NBER WORKING PAPER SERIES

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Working Paper 29688
http://www.nber.org/papers/w29688

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2022

We would like to thank Yongheng Deng, Maggie Hu, Ming Li, John Matsusaka, Randall Morck, Michael Zheng Song, Shang-Jin Wei, Yiqing Xu, Bernard Yeung, Minyuan Zhao, and seminar/ conference participants at Chinese University of Hong Kong (Shenzhen), University of Southern California, University of Pennsylvania, NBER Chinese Economy Working Group Meeting (Fall 2021), and Jinan-SMU-ABFER Annual Conference (2021) for useful comments and suggestions. Linzhen Zhu and Jiaxin Zheng provided outstanding research assistance. All remaining errors are our own. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 29688
January 2022
JEL No. D73,R31,R52

ABSTRACT

We advance a novel hypothesis that China's recent anti-corruption campaign may have contributed to the recent resurgence of the state-owned enterprises (SOEs) in China as an unintended consequence. We explore the nexus between the anti-corruption campaign and the SOE resurgence by presenting supporting evidence from the Chinese real estate sector, which is notorious for pervasive rent-seeking and corruption. We use a unique data set of land parcel transactions merged with firm-level registration information and a difference-in-differences empirical design to show that, relative to the industrial land parcels which serve as the control, 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 interpret the findings through the lens of a model where we show, since selling land to private developers carries the stereotype that the city official may have received bribes, even the "clean" local officials will become more willing to award land to SOEs despite the presence of more efficient competing private developers. We find evidence consistent with the model predictions.

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1. Introduction

Nicholas Lardy, a well-known China expert, wrote in his 2019 book "*The State Strikes Back*": "[s]ince 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 about 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 any 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 reforms, and it included the signal phrase "We must ensure that the market has a *decisive role* in the allocation of resources," where for the first time the word "decisive" was used to describe the role of the market 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 unprecedented in its intensity, scope, and duration. By the end of 2018, 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 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 based on who are more likely to pay bribes to government officials 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. In contrast, it is relatively rare for SOEs 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, local government officials will intentionally avoid corruption-stereotyped transactions with private firms in fear of arousing suspicion from the central government that can result in follow-up corruption investigations even if these transactions are

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

entirely justified on efficiency grounds. The reluctance of dealing with private firms is not restricted to "dirty" officials because "clean" officials also dislike the hassles and reputational damage associated with being swept in investigations even if they are ultimately cleared of corruption. In fact, it is theoretically possible that the incentives of "clean" officials to shun private firms for self-preservation could even be stronger than those of "dirty" officials. As a result, the anti-corruption campaign can induce the local government officials, whether clean or dirty, to stay away from private firms so as to protect themselves from investigations; and this can cause an unintended reemergence of the state-owned enterprises in corruption-susceptible sectors.

In this paper, we formally 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 contributed 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 RMB in 2018 and accounted for about 14 percent of China's annual GDP. This sector has also been subject to heavy government regulations ranging from land auctions to zoning adjustments, and is notorious for pervasive rent-seeking and corruption (Chen and Kung, 2019; Fang, Gu, and Zhou, 2019). Our manually-collected data show that among the city-level officials charged with corruption during 2012-2018, about 59.4% of them were involved in at least one bribery case related to real estate development. The absolute majority of the bribery came from private developers, and only a small fraction was paid by state-owned developers.

This paper exploits a unique data set 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 7.2 percentage points after the release of the Eight-Point Stipulations (a landmark event that was often identified as the beginning of the anti-corruption campaign), representing a more than 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. Moreover, the positive effect of the campaign on the resurgence of the 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 cumulative number of province-level crackdown cases.

We conduct more empirical analyses to examine several alternative hypotheses. For example, the rise of SOE shares in the residential land transactions may be driven by the deeper pockets of SOEs or their more optimistic market expectation about the housing market after the anti-corruption campaign. Our key results are robust after including the proxies for financing capacities and housing price expectations of SOEs, which

suggests that these alternative interpretations are unlikely the key driver of our results. Our further analysis shows that the rise of SOEs in the residential 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 the local private developers due to the anti-corruption campaign was filled up not by financially stronger players of the industry (e.g., centrally-owned SOEs or nationally known publicly-listed developers), but by local SOEs which tended to be well-connected with local governments but less competitive.

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 anti-corruption officials from the central government understood from the historical probabilities that dirty officials are more likely to award land parcels to privately-owned enterprises (POEs) to update their belief about the type of local officials. 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; moreover, their dirty reputation acquired before the anti-corruption campaign may have been too overwhelming to repair, and as such, they may give up on pretending to be clean.

We present several pieces of empirical evidence consistent with model predictions. First, we find 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. The reason is that those with a higher *ex-ante* probability of promotion have a higher stake in avoiding being swept in a corruption investigation. 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 total number of private firms with at least one residential land purchase in the pre-campaign period as a proxy for the degree of corruption stereotype of dealing with POEs. 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, where clean city officials are defined as those city party chiefs and mayors who had not yet been caught in the anti-corruption campaign by the end of 2020, and dirty officials as those who were

already indicted with corruption charges during the anti-corruption campaign.[2] Third, we offer some suggestive evidence regarding 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 data set of eight major cities in China, and find that, after the campaign, the housing projects managed by SOEs experienced more delays in completing the housing development and achieved a lower quality of housing units built in cities with clean officials, which likely indicates a lower efficiency of housing development than those managed by private developers.

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

To the best of our knowledge, this paper is the first to examine the role of corruption stereotype in motivating local officials (including the inherently clean officials) to grant SOEs more advantageous treatment relative to POEs for the purpose of self-preservation. This analysis highlights that the rise of SOEs in the real estate sector of the Chinese economy may partly be an unintended consequence of the anti-corruption campaign. Our paper thus provides an important clue to the recent resurgence of the SOEs in the Chinese economy, a phenomenon that has attracted intense scholarly attention (e.g., Lardy, 2019).

This paper also contributes significantly to a burgeoning strand of empirical literature estimating the effects of China's recent anti-corruption campaign. Some studies have identified a positive effect of the campaign in several aspects of the economy, such as reductions in luxury goods, alcohol, and other corruption-related consumption (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 toward a potentially negative effect associated with the campaign, such as drops in investment and new firm registrations (Chen and Zhong, 2017; Xu, 2018; Zheng and Xiao, 2020). Several studies highlight the differential impacts of the anti-corruption campaign on firms with different ownership types. 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 private, small-sized, or non-politically 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

[2] Note that "clean" officials, as they are empirically defined, may include some who eventually would be found to be dirty. Also note that the clean and dirty officials were all still serving their leadership positions when the land transactions took place.

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 crackdowns. However, none of the above studies have documented direct evidence for the effect of China's anti-corruption campaign on the resurgence of the SOEs.

Our study also contributes to the existing scholarship that tests two major competing hypotheses about the effects of corruption on the economy. One hypothesis emphasizes that corruption increases transaction costs, i.e., "grits" (Klitgaard, 1991; La Porta, et al., 1999; Shleifer and Vishny, 1993), thus anti-corruption policies facilitate a more transparent and rule-based business environment and improve economic efficiency. The competing hypothesis stresses the role of corruption as a "grease of the wheel" that allows firms to get around the inefficient bureaucracy represented by excessive red tapes and regulation hurdles (Leff, 1964; Huntington, 1968) or as a screening mechanism in favor of more efficient firms (Lui, 1985). According to this hypothesis, an anti-corruption campaign may increase institutional distortions and hinder economic development. Our paper contributes to this literature by adding more nuances to this time-honored debate. In our analysis, regardless of whether corruption serves as "grits" or "grease" of the wheel of business, the inefficiency implications of an anti-corruption campaign is not as clear cut, when government officials, some clean and some dirty, strategically react to the anti-corruption campaign in an environment where they are subject to stereotyping when dealing with some firms. We demonstrate in the context of China that the anti-corruption campaign triggered a response of local officials to avoiding transactions with POEs that elicit corruption stereotypes, even when these transactions might be justified on efficiency grounds. The role of corruption stereotype in complicating the effects of anti-corruption campaigns has general implications for contexts outside China.

Our paper is also a novel extension of the large literature on statistical discrimination, which mostly focuses on labor and consumer product markets (Phelps, 1972; Arrow, 1973; Altonji and Pierret, 2001), to the political economy and anti-corruption setting.[3] When both anti-corruption investigators and the general public share the perception that a certain type of government-business transactions (e.g., those involving POEs) is more susceptible to corruption, such corruption stereotypes can induce strategic responses of both clean and dirty government officials and generate unintended consequences.[4]

The remainder of the paper is structured as follows. In Section 2, we provide the institutional background of the prevalent rent-seeking behavior in the Chinese real estate sector, and China's recent anti-corruption campaign; in Section 3, we describe our data and empirical strategy; in Section 4, we present our primary empirical finding 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

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

[4] Evidence for the unintended consequence of stereotype avoidance is also presented in labor market settings, for example, Doleac and Hansen (2020) studies the unintended consequence of "ban the box" policy.

stereotype against POEs in deterring local officials from selling land to private real estate developers after the anti-corruption campaign; in Section 6, we present empirical evidence consistent with the hypotheses derived from the theoretical model; and in Section 7, we conclude.

2. Institutional Background

2.1 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 from the Chinese National Bureau of Statistics, there were 206 thousand real estate developers in China by the end of 2018, with a total asset of 10.1 trillion RMB. In 2018, these developers spent 8.52 trillion RMB on housing development and sold 1.48 billion square meters of newly built housing units with a total value of 12.64 trillion RMB.

For a typical residential 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 the 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. The transfer price of LURs from the local government to the developer, also known as the land parcel transaction price, is determined in a public auction/bidding process in which real estate developers participate.[5] 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 one to three years, and then sell the completed dwelling units to household buyers. In most cases, the transaction prices of dwelling units are determined by local housing market conditions.

The above housing development process is highly regulated by the local government. City officials play a key role in urban planning and land development in China (Lichtenberg and Ding, 2009; Wang, Zhang, and Zhou, 2020). Owing 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, Henderson, and Zhang (2013), Chen and Kung (2019), and Li (2020), some city officials might manipulate the public auctions/biddings and help developers to win the auctions/biddings at lower prices. Second, Cai, Wang, and Zhang (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, the maximum floor area of housing permitted to be built on the parcel, is determined according to the zoning regulation prior to its transaction and is subject to a cap. If a developer could increase the FAR with the help of officials in the zoning bureaus, it can build additional

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

floor areas and profit from the subsequent housing sales.[6] Therefore, residential housing development is widely perceived as a sector where the local government chiefs wield large influence on who won the land parcel auctions and at what price; as a result, there were severe corruption and rent-seeking in the real estate sector, at least before the anti-corruption campaign.

2.2 The anti-corruption campaign in China since 2012

Facing the increasing concerns of corruption in China, the new leadership headed by President Xi Jinping launched the anti-corruption campaign almost immediately after taking office in November 2012. On December 4, 2012, the Politburo of the Chinese Communist Party (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 to Politburo members, they were officially released to the public and became a strong signal of strengthening the 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 non-distinguishable from similar political announcements made at the time of top leadership transition in the past.

An arguably clearer signal of the unprecedented nature of President Xi's 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 regular central inspections (*zhong yang xun shi*). Specifically, the CCDI would dispatch inspection teams to all the provinces, ministries, and central SOEs according to a schedule. A central inspection team typically spent two months in an inspected organization, collecting information on bribery, embezzlement, or other corruption activities via audits, interrogations, and solicitation of tips 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, thus it can be expected to generate greater shocks to the Chinese bureaucratic system. Following the CCDI inspection schedule, all the 31 provinces received the central inspections in four batches between May 2013 and September 2014.

A most remarkable phenomenon of this anti-corruption campaign is the dramatic increase since 2013 in the number of senior government officials charged with corruption. As depicted in Figure 1, only 28

[6] Corroborating evidence is provided in Fang, Gu, and Zhou (2019) which document that officials in city bureaus of development and reform commission, taxation, housing administration, land administration, and construction planning on average get a price discount of 1.05% when they purchase new homes from developers.

provincial-level officials were 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 stayed high 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 charged with corruption since the founding of the People's Republic of China. Zhou's downfall was soon followed by that of two more Politburo-level officials, Ling Jihua and Guo Boxiong.

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

[Figure 1 About Here]

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 in office between January 2000 and December 2012 (i.e., right before the start of the anti-corruption campaign).[7] We ended up with a sample of 1,565 city leaders. By the end of 2018, 244 (over 15%) of these city leaders were accused of corruption during the anti-corruption campaign. For these corrupted city leaders, we collected detailed information on the corruption cases for 180 city leaders through court verdicts, indictment charges, or official media reports, based on which we provide the descriptive analysis as shown in Table 1.[8]

[Table 1 About Here]

Panel A of Table 1 shows that out of all the 180 corrupt city leaders with detailed verdict information, 166 (or 92.2%) were involved in at least one bribery case, out of which 107 (or 59.4%) took bribes from real estate developers.

A total of 213 bribery cases involving real estate developers are described in the verdicts of the 180 corrupt city leaders. Panel B of Table 1 provides a breakdown of these cases according to which type of favors the developers received from the corrupt city leaders. The three most common favors include obtaining development projects, securing land use rights, and speeding up the approval procedures in construction. In Panel C, we show that most of the bribers were private firms. More specifically, 84.0% of the real-estate

[7] See Section 3.1 for more details about the data source.

[8] As for the other 64 corrupt officials, 47 were not yet sentenced by the end of 2018 and 17 were sentenced but the detailed information of their verdicts is not publicly available.

related cases involved bribes paid by private enterprises or by individuals, presumably on behalf of private firms; in contrast, SOEs were the bribers in only 12 (or 5.6%) of the real-estate-related cases.

The prevalence of private firms among those paying bribes to government officials in the real estate sector is consistent with the common public perception that POEs are much more susceptible to corruption and rent-seeking for government officials than SOEs, especially in heavily regulated sectors. This stereotype of corruption against the POEs leads government officials to become reluctant, and in many cases to avoid altogether, to do regular businesses with private firms. Indeed, this observation motivates our subsequent analysis, which documents the effects of the anti-corruption campaign on the rise of the SOEs in the lucrative residential land transactions and formally examines the role of stereotyping avoidance incentives of the city leaders in explaining the resurgence of the SOEs in China's real estate sector.

It is also worth noting 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 in order to boost local economic development and enhance their chance of promotion (Li and Zhou, 2005; Yao and Zhang, 2015), instead of pursuing immediate private 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 transactions 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 the justification for using industrial land transactions as a control group in our analysis below for the effects of the anti-corruption campaign on the rise of SOEs in China's residential land market.

3. Data and Empirical Strategy

3.1 Data

The main data set used in this study is the full sample micro-level data of urban residential- and industrial-use land parcels sold via public auctions or biddings in all the 287 cities in mainland China from January 2008 to December 2017. As described in Section 2.2, an urban land transaction in China refers to the transfer of LURs for a specific length of tenure, which is 70 years for residential use, 50 years for industrial use, and 40 years for commercial use land parcels, from the local government to a firm or an individual. Since August 2004, all residential- and commercial-use urban land parcels are required to be sold via public auctions or biddings; similar requirements apply to industrial-use land parcels from April 2007. To reinforce the transparency of land transactions, from January 2008, the Ministry of Land Resources publicly releases the detailed information of each urban land transaction across the country on its official website, from which we collected our main data set.

For each land parcel, we have information on its city and district/county, detailed location, land use (residential/industrial/commercial), land area, designated floor-to-area ratio (FAR), the grade of land location,

type of auction (sealed bidding, English auction, or two-stage auction), contract date, transaction price, and buyer name.[7] We additionally clean the data set via the following procedures. First, we exclude residential-use 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 exclude land parcels purchased by individuals; that is, we only include in our analysis land parcel transactions with at least one of the buyers being a firm. Third, if a land parcel transaction lists more than one buyer, we divide the total price and land area equally among the buyers because the data does not contain information about the equity share among the buyers. These procedures result in 425,513 land parcel transactions in the analysis sample, with 127,904 parcels for residential use and 297,609 for industrial use, respectively.

Panel A of Figure 2 plots the quarterly number (i.e., volume) of residential and industrial land transactions in the sample. The transaction volumes of both groups rose 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 of Figure 2 depicts the quarterly average prices per square meter of land area in yuan for these two groups, which experienced striking divergence during the sample period. The average residential land price increased from 1,200 yuan per square meter of land area in early 2008 to 4,200 yuan at the end of 2017, translating into an average annual growth rate of 13.3%. In contrast, the average industrial land price was stable during the decade and only fluctuated slightly around 250 yuan per square meter of land area. This remarkable difference in both price levels and variations further collaborates that residential land transactions are much more susceptible to corruption than industrial land transactions.

[Figure 2 About Here]

Our second data set is the firm registration data set released by the Chinese State Administration for Market Regulation, which we use to merge with the land transaction data in order to obtain more information about the winning buyers of the land parcels in our first data set, especially their ownership types. For each firm buyer, we designed a program to automatically identify its ultimate owner through the circulated tracing process (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, or a non-SOE if the ultimate owner is an individual or a foreign company. If the ultimate owner is a listed firm, we directly adopt the ownership type reported in its financial report.[8] Based on the above

[7] See Li (2020) for a detailed description of the two-stage auction method used in China's land transactions. 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, *ceteris paribus*.

[8] We further verified the accuracy of the ownership type identification as follows. First, we manually collect the 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,

procedures, 47,562 of the 425,513 land parcels in our analysis 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 publicly listed firm, and 0 otherwise). Table 2 reports the summary statistics of major variables by land use group.

[Table 2 About Here]

We also use two complementary data sets in some of our analyses. The first one measures the severity of real-estate related bribery by POEs before the anti-corruption campaign. We manually collected 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 operated by the Supreme People's Court of China. From the beginning of 2014 till the end of 2020, this website collects more than 100 million court verdicts in China and is widely believed to have listed all the court verdicts.[9] We search for the court verdicts based on the following three rules: (1) the court verdict is the first verdict for a criminal case; (2) at least one of the charges is about accepting bribes; (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 occurred between January 1, 2000, and December 4, 2012 (i.e., right before the official start of the anti-corruption campaign). The search yields a total of 4,710 cases. Then, we identify the ultimate ownership type of each briber through the same circulated tracing process using the firm registration data set described above.[10] Following these procedures, we are able to identify bribers' ownership type for 4,142 out of the 4,710 cases, with 3,990 POEs and 152 SOEs. As we will explain in Section 6.2, our key indicator of provincial-level severity of real-estate related bribery by POEs, which we will use to proxy the corruption stereotype against POEs, is calculated as the cumulative number of real-estate-related cases involving bribe-paying POEs normalized by the total number of POEs who bought residential land in the province between January 1, 2008, and December 3, 2012. The summary statistics of the key indicator of the severity of real-estate related bribery at the land parcel level by land use group are also presented in Table 2.

The second data set 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 January 2000 and December 2017. For each official, we have information on his/her key personal

its ultimate owner will be directly identified. Second, we randomly selected 100 land parcels and manually verified the ownership type of their buyers. The results perfectly matched.

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

[10] Two things are worth noting. 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.

attributes such as age, gender, and educational background. We can also observe his/her experience before the current position and his/her next position subsequent to the current position. In Section 6.1, we use this data set to measure local officials' *ex-ante* promotion probability and investigate its effect on the residential land market share change after the anti-corruption campaign.

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 less affected by the campaign, if at all. Therefore, we choose the residential land transactions as the treatment group and the industrial land transactions as the control group. We adopt the official release of the Eight-Point Stipulations on December 4, 2012, as the beginning of the policy event, and estimate the following equation:

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

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. $TREAT_i$ equals 1 for the residential land parcels and 0 for the industrial land parcels. $POST_t$ 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 α_j, and the year-by-quarter fixed effects δ_t. Robust standard errors clustered at the city by year-quarter level are reported in all the regressions.[11]

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:

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

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 SOE share among the buyers in the residential land market relative to the industrial land market.

4. Empirical Results

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

4.1 Baseline results

Figure 3 shows the raw data pattern of our major outcome variable, the SOE shares 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 generally in parallel between these two groups before late 2012, although the SOE share in the residential land group was always higher than in the industrial land group. However, the SOE shares in these two groups started to diverge since the release of the Eight-Point Stipulations in December 2012. While the SOE share in the industrial land group remained stable, the share in the residential land group started to increase drastically since the beginning of 2013 and surged since early 2014 when the anti-corruption campaign was further intensified. The SOE share in the residential land group peaked around 37% at the end of 2015, almost three times the level up to 2012. The share then declined to around 20% at the end of the sample. While Figure 3 provides the Prima facie evidence for the association between the anti-corruption campaign and the resurgence of the SOEs in the residential land market, we leave more conclusive findings to the empirical analysis.

[Figure 3 About Here]

Table 3 reports the baseline estimation results of the DID model as specified in Eq. (1). As shown in column (1), compared with the industrial use land parcels, the SOE share among buyers in the residential use land parcels significantly increased after the release of the Eight-Point Stipulations, consistent with the raw trend in Figure 3. The magnitude is also economically large. Controlling for other factors, the SOE share in the residential use land group increases by 7.2 percentage points, which amounts to an over 60% increase of the SOE share prior to the anti-corruption campaign (11.9 percent).[12] This finding provides evidence that a surge of the SOE share in the residential land transactions may be triggered by the anti-corruption campaign.

As previously mentioned, city chief officials have played a big role in urban housing development. Therefore, 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 between SOE and POE developers. To address this concern, we further control for the city chief fixed effects. In column (2), we control for the person-level 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 control for the term fixed effects, in which one term refers to the duration of the official term of a 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 driven by the turnovers of city chiefs who may have different preferences regarding developers of private and state ownerships. This corroborates our interpretation that the surge in the SOE

[12] 0.0721/11.9% = 60.6%, where 0.0721 is the coefficient of the interaction in column (1) of Table 3 and 11.9% is the average SOE share among all residential use land buyers before December 4, 2012.

share among the residential land transactions is closely associated with the anti-corruption campaign.

[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 plotted 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 announcement of the central inspections in May 2013, the SOE share among residential land buyers gradually rose relative to that among industrial land buyers. The downfall of Xu Caihou and Zhou Yongkang —the so-called "Big Tigers" prosecuted in the anti-corruption campaign— sped up the increase of the SOE share in the residential land transactions. As the intensity of the anti-corruption campaign waned from around early 2016, the SOE share in residential land purchases started to decline again.

[Figure 4 About Here]

4.2 Alternative explanations

In this subsection, we discuss two alternative explanations about our key results.

A. Financial Access. The first alternative interpretation is that the rise of the SOE share in residential use land transactions is because the SOE developers have better financial access than POE developers, and this advantage increased after the anti-corruption campaign. Indeed, the existing literature points out that SOEs in China typically have stronger financial capability than non-SOEs, and have easier access to bank lending (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:

$$OUTCOME_{it} = \beta_1 * RE_{it} * POST_{it} + \beta_2 * RE_{it} * POST_{it} * SOE_{it} + \beta_3 X_{it} + \alpha_i + \delta_t + \varepsilon_{it} \quad (3)$$

where $OUTCOME_{it}$ refers to the outcome variable associated with firm i in quarter t; We mainly focus on two outcome variables: *New Debt*, which refers to the net increase of debts, normalized by the total asset at the beginning of the quarter; and *Debt Cost*, which refers to the ratio between debt financing cost and the average debt in the quarter. 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 between 2008Q1 and 2012Q4; SOE_{it} refers to SOEs. We also control for the time-varying

[13] The data is downloaded from RESSET. The summary statistics are available in Table A.1 in the appendix.

firm attributes (X_{it}), including leverage ratio and logged total assets, both calculated at the beginning of each quarter, and return on equity in the quarter, as well as the firm fixed effects (α_i) and year-by-quarter fixed effects (δ_t).

The regression results are reported 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.

[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 driven by the SOEs' deep pockets. In columns (1) and (2) of Table A.2, which will be discussed in detail in the heterogeneity analysis, we show that the surge of SOE share in residential land transactions is mainly driven by the rise of local SOEs, not by central SOEs which have a much stronger financial capacity. 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 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 their rising share accelerated after 2014 and reached the peak in 2016. As the campaign's intensity declined, the share of local SOEs decreased 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 non-local POEs, maintained an almost unchanged presence in the residential 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 almost entirely filled by the local SOEs, instead of the central SOEs that 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 residential land market after the anti-corruption campaign was driven mostly by the decreasing share of non-listed POEs, and the rising SOE share was mainly driven by that of the non-listed SOE, instead of listed SOEs with easier access to financing resources.

The above evidence jointly suggests that the increase in SOE share in the residential market is not driven by the "deep pocket" of SOEs *per se*.

B. Expectations about the Housing Markets. Another alternative explanation for the rising SOE share in the residential land transactions is that, after the anti-corruption campaign, SOE developers had more optimistic expectations about the housing market than the POE developers. 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. To test this alternative explanation, we utilize the monthly constant-

quality house price index by Wu, Deng, and Liu (2014) and create measures of housing price growth. In column (3) of Table 4, we add the triple interaction term between *TREAT*POST* and *Prior HPG*, which represents the cumulative house price growth in the city during the 12 months prior to the land transaction and serves as the proxy of buyers' adaptive housing price growth expectations. In column (4), we replace *Prior HPG* with *Subsequent HPG*, which equals the cumulative house price growth during the subsequent 12 months after the land transaction and serves as the proxy of forward-looking housing price growth 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 conclude that the hike in SOE shares is not entirely driven by changes in SOEs' house price expectations.

4.3 Robustness checks and Heterogeneity Analysis

A. More Refined Firm Ownership. In the basic specification, we define a firm's ownership type 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 main 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 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 the three largest shareholders of the buyer firm are SOEs or POEs. As shown in Panel A of Table A.3 in the appendix, these two categories jointly account for around 98% of our sample, which ensures 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 a mixture of SOE and POE shareholders, and we can further classify them into two categories (*MixSOE* and *MixPOE*) according to the ownership type of 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.3. 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.

B. Other Robustness Checks. In Table A.4 in the appendix, we conduct a series of other robustness checks. In column (1), we control for other buyer firms' attributes (*LOCAL*, *HISTORY*, and *LISTED*); in

column (2), we control for parcels' transaction prices, although we choose not to include these two sets of control variables in the baseline model because they are likely to be endogenous. In column (3), we include land parcels designated for public or quasi-public residential projects in the treatment group, and in column (4), we include the commercial use land parcels in the control group. In column (5), we exclude the land parcels purchased by local government financing vehicles (LGFVs) from our analysis. The estimated coefficients of *POST*TREAT* are robustly positive and statistically significant at the 1% level in all these specifications.

C. Heterogeneity Analysis. 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 Table A.2. First, we separate the SOE land buyers into central SOEs, i.e., SOEs controlled by the State-Owned Assets Supervision and Administration Commission (SASAC) of the State Council or other ministries of the central government, and local SOEs, i.e., SOEs controlled by different levels of the local governments. As shown in columns (1) and (2), where the independent variables are respective dummies for whether the buying firm is a central SOE or local SOE, 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. We find, however, as some of the POE 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.

Second, in column (3), 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 win the auctions. However, we already showed that SOEs' deeper pockets are unlikely the reason for this finding in Section 4.2.

Finally, in columns (4) and (5), we replicate the regression on subsamples of land parcels sold by English auctions and two-stage auctions, respectively.[15] The results are similar.

D. Effect of the Intensity of the Anti-Corruption Campaign. In the baseline analysis, we defined the official release of the Eight-Point Stipulations on December 4, 2012, as the start 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 shares among the winning firms in the

[15] We do not include the sealed bid auction samples because the number of land transactions using sealed bid auctions is too small.

residential use land market.

In Table A.5, 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 announcement of the CCDI 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 term 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 merely 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 former national-level top officials (Xu Caihou and Zhou Yongkang).

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 introduce the interaction term between *TREAT***POST* and *During_INSPECT*, which equals 1 for the period (typically two or three months) when the province was under 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 the 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 investigated for corruption, the city-level officials in the same province would be scared or shocked either because of their potential connections with the higher-level official or because of the chilling effect from witnessing the 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 cumulative 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 share among residential land buyers is especially high after the intense local crackdown events. This result can also help explain the decline of the SOE share in the residential land market after 2016. After the most intense crackdowns of corrupted chiefs between 2014 and 2016, the frequency of crackdown events decreased modestly thereafter.

5. Corruption Stereotype and Anti-Corruption Campaign: Theoretical Hypotheses

So far, we have established that, relative to the industrial land parcels which serve as the control, 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. In this section, we attempt to interpret the findings through the lens of a model where local officials, in response to the anti-corruption campaign, become more willing to award land to SOEs since selling land to private developers carries the stereotype that the city official may have received bribes. The model also yields testable implications that we empirically evaluate in the next section.

Consider a city whose official, whether he/she is the mayor or the party secretary, 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 $\pi_0 \in (0,1)$.

When a residential 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 an SOE or POE.[16] In contrast, a dirty politician's decision may be distorted by the potential bribes he/she can receive from POE developers. Specifically, let us, for simplicity, assume that there are two bidders in every land parcel auction, one POE and one SOE. Let v_p and v_s denote the value of the POE and SOE bidders, respectively, and we assume that they are drawn from a joint distribution and that the auction admits a monotonic equilibrium.

Prior to the anti-corruption campaign, the probability that the POE developer wins the land transaction in the city with a clean official is:

$$p_c = Pr(v_p > v_s). \tag{4}$$

A dirty official, however, would allow the POE a net kickback of $k = \theta b > 0$ after the auction if the POE were to offer a bribe b to the politician.[17] Not all POEs would offer a bribe to the politician; we assume that only a fraction $\mu \in (0,1)$ of the POEs bribe. Thus, the probability that a dirty politician will award the land parcel to a POE developer is:

$$p_d = Pr(v_p > v_s) + \mu \Pr\left(v_p < v_s < v_p + k\right) \tag{5}$$

Clearly, $p_c < p_d$. That is, prior to the anti-corruption campaign, POE developers are more likely to win residential use land parcels in cities with dirty officials, *ceteris paribus*. As we will see below, precisely because dirty officials are more likely than clean officials to award land parcels to POE developers prior to

[16] 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.

[17] For example, Li (2020) shows that local officials may provide inside information about the future infrastructure plans, or provide kickbacks in relocating the residents or businesses on the auctioned land parcel, to developers that pay them bribes.

the anti-corruption campaign, awarding land parcels to POE developers becomes a "stigmatic" action for politicians.

At the start of the anti-corruption campaign, suppose that a city had sold a total of *n* land parcels. The number of land parcels sold to POE developers, denoted by $n_p \in \{0, \dots, n\}$, is random.[18] The CCDI will use Bayesian updating to form a belief, denoted by π, about whether the city official was dirty based on (n, n_p).[19] On average, we expect that clean officials have cleaner reputations, i.e., lower π, than dirty officials.

CCDI officials adopt a probabilistic investigation rule that targets politicians with dirty reputations; specifically, we denote by $I(\pi) \in (0,1)$ the probability that a politician with a dirty reputation score π will be investigated by CCDI, where $I' > 0$ and $I'' < 0$. Being investigated by the CCDI, regardless of whether the politician is eventually found to be clean or dirty, incurs a cost of $H > 0$ for the politician, which includes both the hassle cost and the opportunity cost of losing the chances of being promoted to a higher position; in addition, if the politician is actually dirty, he/she will incur additional jail cost $J > 0$.

CCDI officials observe the number of residential land parcels *newly* awarded to POE and SOE developers after the anti-corruption campaign and further update the city leaders' dirty reputation. We assume that CCDI updates beliefs according to historical probabilities that dirty and clean politicians award land parcels to POEs with probabilities p_c and p_d as specified in Eqs. (4) and (5), respectively.

Because $p_c < p_d$, awarding a land parcel to a POE carries a reputational cost for the city official, even when doing so is completely justified on efficiency grounds, i.e., even if $v_p > v_s$. Suppose a politician's current reputation score is π. If he/she awards the land to a POE, the dirty reputation score of the city official will deteriorate to

$$\pi_p = \frac{\pi p_d}{\pi p_d + (1-\pi)p_c}, \tag{6}$$

and if he/she awards the land to an SOE, it will improve to

$$\pi_s = \frac{\pi(1-p_d)}{\pi(1-p_d) + (1-\pi)(1-p_c)}. \tag{7}$$

It follows from $p_c < p_d$ that $\pi_p > \pi > \pi_s$.

Now we are ready to analyze the behavior of the city officials after the anti-corruption campaign. First, consider a clean official with a dirty reputation score π. When facing a POE and an SOE developer with

[18] Specifically, n_p is distributed as Binomial(n, p_c) and Binomial(n, p_d), respectively, in cities with clean and dirty officials.

[19] It is not important for the subsequent analysis, but the politician's dirty reputation is given by:

$$\pi = \frac{\pi_0 p_d^{n_p}(1-p_d)^{n-n_p}}{\pi_0 p_d^{n_p}(1-p_d)^{n-n_p} + (1-\pi_0)p_c^{n_p}(1-p_c)^{n-n_p}}.$$

values v_p and v_s, respectively, the clean official award the land parcel to the POE developer if

$$v_p - I(\pi_p)H > v_s - I(\pi_s)H \Leftrightarrow v_p - v_s > [I(\pi_p) - I(\pi_s)]H \quad (8)$$

If the city official is dirty, however, there are two cases to consider. If the POE developer does not pay a bribe, the city official now awards the land parcel to the POE if

$$v_p - I(\pi_p)(H+J) > v_s - I(\pi_s)(H+J) \Leftrightarrow v_p - v_s > [I(\pi_p) - I(\pi_s)](H+J) \quad (9)$$

If the POE developer pays a bribe, the dirty official will award the land parcel to the POE if

$$v_p + k - I(\pi_p)(H+J) > v_s - I(\pi_s)(H+J) \Leftrightarrow v_p - v_s > [I(\pi_p) - I(\pi_s)](H+J) - k. \quad (10)$$

We now summarize the above discussions into the following testable hypotheses:

Hypothesis 1. *After the anti-corruption campaign, in cities with clean officials, the SOE share of residential land parcel sales will increase; and the land parcel assignment will be less efficient.*

Hypothesis 1 follows from the comparison between Eqs. (4) and (8), particularly noting that clean officials' reputation score π should be moderate, and they still have "feathers to protect" in the sense that $I(\pi_p) - I(\pi_s)$ is likely substantial for clean officials.

Hypothesis 2. *After the anti-corruption campaign, in cities with dirty officials, the SOE share of residential land parcel sales will increase, but the magnitude of the increase may be small; importantly, the impact of the anti-corruption campaign on the efficiency of the land parcel assignment is ambiguous.*

The first part of the hypothesis follows from the fact that the dirty officials' reputation score π prior to the anti-corruption campaign could be close to 1; it is clear from Eqs. (6) and (7) that if π is close to 1, both π_p and π_s are close to 1 as well. In other words, a dirty officials' reputation is so bad that it may no longer be salvageable. This will imply that $I(\pi_p) - I(\pi_s)$ is close to zero. For the second part of the hypothesis, we compare Eq. (10) with the second term of Eq. (5) and see that a dirty official may be less inclined to award the land parcel to a corrupt but inefficient POE developer after the anti-corruption campaign, which could result in efficiency improvement. This serves as a countervailing force for the efficiency loss when comparing Eq. (9) with the first term of Eq. (5). Therefore, the overall efficiency effect of the anti-corruption campaign in cities with dirty officials is ambiguous.

Hypothesis 3. *In provinces with higher corruption stereotypes against POEs, i.e., with a higher μ, the city officials are more likely to increase the SOE share after the anti-corruption campaign, ceteris paribus. Moreover, the effect of higher corruption stereotypes is larger for clean officials than for dirty officials.*

This first claim of the hypothesis follows from the following fact: if there is a higher corrupt stereotype against POEs, i.e., a higher μ, Eqs. (4) and (5) imply that p_c/p_d is smaller. This would imply that $I(\pi_p) - I(\pi_s)$ will be higher, i.e., awarding the land parcel to the POE developer will carry higher reputation costs, which will then induce the city officials to favor SOEs more. The second claim follows from the same logic

as that of Hypothesis 2, because it is difficult to salvage dirty officials' reputation since their reputation score π prior to the anti-corruption campaign could be close to 1.

Hypothesis 4. *Everything else equal, the increase of SOE share after the anti-corruption campaign is higher in cities where their leaders have higher ex-ante promotion probability.*

This hypothesis follows from the fact that a higher *ex-ante* promotion probability implies a higher *H*, which proxies the lost opportunity to get promoted if the city officials fall prey to the anti-corruption campaign. This would lead them to favor SOEs more.

6. Effects of Corruption Stereotype: Empirical Evidence

In this section, we aim to test the hypotheses developed in Section 5. We focus on testing three major predictions. First, the anti-corruption campaign will have a larger positive effect on the rise of the SOEs in the residential land market if incumbent city leaders have stronger career concerns (**Hypothesis 4**). Second, the anti-corruption will have a larger positive effect on the rise of the 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 (**Hypothesis 3**). Third, the anti-corruption campaign will lead to less efficient housing development in cities with clean officials, while the effect of the campaign on the housing development efficiency in cities with dirty officials is ambiguous (**Hypotheses 1 and 2**).

6.1 Career incentives and the rise of SOEs

We follow Wang, Zhang, and Zhou (2020) to construct a measure of *ex-ante* career incentives for China's city officials. The idea of this variable construction is to exploit the personal characteristics of city leaders at the year when they began their current term 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 for a city leader.

For this purpose, we firstly exploit the data covering all the incumbent city leaders between January 2000 and November 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 1 if the city leader got promoted after the current position, and 0 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 in Table A.6, we predict the *ex-ante* promotion probability for each incumbent city leader between January 2008 and December 2017. We then define two dummies, *High_ccp* equals 1 if the predicted promotion probability of the party chief is above 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.[20] The results show that for party chiefs, the impact of the anti-corruption campaign on SOE's share in the residential market 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 3.0 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.

[Table 5 About Here]

We also use another measure, namely 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 1 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 Hypothesis 4 outlined in Section 5, 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 the SOEs in the residential land market. In other words, the evidence suggests that the resurgence of the 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 January 1, 2000, and December 4, 2012 (described in Section 3) to construct a provincial-level measure of corruption stereotype (i.e., μ) against POE developers before the anti-corruption campaign. More specifically, we define a variable of corruption stereotype, denoted as *Stereotype*, as the provincial-level cumulative 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 between January 1, 2008, and December 4, 2012.[21] We use the provincial-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,

[20] If we replace the dummy 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, which are available upon request.

[21] 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 between January 1, 2008 and December 4, 2012. These results are available upon request.

city-level leaders are evaluated, appointed, and monitored/investigated by provincial governments, and therefore regional bureaucratic culture and characteristics of government-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 Hypothesis 3 in Section 5: 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) more 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 stereotype, even a clean city leader will be scared by the anti-corruption campaign and more likely to 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 caught for corruption charges, either on the postition or after they left the office, during the campaign up till December 2020. How to define "clean" city officials is more challenging because, even if a city official remains "clean" until the end of our sample period, we as outside observers can never say he/she is truly "clean." In what follows, we define "*clean*" city officials as city party chiefs or mayors who had not been prosecuted on corruption charges before the end of 2020; however, we should recognize that this group of so-called "clean" city officials, as we defined, would almost certainly still include potentially "dirty" city officials (despite the fact they had not yet been prosecuted). Nonetheless, it is plausible that the group as a whole is likely to include at least some inherently clean officials and thus should be cleaner 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; and indeed, this will affect the interpretation of some of the results below.

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 the mayor was a "dirty" official according to our aforementioned definition; and the subsample of "clean" officials include 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 the SOEs after the campaign shown in

column (5) is actually driven by cities with "clean" city leaders, and that the impact of stereotypes on the SOE shares in cities with "dirty" city leaders is statistically insignificant. This result, which is consistent with our Hypothesis 3 in Section 5, clearly indicates that clean city officials are more inclined to award 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 starts: inherently clean city officials may strategically choose to award residential land to SOEs even if POEs are more efficient bidders. To test this prediction, we collected a sample of residential land parcel – housing complex matched data from the 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 developed on the parcels. With the help of CREIS, we managed to get access to all the 1,747 such parcels between January 2008 and December 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:

$$OUTCOME_{ijt} = \beta_1 * CLEAN_{ij} * POST_t + \beta_2 * CLEAN_{ij} + \beta_3 * POST_t + X_i + \alpha_j + \delta_t + \varepsilon_{ijt} \qquad (11)$$

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

We adopt two outcome 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 *ResalePrice_Ratio*, which equals the ratio of the resale prices of the same set of apartments against the land price per floor area. The first measure represents the duration of housing project completion, and the second measure captures the market's reflection of the inherent housing quality of the apartments, as it is plausible to assume that the price ratios of second-hand apartments are solely determined by market demand and supply and are free of government controls, and the effect of location can be perfectly controlled by land transaction prices.

To examine the effect of the anti-corruption campaign on housing development efficiency for "clean" cities, we introduce the interaction term *CLEAN *POST*. Table 6 shows that the coefficient estimate for the interaction term is significantly positive at 10% level in column (1) when the outcome is *LAG*, and significantly negative, also at 10% level, in column (2) when the outcome is *ResalePrice_Ratio*. Specifically, column (1) shows that, compared with developers in cities with "dirty" officials, developers from cities with "clean" officials experience a 29.0% (= exp(0.255)-1) increase in the time interval between land purchasing and project opening after the start of the anti-corruption campaign. It is also interesting to note that the coefficient estimate for the *POST* dummy, which captures the efficiency effect of the campaign for cities with "dirty" officials, is negative but not statistically significant. Both are consistent with our Hypotheses 1 and 2. Column (2) shows that the ratio of the secondary market price of the apartments relative to the land price is 1.7 percentage points lower in cities with "clean" officials than those with "dirty" officials after the anti-corruption campaign, which indicates that the anti-corruption campaign lowered the housing quality of dwelling units developed in cities with "clean" officials, consistent with Hypothesis 1. The finding in column (2) also ensures that the longer lag found in column (1) was not due to the higher housing quality of the apartments developed.

[Table 6 About Here]

7. Conclusion

In this paper, we advance a novel hypothesis that China's recent anti-corruption campaign may have contributed to the recent resurgence of the state-owned enterprises (SOEs) in China as an unintended consequence. We explore the nexus between the anti-corruption campaign and the SOE resurgence by presenting supporting evidence from the Chinese real estate sector, which is notorious for pervasive rent-seeking and corruption.

Using a unique data set 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 theoretical model to show that under the anti-corruption campaign, local officials are more reluctant to sell selling land to private developers because selling land to private developers carries the stereotype that the city official may have received bribes. Interestingly, even (or more accurately, particularly) the "clean" local officials will become more willing to award land to SOEs despite the presence of more efficient competing private developers. 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 the 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 housing quality), especially for cities with "clean" city officials. This analysis highlights the rise of the SOEs in the largest sector of China as an unintended consequence of the anti-corruption campaign. Our study thus contributes to our understanding of the resurgence of the SOEs in the Chinese economy.

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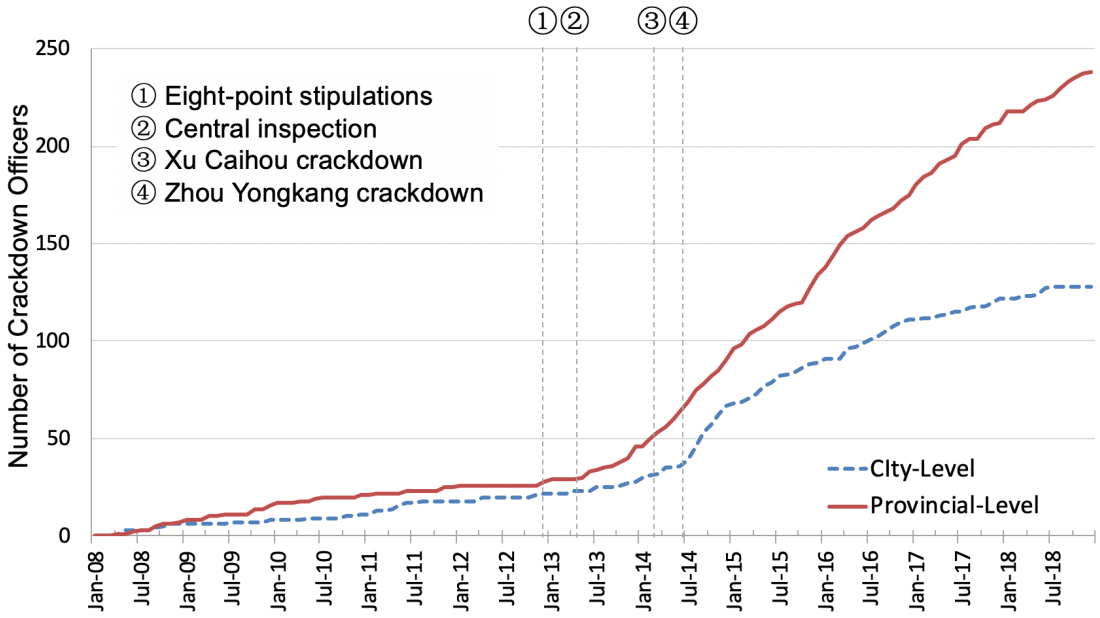
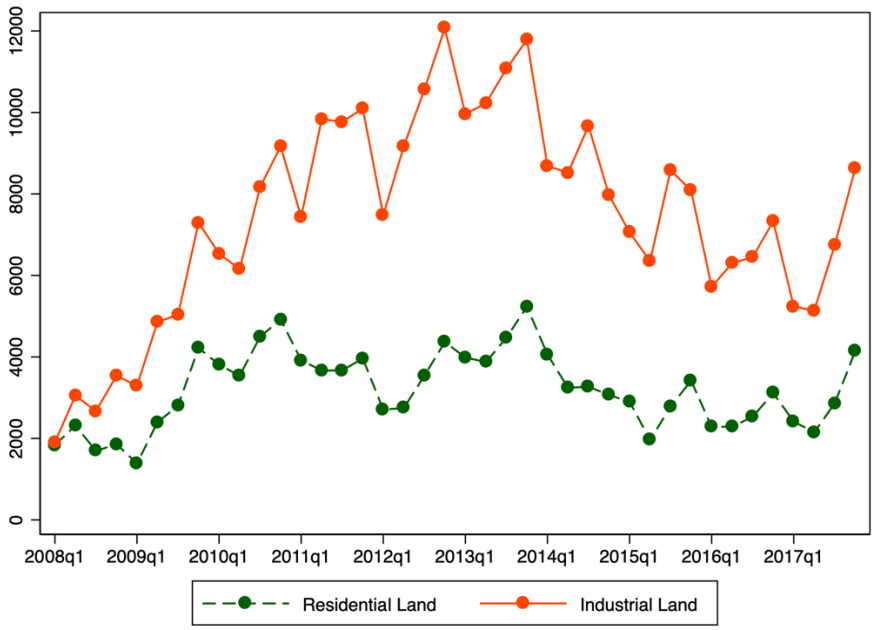
Figure 1: China's Anti-Corruption Campaign

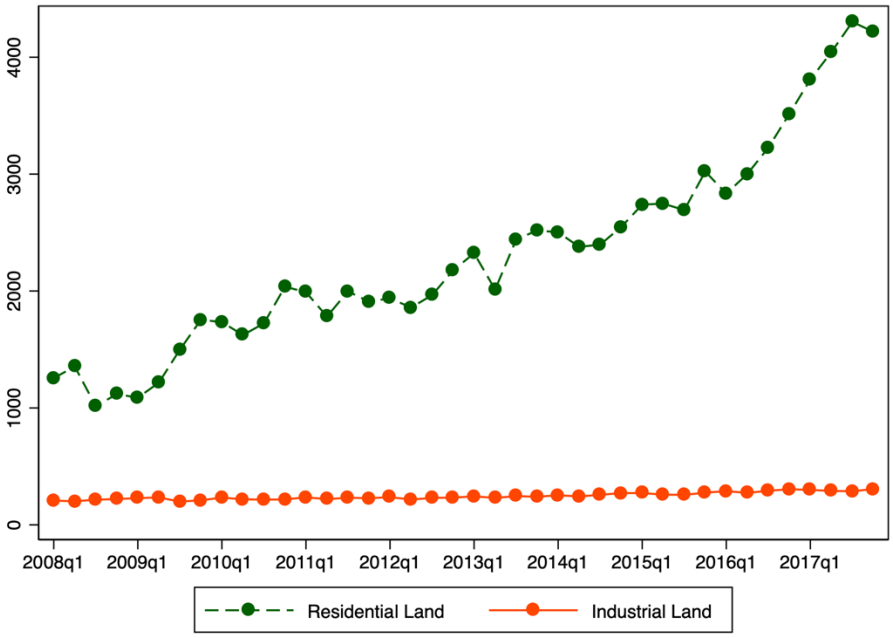


Note: The figure shows the monthly number of official crackdowns from January 2008 to December 2018. The blue dashed line and the red solid line plot the city-level chiefs and provincial-level chiefs, respectively. The vertical lines denote the four landmark events in the campaign, namely, the announcement of the Eight-Point Stipulations, the announcement of central inspections, the crackdown of Xu Caihou, and the crackdown of Zhou Yongkang.

Figure 2: Land Parcels Sold During the Sample Period



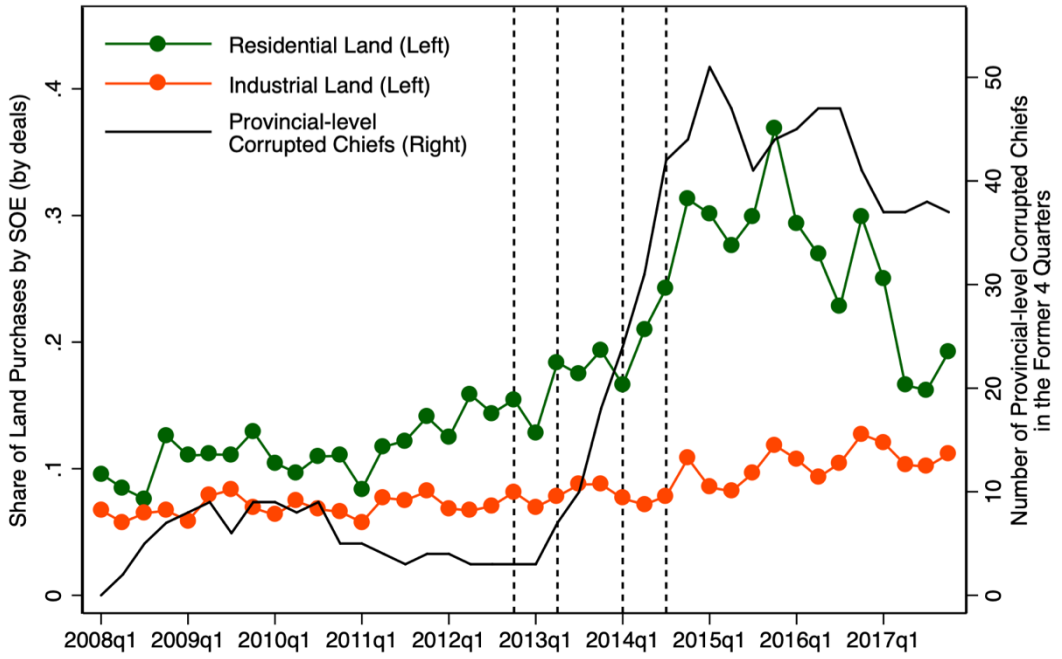
Panel A: Quarterly number of land parcels sold during the sample period



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

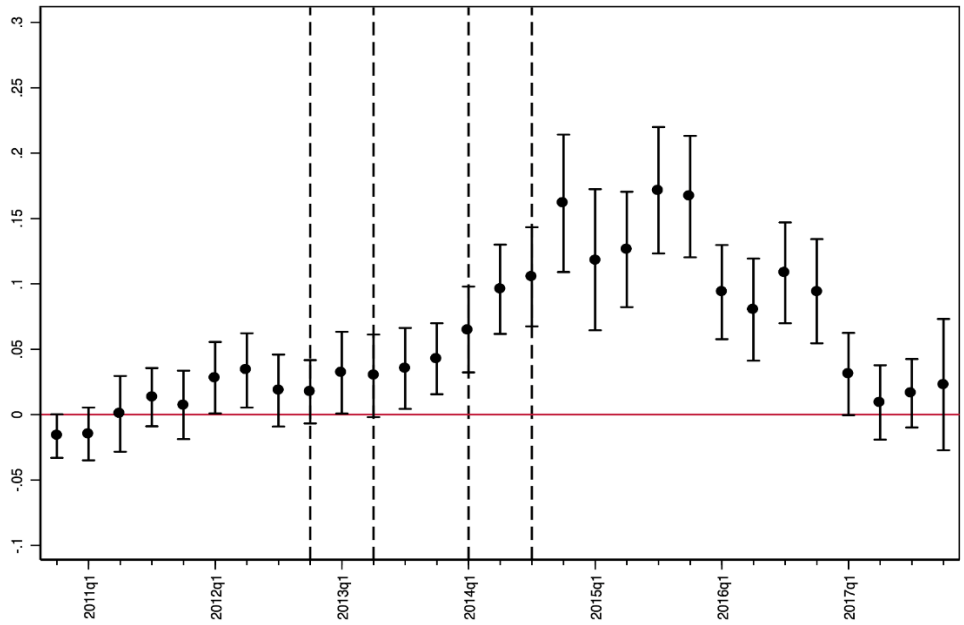
Note: The figure shows the quarterly number and the average price of transactions by land usages from 2008Q1 to 2017Q4. The green dashed line and the red solid line plot the residential land and industrial land, respectively.

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



Note: The figure shows the quarterly share of land purchases by SOEs from 2008Q1 to 2017Q4. The green dashed line and the red solid line plot the residential land and industrial land, respectively. The solid black line plots the cumulative number of provincial-level official crackdowns in the previous four quarters. The vertical lines denote the four landmark events in the campaign, namely, the announcement of the Eight-Point Stipulations, the announcement of central inspections, the crackdown of Xu Caihou, and the crackdown of Zhou Yongkang.

Figure 4: Parallel Trend Test



Note: The figure visualizes the coefficients estimated with the 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 vertical lines denote the four landmark events in the campaign, namely, the announcement of the Eight-Point Stipulations, the announcement of central inspections, the crackdown of Xu Caihou, and the crackdown of Zhou Yongkang.

Table 1: Descriptions of City-level Corrupt Leaders

A. Breakdown of the 180 Corrupt City Leaders

Categories		Number
Engaged in at least one bribery case	Bribery case related to real estate	107 (64.5%)
	Bribery case unrelated to real estate	38 (22.9%)
	Unable to identify	21 (12.6%)
	Sub-total	166 (100.0%)
Not engaged in any bribery cases		14
Total corrupt city leaders		180

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

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 briber characteristics

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		
Variables	Explanation	Obs.	Mean	S.D.	Obs.	Mean	S.D.
SOE	Whether the buyer is an SOE firm (in %)	127,904	17.69	38.16	297,609	8.379	27.71
LISTED	Whether the buyer is a listed firm (in %)	114,016	7.480	26.31	258,631	3.279	17.81
LOCAL	Whether the buyer is a local firm (in %)	103,084	79.22	40.58	229,903	87.02	33.61
HISTORY	Length since the establishment of the buyer firm (in years)	104,989	595.3	2,241	246,919	412.9	2,023
FAR	Floor area ratio of the parcel	105,726	18.89	99.31	251,457	8.473	45.69
AREA	Floor area of the parcel (in 10 thousand sq.m.)	127,327	2.552	1.123	295,792	1.142	0.555
Stereotype	Severity of real-estate-related bribery by POEs (see the text for more details)	127,904	0.110	0.115	297,609	0.144	0.140
High_ccp	Dummy for CCP chiefs with higher promotion probability	108,163	0.484	0.500	246,478	0.508	0.500
High_mayor	Dummy for mayors with higher promotion probability	107,907	0.466	0.499	247,275	0.480	0.500
Retire_ccp	Dummy for CCP chiefs aged at or over 55	108,418	0.433	0.495	247,800	0.428	0.495
Retire_mayor	Dummy for mayors aged at or over 55	108,081	0.211	0.408	247,066	0.206	0.404

Note: This table shows the summary statistics of land buyers, land parcels, and city chiefs by land usage in the sample period from 2008Q1 to 2017Q4.

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

Variables	(1) *SOE*	(2) *SOE*	(3) *SOE*
*POST * TREAT*	0.0721***	0.0734***	0.0734***
	(0.00575)	(0.00604)	(0.00604)
POST	-0.0148	-0.0126	-0.0127
	(0.00971)	(0.00920)	(0.00920)
TREAT	0.0656***	0.0634***	0.0634***
	(0.00406)	(0.00403)	(0.00404)
Observations	406,866	399,990	399,990
R-squared	0.088	0.109	0.109
Land Parcel Attributes	YES	YES	YES
City FE	YES	NO	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 SOEs' land purchase. The sample includes all residential and industrial land parcels sold via public biddings or auctions in 287 cities between January 2008 and December 2017. The dependent variable *SOE* equals 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 1 for land parcels sold after December 4, 2012, and 0 otherwise. In column (1), we control for land parcels' hedonic attributes, city fixed effects, and year by quarter fixed effects. In column (2), we replace the city fixed effects with the city-level chief fixed effects by person. In column (3), we use the chief fixed effects 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. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 0.01 level.

Table 4: Addressing Alternative Explanations

Variables	(1) *New Debt*	(2) *Debt Cost*	(3) *SOE*	(4) *SOE*
*RE * POST*	0.0161***	0.0198***		
	(0.00430)	(0.00301)		
*RE * POST * SOE*	-0.0128**	-0.0160***		
	(0.00573)	(0.00443)		
*POST * TREAT*			0.0515***	0.0658***
			(0.00915)	(0.00978)
*POST * TREAT * Prior HPG*			0.0142***	
			(0.00365)	
*POST * TREAT * Subsequent HPG*				0.0171***
				(0.00400)
TREAT			-0.0223*	-0.0299**
			(0.0128)	(0.0128)
POST			0.102***	0.0809***
			(0.00913)	(0.00858)
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	0.102	0.101
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: This table addresses two alternative explanations for the rising SOE share in the residential land transactions. 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 of debt financial cost over 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 at the beginning of the quarter, return on equity in the quarter, and logged total assets at the beginning of the quarter, respectively. Columns (3) and (4) include all residential and industrial land parcels sold via public biddings or auctions in 287 cities between January 2008 and December 2017. The dependent variable *SOE* equals 1 if the buyer is an SOE firm, and 0 otherwise. The independent variables, *Prior HPG* and *Subsequent HPG*, represent the cumulative house price growth in the city during the 12 months prior and subsequent to the land transaction, respectively. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 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*	0.0303**						
	(0.0144)						
*POST * TREAT * High_may*		0.0240					
		(0.0148)					
*POST * TREAT * Retire_ccp*			-0.0330**				
			(0.0146)				
*POST * TREAT * Retire_may*				-0.0547***			
				(0.0162)			
*POST * TREAT * Stereotype*					0.166***	0.0932	0.181**
					(0.0480)	(0.0824)	(0.0719)
*POST * TREAT*	0.0707***	0.0790***	0.0992***	0.100***	0.0544***	0.0527***	0.0624***
	(0.0106)	(0.00845)	(0.00901)	(0.00818)	(0.00836)	(0.0120)	(0.0127)
POST	-0.0206**	-0.0230**	-0.0204**	-0.0182*	-0.0181*	-0.0276*	-0.0176
	(0.0101)	(0.00983)	(0.0100)	(0.00981)	(0.0102)	(0.0148)	(0.0130)
TREAT	0.0535***	0.0430***	0.0388***	0.0452***	0.0676***	0.0512***	0.0744***
	(0.00506)	(0.00467)	(0.00405)	(0.00358)	(0.00524)	(0.00967)	(0.00621)
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 corruption stereotypes on the rising SOE share in the residential land transactions. The sample includes all residential and industrial land parcels sold via public biddings or auctions in 287 cities between January 2008 and December 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. In columns (1) and (2), *High_ccp* and *High_may* refer to whether the probability of promotion for the city's CCP chief or the mayor is above the median, respectively. The prediction model of the probability of promotion is reported in Table A.6. In columns (3) and (4), *Retire_ccp* and *Retire_may* refer to whether the city's CCP chief or the mayor is aged at or over 55, respectively. In column (5), *Stereotype* refers to the provincial number of real-estate related cases involving bribe-paying POEs or individuals on behalf of POEs, normalized by the total number of POEs who bought at least one residential land parcel from January 1, 2008, to December 4, 2012. In columns (6) and (7), we rerun the same regressions as in column (5) on subsamples for dirty chiefs (i.e., at least one of the city chiefs were caught for corruption charges, either on the post or after they left the office, during the campaign up till Dec 2020) and clean chiefs (i.e., both the CCP chief and the mayor had not been prosecuted on corruption charges till Dec 2020), respectively. We also control for 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. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 0.01 level.

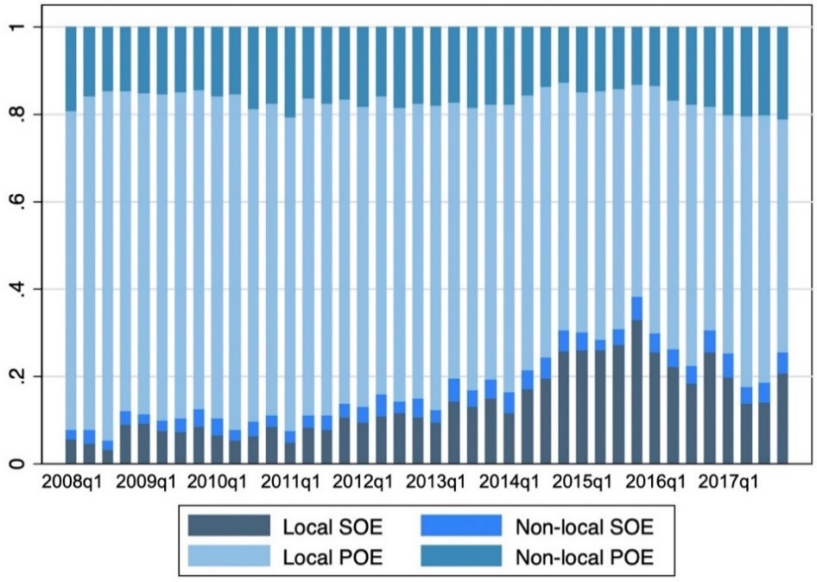
Table 6: Effect on Housing Development Efficiency

	(1)	(2)
Variables	ln(*LAG*)	*ResalePrice_Ratio*
*POST * CLEAN*	0.255*	-1.696*
	(0.133)	(0.723)
CLEAN	-0.347***	0.788
	(0.0799)	(1.387)
POST	-0.0528	2.413
	(0.342)	(1.605)
Observations	1,743	1,382
R-squared	0.218	0.491
City FE	YES	YES
Year by Quarter FE	YES	YES
Land Parcel Attributes	YES	YES

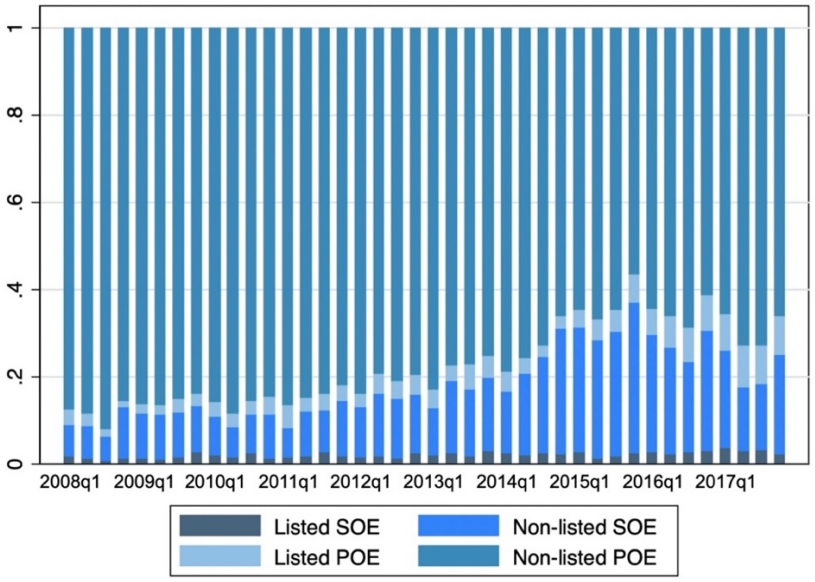
Note: This table reports the results of the difference-in-differences model on the housing development efficiency. The sample includes residential land parcel – housing complex matched data from the China Real Estate Index System (CREIS) in eight major cities (Wuhan, Chongqing, Xi'an, Kunming, Zhengzhou, Beijing, Shanghai, and Jinan) between January 2008 and December 2017. The dependent variable *LAG* in column (1) equals the number of days between land transactions and public sales of the housing project. The dependent variable *ResalePrice_Ratio* in column (2) equals the ratio of the resale prices of the same set of apartments against the land price per floor area. *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. *CLEAN* equals 1 if the city leaders when the land parcel was sold had not been prosecuted on corruption charges until the end of 2020. In both regressions, we control for land parcels' hedonic attributes (including land area, floor area ratio, land location grade dummies, and transaction type dummies), city fixed effects, and year-by-quarter fixed effects. Robust standard errors clustered at the city level are used in all the regressions. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 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 breakdown of residential land buyers by the ownership types and listing status from 2008Q1 to 2017Q4. In Panel A, the bars from the bottom up represent local SOE, non-local SOE, local POE, and non-local POE in turn. In Panel B, the bars from the bottom up represent listed SOE, non-listed SOE, listed POE, and non-listed POE in turn.

Table A.1: Summary Statistics of the Firm-quarterly Panel Data

Variables	Explanation	Obs.	Mean	S.D.
New Debt	Net increase of debts, normalized by the total asset at the beginning of the quarter	89,238	0.14	0.15
Debt Cost	Ratio between the debt financial cost and the average debt in the quarter	37,414	0.051	0.061
RE	Whether the firm is in the real estate industry	141,280	0.038	0.19
LEV	Leverage ratio (beginning of each quarter; in %)	100,114	44.40	22.39
ROE	Return on equity (current quarter; in %)	103,657	6.53	10.16
ASSET	Total asset (beginning of each quarter; in logs)	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.2: Effect of the Anti-Corruption Campaign on SOEs' Land Purchase: Heterogeneity Analysis

	(1)	(2)	(3)	(4)	(5)
	All Transactions			English Auctions	Two-Stage Auctions
Variables	*Central SOE*	*Local SOE*	*SOE*	*SOE*	*SOE*
TREAT * *POST*	0.00172	0.0811***	0.0587***	0.0695***	0.0678***
	(0.00148)	(0.00558)	(0.00545)	(0.00701)	(0.0175)
TREAT * *POST* * ln(*AREA*)			0.0219***		
			(0.00323)		
POST	0.00436	-0.0221**	-0.0186*	-0.0105	-0.0613**
	(0.00470)	(0.00874)	(0.00981)	(0.00962)	(0.0259)
TREAT	0.00412***	0.0791***	0.0660***	0.0680***	0.00599
	(0.00136)	(0.00400)	(0.00385)	(0.00445)	(0.0118)
Observations	406,866	406,866	406,866	363,758	39,892
R-squared	0.021	0.094	0.089	0.170	0.368
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 SOEs' land purchase. Columns (1), (2) and (3) include all residential and industrial land parcels sold via public biddings or auctions in 287 cities between January 2008 and December 2017. Columns (1) and (2) use the dummy for central SOEs and local SOEs as the outcome variables, respectively. Column (3) introduces an interaction of the DID term with the logged land area. Columns (4) and (5) include land parcels sold by English auctions and by two-stage auctions, 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. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 0.01 level.

Table A.3: Effect of the Anti-Corruption Campaign on SOEs' Land Purchase: More Detailed Ownership Types for 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 show the effect of the anti-corruption campaign on land buyers with more detailed ownership types. 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 that is ultimately state-owned, or by more than one firm which is all ultimately state-owned. *PurePOE* is defined similarly as *PureSOE*. *Mix* equals 1 if the buyer is founded by more than one firm with different types of ownership. We further divide *Mix* into three types. *MixSOE* equals 1 if the buyer is founded by more than one firm with different types of ownership and the biggest shareholder is ultimately state-owned. *MixPOE* is defined similarly as *MixSOE*. *MixUnclear* indicates that land buyers have different types of ownership, but the leading firm is unclear. Panel A shows the summary statistical 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 biddings or auctions in 287 cities between January 2008 and December 2017. *RESIDENTIAL* 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. In all regressions, we control for land parcels' hedonic attributes, city fixed effects, and year-by-quarter fixed effects. We also calculate the magnitude of the effect by dividing the coefficients of DID term by the mean value of dependent variables for residential land sold between January 2008 and December 4, 2012. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 0.01 level.

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

	(1)	(2)	(3)	(4)	(5)
Variables	*SOE*	*SOE*	*SOE*	*SOE*	*SOE*
*POST * TREAT*	0.0836***	0.0585***	0.0745***	0.0670***	0.0586***
	(0.00692)	(0.00558)	(0.00528)	(0.00474)	(0.00503)
POST	-0.0208**	-0.0117	-0.0187*	-0.0255***	-0.00572
	(0.0103)	(0.00949)	(0.00973)	(0.00978)	(0.00929)
TREAT	0.0562***	0.0279***	0.0824***	0.110***	0.0514***
	(0.00441)	(0.00427)	(0.00515)	(0.00514)	(0.00360)
Observations	311,095	406,793	465,115	549,581	396,746
R-squared	0.229	0.090	0.095	0.105	0.068
Land Parcel Attributes	YES	YES	YES	YES	YES
Buyer Attributes	YES	NO	NO	NO	NO
Land Price	NO	YES	NO	NO	NO
Including Quasi-Public Lands	NO	NO	YES	NO	NO
Including Commercial Lands	NO	NO	NO	YES	NO
Including LGFVs	YES	YES	YES	YES	NO
City FE	YES	YES	YES	YES	YES
Year by quarter FE	YES	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 biddings or auctions in 287 cities between January 2008 and December 2017. In column (3), we also include public housing and quasi-public housing lands in the treatment group. In column (4), we also include commercial lands in the control group. In column (5), we exclude the land parcels purchased by Local Government Financing Vehicles (LGFVs). In all regressions, we control for land parcels' hedonic attributes, city fixed effect, and year-by-quarter fixed effects. In column (1), we further control for buyers' non-ownership attributes, including listed status, whether it is a local firm, and the length since the establishment of the firm. In column (2), we further control for logged land prices. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 0.01 level.

Table A.5: Effect of the Intensity of Anti-Corruption Campaign

Variables	(1) *SOE*	(2) *SOE*	(3) *SOE*
*TREAT * POST_Eight-point stipulations*	-0.0674		
	(0.0729)		
*TREAT * POST_Central inspection*	0.0345***		
	(0.00985)		
*TREAT * POST_Xu Caihou's fall*	0.0783***		
	(0.0163)		
*TREAT * POST_Zhou Yongkang's fall*	0.0974***		
	(0.00751)		
*TREAT * POST * During_INSPECT*		0.00796	
		(0.0215)	
*TREAT * POST * After_INSPECT*		0.0537***	
		(0.0102)	
*TREAT * POST * CRACKDOWN_PROV*			0.0167***
			(0.00512)
*TREAT * POST*		0.0371***	0.0608***
		(0.00858)	(0.00628)
During_INSPECT		8.97e-05	
		(0.00838)	
After_INSPECT		-0.0168**	
		(0.00696)	
CRACKDOWN_PROV			-0.00823***
			(0.00181)
POST	0.0213	-0.00514	-0.0116
	(0.0223)	(0.00973)	(0.00969)
TREAT	0.0647***	0.0650***	0.0655***
	(0.00407)	(0.00407)	(0.00406)
Observations	406,866	406,866	406,866
R-squared	0.089	0.089	0.089
Land Parcel Attributes	YES	YES	YES
City FE	YES	YES	YES
Year by Quarter FE	YES	YES	YES

Note: Column (1) reports the effects of different sub-periods of the anti-corruption campaign (see Figure 1 for the sub-periods). Column (2) reports the effects of central inspections on provinces. *During_INSPECT* (respectively, *After_INSPECT)* equals 1 for the period during which the province was under (and respectively, after) the central inspection, respectively. Column (3) reports the effects of crackdowns of provincial-level officials. *CRACKDOWN_PROV* refers to the cumulative number of provincial-level officials accused of corruption during the previous four quarters. Robust standard errors clustered at the city by year-quarter level are used in all the regressions. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 0.01 level.

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

Note: This table shows the prediction model of the probability of promotion for all city chiefs by terms between January 2000 and November 2012. The terms which ended unnaturally (i.e., dead or prosecuted) 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 was promoted after the current term. We also control for the dummies of out-service education level and city fixed effect in both regressions. Robust errors are adopted. *, ** and *** respectively indicates significance at the 0.1, 0.05 and 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 had been prosecuted on corruption charges until the end of 2020	0.700	0.458	0	1
LAG	Number of days between land transaction and public sales of the housing project	902.4	602.1	99	3,050
ResalePrice_Ratio	Ratio of the resale prices of the same set of apartments against 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 January 2008 and December 2017 in eight major cities (Beijing, Chongqing, Kunming, Jinan, Shanghai, Wuhan, Xi'an, and Zhengzhou).