the Internet Appendix provides another test for the existence of pre-existing trends exploring the dynamic effects around the anti-corruption campaign.

young firms. Columns 1 to 4 of Panels A and B suggest that higher profitability and TFP are largely driven by small and young firms, even though differences are not always statistically significant at conventional levels.[12] A one-standard-deviation increase in EE_0(*Industry* × *Province*) is associated with a 0.26 (1.32) percentage points increase in the profitability (TFP) of small firms (column 1 of Panels A and B), and 0.73 percentage points increase in the TFP of large firms (column 2 of Panel B). Similarly, a one-standard-deviation increase in EE_0(*Industry* × *Province*) is associated with a 0.22 (2) percentage points increase in the profitability (TFP) of young firms (column 3 of Panels A and B), and a 0.79 percentage points increase in the TFP of old firms (column 4 of Panel B). We find no statistically significant effect of the anti-corruption on the profitability of large firms and old firms ex ante more exposed to corruption, suggesting that while all firms adopt new technologies, more established firms lose rents arising from lucrative sale contracts and subsidized goods and services.

Overall, it appears that the benefits accruing to small and young firms are at least double those accruing to their larger and older counterparts. Albeit large and old firms benefit to a lesser extent, we find no evidence of obvious losers. This indicates that even if large and old firms adapt better to a corrupt environment and can limit the damages of corruption, an equilibrium with high corruption is an inefficient equilibrium for all firms.

In columns 5 and 6, we consider privately-owned and state-owned enterprises. Central and provincial governments continued to convey resources to SOEs. Hence, the anti-corruption campaign is unlikely to have produced as large effects for SOEs as for private firms. In Panel A, the anti-corruption campaign does not appear to affect the ROA of SOEs in high-entertainment-

[12] In particular, in the specifications for the ROA, the coefficient for small firms is strictly larger than the one for large firms at the 10% level, but we find no differences in statistical significance between old and young firms. In contrast, in the specifications for TFP, only the coefficients for young and old firms are statistically different.

expenses industries and provinces; the estimated coefficient on EE_0(*Industry* × *Province*) × *Anti-corruption* is significantly lower than the corresponding coefficient for private firms at the 10 percent level. The coefficient in the specification for the TFP of SOEs in column 6 of Panel B is marginally insignificant and about 60% of the one we obtain for private firms, but not statistically different from the corresponding coefficient for private firms. Overall, it appears that the effects we uncover in Table III are largely driven by privately-owned firms, which presumably were more subject to rent extraction by government officials.

4.2 Corrupting Firms

We also ask whether firms with ex ante larger entertainment expenses, which presumably had been successful in obtaining political favors, lose once their ability of corrupting officials is curtailed.

In Table V, we test whether firms better poised to gain from a corrupt environment lose from the anti-corruption campaign. We rank firms based on their level of entertainment expenses within a corruption market (defined at the province-industry level) before the anti-corruption campaign and consider as better able to obtain favors firms that are in the top percentiles for entertainment expenses during 2009-2012 within their corruption market. We do not standardize a firm's entertainment expenses by its sales, because a particular firm's performance depends on its relative position in the "corruption market". This cannot be captured by the ratio of entertainment expenses to sales: This ratio could be very high for a small firm, which would be easily outbid by a larger firm with a possibly smaller ratio of entertainment expenses to sales.[13]

[13] As explained in Subsection 3.2, we standardize by sales in the definition of EE_0(*Industry* × *Province*) to abstract from differences in the scale of industries in different provinces.

The profitability of firms that spent more on entertainment expenses appears to increase to a lower extent after the start of the anti-corruption campaign. We observe no differential effects on TFP. This might indicate that all firms adopt new technologies when the business environment in which they operate becomes less corrupt, but that firms that were corrupting more lose rents arising from lucrative sale contracts and subsidized goods and services. Consequently, their profits increase to a lower extent even if they adopt new technologies.

More importantly, we still find that firms operating in provinces and industries with high entertainment expenses perform better after the start of the anti-corruption campaign, regardless of their attempts to corrupt officials. Thus, these findings lend further support for our conjecture that corruption is an inefficient equilibrium that can make worse off virtually all firms.

These tests also help mitigating concerns that the performance improvements we observe simply capture a decrease in underground economy and lower tax evasion after the start of the anti-corruption campaign. Companies that evade taxes and perform a larger part of their business in the underground economy can be expected to have higher entertainment expenses and may start reporting higher profits to the tax authority after the start of the anti-corruption campaign. It is therefore comforting that firms that have previously spent more on entertainment expenses do not experience performance improvements after the start of the anti-corruption campaign. Performance improvements are driven instead by firms operating in an ex ante more corrupt environment, which is consistent with our hypothesis that a corrupt environment hampers firm performance.[14]

[14] There is little reason to believe that $EE_0(Industry \times Province)$ could capture the underground economy or tax evasion in our specifications with industry × year fixed effects and province × year fixed effects, as these factors tend not to vary within a province and an industry.

4.3 Alternative Measures of Corruption

In Table VI, we perform a number of tests to probe that our results do not depend on the specific measure of ex ante exposure to corruption that we use. In Panel A, we capture exposure to corruption using the fraction of listed companies in an industry-province that are politically connected, defined as in Section 3.2. Firms' profitability and TFP appear to improve in industries and provinces with ex ante more politically connected firms, following the start of the anti-corruption campaign. In particular, a one-standard-deviation increase in $PC_0(Industry \times Province)$ is associated with a 0.08 percentage points increase in firm profitability (column 4) and 0.37 percentage points increase in TFP (column 8), following the start of the anti-corruption campaign. These are equivalent to about 1% of the standard deviation of profitability and TFP in the sample.

We also consider differences in enforcement across provinces. Instead of using the anti-corruption campaign dummy, we use a province level index, based on the number of convicted officials, to capture the strength of the anti-corruption drive in a province over time. In particular, we set the intensity of the anti-corruption campaign in a province equal to the natural logarithm of one plus the number of individuals investigated for corruption in a province during 2013 in 2013, and equal to the natural logarithm of one plus the number of individuals investigated for corruption in a province during 2013-2014 in 2014. We set the intensity of the anti-corruption campaign equal to zero prior to 2013. In Panel B, we continue to find that firms that were more exposed to a corrupt environment benefit to a larger extent from the anti-corruption campaign. In column 4 (8) of Panel B, a one-standard-deviation increase in our province level proxy for enforcement (1.394) translates into 0.07 (0.94) percentage points higher profitability (TFP) in an industry-province with average entertainment expenses (0.269). These magnitudes are comparable with our earlier estimates.

4.4 Mechanisms

The results so far indicate that corruption has negative spillovers on firm performance, in particular for small and young firms. To provide some insights on how the anti-corruption campaign led firms to achieve better performance, we explore how corruption in an industry-province affects firms' ability to expand their sales and access to external finance.

Columns 1 to 4 of Table VII investigate the effect of the anti-corruption campaign on firms' sales growth. Sales growth increases for firms in ex ante more corrupt industries and provinces after the anti-corruption campaign. A one-standard-deviation increase in $EE_0(Industry \times Province)$ is associated with a 0.95(=0.063 ×0.151) percentage points increase in sales growth following the start of the anti-corruption campaign (column 4). This is equivalent to a 6 percent increase for the average firm. Overall, it appears that corruption slows down firms' ability to expand their markets, possibly because it acts as a tax on their profits. Being an inefficient equilibrium, corruption may also depress demand.

Corruption efforts are often associated with easier access to external finance. This is particularly likely to be the case in China, not only because formal financial markets are underdeveloped, but also because provincial and central governments support connected businesses by funneling cheap credit through the banking system. Most firms are then forced to use more expensive informal sources of funding. We explore whether these distortions decrease resulting in lower cost of debt after the start of the anti-corruption campaign. Columns 5 to 8 of Table VII explore the effect of corruption on firms' cost of debt, calculated as interest expenses scaled by total liabilities. Following the anti-corruption campaign, the cost of debt decreases for firms that are ex ante more exposed to corruption. A one-standard-deviation increase in $EE_0(Industry \times Province)$ is associated with a 0.01(=-0.001 ×0.151) percentage points decrease in a firm's cost of debt. Since we proxy the cost of debt as the average cost of a firm's liabilities, which include trade credit and other potentially cheap sources of external finance, the average cost of liabilities is 1.11% in our sample. Hence, the estimated change is equivalent to a 1.5% drop in the cost of debt for the average firm. Higher sales and lower cost of debt in turn contribute to explain why firms become more profitable and are able to improve their technologies.

5. The Aggregate Effects of Corruption on the Economy

So far, we have shown that following the anti-corruption campaign, the performance of the average firm improves. However, this does not necessarily imply that corruption is inefficient. Corruption may be welfare-enhancing if the most productive firms employ more capital and labor as a result of their higher entertainment expenses. In addition, high-quality small firms could ultimately grow and overcome the initial scale disadvantage. If corruption does not discourage entry, the frictions it creates are not expected to have any lasting impact on the economy. Below, we evaluate these channels to be able to infer whether corruption harms allocational efficiency.

5.1 Corruption and Resource Allocation

In this section, we test whether higher productivity firms attract more resources over time and to what extent higher corruption constitutes sand in the wheels for this adjustment process. Hsieh and Klenow (2009) propose a methodology to evaluate to what extent resources are misallocated between firms. In their framework, large differences in the marginal productivity of the factors of production between firms indicate that less productive firms are able to employ more resources and that resources are therefore not allocated efficiently. Instead of directly comparing the level of the marginal productivity of capital and labor across firms, we consider the scale of production speed of adjustment to differences in productivity. This approach, which follows Wurgler (2000) and Bai, Carvalho, and Phillips (2018), has the advantage to avoid measurement errors in the productivity gaps that would bias the analysis against finding any systematic evidence of factor reallocation.[15] We capture, as the theory would imply, that the use of a factor of production should increase in firms in which at the margin the factor of production makes greater contributions to the output production. Put differently, a higher correlation between the growth in the use of a factor of production and a firm's marginal productivity for that factor of production implies greater allocational efficiency.

We thus test whether the change in firm f's share of labor (capital) input between year t and $t-1$, $\Delta l_{f,i,p,t}$ ($\Delta k_{f,i,p,t}$), is positively related to the marginal productivity of labor (capital) input of firm f at time $t-1$, $MPL_{f,i,p,t-1}$ ($MPK_{f,i,p,t-1}$), and whether $EE_{i,p,0}(Industry \times Province)$ decreases this correlation. We further test whether the effect of $EE_{i,p,0}(Industry \times Province)$ is muted after the start of the anti-corruption campaign.

We estimate the following models considering as dependent variables changes in the firm's employment share and its share of fixed assets, respectively:

$$\Delta l_{f,i,p,t} = \beta_1 MPL_{f,i,p,t-1} + \beta_2 MPL_{f,i,p,t-1} \times EE_{i,p,0}(Industry \times Province) + \beta_3 MPL_{f,i,p,t-1} \times EE_{i,p,0}(Industry \times Province) \times Anti\text{-}corruption_t + \beta_4 EE_{i,p,0}(Industry \times Province) \times Anti\text{-}corruption_t + \boldsymbol{\gamma X_{f,t-1}} + \delta_f + \vartheta_{p,t} + \xi_{i,t} + \varepsilon_{f,i,p,t}.$$

(2)

$$\Delta k_{f,i,p,t} = \beta_1 MPK_{f,i,p,t-1} + \beta_2 MPK_{f,i,p,t-1} \times EE_{i,p,0}(Industry \times Province) + \beta_3 MPK_{f,i,p,t-1} \times EE_{i,p,0}(Industry \times Province) \times Anti\text{-}corruption_t + \beta_4 EE_{i,p,0}(Industry \times$$

[15] To affect our inference, measurement errors in the marginal productivity of capital and labor would have to be correlated with EE_0(*Industry* × *Province*) and vary after the start of the anti-corruption campaign. This is implausible.

$Province) \times Anti\text{-}corruption_t + \boldsymbol{\gamma X_{f,t-1}} + \delta_f + \vartheta_{p,t} + \xi_{i,t} + \varepsilon_{f,i,p,t}$.

(3)

As in the previous specifications, we control for a vector of firm time-varying characteristics, $\boldsymbol{X_{f,t-1}}$, which may affect performance, interactions of province and time fixed effects ($\vartheta_{p,t}$), of industry and time fixed effects ($\xi_{i,t}$) as well as firm fixed effects (δ_f), which control for systematic differences in the rate of growth of the factors of production across firms.

We expect $\beta_1 > 0$ if more productive firms increase the amounts of factors of production they employ. If corruption decreases allocational efficiency, we expect that $\beta_2 < 0$. Furthermore, we expect $\beta_3 + \beta_4 > 0$ if the anti-corruption campaign decreases any negative effects of corruption.

Table VIII shows how corruption affects the allocation of labor and capital. The dependent variable is the logarithmic change in a firm's share of the industry-province's number of employees between t and $t-1$ in columns 1 to 3 and the logarithmic change in a firm's share of the industry-province's fixed assets between t and $t-1$ in columns 4 to 6. We measure the productivity of labor (capital) as the logarithm of the ratio of sales to employees (fixed assets), thus approximating a Cobb-Douglas production function. In particular, by using the value of sales in our proxy for productivity, we capture both changes in quantities and changes in the quality of the product. While an increase in the value of sales could in principle be caused by an increase in prices due to a decrease in competition, our results in Tables 9 and 10 show that firm entry increases following the anti-corruption campaign.

Panel A shows the main results. As one would expect, in columns 1 and 4, a firm's use of labor (capital) in an industry increases with its marginal productivity of labor (capital). However, higher entertainment expenses in an industry-province decrease the extent to which the most productive firms in the industry-province are able to attract more capital and labor (columns 2 and 5). Thus, corruption appears to slow down the reallocation of resources to the most productive firms. A one-standard-deviation increase in EE_0(*Industry* × *Province*) (equivalent to 0.151) is associated with a 3.3% (=0.151×0.086/0.393) drop in the speed of labor reallocation (column 2) and a 2.55% (=0.151×0.061/0.361) drop in the speed of capital reallocation (column 5) relative to an hypothetical industry-province with zero entertainment expenses.

While corruption continues to hamper the reallocation of resources, the sum of the coefficients on *MPL* × EE_0(*Industry* × *Province*) × *Anti-corruption* (*MPK* × EE_0(*Industry* × *Province*) × *Anti-corruption*) and EE_0(*Industry* × *Province*) × *Anti-corruption* in column 3 (6) indicates that the marginal productivity of labor (capital) becomes more correlated with the growth of labor (capital) shares for the most productive firms in the most corrupt business environments following the launch of the anti-corruption campaign.[16] This suggests that a decrease in corruption improves allocational efficiency and that corruption leads to an inefficient allocation of resources and is therefore harmful for an economy.

Panel B shows that the results on allocational efficiency are robust when we allow the intensity of the anti-corruption campaign to vary across provinces using our provincial index of enforcement based on convicted officials, as in Table VI Panel B. The estimates indicate that a stronger crackdown on corruption is associated with a higher correlation between the growth in the use of a factor of production and a firm's marginal productivity for that factor of production,

[16] In column 3 of Panel A, the sum of the coefficients on *MPL* × EE_0(*Industry* × *Province*) × *Anti-corruption* and EE_0(*Industry* × *Province*) × *Anti-corruption* implies that the anti-corruption campaign increases the flow of labor for firms with an MPL of at least 11.45. Thus, a firm must at least have productivity close to the sample median of 13.263 to benefit in terms of more resources.

following the start of the anti-corruption campaign, especially in industries and provinces with ex ante higher entertainment expenses.[17]

These results indicate that allocational efficiency is higher in an equilibrium with less corruption and contribute to explain how the anti-corruption campaign led to better firm performance.

5.2 Corruption and Industry Structure

In this section, we explore how corruption affects industry structure. To address this question, we start considering variation between industries and provinces and compute the fraction of young firms relative to all firms in a province and industry in a given year. We consider firms that are less than four years old as young. We test how the entertainment expenses in an industry and province affect the proportion of young firms in that industry and province using the following model:

$$y_{i,p,t} = a_1 + a_2 EE_{i,p,0}(Industry \times Province) \times Anti\text{-}corruption_t + \alpha_3 EE_{i,p,0}(Industry \times Province) + \vartheta_{p,t} + \xi_i + \varepsilon_{i,p,t}, \quad (4)$$

where the dependent variable, $y_{i,p,t}$, captures the proportion of young firms in an industry and province and other industry-province specifics outcomes. Since differently from the earlier models, our unit of observation is no longer the firm-year, but the industry-province-year, we are able to estimate less demanding specifications. For this reason, we absorb unobserved

[17] In column 3 of Panel B, the sum of the coefficients on *MPL* × EE_0(*Industry* × *Province*) × *Convicted Officials* and EE_0(*Industry* × *Province*) × *Convicted Officials* implies that the intensity of the anti-corruption campaign is associated with a larger flow of labor for firms with an MPL of at least 11.9. Also in this case, a firm must at least have productivity close to the sample median of 13.263 to benefit in terms of more resources.

heterogeneity by including interactions of province and time fixed effects ($\vartheta_{p,t}$) as well as industry fixed effects (ξ_i). We expect $a_2 > 0$ if the anti-corruption campaign favors firm entry.

Considering differences between industries and provinces allows us to control for different entry and exit rates across industries as well as different economic shocks and levels of economic development across provinces, which could affect the proportion of new firms. For instance, some provinces could have more entry because they have experienced recent improvements in economic performance. Also some industries may be younger and have naturally higher entry.

In columns 1 and 2 of Table IX, EE_0(*Industry* × *Province*) appears to be negatively associated with firm entry before the start of the campaign. However, following the start of the anti-corruption campaign, the proportion of young firms increases if an industry was ex ante relatively more corrupt in a given province. More importantly, columns 3 and 4 show that the proportion of high-quality young firms, defined as firms with TFP in the top quartile, increases in ex ante more corrupt industries and provinces, following the start of the anti-corruption campaign.

The effects are not only statistically, but also economically significant. In column 2 (4), a one-standard-deviation increase in EE_0(*Industry* × *Province*) is associated to a 0.67 (0.53) percentage points increase in the proportion of new (new high-quality) firms following the start of the anti-corruption campaign.[18] The proportion of new (new high-quality) firms is on average 10% (2%). Therefore, a one-standard-deviation increase in EE_0(*Industry* × *Province*) is associated with a 26% increase in entry of high-quality firms for an industry with average entry rate.

Columns 5 to 6 of Table IX show that firm entry is not accompanied by higher firm exit following the start of the anti-corruption campaign. Thus, the net formation of new firms is lower

[18] The economic effect of 0.67 percentage points is computed using the coefficients in column 2 as 0.019×0.35. Similarly, the economic effect of 0.53 percentage points is computed from the coefficients in column 4 as 0.015×0.35.

when corruption is higher, confirming that corruption is an inefficient equilibrium that involves negative externalities for all firms.

Finally, Table X shows that, as a consequence of higher entry, high-quality young firms gain a higher proportion of employment, sales and assets in industries and provinces ex ante more exposed to corruption following the start of the anti-corruption campaign. Column 4 of each panel suggests that a one-standard-deviation increase in $EE_0(Industry \times Province)$ is associated with a 0.23, 0.72, and 0.59 percentage points increase, respectively, in the proportion of employees (Panel A), sales (Panel B), and assets (Panel C) of high-quality young firms. These effects are sizable relative to the average proportions of employees, sales and assets of high-quality young firms that are 0.015, 0.036, and 0.025, respectively. Overall, these findings also help explain why large firms in ex ante more corrupt industries gain less from the anti-corruption campaign. By preventing firm entry, corruption limits competition and allows large incumbents to enjoy monopoly rents.

6. Conclusions

Using a comprehensive firm-level dataset in the world's largest emerging economy, we provide evidence that corruption constitutes an inefficient equilibrium and is detrimental to allocational efficiency and economic performance.

We document that firms operating in an ex ante more corrupt environment become more profitable and productive after a negative shock to the effectiveness of corruption. We also describe some of the channels through which corruption has negative spillovers on the economy. A high level of corruption in an industry prevents labor and capital from being allocated to the most productive firms and deters entry and small firm growth.

Our results highlight the importance of going beyond audit studies of corruption (e.g., Avis, Ferras, and Finan, 2018) and difference-in-differences analyses of the effects of bribes and political connections (e.g., Fisman, 2001). In these settings that are commonly used in the literature, it is to be expected that the performance of firms that benefit from favors is enhanced, while other firms benefit when their competitors are put out of business or fined. By design, these empirical settings do not allow the researcher to evaluate to what extent corruption is associated with economy-wide inefficiencies.

By exploiting the generalized crackdown on corruption brought about by the anti-corruption campaign in China, we provide the first empirical evidence that corruption is an inefficient equilibrium. We view as a promising area for future research to explore the specific channels through which corruption causes negative externalities and to evaluate interventions that may allow economies to move to more efficient equilibria.

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Appendix: Variable Definitions

Variable	Definition and Data Source
% Firms Considering Corruption an Obstacle	The fraction of firms in an industry-province that consider corruption an obstacle to their operations in 2012. Winsorized at the 1% and 99% levels. Source: World Bank China-Enterprise Survey 2012.
Δ Corruption News (Industry × Province)	The difference between the annual average number of news related to corruption for firms in an industry-province in the post-campaign period (2013-2014) and in the pre-campaign period (2009-2012). We collect news articles from 23 nationwide major financial newspapers in the China Core Newspaper Database.
Δ PC (Industry × Province)	The difference between the average of the annual proportion of politically connected firms in an industry-province in the post-campaign period (2013-2014) and that in the pre-campaign period (2009-2012). A listed firm is considered to be politically connected if its board chairperson is or was previously employed as a bureaucrat by the central government or a local government. Sources: CSMAR and Manual Collection.
Age	The natural logarithm of one plus the difference between the current year and the year in which the firm was founded. Winsorized at the 1% and 99% levels. Source: ATS Database.
Anti-corruption	A dummy variable equal to one if the year is equal or greater than 2013, and zero otherwise.
Capital Reallocation	The difference between the natural logarithms of a firm's share of industry-province fixed assets between year t and year $t-1$, winsorized at the 1% and 99% levels. A firm's share of industry-province fixed assets in a given year is computed as its fixed assets divided by the aggregate fixed assets of all firms in the industry and province. Industries are defined using three-digit codes based on the Industrial Classification for National Economic Activities. Source: ATS Database.
Cost of Debt	A firm's interest expenses divided by the average of its total liabilities at the beginning and end of the year. Winsorized at the 1% and 99% levels. Source: ATS Database.
Convicted Officials	This variable is used in Tables 6 and 8. It is set to zero before 2013, it is equal to the natural logarithm of one plus the number of convicted ex-officials in a province in 2013, and to the natural logarithm of one plus the number of convicted ex-officials during 2013-2014 in 2014. Winsorized at the 1% and 99% levels. Source: Manual Collection.
Convicted Officials (Province)	In Panel B of Table II, this variable is defined as the natural logarithm of one plus the annual average of convicted officials during 2013-2014 in a province. In Panel C of Table II, it is defined as the natural logarithm of the number of convicted officials in a province-year during 2009-2014. Source: Manual Collection.
Corruption News(Industry × Province)	We download all news articles published during the sample period from 23 major nationwide financial newspapers in the China Core

	Newspaper Database. For each firm and year in our sample, we count the number of news articles that mention the name of the company in association with corruption. We construct a list of corruption terms in Mandarin. Since there is more than one way to refer to corruption, our list of words includes a large array of terms. We average the number of articles that associate the firm with corruption across firms in an industry-province and year.
Dummy for Top Tercile (Quartile/Quintile/Decile) ee_0	A dummy variable equal to one if a firm's average annual entertainment expenses over the 2009-2012 period are in the top tercile (quartile/quintile/decile) of the industry-province, and zero otherwise. Industries are defined using three-digit codes based on the Industrial Classification for National Economic Activities. Source: ATS Database.
EE_0(Industry × Province)	Defined in the main analysis as the sum of entertainment expenses of all firms in an industry and province over 2009-2012, divided by the sum of the sales of all firms in the same industry-province during this period. Industries are defined using three-digit codes based on the Industrial Classification for National Economic Activities. In the validation analysis, we aggregate this variable using coarser industry codes and consider its evolution over time, as explained in the table captions and the text. Winsorized at the 1% and 99% levels. Source: ATS Database.
Entry	The number of young firms (or the number of high-quality young firms) in an industry-province and year, divided by the total number of firms in that industry-province and year. A firm is considered young if it is less than four years old. A firm is considered high-quality if its TFP is the top quartile of the sample in a year. Industries are defined using three-digit codes based on the Industrial Classification for National Economic Activities. Source: ATS Database.
Exit	The number of firms exiting in year t, divided by the number of firms at $t-1$. Source: ATS Database.
Labor Reallocation	The difference between the natural logarithms of a firm's share of industry-province employment between year t and year $t-1$. Winsorized at the 1% and 99% levels. A firm's share of industry-province employment in a given year is computed as its number of employees divided by the aggregate number of employees for all firms in the industry-province. Industries are defined using three-digit codes based on the Industrial Classification for National Economic Activities. Source: ATS Database.
Leverage	Total liabilities divided by total assets, measured at the beginning of the year. Winsorized at the 1% and 99% levels. Source: ATS Database.
Log(Assets)	Natural logarithm of total assets. Winsorized at the 1% and 99% levels. Source: ATS Database.

MPK	The marginal productivity of capital, approximated by the natural logarithm of sales divided by fixed assets. Winsorized at the 1% and 99% levels. Source: ATS Database.
MPL	The marginal productivity of labor, approximated by the natural logarithm of sales divided by the number of employees. Winsorized at the 1% and 99% levels. Source: ATS Database.
PC_0(Industry × Province)	The fraction of politically connected listed companies in an industry-province during the pre-anti-corruption period (2009-2012). A firm is considered to be politically connected if its board chairperson is or was previously employed as a bureaucrat by the central government or a local government. Industries are defined using one-digit codes based on the Industrial Classification for National Economic Activities. Winsorized at the 1% and 99% levels. Sources: CSMAR and Manual Collection.
ROA	Operating income divided by total assets. Winsorized at the 1% and 99% levels. Source: ATS Database.
Sales Growth	A firm's sales in year t divided by its sales in year $t-1$, minus one. Winsorized at the 1% and 99% levels. Source: ATS Database.
SOE	A dummy variable equal to one if a firm is government controlled or owned, and zero otherwise. Source: ATS Database.
TFP	Levinsohn-Petrin estimate of total factor productivity. Winsorized at the 1% and 99%. Source: ATS Database.
Young Firms' Proportion of Employees (Sales/Assets)	The sum of employees (sales/assets) of young firms in an industry-province and year, divided by the sum of employees (sales/assets) of all firms in that industry-province and year. A firm is considered young if it is less than four years old. Industries are defined using three-digit codes based on the Industrial Classification for National Economic Activities. Source: ATS Database.

Figure 1. The anti-corruption movement across Chinese provinces. This figure reports the number of ex government officials and SOE executives investigated across Chinese provinces between 2013 and 2014. A darker color indicates a larger number.

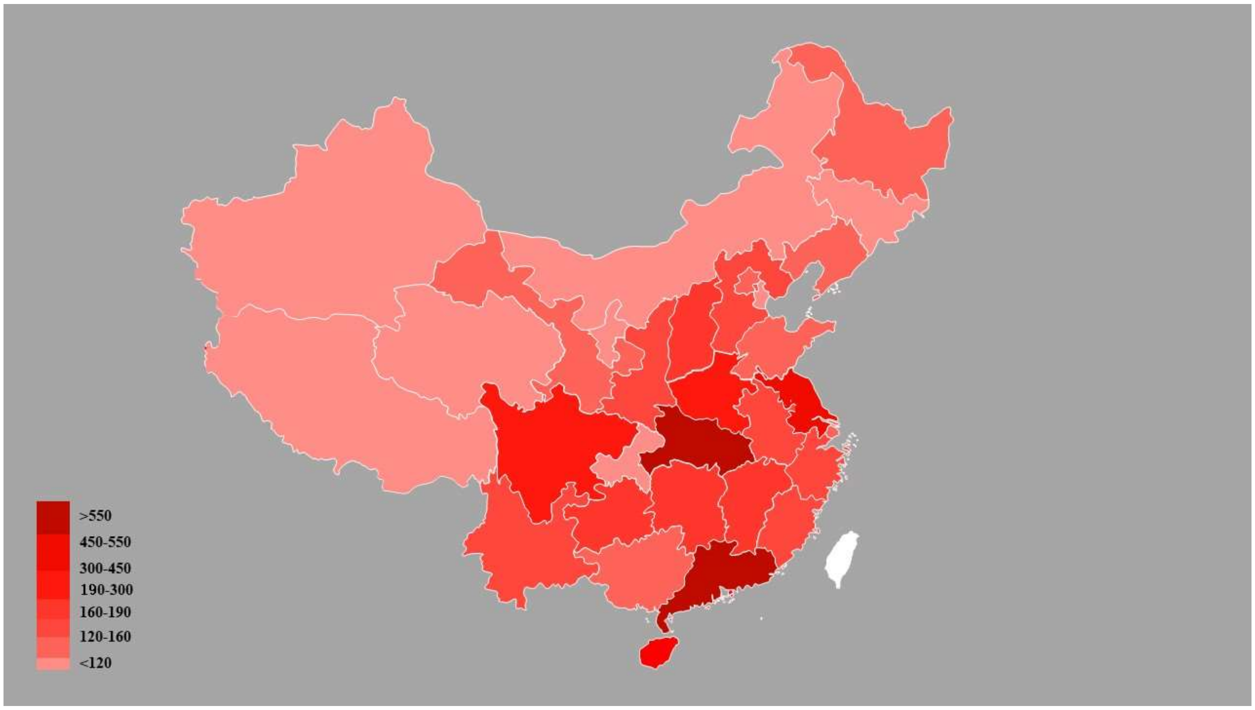


Figure 2. Media coverage of corruption. This figure reports the number of news articles on corruption covering firms in different Chinese provinces during 2013-2014. A darker color indicates a larger number.

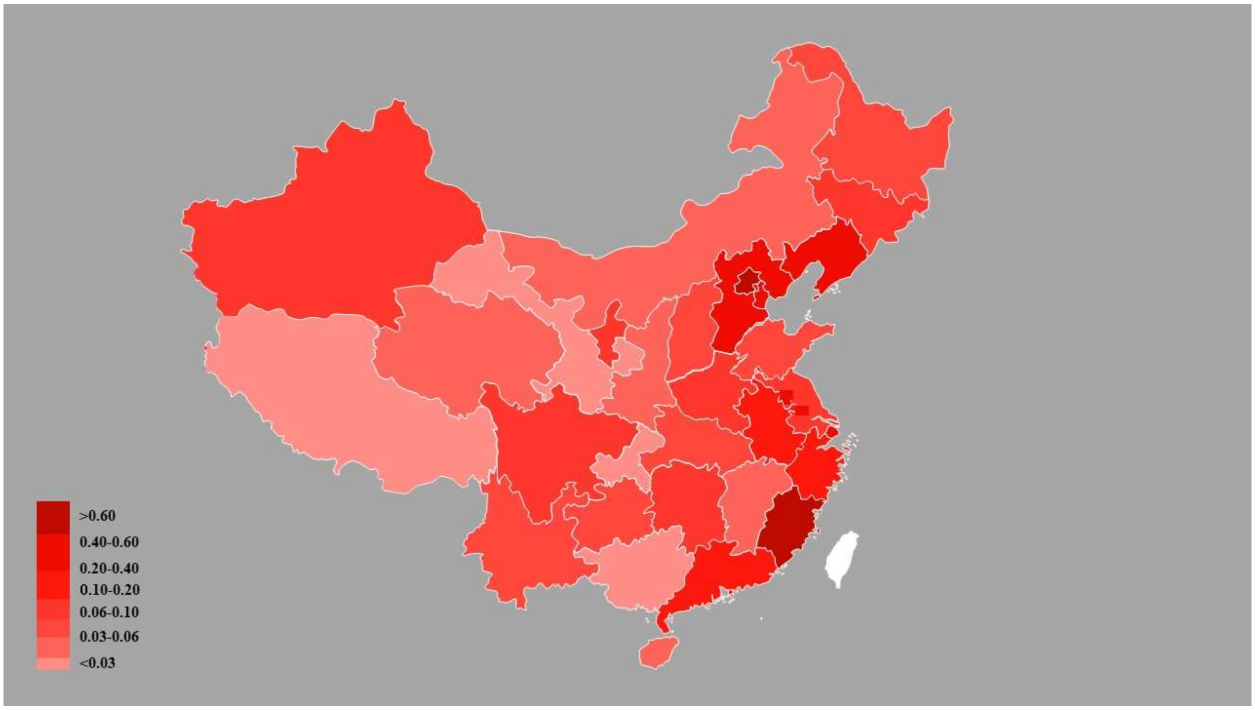
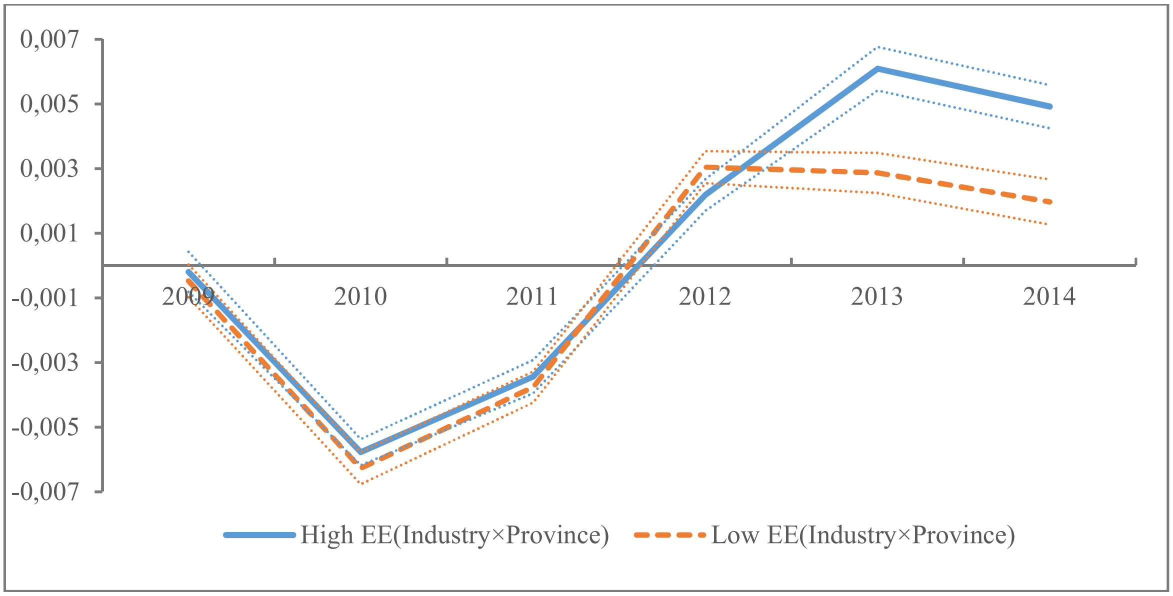


Figure 3. Dynamic effects. In Panel A, the blue solid line (orange dashed line) is the median of the residuals obtained regressing ROA on firm fixed effects and year fixed effects among firms that operate in industries and provinces with "EE_0(Industry × Province)" above (below) the median. In Panel B, the blue solid line (orange dashed line) is the median of the residuals obtained regressing TFP on firm fixed effects and year fixed effects among firms that operate in industries and provinces with "EE_0(Industry × Province)" above (below) the median. In both panels, the dotted lines indicate the corresponding 95% confidence intervals.

Panel A: ROA



Panel B: TFP

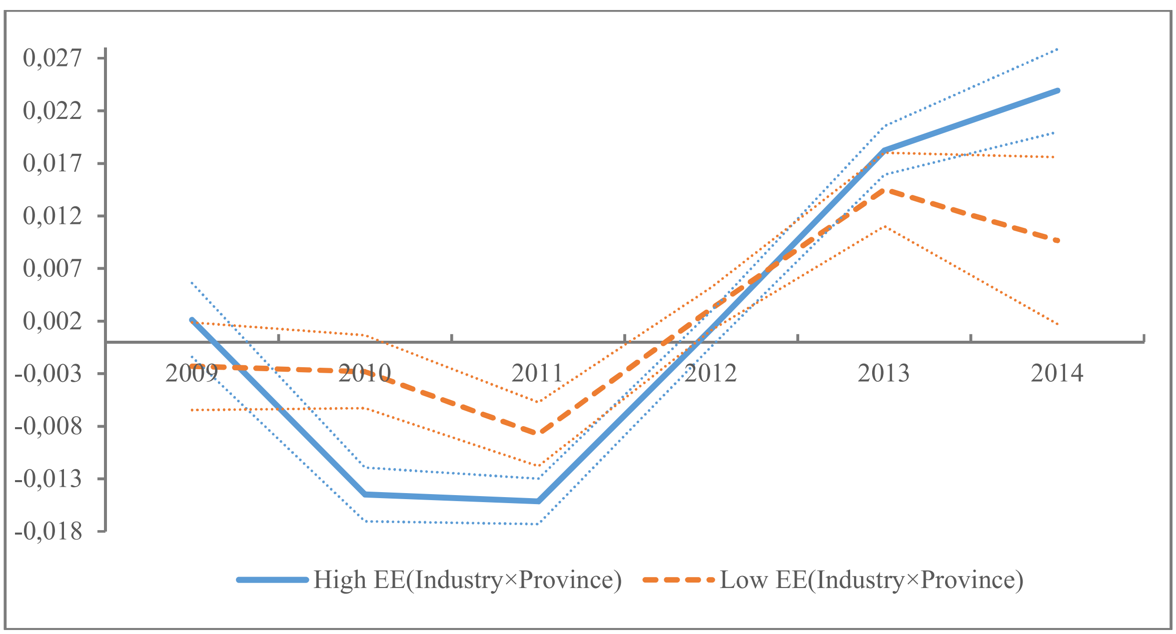


Table I. Summary statistics

This table summarizes the main characteristics of the sample firms. The sample period is 2009-2014. The unit of observations is the firm-year.

	# of obs.	Mean	Median	Std. Dev.
ROA	1,261,057	0.035	0.016	0.103
TFP	1,204,089	8.405	8.313	0.774
Sales Growth	1,261,057	0.172	0.06	0.674
Interest Rate	1,242,205	0.011	0.006	0.018
EE_0(Industry × Province)	1,261,057	0.269	0.239	0.151
Assets (million RMB)	1,261,057	309.576	67.527	794.347
Employee	1,231,851	283.167	110	524.627
Leverage	1,261,057	0.649	0.678	0.311
Age (years)	1,261,057	11.202	9	8.958
SOE	1,261,057	0.121	0	0.326
Capital Reallocation	1,136,922	-0.207	-0.205	0.555
Labor Reallocation	1,122,262	-0.245	-0.204	0.473
MPK	1,152,406	1.843	1.501	1.998
MPL	1,149,517	13.478	13.263	1.479

Table II. Validation tests

Panel A: Does EE capture corruption?

The unit of observation is the industry-province. The dependent variable is the fraction of listed firms with political connections in an industry-province during 2009-2012 in columns 1-3 and the fraction of firms in an industry-province that consider corruption an obstacle in the 2012 World Bank Enterprise Survey (Section J-30) in columns 4-6. "EE_0(Industry × Province)" is measured during 2009-2012. "Average Log(Assets)", "Average Leverage", and "Average Age" are, respectively, the average of "Log(Assets)", "Leverage", and "Age" of sample firms in an industry-province during 2009-2012. "Fraction of SOEs" is the fraction of SOEs in an industry-province during 2009-2012. T-statistics computed with robust standard errors are reported in parentheses. All models include a constant but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	PC_0(Industry × Province)			% Firms Considering Corruption an Obstacle		
	(1)	(2)	(3)	(4)	(5)	(6)
EE_0(Industry × Province)	0.168*	0.462**	0.464**	0.048	0.123*	0.160*
	(1.75)	(2.58)	(2.45)	(0.77)	(1.68)	(1.97)
Average Log(Assets)			0.013			0.033
			(0.20)			(0.66)
Average Leverage			-0.026			0.116
			(-0.70)			(1.57)
Average Age			0.047			-0.031
			(0.27)			(-0.26)
Fraction of SOEs			-0.007			0.160
			(-0.02)			(0.58)
Observations	261	261	261	198	198	198
R-squared	0.012	0.279	0.282	0.003	0.313	0.327
Industry FE	NO	YES	YES	NO	YES	YES
Province FE	NO	YES	YES	NO	YES	YES

Continued Table II. Validation tests

Panel B: Does the anti-corruption campaign target corrupted industries and provinces?

The unit of observation is the industry-province in columns 1 and 3 and the province in column 2. The dependent variable is the change in the fraction of politically connected listed firms in an industry-province between the pre-campaign period (2009-2012) and the post-campaign period (2013-2014) in column 1, the natural logarithm of the average number of convicted officials in a province in 2013-2014 in column 2, and the change in the average number of news on corruption in an industry-province between the pre-campaign period (2009-2012) and the post-campaign period (2013-2014). "EE_0(Industry × Province)" and "EE_0(Province)" are measured during 2009-2012. "Average Log(Assets)", "Average Leverage", and "Average Age" are, respectively, the average of "Log(Assets)", "Leverage", and "Age" of sample firms in an industry-province during 2009-2012 in columns 1 and 3, and in a province during 2009-2012 in column 2. "Fraction of SOEs" is the fraction of SOEs in an industry-province during 2009-2012 in columns 1 and 3, and in a province during 2009-2012 in column 2. T-statistics computed with robust standard errors are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Δ PC (Industry × Province)	Convicted Officials (Province)	Δ Corruption News (Industry × Province)
	(1)	(2)	(3)
EE_0(Industry × Province)	-0.212**		0.843**
	(-2.04)		(2.45)
EE_0(Province)		4.895**	
		(2.11)	
Average Log(Assets)	-0.038	0.578	0.041
	(-1.32)	(1.01)	(0.46)
Average Leverage	0.013	0.433	0.003
	(0.59)	(0.89)	(0.13)
Average Age	0.210*	0.543	-0.252
	(1.82)	(0.31)	(-0.83)
Fraction of SOEs	0.046	-5.668**	-0.177
	(0.31)	(-2.56)	(-0.47)
Observations	249	31	1,983
R-squared	0.134	0.231	0.003
Industry FE	YES	NO	NO

Continued Table II. Validation tests

Panel C: Did the anti-corruption campaign decrease corruption?

The unit of observation is the industry-province-year over the period 2009-2014 in columns 1, 2, and 4, and is the province-year in column 3. The dependent variable is “EE(Industry × Province)” in column 1, calculated as the sum of firms’ entertainment expenses in an industry-province-year, divided by the sum of firms’ sales in the same industry-province-year; the fraction of politically connected listed firms in an industry-province-year in column 2; the natural logarithm of the number of convicted officials in a province-year in column 3; and the average number of news on corruption in an industry-province-year in column 4. “Average Log(Assets)”, “Average Leverage”, and “Average Age” are, respectively, the average of “Log(Assets)”, “Leverage”, and “Age” of sample firms in an industry-province-year in columns 1, 2 and 4, and in a province-year in column 3. “Fraction of SOEs” is the fraction of SOEs in an industry-province-year (or province-year). T-statistics computed with robust standard errors are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	EE(Industry × Province)	PC(Industry × Province)	Convicted Officials (Province)	Corruption News (Industry × Province)
	(1)	(2)	(3)	(4)
Anti-corruption	-0.137***	-0.072***	1.568***	0.105*
	(-10.63)	(-3.10)	(8.38)	(1.81)
Average Log(Assets)	-0.091***	0.023	0.144	0.044
	(-10.41)	(1.33)	(0.51)	(1.13)
Average Leverage	-0.001	-0.003	-0.029	-0.000
	(-0.47)	(-0.50)	(-0.75)	(-0.00)
Average Age	-0.065***	0.121**	2.323*	0.129
	(-2.83)	(2.12)	(1.89)	(1.24)
Fraction of SOEs	0.223***	-0.171*	10.759***	-0.080
	(5.89)	(-1.84)	(4.59)	(-0.47)
Observations	12,103	1,493	186	12,103
R-squared	0.160	0.232	0.861	0.043
Province FE	YES	YES	YES	YES
Industry FE	YES	YES	NO	YES

Table III. The anti-corruption campaign and firm performance

This table explores the effects of the anti-corruption campaign on firm performance. The unit of observation is the firm-year. The dependent variable is the firm's ROA in columns 1-4 and the firm's total factor productivity (TFP) in columns 5-8. The sample period is 2009-2014. "EE_0(Industry × Province)" is measured during 2009-2012. Control variables are measured at year $t-1$. All variables are defined in the Appendix. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	ROA				TFP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EE_0(Industry × Province) × Anti-corruption	0.030***	0.033***	0.009**	0.008**	0.090***	0.093***	0.076***	0.082***
	(6.19)	(6.77)	(2.55)	(2.25)	(4.13)	(4.12)	(4.95)	(5.18)
Log(Assets)	-0.013***	-0.013***	-0.012***	-0.012***	0.112***	0.111***	0.115***	0.114***
	(-19.65)	(-20.05)	(-19.06)	(-19.28)	(23.70)	(23.80)	(26.36)	(26.10)
Leverage	0.011***	0.011***	0.012***	0.011***	0.071***	0.071***	0.067***	0.067***
	(9.37)	(9.58)	(9.84)	(9.95)	(9.00)	(9.08)	(9.58)	(9.55)
Age	-0.003***	-0.003***	-0.002***	-0.002***	-0.027***	-0.028***	-0.012***	-0.013***
	(-4.26)	(-4.63)	(-2.98)	(-3.30)	(-5.55)	(-5.85)	(-2.86)	(-3.12)
SOE	-0.001	-0.001	-0.001	-0.001	0.001	0.002	0.000	0.001
	(-1.28)	(-1.15)	(-1.17)	(-1.14)	(0.32)	(0.50)	(0.10)	(0.25)
Observations	1,156,034	1,156,034	1,156,034	1,156,034	1,093,212	1,093,212	1,093,212	1,093,212
R-squared	0.672	0.673	0.682	0.683	0.898	0.899	0.901	0.901
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	YES	NO	NO	NO
Province x Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Industry x Year FE	NO	NO	YES	YES	NO	NO	YES	YES

Table IV. Subsample tests

This table explores the effects of the anti-corruption campaign on firm performance considering different subsamples. The unit of observation is the firm-year. The dependent variable is the firm's ROA in Panel A and the firm's total factor productivity (TFP) in Panel B. The sample period is 2009-2014. "EE_0(Industry × Province)" is measured during 2009-2012. A firm is considered a large (small) firm, if its assets at year $t-1$ are in the top (bottom) sample quartile. A firm is considered young (old) if its age at year $t-1$ is in top (bottom) sample quartile. Control variables are measured at year $t-1$. All variables are defined in the Appendix. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: ROA

	Assets		Firm Age		Ownership	
	Small	Large	Young	Old	Non-SOE	SOE
	(1)	(2)	(3)	(4)	(5)	(6)
EE_0(Industry × Province) × Anti-corruption	0.017**	0.003	0.015**	0.008	0.010**	-0.002
	(2.17)	(0.47)	(2.27)	(1.47)	(2.56)	(-0.25)
Log(Assets)	-0.014***	-0.014***	-0.014***	-0.011***	-0.013***	-0.013***
	(-10.98)	(-11.14)	(-13.62)	(-10.79)	(-18.98)	(-8.92)
Leverage	0.015***	0.014***	0.017***	0.009***	0.012***	0.009***
	(7.02)	(6.04)	(8.20)	(5.57)	(9.97)	(3.23)
Age	-0.001	-0.004***	-0.000	0.004	-0.002***	-0.001
	(-0.46)	(-3.74)	(-0.25)	(0.46)	(-3.06)	(-0.33)
SOE	-0.004	-0.001	-0.002	-0.001		
	(-1.08)	(-0.66)	(-0.68)	(-1.00)		
Observations	243,892	288,128	307,905	284,516	1,007,551	138,878
R-squared	0.700	0.727	0.705	0.707	0.673	0.745
Firm FE	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES
Industry x Year FE	YES	YES	YES	YES	YES	YES

Continued Table IV. Subsample tests

Panel B: TFP

	Assets		Firm Age		Ownership	
	Small	Large	Young	Old	Non-SOE	SOE
	(1)	(2)	(3)	(4)	(5)	(6)
EE_0(Industry × Province) × Anti-corruption	0.086***	0.050*	0.137***	0.054**	0.081***	0.050
	(3.57)	(1.67)	(4.88)	(2.41)	(4.59)	(1.64)
Log(Assets)	0.086***	0.159***	0.119***	0.099***	0.118***	0.097***
	(19.24)	(11.92)	(18.53)	(20.57)	(25.77)	(14.99)
Leverage	0.021***	0.121***	0.079***	0.062***	0.067***	0.071***
	(3.85)	(5.61)	(7.20)	(7.85)	(9.01)	(7.72)
Age	-0.008	-0.020**	-0.020***	-0.067	-0.011***	0.003
	(-1.53)	(-2.46)	(-3.79)	(-1.33)	(-2.62)	(0.43)
SOE	-0.011	0.011	0.009	-0.004		
	(-1.20)	(1.53)	(0.79)	(-0.64)		
Observations	225,048	275,663	287,128	271,549	953,024	131,290
R-squared	0.894	0.864	0.914	0.900	0.900	0.909
Firm FE	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES
Industry x Year FE	YES	YES	YES	YES	YES	YES

Table V. Corrupting firms and the anti-corruption campaign

This table relates the anti-corruption campaign to firm performance distinguishing between firms with different percentiles of entertainment expenses before the start of the anti-corruption campaign. The dependent variable is the firm's ROA in columns 1-4, and TFP in columns 5-8. The sample period is 2009-2014. "EE_0(Industry × Province)" is measured during 2009-2012. Control variables, measured at year $t-1$, include "Log(Assets)", "Leverage", "Age", and "SOE", but coefficients are not tabulated. All variables are defined in the Appendix. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	ROA				TFP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy for top tercile ee_0 × Anti-corruption	-0.003***				-0.001			
	(-5.14)				(-0.58)			
Dummy for top quartile ee_0 × Anti-corruption		-0.003***				-0.001		
		(-5.65)				(-0.53)		
Dummy for top quintile ee_0 × Anti-corruption			-0.003***				-0.002	
			(-5.88)				(-0.95)	
Dummy for top decile ee_0 × Anti-corruption				-0.003***				-0.004
				(-4.82)				(-1.13)
EE_0(Industry × Province) × Anti-corruption	0.008**	0.008**	0.008**	0.008**	0.082***	0.082***	0.082***	0.082***
	(2.20)	(2.20)	(2.20)	(2.21)	(5.17)	(5.17)	(5.17)	(5.16)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,156,034	1,156,034	1,156,034	1,156,034	1,093,212	1,093,212	1,093,212	1,093,212
R-squared	0.683	0.683	0.683	0.683	0.901	0.901	0.901	0.901
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry x Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Table VI. Alternative measures of corruption

This table considers various measures of corruption and their impact on firm performance. The unit of observation is the firm-year. The dependent variable is the firm's ROA in columns 1-4 and TFP in columns 5-8. In Panel A, we replace "EE_0(Industry × Province)" with "PC_0(Industry × Province)", calculated as the average fraction of listed companies that have a politically connected chairperson of the board in firm f's industry-province between 2009 and 2012. A chairperson of the board is considered politically connected if he or she is or was previously employed as bureaucrat by the central government or a local government. In Panel B, we measure the intensity on the anti-corruption campaign in the province of firm f with "Convicted Officials", computed as the natural logarithm of one plus the sum of ex-officials in a province investigated for corruption during the 2013-2014 period for year 2014; the natural logarithm of one plus the number of ex-officials in a province investigated for corruption in 2013 for year 2013; and set equal to zero before 2013. Control variables, measured at year $t-1$, include "Log(Assets)", "Leverage", "Age", and "SOE", but coefficients are not tabulated. All variables are defined in the Appendix. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Politically connected firms

Dependent Variable	ROA				TFP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PC_0(Industry × Province) × Anti-corruption	0.009*	0.011**	0.001	0.004*	0.061**	0.075***	0.013	0.019**
	(1.84)	(2.19)	(0.28)	(1.65)	(2.39)	(2.89)	(1.34)	(1.99)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,063,855	1,063,855	1,063,855	1,063,855	1,008,014	1,008,014	1,008,014	1,008,014
R-squared	0.674	0.675	0.685	0.685	0.902	0.902	0.904	0.905
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	YES	NO	NO	NO
Province x Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Industry x Year FE	NO	NO	YES	YES	NO	NO	YES	YES

Continued Table VI. Alternative measures of corruption

Panel B: Convicted officials

Dependent Variable	ROA				TFP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EE_0(Industry × Province) × Convicted officials	0.008***	0.010***	0.003***	0.002*	0.026***	0.031***	0.018***	0.025***
	(5.77)	(6.14)	(3.19)	(1.88)	(3.77)	(3.70)	(4.05)	(4.55)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,156,034	1,156,034	1,156,034	1,156,034	1,093,212	1,093,212	1,093,212	1,093,212
R-squared	0.672	0.672	0.682	0.683	0.898	0.899	0.901	0.901
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	YES	NO	NO	NO
Province x Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Industry x Year FE	NO	NO	YES	YES	NO	NO	YES	YES

Table VII. Mechanisms

This table relates corruption to firms' sales growth in columns 1-4 and firms' cost of debt in columns 5-8. The unit of observation is the firm-year. The sample period is 2009-2014. "EE_0(Industry × Province)" is measured during 2009-2012. Control variables, measured at year $t-1$, include "Log(Assets)", "Leverage", "Age", and "SOE", but coefficients are not tabulated. All variables are defined in the Appendix. T-statistics computed with robust standard errors at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Sales Growth				Cost of Debt			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EE_0(Industry × Province) × Anti-corruption	0.102***	0.093***	0.065***	0.063***	-0.003***	-0.003***	-0.003***	-0.001*
	(5.27)	(5.85)	(2.62)	(2.75)	(-2.77)	(-3.27)	(-3.48)	(-1.76)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,157,288	1,157,288	1,157,288	1,157,288	1,138,430	1,138,430	1,138,430	1,138,430
R-squared	0.303	0.305	0.312	0.313	0.478	0.482	0.499	0.501
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	YES	NO	NO	NO
Province x Year FE	NO	YES	NO	YES	NO	YES	NO	YES
Industry x Year FE	NO	NO	YES	YES	NO	NO	YES	YES

Table VIII. Corruption and the allocation of resources

This table studies the effect of corruption on capital and labor allocation. The unit of observation is the firm-year. In both panels, the dependent variable is the change in the natural logarithm of the share of industry-province employment of firm f from year $t-1$ to year t in columns 1-3 and the change in the natural logarithm of the share of industry-province fixed assets of firm f from year $t-1$ to year t in columns 4-6. The sample period is 2019-2014. "EE_0(Industry × Province)" is measured during 2009-2012. Control variables include "Log(Assets)", "Leverage", "Age", and "SOE", but coefficients are not tabulated. All variables are defined in the Appendix. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Anti-corruption campaign

Dependent Variable	Allocation of Labor			Allocation of Capital		
	(1)	(2)	(3)	(4)	(5)	(6)
MPL	0.371***	0.393***	0.394***			
	(30.13)	(28.34)	(28.21)			
MPL × EE_0(Industry × Province)		-0.086*	-0.106**			
		(-1.85)	(-2.28)			
MPL × EE_0(Industry × Province) × Anti-corruption			0.047***			
			(5.56)			
MPK				0.345***	0.361***	0.361***
				(49.47)	(31.93)	(31.77)
MPK × EE_0(Industry × Province)					-0.061*	-0.078**
					(-1.94)	(-2.41)
MPK × EE_0(Industry × Province) × Anti-corruption						0.054***
						(6.33)
EE_0(Industry × Province) × Anti-corruption			-0.538***			-0.003
			(-4.64)			(-0.03)
Control Variables	YES	YES	YES	YES	YES	YES
Observations	1,013,869	1,013,869	1,013,869	1,034,224	1,034,224	1,034,224
R-squared	0.393	0.393	0.393	0.420	0.420	0.421

Firm FE	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES
Industry x Year FE	YES	YES	YES	YES	YES	YES

Continued Table VIII. Corruption and the allocation of resources

Panel B: Convicted officials

Dependent Variable	Allocation of Labor			Allocation of Capital		
	(1)	(2)	(3)	(4)	(5)	(6)
MPL	0.371***	0.393***	0.394***			
	(30.13)	(28.34)	(28.23)			
MPL × EE_0(Industry × Province)		-0.086*	-0.100**			
		(-1.85)	(-2.17)			
MPL × EE_0(Industry × Province) × Convicted Officials			0.010***			
			(3.99)			
MPK				0.345***	0.361***	0.361***
				(49.47)	(31.93)	(31.61)
MPK × EE_0(Industry × Province)					-0.061*	-0.076**
					(-1.94)	(-2.35)
MPK × EE_0(Industry × Province) × Convicted Officials						0.018***
						(5.57)
EE_0(Industry × Province) × Convicted Officials			-0.119***			0.029
			(-3.32)			(0.71)
Control Variables	YES	YES	YES	YES	YES	YES
Observations	1,013,869	1,013,869	1,013,869	1,034,224	1,034,224	1,034,224
R-squared	0.393	0.393	0.393	0.420	0.420	0.421
Firm FE	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES
Industry x Year FE	YES	YES	YES	YES	YES	YES

Table IX. Corruption and firm entry and exit

This table relates corruption to firm entry and exit. The unit of observation is the industry-province-year. The sample period is 2009-2014. "EE_0(Industry × Province)" is measured during 2009-2012. Columns 1-4 relate corruption to firm entry, defined as the proportion of young firms among all firms in a province and industry in columns 1-2 and the proportion of high-quality young firms among all firms in a province and industry in columns 3-4. A firm is considered young if it is less than four years old. We classify a firm to be high quality if its TFP is the top quartile of the sample during the year. Columns 5-6 relate corruption to firm exit, defined as the proportion of firms that exit in year t. "Average Log(Assets)" is the average of the natural logarithm of total assets of all firms in a province and industry. "Average Leverage" is the average of the leverage of all firms in a province and industry. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Entry				Exit	
	All Young Firms		High-Quality Young Firms		All Firms	
	(1)	(2)	(3)	(4)	(5)	(6)
EE_0(Industry × Province)	-0.037***	-0.037***	-0.025***	-0.024***	0.018	0.022
	(-4.16)	(-4.22)	(-7.42)	(-7.20)	(1.01)	(1.07)
EE_0(Industry × Province) × Anti-corruption	0.015**	0.019***	0.017***	0.015***	-0.040	-0.057
	(2.05)	(2.71)	(5.84)	(5.12)	(-0.71)	(-0.95)
Average Log(Assets)	-0.010***	-0.008***	0.003***	0.003***	-0.090***	-0.089***
	(-3.57)	(-2.94)	(2.84)	(2.62)	(-10.15)	(-9.75)
Average Leverage	-0.000***	-0.000***	-0.000***	-0.000***	0.000	0.000
	(-4.34)	(-4.50)	(-2.84)	(-2.68)	(0.18)	(0.10)
Observations	9,568	9,568	9,568	9,568	14,127	14,127
R-squared	0.445	0.470	0.396	0.410	0.039	0.051
Province FE	YES	NO	YES	NO	YES	NO
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	YES	NO	YES	NO
Province x Year FE	NO	YES	NO	YES	NO	YES

Table X. Corruption and industrial structure

The unit of observation is the industry-province-year. The sample period is 2009-2014. "EE_0(Industry × Province)" is measured during 2009-2012. The dependent variable is the proportion of employees (Panel A), sales (Panel B), and assets (Panel C) of young firms (columns 1-2) and of high-quality young firms (columns 3-4), respectively. A firm is considered young if it is less than four years old. We classify a firm to be high quality if its TFP is the top quartile of the sample during the year. "Average Log(Assets)" is the average of the natural logarithm of total assets of all firms in a province and industry. "Average Leverage" is the average of the leverage of all firms in a province and industry. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Employees

Dependent Variable	Young Firms' Proportion of Employees			
	All Young Firms		High-Quality Young Firms	
	(1)	(2)	(3)	(4)
EE_0(Industry × Province)	-0.010**	-0.010**	-0.009**	-0.008**
	(-2.22)	(-2.41)	(-2.18)	(-2.22)
EE_0(Industry × Province) × Anti-corruption	-0.002	-0.001	0.008***	0.005*
	(-0.53)	(-0.17)	(2.66)	(1.67)
Average Log(Assets)	-0.013***	-0.013***	-0.002	-0.002
	(-5.19)	(-5.09)	(-1.47)	(-1.53)
Average Leverage	-0.000	-0.000	-0.000**	-0.000**
	(-0.46)	(-0.25)	(-2.29)	(-1.97)
Observations	14,113	14,113	14,113	14,113
R-squared	0.124	0.134	0.067	0.079
Province FE	YES	NO	YES	NO
Industry FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Province x Year FE	NO	YES	NO	YES

Continued Table X. Corruption and industrial structure

Panel B: Sales

Dependent Variable	Young Firms' Proportion of Sales			
	All Young Firms		High-Quality Young Firms	
	(1)	(2)	(3)	(4)
EE_0(Industry × Province)	-0.011**	-0.012**	-0.019***	-0.018***
	(-2.30)	(-2.47)	(-2.67)	(-2.69)
EE_0(Industry × Province) × Anti-corruption	0.002	0.003	0.019***	0.016**
	(0.44)	(0.57)	(2.78)	(2.51)
Average Log(Assets)	-0.016***	-0.015***	-0.004**	-0.004**
	(-5.57)	(-5.53)	(-2.38)	(-2.38)
Average Leverage	0.000	0.000	-0.000	-0.000
	(0.14)	(0.11)	(-0.12)	(-0.09)
Observations	14,127	14,127	14,127	14,127
R-squared	0.131	0.141	0.094	0.106
Province FE	YES	NO	YES	NO
Industry FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Province x Year FE	NO	YES	NO	YES

Panel C: Assets

Dependent Variable	Young Firms' Proportion of Assets			
	All Young Firms		High-Quality Young Firms	
	(1)	(2)	(3)	(4)
EE_0(Industry × Province)	-0.009*	-0.010**	-0.014**	-0.013**
	(-1.86)	(-2.06)	(-2.52)	(-2.56)
EE_0(Industry × Province) × Anti-corruption	0.001	0.003	0.016***	0.013**
	(0.24)	(0.60)	(2.78)	(2.48)
Average Log(Assets)	-0.016***	-0.016***	-0.003**	-0.003**
	(-5.97)	(-5.95)	(-2.04)	(-2.02)
Average Leverage	-0.000	-0.000	-0.000	-0.000
	(-0.24)	(-0.56)	(-0.16)	(-0.19)
Observations	14,126	14,126	14,126	14,126
R-squared	0.117	0.129	0.077	0.089
Province FE	YES	NO	YES	NO
Industry FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Province x Year FE	NO	YES	NO	YES

Internet Appendix

Table IA.1: Determinants of EE_0(Industry × Province)

We present R-squared of a regression of "EE_0(Industry × Province)", measured during 2009-2012, on different sets of fixed effects, as indicated on the table. The unit of observation is the industry-province.

Dependent Variable	EE_0(Industry × Province)		
	(1)	(2)	(3)
Industry FE	YES	NO	YES
Province FE	NO	YES	YES
Observations	2,085	2,085	2,085
R-squared	0.529	0.059	0.593

Table IA.2: Pre-existing trends

This table tests for pre-existing trends. The dependent variable is the firm's ROA in column 1, and TFP in column 2. "Year 2011 (2012, 2013, 2014)" is a dummy variable equal to one for year 2011 (2012, 2013, and 2014) and zero otherwise. Control variables, measured at year $t-1$, include "Log(Assets)", "Leverage", "Age", and "SOE", but coefficients are not tabulated. All variables are defined in the Appendix. T-statistics computed with robust standard errors clustered at the industry-province level are reported in parentheses. All models include a constant and fixed effects as indicated on the table, but the coefficients are not reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	ROA	TFP
	(1)	(2)
EE_0(Industry × Province) × Year 2011	0.005	-0.021
	(1.59)	(-1.55)
EE_0(Industry × Province) × Year 2012	0.004	0.022
	(0.72)	(1.18)
EE_0(Industry × Province) × Year 2013	0.010**	0.050**
	(2.27)	(2.52)
EE_0(Industry × Province) × Year 2014	0.011**	0.134***
	(2.21)	(5.18)
Control Variables	YES	YES
Observations	1,156,034	1,093,212
R-squared	0.683	0.901
Firm FE	YES	YES
Province x Year FE	YES	YES
Industry x Year FE	YES	YES

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