Anti-Corruption Campaign, Stereotyping, and the Resurgence of the SOEs: Evidence from China's Real Estate Sector

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Abstract

We advance a novel hypothesis that the anti-corruption campaign triggered the recent resurgence of the state-owned enterprises (SOEs) in China as an unintended consequence. We explore its nexus with the anti-corruption campaign that started in 2012 by presenting supporting evidence from the Chinese real estate sector, which is one of the largest sectors of the country but notoriously known for pervasive rent-seeking and corruption. Using a unique dataset of land parcel transactions merged with firm-level registration information, we find that the fraction of residential land parcels purchased by SOEs increased significantly relative to that purchased by private developers after the anti-corruption campaign. This finding is robust to a set of alternative specifications. We build a model to show that under the anti-corruption campaign, local officials (including those inherently clean ones) are deterred by corruption stereotypes that selling land to private developers is more susceptible to corruption, and thus more willing to award land to SOEs even when the latter are less efficient. We find evidence consistent with the model predictions.

Keywords: Anti-Corruption Campaign; Land Market; State-Owned Enterprises; State Capitalism

JEL Codes:

1. Introduction

Nicholas Lardy, a well-known China expert, wrote in his 2019 book titled "*The State Strikes Back,*" "Since 2012, however, this picture of private, market-driven growth has given way to a resurgence of the role of the state in resource allocation and a shrinking role for the market and private firms." This is a dramatic change of tune from his 2014 book "*Markets Over Mao,*" where he compellingly argued that "China has maintained extraordinarily rapid growth since 1978 primarily because of the freeing of the private sector and the shrinking of the state—that is, markets over Mao." The resurgence of the State in the Chinese economy, colloquially known by the term "The State Advances while the Private Sector Retreats," is now emerging as an international consensus on the direction of the Chinese economy; and it raises concerns on whether China is reversing more than thirty years of market-oriented reforms, which underlies its unprecedented growth miracle (Hirson, 2019).

It is not easy to pinpoint what drove the resurgence of the state-owned enterprises (SOEs) in the Chinese economy. There did not seem to have an official reversal of market-oriented reform around 2012 or 2013. In fact, the Third Plenum of the 18th Chinese Communist Party Congress in the Fall of 2013 officially endorsed a far-reaching blueprint for economic reform, and included the signal phrase "We must ensure that the market has a decisive role in the allocation of resources" for the first time in an official document of the Chinese Communist Party (Lardy, 2019, p. 32).

In this paper, we advance a novel hypothesis about the resurgence of the SOE by exploring its nexus with the recent anti-corruption campaign in China. Since December 2012, the Chinese central government has launched an anti-corruption campaign, which was historically unprecedented by its intensity, scope, and duration. Up to July 2019, approximately 250 province-or above level officials and numerous prefecture- and county-level officials were charged with corruption in this campaign, including several high-profile national leaders.[1] We

[1] They include, for instance, Zhou Yongkang, former Politburo Standing Committee member, and Xu Caihou, vice chairman of the Chinese Military Committee.

argue that in a context of weak rules of law and widespread corruption, people generally form some shared beliefs or stereotyping about the incidence of corruption and who pays money to whom in a specific context. For instance, it is commonly perceived in China that private real estate developers tend to give kickbacks to city government officials who grant them access to lucrative residential land. However, it is relatively rare for state-owned enterprises to engage in this type of corruption: the managers of SOEs receive little private gain from the rent-seeking activities but face a large private risk of corruption charge since SOEs generally have a more effective internal auditing system than private enterprises. Given such stereotyping, when a massive anti-corruption campaign is launched, the corruption-stereotyped transactions with private firms will be intentionally avoided by the government officials who fear follow-up corruption investigations even if these transactions are socially optimal. The reluctance of dealing with private firms also appears for those government officials who are inherently clean but dislike the hassles or reputational damage associated with corruption investigations. As a result, the anti-corruption campaign induces government officials to stay away from private firms to protect themselves and causes an unintended rise of state-owned enterprises in a corruption susceptible sector.

In this paper, we test the hypothesis that China's unprecedented anti-corruption campaign triggered a stereotyping about corruption-susceptible transactions and deterred government officials from dealing with private firms, which leads to the resurgence of the state-owned enterprises in the Chinese economy. We provide supporting evidence for this hypothesis from the real estate sector, particularly the residential land market. The real estate sector is probably the best place to look for such evidence regarding the nexus between the anti-corruption campaign, corruption stereotyping, and the resurgence of the SOEs. The real estate sector has been one of the largest sectors in the Chinese economy in the past decade: its annual sales were 12.64 trillion-yuan RMB in 2018 and accounted for about 14 percent of China's annual GDP. This sector has also been subject to heavy government regulation ranging from land auctions to zoning adjustments, and is notoriously known for pervasive rent-seeking and corruption (Chen and Kung, 2018; Fang, Gu, and Zhou, 2019). Our manually-collected data show that among the

city-level officials charged of corruption during 2012-2018, about 59.4% of them engaged in at least one bribery case related to real estate development. The absolute majority of the bribery came from private housing developers, and only a small fraction was paid by state-owned developers.

This paper exploits a unique dataset of land parcel transactions merged with firm-level registration information. We find that SOEs emerged more actively in residential land transactions than private developers after the anti-corruption campaign. More specifically, compared with the industrial land transactions, which are virtually immune from rent-seeking and corruption, the share of SOEs in residential land transactions increased by 7.1 percentage points after the release of the Eight-Point Stipulations (a landmark event of the anti-corruption campaign), which accounts for over 60 percent increase of the average SOE share prior to the anti-corruption campaign. This significant effect is robust to the inclusion of city official fixed effects and other additional controls. The positive effect of the campaign on the resurgence of SOEs in housing development increases with the intensity of the campaign, as measured by the downfall of national-level leaders, the launch of the provincial-level central inspections, and the accumulative number of province-level crackdown cases.

We conduct more empirical analyses to address the alternative interpretations that the rise of SOEs in residential land transactions is driven by the deeper pockets of SOEs or their more optimistic market expectation about the hosing market after the anti-corruption campaign. Our key results remain similar after including the proxies for financing capacities and market expectations of SOEs, which suggests that these alternative interpretations are unlikely to drive our results. Our further analysis shows that the rise of SOEs in the housing development was primarily associated with the replacement of local, non-listed private firms by local, non-listed SOEs. In other words, the market void left by local private developers due to the anti-corruption campaign was filled up not by financially capable players of the industry (e.g., centrally-owned SOEs or nationally known publicly-listed developers), but by local SOEs which were well-connected with local governments but tended to be less competitive.

In order to understand the mechanism by which the anti-corruption campaign led to the rise of SOEs in the housing sector, we build a theoretical model to highlight the role of corruption stereotypes against private firms in deterring local government officials from selling land to private real estate developers during the campaign period. We consider a setting where there are two types of city officials, "clean" and "dirty," in terms of whether to take bribes from developers and distort their decision on land allocation, and the types are private information. The higher-level anti-corruption officials update their belief about the type of local officials according to historical probabilities that dirty and clean officials award land parcels to SOEs. The model predicts that the clean city officials would react to the anti-corruption campaign by awarding land parcels to SOEs to protect themselves from being stereotyped as dirty officials and induce investigations even though private enterprises are more efficient bidders. The reaction of dirty officials to the campaign is ambiguous, however, since for dirty officials, awarding land parcels to SOEs involves a trade-off between a loss of kickbacks and a lower chance of being investigated.

We present several pieces of evidence consistent with model predictions. First, we find evidence that those cities where the city officials (either party chiefs or mayors) have a higher *ex-ante* probability of political promotion experienced a significantly larger increase of the SOE share in residential land transactions after the anti-corruption campaign. This finding establishes the linkage between the post-campaign rise of SOEs in the residential land market and the career incentive of city officials. Second, we use the province-level proportion of real-estate-related bribery cases involving private firms over the number of private firms with residential land purchases for the pre-campaign period to proxy for the degree of corruption stereotype. Our empirical results show that the positive effect of the campaign on the increase of SOE presence in the residential land market is stronger if the degree of corruption stereotype is higher. More importantly, the positive interaction effect between the anti-corruption campaign and corruption stereotype is much larger for "clean" city officials than for dirty officials. Here "clean" city officials are defined as those city party chiefs and mayors who have so far not been caught on corruption and dirty officials as those already caught for corruption charges during the anti-

corruption campaign. Third, we offer some suggestive evidence for the efficiency implications of the rise of SOEs in the housing development for the cities led by "clean" and dirty city leaders. We manually collected a housing project-level dataset of eight major cities in China, and find that, after the campaign, the housing projects managed by SOEs experienced more delays in housing development and a higher price markup over the land price per square meter of the apartments sold on the market than those managed by private developers, and these effects are much stronger for "clean" city officials than for dirty officials. As detailed in Section 6, the longer delays and higher price markups do not correspond to the higher quality of the housing projects managed by SOEs, and more likely represent a lower efficiency of housing development.

In sum, our empirical analysis provides supportive evidence for the hypothesis that the corruption stereotyping existing in the pre-campaign period is an important mechanism linking the anti-corruption campaign and the rise of SOEs in the residential land market. We show that the anti-corruption campaign is associated with the increase of residential land parcels awarded to SOEs, and this effect is much more pronounced for "clean" officials than for dirty ones. The post-campaign rise of SOEs probably leads to deteriorations in housing development efficiency (measured by delays and price markups), especially for cities with "clean" officials.

This paper contributes significantly to a burgeoning strand of empirical literature estimating the effects of China's anti-corruption campaign. Some studies have identified a positive effect of the campaign in several aspects of the economy, such as reductions in corruption-related consumption (e.g., luxury goods or alcohol) (Qian and Wen, 2015; Ke, Liu, and Tang, 2018; Shu and Cai, 2017), stock price crash risk (Chen et al., 2018; Hu et al. 2020), and corporate frauds (Zhang, 2018). Some other studies point to a potentially negative effect associated with the campaign, such as drops in investment and business entry (Chen and Zhong, 2017; Xu, 2018; Zheng and Xiao, 2020). Several studies highlight the differential impacts of the anti-corruption campaign on different ownership types of firms. Lin et al. (2018) find that SOEs gain broadly, while non-SOEs gain in more liberalized provinces but lose in provinces with weak market institutions. Ding et al. (2020) present evidence that while the overall stock

market response is positive, the positive effect is larger for non-SOEs, small-sized, or politically non-connected firms. Some other studies investigate the heterogeneous effects via specific channels. There is evidence that the anti-corruption campaign leads to the credit reallocation from SOEs to non-SOEs (Li, Wang, and Zhou, 2018; Sun, Xu, and Zhang, 2018). Xu and Yano (2017) provide evidence that the anti-corruption campaign significantly increases firms' innovation activities, but such an effect only exists in non-SOEs or politically non-connected firms. Zhou (2017) suggests that SOEs suffer less from the negative impacts due to the increasing political uncertainty associated with corruption crackdown events.

However, none of the above studies have documented direct evidence for the effect of China's anti-corruption campaign on the resurgence of SOEs in a sector. More importantly, to our best knowledge, this paper is the first study to examine the role of corruption stereotype in motivating local officials (even the inherently clean ones) to self-protect and pushing SOEs in an advantageous position over private enterprises, regardless of their relative efficiency. This analysis highlights the rise of SOEs in the largest sector of China as an unintended consequence of the anti-corruption campaign, which provides an important clue to explaining the recent resurgence of SOEs in the Chinese economy, which has invoked intense scholarly attention (e.g., Lardy, 2019).

Our study also contributes to the existing scholarship on the effects of anti-corruption policies in a broad context. Almost all the studies about the impacts of anti-corruption policies share a common theme in testing two major competing hypotheses about the effects of corruption on the economy. One hypothesis highlights the effects of corruption in increasing transaction costs (Klitgaard, 1991; La Porta, et al., 1999; Shleifer and Vishny, 1993) and thus argues that anti-corruption policies facilitate a more transparent and rule-based business environment and improves economic efficiency. The other hypothesis stresses the role of corruption as a "grease of business" in getting around excessive red tapes and regulation hurdles ((Leff, 1964; Huntington, 1968) and sorting out efficient firms (Liu, 1985). According to this approach, the anti-corruption campaign may increase institutional distortions and hinder economic development. Our analysis adds to this time-honored debate by introducing

corruption stereotype and strategic reactions of government officials as a new source of inefficiency associated with anti-corruption campaigns, no matter whether corruption serves as a surcharge on transactions or "grease of business" prior to the campaign. We demonstrate in the context of China that the anti-corruption campaign triggered a response of local officials to avoiding transactions with corruption stereotypes even though these transactions might be socially optimal. The role of corruption stereotype in complicating the effects of anti-corruption campaigns has general implications for contexts outside China.

Our paper is closely related to a large literature on statistical discrimination and its effect on human capital investment and labor markets (Phelps, 1972; Arrow, 1973; Altonji and Pierret, 2001; Fang, 2006).[2] We enrich this strand of literature by extending statistical discrimination typically in labor markets to the context of anti-corruption campaigns where both investigators and the general public share the expectation that certain type of government-business transactions (e.g., involving private enterprises) is more susceptible to corruption. Our study shows how such corruption stereotypes induce strategic responses of government officials, which distorts the impacts of anti-corruption campaigns.

The remainder of the paper is structured as follows. In Section 2, we provide the institutional background of the anti-corruption campaign and the rent-seeking in the real estate sector; in Section 3, we describe our data and empirical strategy; in Section 4, we present our primary empirical findings that the anti-corruption campaign caused the rise in the share of SOEs among the winning buyers of residential land parcels; in Section 5, we build a theoretical model to highlight the role of corruption stereotype against private firms in deterring local officials from selling land to private real estate developers after the anti-corruption campaign, and present empirical evidence consistent with the hypotheses derived from the theoretical model in Section 6; and in Section 7, we conclude.

2. Institutional Background

[2] See Fang and Moro (2010) for an extensive review of the statistical discrimination models and applications.

2.1 The anti-corruption campaign in China since 2012

Facing the increasing concerns of corruption in China, the new CCP leadership, headed by Xi Jinping, launched the anti-corruption campaign almost immediately after taking office in November 2012. On December 4, 2012, the Politburo of the CCP Central Committee issued the so-called "Eight-Point Stipulations" (*ba xiang gui ding*). The document contained eight requirements for Politburo members, including regulations on inspection tours, meetings, official documents, and overseas visits, as well as bans on extravagant accommodation and cars. Although the requirements only explicitly applied for Politburo members, they were officially released to the public and became a strong signal of strengthening within-party disciplines. At least from the *ex-post* perspective, the issuance of the "Eight-Point Stipulations" should be marked as the starting point of the anti-corruption campaign (Lin et al., 2018; Ke, Liu, and Tang, 2018). Nevertheless, some would argue (e.g., Ding et al. (2020)) that this signal remained somewhat ambiguous when it was firstly released because it did not directly target corruption or include concrete measures, which made it nondistinguishable from similar political announcements made at the time of top leadership transition.

An arguably clearer signal of the anti-corruption campaign arrived about half a year later. On May 17, 2013, Wang Qishan, Head of the Central Commission for Discipline Inspection (CCDI) of CCP, announced that the CCDI would start to conduct central inspections (*zhong yang xun shi*). Specifically, the CCDI would send inspection teams to all the provinces, ministries, and central SOEs according to schedule. A central inspection team typically spent two months in an inspected organization, collecting information on bribery, embezzlement, or other corruption via audits, interrogations, and soliciting tip information about corruption from the public. All the evidence or clues of corruption cases would be either reported to the CCDI (for provincial-level officials) or transferred to the local commissions for CCDI (for lower-rank officials) for further investigations. The launch of the central inspection was a new move that had never been adopted in previous anti-corruption efforts and, thus, can be expected to bring in greater shocks to the bureaucratic system around the country. Following the schedule, all the

31 provinces received the central inspections in four batches between May 2013 and September 2014.

As a most remarkable phenomenon of this anti-corruption campaign, the number of senior government officials on corruption charges dramatically increased since 2013. As depicted in Figure 1, there were only 28 provincial-level officials accused of corruption between 2008 and 2012, or less than six crackdown cases per year on average. In sharp contrast, there were 17 provincial-level crackdowns between May and December in 2013. The number surged to 44 in 2014 and kept at a high level in the following two years (44 in 2015 and 41 in 2016). The number of crackdown cases then decreased, but it still reached 37 in 2017 and 26 in 2018. The campaign culminated in the crackdown of previous national-level leaders. In March 2014, Xu Caihou became the first convicted Politburo member in this anti-corruption campaign. In July 2014, Zhou Yongkang was officially reported as the first Politburo Standing Committee member who was charged with corruption since the foundation of the PRC. Zhou's downfall was soon followed by another two Politburo-level officials, Ling Jihua and Guo Boxiong.

The scope of the campaign was also unprecedented. The targets included not only Big Tigers, but also lower-level officials. Figure 1 also shows that there was also an increasing number of the crackdown on prefectural-level city chiefs (including CCP chiefs and mayors).

*** Insert Figure 1 about here ***

2.2 Rent-seeking and corruption in China's housing development sector

China currently has the largest housing developing industry around the world. According to the latest available data by the National Bureau of Statistics, China, by the end of 2018, there were 206 thousand real estate developers in China, with a total asset of 10.1 trillion-yuan RMB. In 2018, these developers spent 8.52 trillion-yuan RMB on housing development and sold 1.48 billion square meters of newly-built housing units with a total value of 12.64 trillion-yuan RMB.

For a typical private housing project in China, the development process includes the following steps. In most cases, the development process starts with the transfer of Land Use Rights (LURs) of a residential land parcel from the local government to the developer in the residential land market. In mainland China, while local governments still retain ultimate ownership of all urban lands on behalf of the State, enterprises (such as housing developers) are allowed to purchase 70-year LURs for residential land parcels since the Constitutional Amendment in 1988. In the transfer of LURs associated with a land parcel from the local government to the developer, all future rental payments of the land parcel are included in an initial lump-sum payment by the developer, which can be treated as the transaction price of the land parcel. Theoretically, the transaction price is determined in a public auction/bidding process with free competition between different developers.[3] After purchasing a residential land parcel, the developer will hire professional contractors to plan, design, and build high-rise residential buildings on the parcel, which typically take two to three years, and then sell the completed dwelling units to household buyers. The transaction prices of dwelling units are determined by local housing market conditions in most cases.

The above housing development process is highly regulated by the corresponding local government. City officials have played a key role in urban planning and land development in China (Lichtenberg and Ding, 2009; Wang, Zhang, and Zhou, 2020). Thanks to their authority in land development and zoning regulation, city officials often became the rent-seeking targets of real estate developers, as reported in news media and revealed by academic studies. First, according to Cai et al. (2013) and Chen and Kung (2019), some city officials might manipulate the public auctions/biddings and helped briber developers to win the auctions/biddings at lower prices. Second, Cai et al. (2017) and Deng (2017) point out a prevalent corruption associated with the zoning adjustment in housing development. In China, the floor area ratio (FAR) of a residential land parcel is determined according to the zoning regulation before its transaction; in other words, the maximum floor area of housing permitted to be built on the parcel is subject to a fixed constraint. If a developer could adjust the zoning with the help of

[3] See Wu, Gyourko and Deng (2012) for example for more details about China's urban land market.

officials in the zoning bureaus and increase the FAR, it can greatly benefit from the additional floor areas. Fang, Gu, and Zhou (2019) provide empirical evidence that officials in bureaus of development and reform commission, taxation, housing administration, land administration, and construction planning around the country on average get a price discount of 1.05% when they purchase new homes from developers. Therefore, housing development is widely perceived as the sector with the most severe corruption and rent-seeking, at least before the anti-corruption campaign.

In order to provide some stylized facts about the corruption of city officials and its relation with the housing development, we manually collected information on all city leaders, including city party chiefs (*shi wei shu ji*) and mayors (*shi zhang*), of 287 prefectural-level cities who were on office between Jan 2000 and Dec 2012 (i.e., right before the anti-corruption campaign). We end up with a sample of 1,565 city leaders. By the end of 2018, 244, or over 15% of these city leaders, were accused of corruption during the anti-corruption campaign. For these corrupted city leaders, we collect detailed information on the corruption cases for 180 city leaders through court verdicts, indictment charges, or official media reports,[4] based on which we provide the descriptive analysis as shown in Table 1.

*** Insert Table 1 about here ***

The most important finding is that a large portion of corruption came from the real estate sector. As shown in Panel A, out of all the 180 corrupted city leaders with detailed information, 166 (or 92.2%) got involved in at least one bribery case, and 107 (or 59.4%) took at least one bribe related to housing development issues, with a total of 213 housing development-related bribery cases. Note that housing development is the largest category in all bribery cases, with buying government posts as the second largest category.

Panel B provides a breakdown of the housing development bribery cases according to which type of favors the bribers expected to receive. The three most common favors include

[4] For the other 64 corrupted officials, 47 officials had not been sentenced by the end of 2018, 17 officials had been sentenced but detailed information is not available.

obtaining development projects, securing land use rights, and speeding up the approval procedures in construction. We find that most bribers were private firms. To be specific, 84.0% of the real-estate-related cases involved bribes paid by private enterprises or by individuals, presumably on behalf of private firms (Panel C). By contrast, only 12 (5.6%) of the real-estate-related cases involved bribes-paying SOEs.

The above empirical fact about the overdominance of private firms paying bribes in the real estate sector is consistent with the common perception of the general public that it is much more susceptible to corruption and rent-seeking for government officials to interact with private firms than with SOEs, especially in the heavily regulated sectors. Due to this perception, when the anti-corruption campaign set in, government officials became reluctant to show up in the private gatherings (e.g., dinners) with private businessmen and, in many cases, went so as to avoid regular business-doing with private firms.[5] This observation motivates our subsequent analysis to look at the effects of the anti-corruption campaign on the entry of SOEs versus private firms into lucrative residential land transactions and its impacts on the efficiency of China's real estate sector.

It is noteworthy that corruption is much less prevalent in the industrial land market. In most cases, local officials tend to lease industrial land at low prices to attract manufacturing firms to boost local economic development and enhance their chance of promotion (Li and Zhou, 2005; Yao and Zhang, 2015), instead of pursuing immediate benefits via corruption. As the evidence, among the 166 city leaders involving bribery cases reported above, only 6.0% took bribes related to industrial land issues, with a total of 20 corruption cases, which is very low compared to bribery for residential land development. The virtual immunity of the industrial land transactions from corruption provides a good justification for using industrial land transactions as a control group when we use the residential land transactions as a treatment group to look at

[5] An former executive of a China's state-owned bank, recounted in Ben Hillman (2018), *The China Story*, "These days, if you lend a businessman money and he defaults, you will be suspected of corruption and investigated. If you lend an SOE money and it can't meet repayments, the leaders will arrange for countless extensions. If the SOE defaults it's nothing more than an internal administrative problem. The bank won't be blamed. So why would banks lend to private firms when SOEs are so hungry for capital?"

the effects of the anti-corruption campaign on the ownership structure of China's housing developers.

3. Data and Empirical Strategy

3.1 Data

In this study, we introduce the full-sample, micro-level data of urban residential- and industrial-usage land parcels sold via public auctions or bidding in all the 287 cities in mainland China during the decade of 2008-2017. As described in Section 2.1, in current China, an urban land transaction refers to the transfer of LURs for a specific length of tenure (70 years for residential-usage land parcels, 50 years for industrial-usage land parcels, and 40 years for commercial-usage land parcels) from the local government to an enterprise or individual. Since August 2004, all residential- and commercial-usage urban land parcels are required to be sold via public auctions or biddings, while similar requirements started to apply to industrial-usage land parcels in April 2007. As an additional effort to reinforce the transparency of land transactions, the Ministry of Land Resources started to publicly release the detailed information of each urban land transaction around the country on its official website since about 2008, which makes it feasible to get access to the land transaction information.

We manually collected all the residential- and industrial-usage land parcels sold via public auctions or biddings between January 2008 and December 2017 in 287 Chinese cities. For each land parcel, we get access to information on its city and district/county, detailed location, land usage, land area, designated floor-to-area ratio, the grade of land location[6], type of auction (sealed bidding, English auction, or two-stage auction), contract date, transaction price, and buyer name. We clean the dataset via the following procedures. First, we exclude residential land parcels designated for public housing and quasi-public housing projects, because these land parcels are not necessarily sold through a fully competitive bidding process. Second, we

[6] The grade of land location is assigned by the local bureau of land resources based on the natural and economic conditions of the land parcel, ranging from grade 1 to grade 18. Lands with higher grade of location are expected to have higher prices, with other conditions being equal.

exclude land parcels purchased by individuals; in other words, for each land parcel, at least one of the buyers should be a firm. Third, if more than one buyer purchases a land parcel, we divide the price and area equally since the proportion of equity is unavailable in the data. These procedures lead to 425,513 observations in the working sample, with 127,904 for residential usage and 297,609 for industrial usage.

Panel A of Figure 2 plots the quarterly amount of residential and industrial land transactions in the sample. The transaction volumes of both groups kept increasing during the early years before reaching the peak at the end of 2013 and then witnessed a mild decrease. The transaction volume of residential land parcels was substantially lower than the industrial land parcels in most quarters. Panel B depicts the quarterly average prices in yuan per square meter of land area for these two groups, which experienced striking divergence during the sample period. The average residential land price kept increasing from 1,200 yuan per square meter of land area in early 2008 to 4,200 yuan at the end of 2017, or an average compound annual growth rate of 13.3%. By contrast, the average industrial land price was highly stable during the decade and fluctuated slightly around 250 yuan per square meter of land area. This remarkable difference in both price levels and variations further verifies that residential land transactions are much more susceptible to corruption than industrial land transactions.

*** Insert Figure 2 about here ***

We further merged the firm names of land buyers with the firm registration dataset released by the State Administration for Market Regulation to get more information about the land buyers, especially their ownership types. For each firm buyer, we designed a program to automatically identify its ultimate owner through the circulated tracing process (which is also known as the depth search algorithm). More specifically, for each buyer firm, we identified the largest shareholder, and its largest shareholder, and so on, until we reached a government bureau (the State Asset Supervision and Administration Commission, or SASAC, in most cases), an individual, a foreign company, or a listed firm. The firm buyer is identified as an SOE if the ultimate owner is a government bureau, and a non-SOE if the ultimate owner is an individual

or foreign company. If the ultimate owner is a listed firm, we directly adopt the ownership type as reported in the financial report.[7] Based on the above procedures, 47,563 of the 425,513 land parcels in the sample are identified as being purchased by SOEs (the dummy variable *SOE* equals 1), with the other 377,951 land parcels purchased by non-SOEs (*SOE* equals 0).

Besides the ownership type, we also collected several other firm attributes for the buyer firms, including *LOCAL* (the dummy equals 1 if the land parcel is purchased by a firm whose ultimate owner is headquartered in the same city, and 0 otherwise), *HISTORY* (number of years between the founding of the buyer firm and the land transaction), and *LISTED* (the dummy equals 1 if the land parcel is purchased by a listed firm, and 0 otherwise). Table 2 reports the summary statistics of major variables by land usage group.

*** Insert Table 2 about here ***

Besides the land transaction dataset, we further introduce two complementary datasets. The first one measures the severity of real-estate-related bribery by POEs before the anti-corruption campaign. We manually collect all the court verdicts issuing real-estate-related bribery cases from the website of *China Judgement Online* (https://wenshu.court.gov.cn/), which is officially built and operated by the Supreme People's Court of China. This website collects more than 100 million court verdicts in China till the end of 2020 and is widely convinced to have listed all the court verdicts.[8] We search for the court verdicts based on the following three rules: (1) the court verdict is the first instance of a criminal case; (2) the charge is about accepting bribes, including institutional bribery and influence-using bribery; (3) at least one of the bribes accepted by the grafter is related to real estate development. For each of these court verdicts, we go through its text carefully and record all the real-estate-related bribery cases that happened before Dec 4, 2012, reaching 4,710 cases in total. Then, we identify the ultimate ownership type

[7] We verified the accuracy of the ownership type identification via the following ways. First, we manually collected list of subsidiary firms for all listed real estate firms, central SOEs, or real estate firms listed as top 100 in China according to Soufun, a leading Chinese real estate consulting firm. If the identified shareholder at any level meets any firm in the list, its ultimate owner will be directly identified. Second, we randomly selected 100 land parcels and manually verified its ownership type, and the results perfectly matched.

[8] See Xu, Zheng, and Wu (2021) for more details about the *China Judgement Online* website.

of each briber through the same circulated tracing process with the firm registration dataset.[9] Following these procedures, we can identify bribers' ownership type for 4,142 of 4,710 cases, with 3,990 POEs and 152 SOEs. Based on these data, our key indicator of provincial-level severity of real-estate-related bribery by POEs is calculated as the accumulated number of real-estate-related cases involving bribes-paying POEs normalized by the total number of POEs who bought residential land in the province. The summary statistics of the key indicator of the severity of real-estate-related bribery at the land parcel level by land usage group are also presented in Table 2.

The second dataset includes the demographic information of city chiefs. The sample includes all city chiefs, including both city-level CCP chiefs and mayors of the 287 Chinese cities who were in the position between Jan 2000 and Dec 2017. For each official, we have information on his/her key personal attributes such as age, gender, and educational background. We can also observe his/her experience before the current position and his/her next position after the current position. We would use this dataset to measure local officials' *ex-ante* promotion probability and investigate its effect on the residential land market share change after the anti-corruption campaign, which is discussed in detail in Section 6.1.

3.2 Empirical strategy

In this study, we adopt a difference-in-differences (DID) design to analyze the impact of the anti-corruption campaign on the ownership structure of buyers in the urban residential land market. As discussed in the previous section, the industrial land market was associated with much lower exposures to corruption even before the anti-corruption campaign, which implies that it would be least affected by the campaign. Therefore, we choose the residential land transactions as the treatment group and the industrial land transactions as the control group. We

[9] Two things are noteworthy. First, we define the briber's ownership type variable as "missing" if the name of the briber cannot be accurately identified in the court verdict. Second, if the briber is a natural person, we treat it as a bribery case by a POE.

adopt the official release of the Eight-Point Stipulations on December 4, 2012, as the policy event, and estimate the following equation:

$$SOE_{ijt} = \beta_1 * TREAT_{ijt} * POST_{ijt} + \beta_2 * TREAT_{ijt} + \beta_3 * POST_{ijt} + X_i + \alpha_j + \delta_t + \varepsilon_{ijt} \quad (1)$$

where i refers to a land parcel, j refers to the city in which the land parcel is located, and t refers to the date when the land transaction contract is signed. The major outcome variable SOE_{ijt} refers to whether the land parcel is purchased by an SOE. $TREAT_{ijt}$ equals 1 for the residential land parcels and 0 for the industrial land parcels. $POST_{ijt}$ equals 1 for land parcels sold after December 4, 2012, and 0 otherwise. We control for land parcels' hedonic attributes, $X_{i,}$ including land area, floor area ratio, land location grade dummies, and transaction type dummies (sealed bidding, English auction, or two-stage auction). We also control for the city fixed effects and the year-by-quarter fixed effects. Robust standard errors clustered at the city by year-quarter level are used in all the regressions.[10]

To verify the parallel trend assumption of the DID specification, we also investigate the dynamic effect of the policy shock. Using eight quarters before the implementation of the Eight-Point Stipulations as the baseline period, we have:

$$SOE_{ijt} = \sum \beta_{1k} * TREAT_{ijt} * \delta_k + \beta_2 * TREAT_{ijt} + X_i + \alpha_j + \delta_t + \varepsilon_{ijt} \quad (2)$$

where the variables are the same as Eq. (1); k ranges from 2010Q4 to 2017Q4. The parameter of interest is β_{1k}, which refers to the dynamic impact of the anti-corruption campaign on the buyer structure in the residential land market.

4. Empirical Results

4.1 Baseline results

Figure 3 shows the raw data pattern of our major outcome variable, the share of SOEs among land buyers, by quarter during the sample period, with the dashed green line and solid red line for the residential and industrial land parcels, respectively. The SOE shares were

[10] We also try the two-way clustering by city and year-quarter, and the results remain robust. The results are available upon request.

generally in parallel between these two groups before late 2012, although the SOE share in the residential land group was always higher than the industrial land group. However, the SOE shares in these two groups started to diverge since the implementation of the Eight-Point Stipulations. While the SOE share of the industrial land group remained stable, the share of the residential land group started to increase remarkably since the beginning of 2013 and surged since early 2014 when the anti-corruption campaign was further intensified. The SOE share of the residential land group peaked around 37% at the end of 2015, almost three times as much as the level before 2012. The share then declined to around 20% at the end of the sample. Figure 3 provides intuitive evidence for the association between the anti-corruption campaign and the change of the buyer ownership in the residential land market, while we leave more conclusive findings to the empirical analysis.

*** Insert Figure 3 about here ***

Table 3 reports the baseline results of the DID model following Eq.(1). As shown in column (1), compared with the industrial land parcels, the share of SOEs in residential land parcels' buyers significantly increased after the release of the Eight-Point Stipulations, as indicated by the raw trend in Figure 3. The magnitude is also economically large. Controlling for other factors, the buyer share of SOEs in the residential land group increases by 7.1%, which can be converted to an over 60% increase compared with the SOE share before the anti-corruption campaign.[11] This finding provides evidence for a surge of SOE participation in residential land transactions and housing development triggered by the anti-corruption campaign.

As previously mentioned, city chief officials have played a big role in urban housing development. One may be concerned that the surge in the SOE share in the housing development is not caused by the anti-corruption campaign per se; instead, the stepping-down of city chiefs charged on corruption in the campaign can trigger turnovers of city chiefs, and the newcomers may have different preferences for SOE versus POE. To address this concern, we further control for the city chief fixed effects. In column (2), we control for the person-level

[11] 0.0708/11.7% = 60.5%, where 0.0708 is the coefficient of the interaction in column (1) of Table 3 and 11.7% is the average share of SOE among all residential land buyers before Dec 4, 2012.

fixed effects; that is, we assign one dummy for each specific city leader in our data, regardless of the position (party chief or mayor) or the city where he/she served. In column (3), we try another specification to control for the term fixed effects, in which one term refers to the office-taking of one party chief or mayor in one city. The results are almost unchanged in both columns, which indicates that when the anti-corruption campaign was introduced, the SOE surge in the housing sector occurred for the same city chief no matter where he/she served, or within-the-same term of the city chief. Thus, the increase in SOE shares is not correlated with the turnovers of city chiefs or the shifts in preferences of city chiefs for private ownership. This collaborates our interpretation that the surge in the share of residential land sold to SOE is closely associated with the anti-corruption campaign.

*** Insert Table 3 about here ***

To verify the validity of DID specification, we conduct a parallel trend test following Eq. (2), and the β_{1k} coefficient estimates are visualized in Figure 4. It shows that there is no significant pre-trend in the SOE share differences between the residential and industrial land parcels before the anti-corruption campaign; however, after the Eight-point Stipulations, especially after the central inspections, the share of SOEs acquiring residential land gradually rose up relative to the share of SOEs buying industrial land. The downfall of Xu Caihou and Zhou Yongkang sped up the increase of the share of SOEs in the residential land transactions. As the intensity of the anti-corruption campaign went down from early 2016, the SOE share in residential land purchases exhibited a declining trend.

*** Insert Figure 4 about here ***

4.3 Robustness checks

In the basic specification, we define the ownership type of a buyer according to its ultimate owner. However, such a classification may ignore some subtle differences. For example, an SOE and a POE may choose to establish a joint venture and jointly purchase a residential land parcel through this new firm. This land parcel would be identified as purchased by an SOE in the basic specification if the SOE is the dominant shareholder, but it ignores the participation

of the POE shareholder. For this purpose, we introduce a more precise definition of firm ownership by exploring up to the three largest shareholders for each land buyer. A land parcel would be identified as purchased by SOE (or *PureSOE* equals 1) or POE (or *PurePOE* equals 1) if all three largest shareholders of the buyer firm are SOEs or POEs. As shown in Panel A of Table A.1 in the appendix, these two categories jointly account for around 98% of our sample, which provides enough confidence to us that the definition adopted in the basic specification can virtually capture the ownership types for most observations. Only a small portion of the land parcels (2.31% for residential lands and 1.89% for industrial lands) are purchased by firms with both SOE and POE shareholders, and we can further classify them into two categories (*MixSOE* and *MixPOE*) according to the dominant shareholders.

We also replicate the main regression based on this refined ownership type data, with the results shown in Panel B of Table A.1. The coefficient of the DID term in column (1), with *PureSOE* as the dependent variable, is significantly positive, and the magnitude is highly consistent with that in Table 3. By contrast, when we adopt *PurePOE* as the dependent variable in column (2), the DID term becomes significantly negative. Notably, the DID term is also significantly positive in column (3), with *MixSOE* as the dependent variable, which provides some suggestive evidence that POEs are more likely to join with SOEs in the real estate sector after the anti-corruption campaign.

We also conduct a series of other robustness checks. We try further controlling for buyer firms' other attributes (*LOCAL*, *HISTORY*, and *LISTED*), or parcels' transaction prices, although we choose not to include these two sets of control variables in the baseline model because they are very likely to be endogenous. We also try including land parcels designated for public or quasi-public projects in the treatment group, or including commercial-usage land parcels in the control group. The results are generally consistent in all these specifications, which are reported in Table A.2 in the appendix.

4.3 Heterogenous analysis

In the baseline analysis, we defined the official release of the Eight-Point Stipulations as

the starting point of the anti-corruption campaign. However, as described in Section 2, the anti-corruption campaign experienced several stages and also exhibited remarkable variations across provinces. In this subsection, we further test whether such temporal or spatial variations of the campaign affect the SOE share among the winning firms in the residential land market.

In Appendix Table A.3, we investigate the heterogeneous effects of the campaign from three perspectives. First, following the description of Section 2.2, we divide the post-campaign period into four subperiods: December 4, 2012 to May 17, 2013 (the starting of the central inspection scheme); May 18, 2013 to March 15, 2014 (the crackdown of Xu Caihou); March 16, 2014 to July 29, 2014 (the crackdown of Zhou Yongkang); and the period after July 30, 2014. We replace the interaction terms of *TREAT*POST* with the interaction terms between *TREAT* and these four sub-period dummies. As shown in column (1), the increase of the SOE share was not significant immediately after the release of the Eight-Point Stipulations, which is consistent with the argument by Ding et al. (2020) that most officials did not take this event very seriously and regarded it as a reoccurrence of previous political moves typically associated with new top leadership. The SOE share in the residential land market started to significantly increase after the CCDI announced its central inspection scheme. This effect became stronger after the crackdowns of the two national-level officials.

Second, given the importance of the CCDI central inspection scheme as shown above, we further exploit the provincial-level variations on the timing of receiving the central inspections to examine the effect of the campaign. More specifically, in column (2), we go further to introduce the interaction term between *TREAT*POST* and *During_INSPECT*, which equals 1 for the period (typically two or three months) when the province received the central inspection, and *After_INSPECT*, which equals 1 for the period after the central inspection. The empirical results show that the SOE share remained unchanged during the months of central inspection, but significantly rose up after the inspection.

Third, we investigate whether local "political earthquakes," namely the removal of provincial-level leaders during the campaign, imposed any direct impact on the participation of

SOEs in the city's residential land market. In general, when a provincial-level official was removed for corruption reasons, the city-level officials in the same province would be scared or shocked either because of their potential connections with the convicted higher-level official or because of eye witnessing a downfall of a familiar superior. In order to explore the deterrence effect of a local political earthquake, we introduce the interaction term between *TREAT***POST* and *CRACKDOWN_PROV*, the latter variable referring to the accumulative number of provincial superiors, i.e., the officials on or above the vice-provincial level in the corresponding province, who were accused of corruption during the previous four quarters. This variable ranges from 0 and 10 (in Shanxi Province in 2014) during our sample period. The triple interaction term is significantly positive, as shown in column (3), which implies that the SOE buyer share is especially higher after the intense local crackdown events. This result can also help explain the decline of the SOE share after 2016. After the most intense crackdowns of corrupted chiefs between 2014 and 2016, the frequency of crackdown events modestly decreased thereafter.

We also investigate the heterogeneity of the anti-corruption effect on the SOE share in the residential land transactions along other dimensions. The results are reported in Appendix Table A.4. First, in column (1) we introduce the interaction of the treatment effect in the baseline specification and the land area (in natural logarithm). The results show that the effect of the anti-corruption campaign is stronger for larger residential land parcels. Our interpretation of this result is that larger-sized land transactions would potentially attract more attention from the media or the general public, which prompted city officials to make deals with SOEs to avoid suspicions. An alternative explanation is that larger-sized land transactions need more money and the pocket of the SOEs is deeper than private firms, so SOEs are more likely to become the winners of the auctions. We will address this alterative interpretation in section 4.4.

Second, we divide the SOE land buyers into central SOEs (i.e., SOEs controlled by the SASAC of the State Council or other ministries of the central government) and local SOEs (i.e., SOEs controlled by the local governments at different hierarchical levels). As shown in columns (2) and (3), our key result in Table 3 is mainly driven by the local SOEs rather than the central

SOEs. This is an interesting finding since the central SOEs with main business in the real estate sector typically enjoy a better reputation for housing quality and have deeper pockets than local SOEs. However, as some of the private real estate developers were pushed out of the land market due to the anti-corruption campaign, the market void was not filled by the more competitive central SOEs but by the local SOEs.

Finally, in columns (4) and (5) we replicate the regression on subsamples of land parcels sold by English auctions and two-stage auctions, respectively,[12] which yields similar effects.

4.4 Alternative explanations

In this subsection, we discuss two alternative explanations about our key results. The first alternative interpretation concerns the difference in financing capacity between the SOEs and the POEs. The existing literature points out that SOEs in China typically have stronger financial capability than non-SOEs, and have easier access to bank lendings (Deng et al., 2015). If such financing advantage is further enhanced in the housing development sector after 2012, it may also result in an increase in SOEs' share in the residential land market. In order to address this alternative explanation, we construct a firm-quarterly panel of all non-financial listed firms in mainland China between 2008Q1 and 2017Q4 to investigate whether SOEs get better financial conditions after the campaign.[13] More specifically, the specification is as follows:

$$OUTCOME_{it} = \beta_1 * RE_{it} * POST_{it} + \beta_2 * RE_{it} * POST_{it} * SOE_{it} + X_{it} + \alpha_i + \delta_t + \varepsilon_{it} \quad (3)$$

where $OUTCOME_{it}$ refers to the outcome variable associated with firm i in quarter t; RE_{it} equals 1 for listed firms classified as being in the real estate industry according to the official industrial classification of the China Securities Regulatory Commission, and 0 for listed firms in other non-financial industries; $POST_{it}$ equals 1 for the period between 2013Q1 and 2017Q4, and 0 for the period of 2008Q1 and 2012Q4; SOE_{it} refers to SOEs. We also control for the time-varying firm attributes (X_{it}), including leverage ratio, return on equity, and total assets, which are all calculated at the beginning of each quarter, as well as firm fixed effects (α_i) and year-

12 We do not include the sealed bidding samples because the number of observations is too small.
13 The data is downloaded from RESSET. The summary statistics are available in Table A.5 in the appendix.

quarter fixed effects (δ_t). We mainly focus on two outcome variables: *NewDebt*, which refers to the net increase of debts, normalized by the total asset at the beginning of the quarter; and *DebtCost*, which refers to the ratio between debt financing cost and the average debt in the quarter.

The regression results are listed in the first two columns of Table 4. We do find evidence that the financial cost of SOEs in the real estate industry relatively decreased compared with the non-SOE real estate firms after the campaign; however, we find no evidence that the SOE real estate firms borrowed more than the non-SOE counterparts after the campaign.

*** Insert Table 4 about here ***

The analysis on the structural change of the SOEs and POEs provides further evidence that the hike in SOEs' market share is not likely to relate to SOEs' deep pockets. Table A.4 has already shown that the surge of SOEs in residential land transactions is mainly driven by local SOEs, but not by central SOEs with much stronger financial capacity. In order to provide a clearer picture, we distinguish housing developers in our sample into four groups, namely, local SOEs, non-local SOES, local POEs, and non-local POEs. Panel A of Appendix Figure A.1 plots the quarterly breakdown of residential land buyers by these four groups. Before the anti-corruption campaign, the distribution of the four types was fairly stable, but since late 2012, local SOEs started to increase their land purchases, and this increasing enthusiasm speeded up after 2014 and reached the peak in 2016. As the campaign's intensity declined, the share of local SOEs went down as well. Accompanying the shifts of the local SOEs' activity in the land market was the opposite trend of the local POEs. The other two types, non-local SOEs and POEs, maintained an almost unchanged presence in the land market before and after the campaign. It is quite clear that the market void left by local POEs due to the anti-corruption campaign is virtually filled by the local SOEs, instead of the SOEs that spread their business nationwide and thus are, arguably, more competitive, especially from the financial aspect. Similarly, in Panel B, we divide the firms by the combination of listing status and ownership, namely, listed SOEs and POEs, and non-listed SOEs and POEs. Apparently, the withdrawal of

POEs from the market after the campaign was driven mostly by the decreasing participation of non-listed POEs, and the increasing activity of SOEs was mainly driven by the increasing participation of non-listed SOEs, instead of listed SOEs with easier access to financing resources. Thus, it is reasonable to argue that the increase in SOEs' share in the residential market is not driven by the "deep pocket" of SOEs per se.

Another alternative interpretation attributes the rising of the SOE share in residential land transactions to SOE's more optimistic expectation about the housing market after the campaign. If the SOEs become more optimistic about the future trend of house prices than the non-SOEs after the anti-corruption campaign, they will bid higher prices for otherwise identical residential land parcels, which leads to a higher SOE winning share in the residential land market. In order to test this alternative explanation, we utilize the monthly constant-quality house price index by Wu, Deng, and Liu (2014). In column (3) of Table 4, we add the interaction term between *TREAT*POST* and *Previous HPG*, the latter representing the accumulative house price growth in the city during the 12 months before the land transaction, which serves as the proxy of buyers' backward-looking expectations. In column (4), we replace *Previous HPG* with *Following HPG*, which equals the accumulative house price growth during the 12 months after the land transaction and serves as the proxy of forward-looking expectations. In both specifications, we do find that the triple interaction terms are significantly positive, which suggests that after the anti-corruption campaign, the increase in SOE share is higher in cities with better housing market conditions. Nevertheless, the interaction term of *TREAT*POST* is still significantly positive in both columns. Therefore, we can safely conclude that the hike in SOE share is not purely driven by changes in SOEs' house price expectations.

5. Theoretical Model

Consider a city whose mayor or party secretary, which we will refer to as "politician," is either "clean" or "dirty." Whether the politician is clean or dirty is private information, but outsiders, including higher-level anti-corruption officials, may update their belief about the type

of the politician. The *ex-ante* probability that a politician is dirty is p_0.

When a land parcel is up for sale for which there are multiple developers competing for it, a clean politician will pick a winner according to whoever has the higher value of the land, regardless of whether the developer is SOE or POE.[14] In contrast, a dirty politician's decision may be distorted by the potential bribes he/she can receive from POE developers. Below, we present a simple model to illustrate how the anti-corruption campaign may affect a politician's decisions to choose SOE vs. POE winners in land auctions.

For simplicity, let us suppose that in every land parcel auction, there are two bidders, one POE and one SOE. Let V_p and V_s denote the value of the POE and SOE bidders, respectively. Suppose V_p and V_s are drawn from a symmetric joint distribution and that the auction admits a symmetric monotonic equilibrium.

The probability that a clean politician will choose the SOE winner is given by

$$q_c = Pr(V_s > V_p) \tag{4}$$

A dirty politician will give the POE net kickbacks K after the auction, if the POE were to offer a bribe b to the politician. Not all POEs would offer a bribe to the politician; we assume that only a μ fraction of the POEs bribe. Thus, the probability that a dirty politician will choose the SOE winner is:

$$q_d = Pr(V_s > V_p + K) + (1 - \mu)Pr(V_p < V_s < V_p + K) \tag{5}$$

Proposition 1 *Prior to the anti-corruption campaign, ceteris paribus, $q_c > q_d$, for each land parcel auction.*

Proof. Note that

[14] In a symmetric auction with monotonic equilibrium, picking the winner according to whoever has the higher bid is equivalent to picking the winner whoever has the higher value in equilibrium.

$$
\begin{aligned}
q_c - q_d &= \Pr(V_s > V_p) - \left[\Pr(V_s > V_p + K) + (1-\mu)\Pr(V_p < V_s \le V_p + K)\right] \\
&= \left[\Pr(V_s > V_p + K) + \Pr(V_p < V_s \le V_p + K)\right] \\
&\quad -\left[\Pr(V_s > V_p + K) + (1-\mu)\Pr(V_p < V_s \le V_p + K)\right] \\
&= \mu \Pr(V_p < V_s \le V_p + K) > 0
\end{aligned} \tag{6}
$$

Suppose that at the start of the anti-corruption campaign (say, when the Eight-Point Stipulations was publicly announced), a politician has already sold N_p land parcels to POE developers and $N_s \equiv N - N_p$ parcels to the SOE developers. Then Bayesian updating implies that this politician is dirty with probability $\hat{p}$ given by

$$
\hat{p}(N_s, N) = \frac{p_0 q_d^{N_s}(1-q_d)^{N-N_s}}{p_0 q_d^{N_s}(1-q_d)^{N-N_s} + (1-p_0) q_c^{N_s}(1-q_c)^{N-N_s}} \tag{7}
$$

Lemma 2 *For a fixed N,* $\hat{p}(N_s, N)$ *is decreasing in* N_s.

Take $\hat{p}$, the politician's "reputation score" of being a dirty politician, as given at the start of the anti-corruption campaign. Suppose that the CCDI adopts inspection and investigation rules that stochastically target politicians with dirty reputations. Let us denote by *J(p)* the probability that a politician with a dirty reputation score *p* will be investigated by CCDI where $J' > 0$ and $J'' < 0$. Being investigated by the CCDI, regardless of whether the politician is eventually found to be clean or dirty, incurs a hassle cost of *H* for the politician; in addition, if the politician is actually dirty, he/she will incur a jail cost of Δ:

Assumption: The beliefs are adaptive: CCDI updates beliefs according to historical probabilities that dirty and clean politicians award land parcels to SOEs: q_d and q_c.

Now we can calculate the "shadow cost" of awarding the land parcel to a POE for a clean and a dirty politician, respectively, as follows.

Suppose a politician's current reputation score is $\hat{p}$. If he/she awards the land to a POE, the reputation score will deteriorate to $\hat{p}_+(\hat{p})$ given by:

$$
\hat{p}_+(\hat{p}) = \frac{\hat{p} q_d}{\hat{p}_c q_d + (1-\hat{p}_c) q_c} \tag{8}
$$

and if he/she awards the land to an SOE, the reputation score will improve to $\hat{p}_-(\hat{p})$ given by:

$$\hat{p}_-(\hat{p}) = \frac{\hat{p}(1-q_d)}{\hat{p}(1-q_d)+(1-\hat{p})(1-q_c)} \quad (9)$$

Suppose the reputation score of a clean politician at the start of the anti-corruption campaign is $\hat{p}_c$, his expected shadow cost of awarding a land parcel to POE is now

$$C_c(\hat{p}_c) = [J(\hat{p}_+(\hat{p}_c)) - J(\hat{p}_-(\hat{p}_c))]H \approx J'(\hat{p}_c)[\hat{p}_+(\hat{p}_c) - \hat{p}_-(\hat{p}_c)]H \quad (10)$$

For a dirty politician with a reputation score of $\hat{p}_d$ at the start of the anti-corruption campaign, his expected shadow cost of awarding a land parcel to POE is now

$$C_d(\hat{p}_d) = [J(\hat{p}_+(\hat{p}_d)) - J(\hat{p}_-(\hat{p}_d))](H+\Delta) \approx J'(\hat{p}_d)[\hat{p}_+(\hat{p}_d) - \hat{p}_-(\hat{p}_d)](H+\Delta). \quad (11)$$

Clearly, conditional on the same current reputation score, i.e., if $\hat{p}_c = \hat{p}_d$, the shadow cost of awarding a land parcel to the POE is higher for a dirty politician than for a clean politician, because the dirty politician will be found to be dirty and face additional jail cost above the hassle cost of being investigated.

However, for a dirty and a clean politician, their shadow costs of awarding a land parcel could differ because likely $\hat{p}_d > \hat{p}_c$. If $\hat{p}_d > \hat{p}_c$, then the sign of $C_d(\hat{p}_d) - C_c(\hat{p}_c) \approx J'(\hat{p}_d)[\hat{p}_+(\hat{p}_d) - \hat{p}_-(\hat{p}_d)](H+\Delta) - J'(\hat{p}_c)[\hat{p}_+(\hat{p}_c) - \hat{p}_-(\hat{p}_c)]H$ will also depend on $J'(\hat{p}_d)[\hat{p}_+(\hat{p}_d) - \hat{p}_-(\hat{p}_d)]$ vs. $J'(\hat{p}_c)[\hat{p}_+(\hat{p}_c) - \hat{p}_-(\hat{p}_c)]$.

First, note that since $J'' < 0$, $J'(\hat{p}_d) < J'(\hat{p}_c)$ when $\hat{p}_d > \hat{p}_c$;

Second, let us define

$$A(\hat{p}) \equiv \hat{p}_+(\hat{p}) - \hat{p}_-(\hat{p}) = \frac{\hat{p}q_d}{\hat{p}_c q_d + (1-\hat{p}_c)q_c} - \frac{\hat{p}(1-q_d)}{\hat{p}(1-q_d)+(1-\hat{p})(1-q_c)} \quad (12)$$

The belief update is non-monotonic in $\hat{p}$ with A (0) = A (1) = 0 and A ($\hat{p}$) > 0 for all $\hat{p} \in$ (0,1). Thus politicians with $\hat{p}$ close to 0 (i.e., politicians with very clean reputations) or 1 (i.e., politicians with very dirty reputations) are least likely to change their behavior as a result of the anti-corruption campaign.

Of course, how would the above expected shadow cost translate into the awarding rate to an SOE firm depends on the trade-off the politician faces between his/her personal shadow cost of being investigated, and the additional revenue from awarding the land parcel to the higher bidder. For simplicity, let us assume that the proportion θ share of the shadow cost will be reflected in the award decision.

Thus, a clean politician will then award the land parcel to an SOE with probability:

$$\tilde{q}_c(\hat{p}_c) = Pr(V_s > V_p - \theta C_c(\hat{p}_c)) \tag{13}$$

where now $\theta C_c(\hat{p}_c)$, a proportion of the shadow cost due to the anti-corruption campaign if the contract is awarded to POE, is subtracted from the POEs' value V_p.

Proposition 3 $\tilde{q}_c(\hat{p}_c) > q_c$ *for all* $\hat{p} \in (0,1)$. *The land assignment is less efficient under the anti-corruption campaign if the politician is clean.*

The clean politicians would react to the anti-corruption campaign by awarding land parcels to POEs to protect themselves from being stereotyped as dirty politicians and induce suspicion.

A dirty politician may still be tempted to give the POE net kickbacks K after the auction, if the POE were to offer a bribe b to the politician, but now they would have to take into account the shadow cost, $\theta C_d(\hat{p}_d)$, due to the anti-corruption campaign, if the contract is awarded POE. Thus, the probability that a dirty politician will choose the SOE winner is:

$$\begin{aligned}\tilde{q}_d(\hat{p}_d) = \Pr\big(V_s > V_p - \theta C_d(\hat{p}_d) + K\big) + (1-\mu)Pr(V_p - \theta C_d(\hat{p}_d) < V_s \\ < V_p - \theta C_d(\hat{p}_d) + K)\end{aligned} \tag{14}$$

When comparing $\tilde{q}_d(\hat{p}_d)$ with q_d, we note that the first term $Pr(V_s > V_p - \theta C_d(\hat{p}_d) + K)$ is higher than $Pr(V_s > V_p + K)$ for sure, but the second term depends on the comparison of

$$Pr(V_p - \theta C_d(\hat{p}_d) < V_s < V_p - \theta C_d(\hat{p}_d) + K) - Pr(V_p < V_s < V_p + K) \tag{15}$$

whose sign depends on the shape of joint probability density function of (V_s, V_p).

Finally, it is useful to point out that the perceived punishment of jail cost Δ is only relevant for the incentives of dirty politicians. To the extent that the perceived Δ is higher in cities where prior officials were already caught in the anti-corruption campaign, we also have the prediction that dirty politicians may reduce the probability of awarding the land parcels to SOEs more; while clean politicians' probability of reducing the SOE share is not affected.

Proposition 4 *Consider politicians in two otherwise identical cities A and B, where only in city A prior officials were already prosecuted in the anti-corruption campaign. Suppose that this leads* $\Delta_A > \Delta_B$. *If the current politicians in the two cities are clean, then* $\tilde{q}_c(\hat{p}_c; A) - q_c = \tilde{q}_c(\hat{p}_c; B) - q_c$; *if the current politicians in the two cities are dirty, then* $\tilde{q}_d(\hat{p}_d; A)$ *may be higher than* $\tilde{q}_d(\hat{p}_d; B)$.

6. Effects of Corruption Stereotype: Further Empirical Analysis

In this section, we aim to test predictions derived from the theoretical model. We focus on testing three major predictions. First, the anti-corruption will have a large positive effect on the rise of SOEs in the residential land market if incumbent city leaders have stronger career concerns. Second, the anti-corruption will have a large positive effect on the rise of SOEs in the residential land market if the corruption stereotype against private firms is stronger in the region, and the effect of stereotype is more pronounced for clean city leaders. Third, the housing development under clean city leaders is less efficient than that under dirty city leaders after the anti-corruption campaign is launched.

6.1 Career incentive intensity and the rise of SOEs

We follow Wang et al. (2020) to construct a measure of *ex-ante* career incentive intensity for China's city leaders. The idea of this variable construction is to exploit the personal characteristics of city leaders at the year of taking-office to predict their *ex-ante* promotion probability according to the historical association between *ex-ante* personal characteristics and promotion. Presumably, a larger *ex-ante* promotion probability implies a stronger career

incentive intensity for a city leader.

For this purpose, we firstly exploit the data covering all the incumbent city leaders between Jan 2000 and Dec 4, 2012 (i.e., right before the anti-corruption campaign) to construct a forecasting model to predict the promotion probability of a specific city leader. More specifically, as shown in Table A.6 in the appendix, the dependent variable equals one if the city leader gets promoted after the current position, and zero otherwise. On the right-hand side, we introduce the leader's gender, age, minority, educational background, a series of dummies about his/her previous experience, and the city fixed effects. Considering that city party chiefs and mayors may experience different promotion paths or criteria in China, we separately run the prediction model for party chiefs and mayors. Based on the estimated coefficients of Table A.6, we then predict the *ex-ante* promotion probability for each incumbent city leader between Jan 2008 and Dec 2017. We then define two dummies, *High_CCP* equals 1 if the predicted promotion probability of the party chief is beyond the median of party chiefs, and similarly for *High_Mayor*.

In columns (1) and (2) of Table 5, we introduce the interaction term between *TREAT*POST* and the dummies indicating incumbent city leaders with higher promotion probabilities.[15] The results show that for party chiefs, the impact of the anti-corruption campaign on SOE's share in the residential markets is stronger if the incumbent CCP chief has a higher *ex-ante* promotion probability. Specifically, compared with CCP chiefs with relatively lower predicted promotion probability, the increase of SOE's market share is 3.2 percentage points higher after the anti-corruption campaign for CCP chiefs with higher promotion probabilities. The interaction term between *TREAT*POST* and *High_Mayor* is also positive, although only marginally significant.

*** Insert Table 5 about here ***

Apart from directly using the predicted promotion probability as a measure of career

[15] If we replace the dummary variables of *High_CCP* and *High_mayor* with the continuous variables of *ex-ante* promotion probability for party chiefs and mayors, we obtain similar results. Results are available upon request.

concern, we also try the dummy for whether the city's party chief or mayor is close to retirement as another indicator of weak career incentive. More specifically, the dummy of *Retire_CCP* (*Retire_Mayor*) equals one if the incumbent CCP chief (mayor) is aged at or over 55, with the assumption that officials over 55 are much less likely to get promoted after the current tenure (Yu, Zhou, and Zhu, 2016). The results in columns (3) and (4) show that, if the city leader is close to retirement, the impacts of the anti-corruption campaign on SOE's share are significantly mitigated.

This evidence, which is consistent with our model prediction, highlights the career incentives of city leaders as an important channel to tighten up the linkage between the anti-corruption campaign and the rise of SOEs. In other words, the evidence suggests that the resurgence of SOEs in the residential land market after the campaign is closely related to the incentives of city leaders.

6.2 Corruption stereotype and the post-campaign rise of SOEs

We exploit the data covering all the real-estate-related bribery cases with POE bribers between 2000 and 2012 (described in Section 3) to construct a measure of corruption stereotype against private housing developers before the anti-corruption campaign. More specifically, we define a variable of corruption stereotype, denoted as *Stereotype*, as the province-level accumulated number of real-estate-related bribery cases involving private firms as bribers, normalized by the total number of POEs who purchased residential land in the province during the time period from 2000 to 2012.[16] We use the province-level incidence of real-estate development corruption involving private firms as a proxy for corruption stereotype for three reasons. First, the province-level measure is more orthogonal to city-level characteristics and thus more exogenous than the city-level one as an explanatory variable. Second, in China, city-level leaders are evaluated, appointed, and monitored (or investigated) by provincial governments, and therefore regional bureaucratic culture and characteristics of government-

[16] Our key results are robust to alternative normalizations such as the total size (total price or total number) of residential land purchased by POEs in the province during Janurary 1, 2008 and December 3, 2012. These results are available upon request.

business relations are generally more distinctive and stable at the province level than at the city level, which also justifies our province-level measure. Third, a city-level measure encounters the small sample size problem (a significant number of cities have zero bribery cases in real-estate development during the sample period), which may lead to estimation bias.

Column (5) of Table 5 reports the regression result. We introduce the interaction term between *TREAT*POST* and *Stereotype*. The triple interaction term is significantly positive, which is consistent with our model prediction: the higher severity of POE-involvement in bribery in a province before the campaign makes it less likely for POEs to secure residential land after the campaign. According to the estimated coefficient, if the provincial corruption stereotype increases by 10%, the city's residential land market will experience a 1.66% (10%×0.166) increase in the SOE share after the campaign. This important result indicates that the corruption stereotype probably induces city leaders to avoid dealing with private housing developers after the campaign.

Our model has an important prediction that due to the presence of corruption sterotype, even a clean city leader will be scared by the anti-corruption campaign and more likely award residential land to SOEs regardless of their efficiency. However, the prediction about the reaction of "dirty" city leaders in dealing with POEs after the campaign is ambiguous. We define "dirty officials" as city party chiefs or mayors who were caught for corruption charges, either on the post or after they left the office, during the campaign. How to define "clean" city officials is challenging since, theoretically, even if a city official remains "clean" until the end of our sample period, we as outside observers can never say he or she is truly "clean." Being aware of this conceptual challenge, we define "clean" city officials as city party chiefs or mayors who have not been prosecuted on corruption charges before the end of 2020. While this group of so-called "clean" city officials may still include potentially "dirty" city officials (not prosecuted yet), they should also include inherently clean ones and thus should be more "clean" than the group of "dirty" ones (already prosecuted) as we defined. In this sense, the comparison of "clean" and "dirty" city officials is more of a matter of degree than a black-white difference.

In columns (6) and (7) in Table 5, we divide the entire sample into two subsamples for "dirty officials" and "clean officials," respectively, and rerun the regression as in column (5). Note that the observations of our regressions in Table 5 are land parcels transacted, so the subsample of "dirty officials" include all land parcels transacted when at least one of the incumbent party chief and mayor was a "dirty official." The subsample of "clean officials" refers to all the land parcels transacted when both incumbent party chief and mayor were "clean officials." The estimates in columns (6) and (7) show that the positive effect of stereotypes on the rise of SOEs after the campaign shown in column (3) is actually driven by cities with "clean" city leaders. This result, which is consistent with our model prediction, clearly indicates that clean city officials are more inclined to awarding residential land to SOEs after the campaign if the corruption stereotype against private firms is higher.

6.3 Efficiency consequences of the anti-corruption campaign

Our theoretical model shows that corruption stereotype has efficiency consequences when the anti-corruption campaign is started: inherently clean city officials may strategically choose to award residential land to SOEs even if POEs are more efficient bidders. In order to test this prediction, we collect a sample of residential land parcel – housing complex matched data from China Real Estate Index System (CREIS), a leading real estate data vendor in China. Specifically, CREIS selects a group of representative residential land parcels in each major city and keeps track of the subsequent development process on these land parcels. Therefore, for these land parcels, we can observe not only when they entered the housing market but also the prices of the apartments they supplied on the market. With the help of CREIS, we managed to get access to all the 1747 such parcels between Jan 2008 and Dec 2017 in eight major cities, including Beijing, Chongqing, Kunming, Jinan, Shanghai, Wuhan, Xi'an, and Zhengzhou. These cities include two first-tier cities (Beijing and Shanghai) and six second-tier cities. The summary statistics of these eight major cities are reported in Table A.7.

We adopt the following difference-in-differences specification:

$$OUTCOME_{ijt} = \beta_1 * SOE_{ijt} * POST_{ijt} + \beta_2 * SOE_{ijt} + \beta_3 * POST_{ijt} + X_i + \alpha_j + \delta_t + \varepsilon_{ijt} \quad (16)$$

where $OUTCOME_{ijt}$ represents the indicators of development efficiency of land parcel i in city j sold at time t; SOE_{ijt} equals 1 for SOEs and 0 otherwise; $POST_{ijt}$ equals 1 for land parcels sold after December 4, 2012, the starting point of the anti-corruption campaign, and 0 otherwise. In all the specifications, we control for land parcels' hedonic attributes (including land area, floor area ratio, land location grade dummies, and transaction type dummies), the city fixed effects, and the year-by-quarter fixed effects. Robust standard errors are clustered at the city level for all the regressions.

We adopt two outcomes variables to measure the development efficiency: *LAG* (in natural logarithm), which equals the number of days between land transaction and public sales of the housing project; and *Price_Ratio*, which equals the ratio of the housing price of the project over the land price per floor area. The first measure represents the duration of housing project completion, and the second approximates the price "premium" of the housing project if we assume a constant construction cost per floor area across housing projects in the same city and same period of time. This assumption is reasonable given that we have controlled for the hedonic attributes of the land parcels, the city fixed effects, and the year-by-quarter fixed effects.

To examine the effect of the anti-corruption campaign on housing development efficiency for "clean cities," we introduce the interaction term between *SOE***POST* and *CLEAN*. As an important finding, the triple interaction term is significantly positive in columns (1) and (2) in Table 6. Specifically, compared with SOE developers from cities with "dirty officials," developers from cities with "clean officials" experience an increase of efficiency loss after the anti-corruption campaign: a 48.1% increase for the time interval between land purchasing and project opening, and a 146.5 percentage points increase for the housing price premium. In other words, for those SOE developers who secured residential land from "clean" city officials, their development speed was significantly slower, and the housing price was much higher after the campaign. To make sure that the increase of development duration and price premium for SOE developers after the campaign is not due to the higher quality of apartments sold by them, we

compare the price ratios of the following resale prices of the same set of apartments against the land price per floor area, using the same specification as in column (2). We assume that the price ratios of second-hand apartments wholly determined by market demand and supply and free of government controls should fully reflect the inherent quality of the apartments. As shown in column (3), we find no significant difference in second-hand apartment price ratios between SOEs and POEs after the campaign.

*** Insert Table 6 about here ***

7. Conclusion

In this paper, we advance a novel hypothesis that the anti-corruption campaign triggered the recent resurgence of the state-owned enterprises in China as an unintended consequence. We explore its nexus with the anti-corruption campaign that started in 2012 by presenting supporting evidence from the Chinese real estate sector, which is one of the largest sectors of the country but notoriously known for pervasive rent-seeking and corruption.

Using a unique dataset of land parcel transactions merged with firm-level registration information, we find that the fraction of residential land parcels purchased by SOEs increased significantly relative to that purchased by private developers after the anti-corruption campaign. This finding is robust to a set of alternative specifications. We build a model to show that under the anti-corruption campaign, local officials (including those inherently clean ones) are deterred by corruption stereotypes that selling land to private developers is more susceptible to corruption, and thus more willing to award land to SOEs even when the latter are less efficient. Our empirical analysis provides supportive evidence for the hypothesis that the corruption stereotyping existing in the pre-campaign period is an important mechanism linking the anti-corruption campaign and the rise of SOEs in the residential land market. We show that the anti-corruption campaign is associated with the increase of residential land parcels awarded to SOEs, and this effect is much more pronounced for "clean" city officials than for dirty ones. The post-campaign rise of SOEs probably leads to deteriorations in housing development efficiency

(measured by delays and price markups), especially for cities with "clean" city officials. This analysis highlights the rise of SOEs in the largest sector of China as an unintended consequence of the anti-corruption campaign, which provides an important clue to explaining the recent resurgence of SOEs in the Chinese economy, which has invoked intense scholarly attention.

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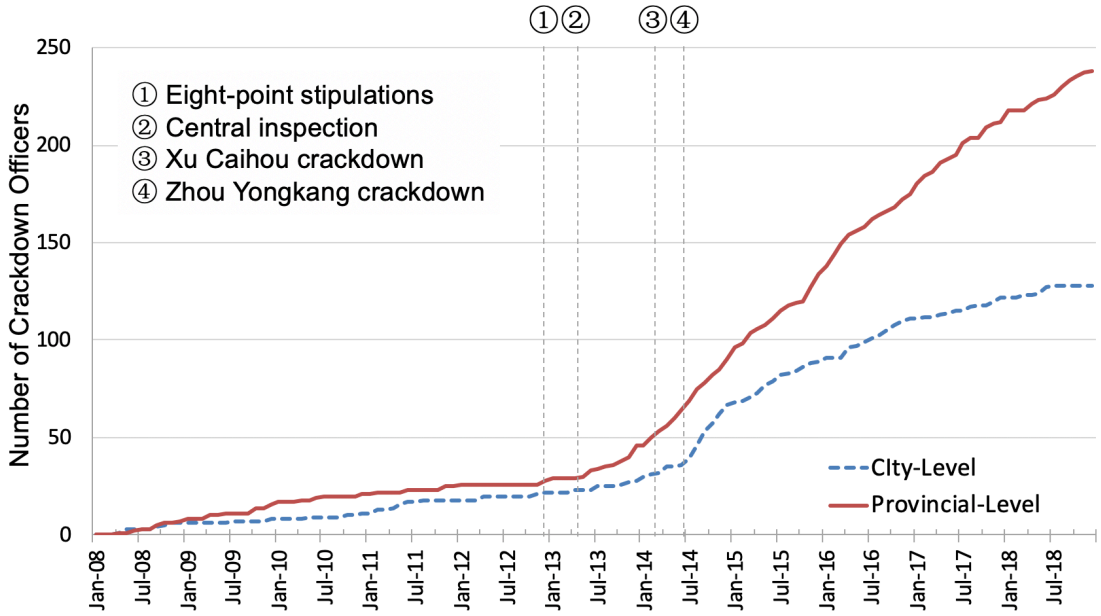
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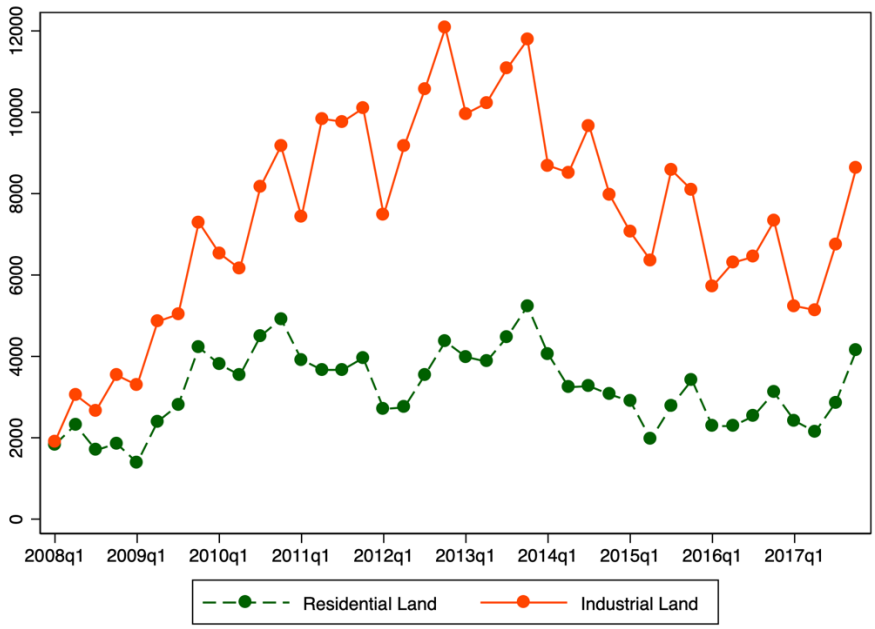
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Figure 1: China's Anti-Corruption Campaign

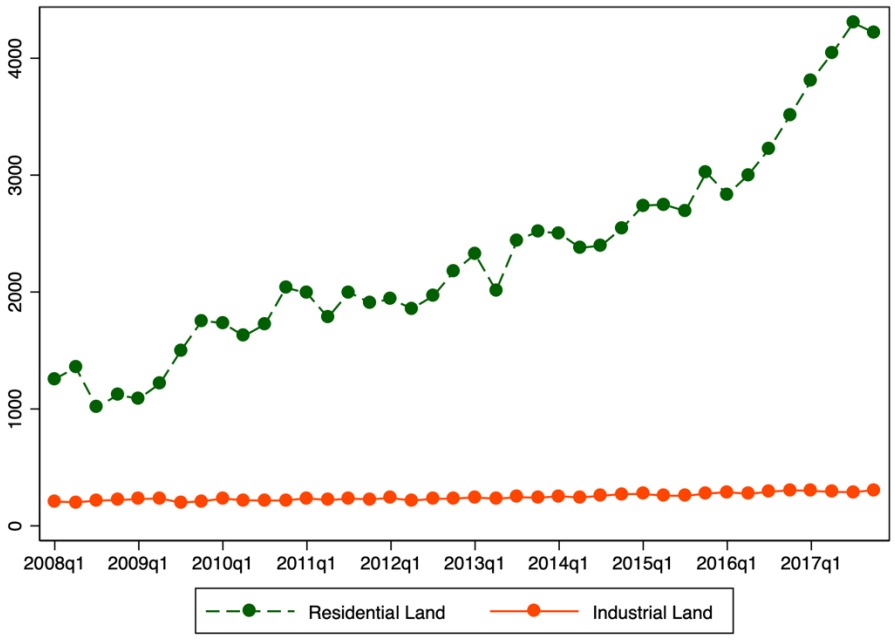


Note: The figure shows the monthly number of corrupted chiefs from Jan 2008 to Dec 2017. The blue dashed line and the red solid line plot the city-level chiefs and provincial-level chiefs, respectively. The vertical lines denote the crackdowns of two national officials (Xu Caihou and Zhou Yongkang) and the implementation of two policies (Eight-point policy and central inspection).

Figure 2: Land Parcels Sold During the Sample Period



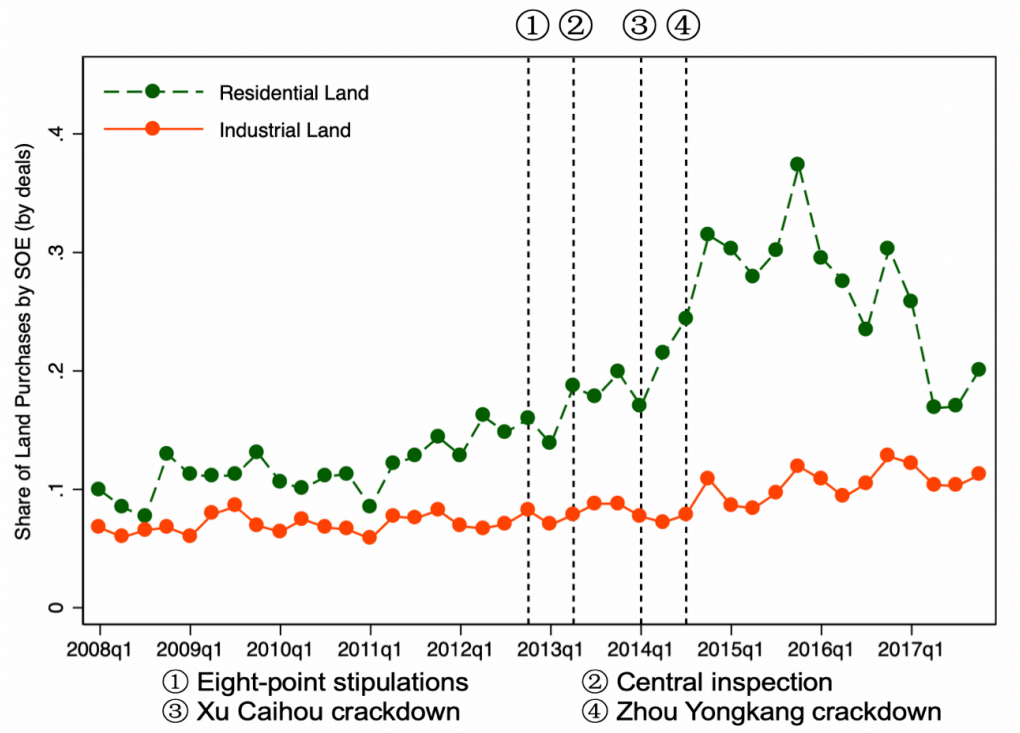
Panel A: Quarterly number of land parcels sold during the sample period



Panel B: Quarterly average price of land parcels (in yuan per sq.m. of land area)

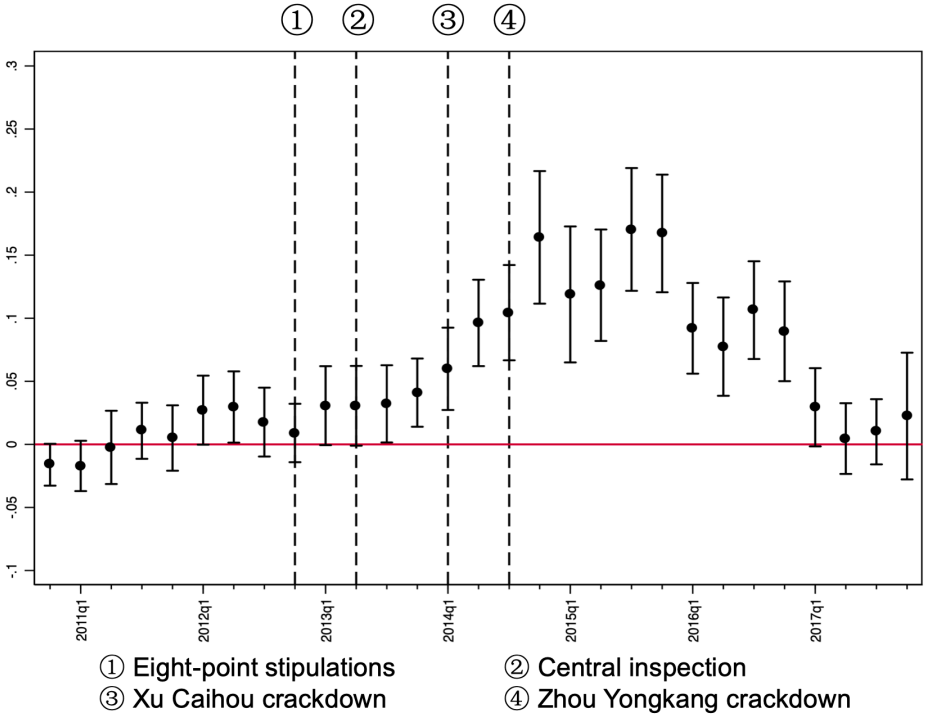
Note: The figure shows the quarterly number and average price of transactions by land usages from 2008q1 to 2017q4. The green dashed line and the red solid line plot the residential land and industrial land, respectively.

Figure 3: Anti-Corruption Campaign and SOEs' Share in the Land market



Note: The figure shows the quarterly share of land purchases by SOE from 2008q1 to 2017q4. The green dashed line and the red solid line plot the residential land and industrial land, respectively. The vertical lines denote the crackdowns of two national officials (Xu Caihou and Zhou Yongkang) and the implementation of two policies (Eight-point policy and central inspection).

Figure 4: Parallel Trend Test



Note: The figure visualizes the coefficients estimated with dynamic DID specification, with both the coefficients and 95 percent confidence intervals reported. The treatment group includes residential land, while industrial land serves as the control group. The pre-trend period includes eight quarters. The four vertical lines denote the crackdowns of two national officials (Xu Caihou and Zhou Yongkang) and the implementation of two policies (Eight-point policy and central inspection).

Table 1: Descriptions of City-level Corrupted Leaders

A. Breakdown of the 192 Corrupted City Leaders

Categories		Number
Engaging in at least one bribery case	Real estate related briberies	107 (64.5%)
	Real estate unrelated briberies	38 (22.9%)
	Unable to identify	21 (12.6%)
	Sub-total	166 (100.0%)
No engagement in any bribery cases		14
Total		180

B. Breakdown of the 213 real estate related bribery cases: By appeals

Appeals	Number	Percentage
Obtaining development projects	88	29.3%
Securing land use rights	45	15.0%
Speeding up the approval procedures in the construction	34	11.3%
Enjoying discounts in land leasing prices	30	10.0%
Enjoying favors in taxation and fees-charges	20	6.7%
Increasing compensation from the government	18	6.0%
Receiving preferential policies	17	5.7%
Side-stepping development regulations	16	5.3%
Assisting the resolution of disputes in construction	8	2.7%
Negotiating the fines	5	1.7%
Others	19	6.3%

C. Breakdown of the 213 real estate related bribery cases: By bribers

Bribers	Number	Percentage
Private enterprises or individuals	179	84.0%
State-owned enterprises	12	5.6%
Unable to identify	22	10.3%
Total	213	100%

Table 2: Summary Statistics of the Land Transaction Data

	Residential			Industrial		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Whether the buyer is an *SOE* firms (in %)	127,904	17.32	37.84	297,609	8.323	27.62
Whether the buyer is a listed company (in %)	113,826	6.622	24.87	258,530	3.074	17.26
Whether the buyer is a local company (in %)	103,084	79.22	40.58	229,903	87.02	33.61
Length since the opening of the buyer company (in years)	105,726	18.89	99.31	251,457	8.473	45.69
Floor Area Ratio of the parcel	127,327	2.552	1.123	295,792	1.142	0.555
Floor AREA of the parcel (in 10 thousand sq.m.)	127,904	3.637	4.084	297,609	3.576	4.916
Severity of real-estate-related bribery by POEs (see tht text for more details)	127,904	0.110	0.115	297,609	0.144	0.140
Dummy for CCP chiefs with higher promotion probability	108,163	0.484	0.500	246,478	0.508	0.500
Dummy for mayors with higher promotion probability	107,907	0.466	0.499	247,275	0.480	0.500
Dummy for CCP chiefs aged no less than 55	108,418	0.433	0.495	247,800	0.428	0.495
Dummy for mayors aged no less thant 55	108,081	0.211	0.408	247,066	0.206	0.404

Note: This table shows the summary statistics of land buyers and land parcels by land usage from the full sample from 2008q1 to 2017q4.

Table 3: Effects of Anti-Corruption Campaign on SOEs' Land Purchases: Baseline Results

Variables	(1) SOE	(2) SOE	(3) SOE
POST * TREAT	0.0708***	0.0719***	0.0719***
	(0.00574)	(0.00602)	(0.00602)
POST	-0.0151	-0.0129	-0.0129
	(0.00963)	(0.00914)	(0.00914)
TREAT	0.0618***	0.0598***	0.0598***
	(0.00402)	(0.00398)	(0.00398)
Observations	406,866	400,011	400,011
R-squared	0.085	0.106	0.106
Land Parcel Attributes	YES	YES	YES
City FE	YES	YES	NO
Year by quarter FE	YES	YES	YES
Chief FE	NO	By person	By term

Note: This table reports the results of the difference-in-differences model on SOE's land purchase. The sample includes all residential and industrial land parcels sold via public bidding or auction in 287 cities between Jan 2008 and Dec 2017. The dependent variable *SOE* equals to 1 if the buyer is an SOE firm, and 0 otherwise. *RESIDENTIAL* equals 1 for the residential land parcels, and 0 for the industrial land parcels. *POST* equals to 1 for land parcels sold after December 4, 2012, and 0 otherwise. In all regressions, we control for land parcels' hedonic attributes, the city fixed effects, and the year by quarter fixed effects. In columns (2) and (3), we also control for the city-level chief fixed effects both by person (i.e., regardless of the city and regardless of whether he or she serves as a mayor or a CCP chief) and by term (i.e., each mayor or CCP chief in each city). Robust standard errors clustered at the city by year-quarter level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table 4: Addressing Alternative Explanations

	(1)	(2)	(3)	(4)
Variables	New Debt	Debt Cost	SOE	SOE
RE*POST	0.0161***	0.0198***	0.0523***	0.0665***
	(0.00430)	(0.00301)	(0.00909)	(0.00976)
RE*POST*SOE	-0.0128**	-0.0160***		
	(0.00573)	(0.00443)		
POST * TREAT * Previous HPG			0.0111***	
			(0.00364)	
POST * TREAT * Following HPG				0.0139***
				(0.00401)
TREAT			0.0960***	0.0737***
			(0.00908)	(0.00847)
POST			-0.0226*	-0.0298**
			(0.0129)	(0.0128)
LEV	0.00267***	-0.000400***		
	(3.98e-05)	(3.87e-05)		
ROE	-0.00118***	3.32e-05		
	(6.90e-05)	(4.93e-05)		
ASSET	0.00826***	-0.00783***		
	(0.00102)	(0.000942)		
Observations	73,317	34,065	154,631	156,191
R-squared	0.662	0.379	0.097	0.096
Firm FE	YES	YES	NO	NO
Year by quarter FE	YES	YES	YES	YES
Land Parcel Attributes	NO	NO	YES	YES
City FE	NO	NO	YES	YES

Note: Columns (1) and (2) use the firm-quarterly panel data of all non-financial listed firms in mainland China between 2008Q1 and 2017Q4. The dependent variable *New Debt* in Column (1) refers to the net increase of debt, normalized by the total asset at the beginning of the quarter; the dependent variable *Debt Cost* in Column (2) refers to the ratio between debt financial cost and the average debt in the quarter. *RE* equals 1 for listed firms classified as being in the real estate industry according to the official industrial classification of the China Securities Regulatory Commission, and 0 for listed firms in other non-financial industries. *LEV*, *ROE,* and *ASSET* refer to the leverage ratio, return on equity, and total assets at the beginning of the quarter, respectively. Columns (3) and (4) include all residential and industrial land parcels sold via public bidding or auction in 287 cities between Jan 2008 and Dec 2017. The dependent variable *SOE* equals 1 if the buyer is an SOE firm, and 0 otherwise. *Previous HPG* in Column (3) refers to the accumulative rate of housing price growth during the previous 12 months, while *Following HPG* in Column (4) refers to the accumulative rate of housing price growth during the following 12 months. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table 5: Impacts of the Corruption Stereotype

Variables	(1) SOE	(2) SOE	(3) SOE	(4) SOE	(5) SOE	(6) SOE Dirty Officials	(7) SOE Clean Officials
POST * TREAT * High_ccp	0.0319**						
	(0.0137)						
POST * TREAT * High_may		0.0222					
		(0.0141)					
POST * TREAT * Retire_ccp			-0.0288**				
			(0.0138)				
POST * TREAT * Retire _may				-0.0460***			
				(0.0156)			
POST * TREAT * Stereotype					0.166***	-0.0404	0.233***
					(0.0480)	(0.101)	(0.0529)
POST * TREAT	0.0622***	0.0699***	0.0900***	0.0887***	0.0544***	0.0783***	0.0424***
	(0.00988)	(0.00814)	(0.00873)	(0.00773)	(0.00836)	(0.0156)	(0.00971)
POST	-0.0168*	-0.0199**	-0.0184*	-0.0150	-0.0181*	-0.0181	-0.0173
	(0.00996)	(0.00980)	(0.0101)	(0.00981)	(0.0102)	(0.0198)	(0.0119)
TREAT	0.0698***	0.0616***	0.0571***	0.0642***	0.0676***	0.0469***	0.0778***
	(0.00556)	(0.00511)	(0.00468)	(0.00431)	(0.00524)	(0.0114)	(0.00591)
Observations	339,373	339,897	340,897	340,534	406,866	90,627	316,237
R-squared	0.088	0.087	0.088	0.088	0.089	0.078	0.097
Land Parcel Attributes	YES	YES	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES	YES	YES

Year by quarter FE	YES	YES	YES	YES	YES	YES	YES

Note: This table reports the results of the difference-in-differences model on SOE's land purchase. The sample includes all residential and industrial land parcels sold via public bidding or auction in 287 cities between Jan 2008 and Dec 2017. The dependent variable SOE equals 1 if the buyer is an SOE firm, and 0 otherwise. TREAT equals 1 for the residential land parcels, and 0 for the industrial land parcels. POST equals 1 for land parcels sold after December 4, 2012, and 0 otherwise. The independent variables in column (1), *Stereotype*, refer to the provincial number of real-estate-related cases involving bribes-paying POEs or individuals on behalf of POEs normalized by the total number of POEs who bought at least one residential land parcel from 2008.1.1 to 2012.12.3. Column (2) and (3) show the same regression on subsamples for dirty chiefs (i.e., at least one of the CCP chief and mayor is corrupted) and clean chides (i.e., both CCP chief and mayor are not cracked down by the end of 2020), respectively. The independent variable in column (4) and (5), *pUP_ccp* and *pUP_may*, refer to whether the probability of promotion for the city's CCP chief and mayor is above median, respectively. The prediction model of the probability of promotion is reported in Table A.6. We also control for the land parcel attributes, city fixed effects and year-by-quarter fixed effects in all regressions. Robust errors clustered at the city by year-quarter level are adopted. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

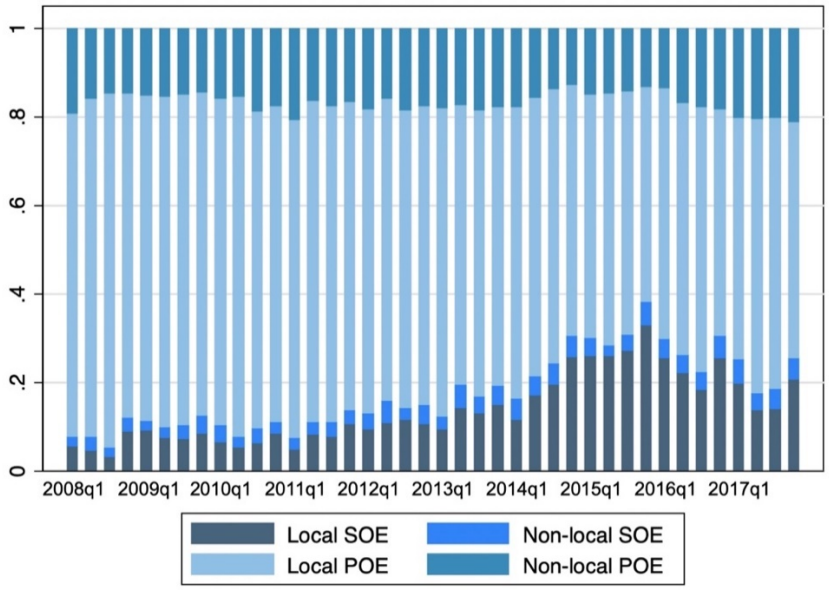
Table 6: Effect on Housing Development Efficiency

VARIABLES	(1) ln(LAG)	(2) Price_Ratio	(3) Price2_Ratio
SOE * POST * CLEAN	0.481***	1.465*	2.617
	(0.0947)	(0.723)	(1.916)
SOE * POST	-0.325***	-1.149*	-2.003
	(0.0528)	(0.520)	(1.860)
SOE * CLEAN	-0.383***	-1.760*	-2.204
	(0.0538)	(0.816)	(1.186)
POST * CLEAN	0.115	-1.310	-2.503**
	(0.100)	(0.715)	(0.763)
CLEAN	-0.242**	0.920	1.371
	(0.0779)	(0.863)	(1.252)
SOE	0.345***	1.076	0.836
	(0.0575)	(0.707)	(1.133)
POST	0.0115	4.256	2.989
	(0.324)	(3.652)	(1.902)
Observations	1,743	1,731	1,382
R-squared	0.226	0.397	0.500
City FE	YES	YES	YES
Year by quarter FE	YES	YES	YES
Land Parcel Attributes	YES	YES	YES

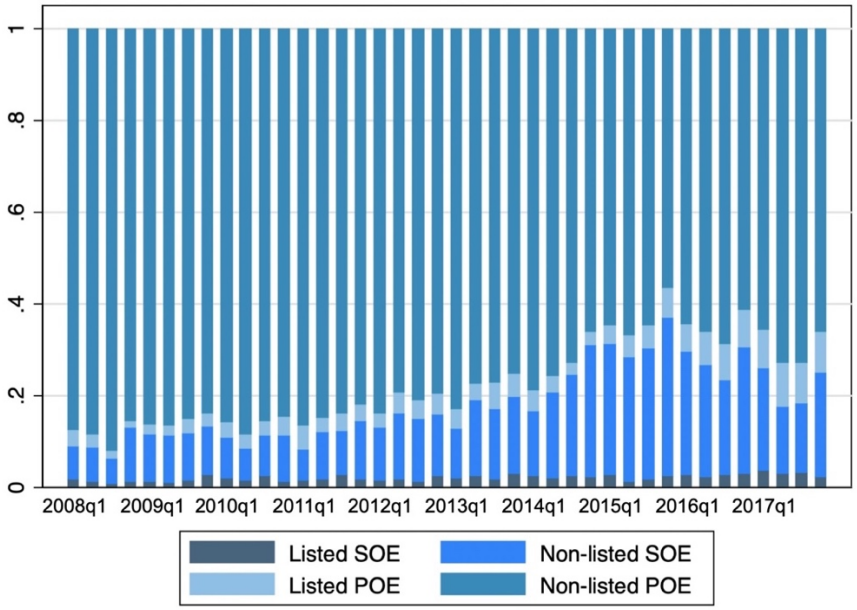
Note: This table reports the results of the difference-in-differences model on the efficiency of land developers. The sample includes all residential land parcels sold in 8 cities (Wuhan, Chongqing, Xi'an, Kunming, Zhengzhou, Beijing, Shanghai, and Jinan) between Jan 2008 and Dec 2017, which can be matched to housing complexes through CREIS. The dependent variable *LAG* in column (1) equals the days between the land transaction date and the opening day of the complex. The dependent variable *Price_Ratio* in column (2) equals the ratio of the housing price of the project and the land price per floor area, and the dependent variable *Price2_Ratio* in column (3) equals the ratio of the resale housing price of the project in 2019 and the land price per floor area. *CLEAN* equals 1 for land parcels transacted under no corrupted city chief, and 0 otherwise. *SOE* equals 1 for the state-owned developers, and 0 otherwise. *POST* equals 1 for land parcels sold after December 4, 2012, and 0 otherwise. In all regressions, we control for land parcels' hedonic attributes, the city fixed effects, and the year-by-quarter fixed effects. Robust standard errors clustered at the city level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Appendix A: Tables and Figures

Figure A.1: Quarterly Share of Transactions by Buyer Attributes



Panel A: By ownership type and whether the buyer is a local firm



Panel B: By ownership type and listed status of buyers

Note: The figure shows the quarterly number of transactions by buyer attributes from 2008q1 to 2017q4. In panel A, the bars from the bottom up refer to local SOE, non-local SOE, local POE, and non-local POE in turn. In panel B, the bars from the bottom up refer to listed SOE, non-listed SOE, listed POE, and non-listed POE in turn.

Table A.1: Effect of Anti-Corruption Campaign on SOEs' Land Purchase: Subdivided Land Buyers

Panel A: Summary Statistics

	Number	Type	Number	Percentage	Type	Number	Percentage
Residential Land	126,412	PureSOE	20,410	16.15%	-	-	-
		PurePOE	103,079	81.54%	-	-	-
		Mix	2,923	2.31%	MixSOE	1,770	60.55%
					MixPOE	845	28.91%
					MixUnclear	308	10.54%
Industrial Land	296,872	PureSOE	21,943	7.39%	-	-	-
		PurePOE	269,334	90.72%	-	-	-
		Mix	5,595	1.89%	MixSOE	2,919	52.17%
					MixPOE	2,622	46.86%
					MixUnclear	54	0.97%

Panel B: Regression Result

	(1)	(2)	(3)	(4)
VARIABLES	PureSOE	PurePOE	MixSOE	MixPOE
POST * RESIDENTIAL	0.0682***	-0.0718***	0.00424***	-0.000667
	(0.00559)	(0.00584)	(0.00141)	(0.000943)
POST	-0.00597	0.0130	-0.00753***	0.00140
	(0.00932)	(0.0100)	(0.00256)	(0.00188)
RESIDENTIAL	0.0605***	-0.0646***	0.00344***	-0.00219***
	(0.00397)	(0.00414)	(0.00110)	(0.000759)
Observations	404,699	404,699	404,699	404,699
R-squared	0.081	0.089	0.013	0.008
Magnitude of Effect	**63.15%**	**-8.21%**	**44.06%**	**12.64%**
Land Parcel Attributes	YES	YES	YES	YES
Year by quarter FE	YES	YES	YES	YES
City FE	YES	YES	YES	YES

Note: These tables shows the effect of the anti-corruption campaign on subdivided land buyers. We decompose the land buyers into three categories based on the ownership of the first-tier shareholders. *PureSOE* equals 1 if the buyer is founded by the government, or by a single firm which is ultimately state-owned, or by more than one firms which are all ultimately state-owned, or the land parcel is directly purchased by more than one state-owned firms. *PurePOE* is defined in a similar way as *PureSOE*. *Mix* equals 1 if the buyer is founded by more than one firms with different types of ownership or the land parcel is directly purchased by more than one firms with different types of ownership. We further divide *Mix* into three types. *MixSOE* equals 1 if the buyer is founded by more than one firms with different types of ownership and the biggest shareholder is ultimately state-owned. *MixPOE* is defined in a similar way as *MixSOE*. *MixUnclear* indicates that land buyers have different types of ownership, but the

leading firm is unclear. Panel A shows the statistical summary of all five types of firms. Panel B further reports the results of the difference-in-differences model on the land purchase of different types of firms. The sample includes all residential and industrial land parcels sold via public bidding or auction in 287 cities between Jan 2008 and Dec 2017. *RESIDENTIAL* equals 1 for the residential land parcels, and 0 for the industrial land parcels. *POST* equals to 1 for land parcels sold after December 4, 2012, and 0 otherwise. In all regressions, we control for land parcels' hedonic attributes, the city fixed effects, and the year-by-quarter fixed effects. We also calculate the magnitude of effect by dividing the coefficients of DID form by the mean value of dependent variables for residential land sold between Jan 2008 and December 3, 2012. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table A.2: Effect of Anti-Corruption Campaign on SOEs' Land Purchase: Robustness Checks

Variables	(1) SOE	(2) SOE	(3) SOE	(4) SOE
POST * TREAT	0.0836***	0.0585***	0.0745***	0.0670***
	(0.00692)	(0.00558)	(0.00528)	(0.00474)
POST	-0.0208**	-0.0117	-0.0187*	-0.0255***
	(0.0103)	(0.00949)	(0.00973)	(0.00978)
TREAT	0.0562***	0.0279***	0.0824***	0.110***
	(0.00441)	(0.00427)	(0.00515)	(0.00514)
Observations	311,095	406,793	465,115	549,581
R-squared	0.229	0.090	0.095	0.105
Land Parcel Attributes	YES	YES	YES	YES
Buyer Attributes	YES	NO	NO	NO
Land Price	NO	YES	NO	NO
Including Quasi-Public Lands	NO	NO	YES	NO
Including Commercial Lands	NO	NO	NO	YES
City FE	YES	YES	YES	YES
Year by quarter FE	YES	YES	YES	YES

Note: This table reports the results of the difference-in-differences model on SOE's land purchase with various settings of sample and fixed effects. *POST* equals 1 for land parcels sold after December 4, 2012, and 0 otherwise. Columns (1) and (2) include all residential and industrial land parcels sold via public bidding or auction in 287 cities between Jan 2008 and Dec 2017. In columns (3) and (4), we also include quasi-public lands and commercial lands, respectively. In all regressions, we control for land parcels' hedonic attributes, city fixed effect, and the year-by-quarter fixed effects. In column (1) we further control for buyers' non-ownership attributes, including listed status and whether it is a local firm. In column (2), we control for logged land price. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table A.3: Effect of the Intensity of Anti-Corruption Campaign

Variables	(1) SOE	(2) SOE	(3) SOE
TREAT * POST_Eight-point stipulations	-0.0559		
	(0.0736)		
TREAT * POST_Central inspection	0.0336***		
	(0.00983)		
TREAT * POST_Xu Caihou's fall	0.0772***		
	(0.0163)		
TREAT * POST_Zhou Yongkang's fall	0.0965***		
	(0.00752)		
TREAT * POST *During_INSPECT		0.00542	
		(0.0215)	
TREAT * POST *After_INSPECT		0.0555***	
		(0.0102)	
TREAT * POST *CRACKDOWN_PROV			0.0173***
			(0.00514)
TREAT * POST		0.0347***	0.0591***
		(0.00854)	(0.00626)
During_INSPECT		0.000106	
		(0.00839)	
After_INSPECT		-0.0160**	
		(0.00697)	
CRACKDOWN_PROV			-0.00837***
			(0.00181)
POST	0.0215	-0.00520	-0.0118
	(0.0223)	(0.00962)	(0.00960)
TREAT	0.0610***	0.0613***	0.0618***
	(0.00403)	(0.00402)	(0.00402)
Observations	406,866	406,866	406,866
R-squared	0.087	0.086	0.086
Land Parcel Attributes	YES	YES	YES
City FE	YES	YES	YES
Year by quarter FE	YES	YES	YES

Note: This table reports the results of the difference-in-differences model on SOE's land purchase. The sample includes all residential and industrial land parcels sold via public bidding or auction in 287 cities between December 4, 2008 and December 31, 2017. Column (1) reports the effects of crackdowns of two national officials (Xu Caihou and Zhou Yongkang) and the implementation of two policies (Eight-point policy and central inspection). Column (2) reports the effects of central inspection on provinces (i.e., *zhong yang xun shi*), where *During_INSPECT* is the dummy for central inspection on provinces,

while *After_INSPECT* refers to whether the province had been inspected. Columns (3) and (4) report the effects of provincial-level grafters' crackdown. *CRACKDOWN_PROV* refers to the cumulated number of provincial-level officials who worked in the corresponding city during the past three years and cracked down in office. *CRACKDOWN_PROV_4q* only counts the cumulated number of provincial-level officials during the previous four quarters. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table A.4: Effect of Anti-Corruption Campaign on SOEs' Land Purchase: Heterogeneity Analysis

	(1)	(2)	(3)	(4)	(5)
	All Transactions			Listing	Auction
Variables	SOE	Central SOE	Local SOE	SOE	SOE
TREAT * POST	0.0581***	-0.00004	0.0806***	0.0682***	0.0627***
	(0.00545)	(0.00127)	(0.00557)	(0.00698)	(0.0174)
TREAT * POST * ln(AREA)	0.0208***				
	(0.00323)				
POST	-0.0189*	0.00405	-0.0220**	-0.0105	-0.0619**
	(0.00973)	(0.00438)	(0.00869)	(0.00958)	(0.0263)
TREAT	0.0632***	-0.000141	0.0781***	0.0643***	0.00549
	(0.00382)	(0.00123)	(0.00397)	(0.00438)	(0.0117)
Observations	406,866	406,866	406,866	363,758	39,892
R-squared	0.087	0.018	0.093	0.168	0.369
Land Parcel Attributes	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES
Year by quarter FE	YES	YES	YES	YES	YES

Note: This table reports the results of the heterogeneity analysis on SOE's land purchase. Columns (1) (2) and (3) include all residential and industrial land parcels sold via public bidding or auction in 287 cities between Jan 2008 and Dec 2017. Column (1) creates an interaction of the DID term with the logged land area. Columns (2) and (3) use the dummy for central SOE and local SOE as the outcome variables, respectively. Columns (4) and (5) include land parcels sold by listing and by auction, respectively. In all regressions, we control for land parcels' hedonic attributes, city fixed effects, and year by quarter fixed effects. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table A.5: Summary Statistics of the Firm-quarterly Panel Data

Variables	Explanation	Obs.	Mean	S.D.
NewDebt	Net increase of debts, normalized by the total asset at the beginning of the quarter	89,238	0.14	0.15
DebtCost	Ratio between the debt financial cost and the average debt in the quarter	37,414	0.051	0.061
RE	Whether it is in the real estate industry	141,280	0.038	0.19
LEV	Leverage ratio (beginning of each quarter)	100,114	44.40	22.39
ROE	Return on equity (beginning of each quarter)	103,657	6.53	10.16
ASSET	Total asset (beginning of each quarter)	100,240	21.69	1.38

Note: This table shows the summary statistics of the firm-quarterly panel of all non-financial listed firms in mainland China between 2008Q1 and 2017Q4.

Table A.6: Prediction of Promotion Probability for City Leaders

Variables	Explanation	(1) UP	(2) UP
		CCP Chief	Mayor
If_Female	whether the chief is female (yes=1, no=0)	0.249*	0.000183
		(0.128)	(0.00556)
If_Minority	whether the chief is the minority (yes=1, no=0)	-0.111	-0.0314
		(0.109)	(0.0240)
Age	age when the chief went into office in this term	-0.0291***	-0.00394**
		(0.00661)	(0.00158)
If_EducatedYouthExp	whether the chief once was an "educated youth" (yes=1, no=0)	0.0583	-0.00224
		(0.0521)	(0.0116)
If_ArmyExp	whether the chief once served in army (yes=1, no=0)	0.0904	0.0105
		(0.0807)	(0.0168)
If_CollegeExp	whether the chief once served in a college or scientific institute (yes=1, no=0)	0.119	-0.0157
		(0.0841)	(0.0220)
If_FirmAdminExp	whether the chief once served as an administrator in enterprises (yes=1, no=0)	0.0227	0.0127
		(0.0644)	(0.0121)
If_SameCityExp	whether the chief once worked in the same city (yes=1, no=0)	-0.148***	0.00346
		(0.0478)	(0.00654)
If_FirstChiefOrMayor	whether it is the first time for the chief to be CCP chief or mayor (yes=1, no=0)	-0.0687	-0.0407*
		(0.0633)	(0.0225)
Observations		670	795
R-squared		0.571	0.698
Education Dummies		YES	YES
City FE		YES	YES

Note: The sample includes all officials by terms between 2000 and 2012. The terms which ended unnaturally are excluded. Columns (1) and (2) include the sample of CCP chiefs and mayors, respectively. The dependent variable, *UP*, is the dummy for whether the chief gets promoted to a higher position after the current term ends. We also control for the dummies of out-service education level and city fixed effect in both regressions. Robust errors are adopted. * indicates significance at the 0.1 level; ** indicates significance at the 0.05 level; *** indicates significance at the 0.01 level.

Table A.7: Summary Statistics of the Matched Data for Eight Major Cities

Variables	Explanation	Mean	S.D.	Min	Max
SOE	Whether the land buyer is an *SOE* firm	0.373	0.484	0	1
CLEAN	Whether neither of the city chiefs in charge is corrupted	0.700	0.458	0	1
LAG	Days between the land transaction date and opening date of the complex	902.4	602.1	99	3,050
Price_Ratio	Ratio of first-hand housing price over the land price per floor area	4.901	4.404	1.278	34.89
Price2_Ratio	Ratio of second-hand housing price over the land price per floor area	6.664	5.290	1.160	39.99

Note: This table shows the summary statistics of the residential land parcel – housing complex matched data between Jan 2008 and Dec 2017 in eight major cities (Beijing, Chongqing, Kunming, Jinan, Shanghai, Wuhan, Xi'an, and Zhengzhou).