Political Connections and Credit Allocations: Evidence from China's State-owned Enterprises in Land Market

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Abstract

This study examines the underlying mechanisms that drive the price premiums State-owned Enterprises (SOEs) pay at land auctions using a comprehensive and representative dataset of 316,320 transactions of land use rights from 2000 to 2016 in approximately 2,300 counties of urban China. We find that the SOEs paid 9.65% more than their Private-owned Enterprises (POEs) counterparts for comparable land parcels at auctions, and the land quality can largely explain the price premiums SOEs pay. In addition, SOEs' soft budget constraint enables them to overbid for the lands they desire, and SOEs even bid higher prices for land after the Economic Stimulas program. Lastly, we show that SOEs' monetary wealth and political connections crowd out POEs in areas with quality land.

Keywords: Land Value, Political Connection, Auctions, Economic Stimulus Program, Crowd Out Effect, Land Market in China

JEL Code: R14, P26, E50, C1, D22

1 Introduction

The competition between state-owned enterprises (SOEs) and private-owned enterprises (POEs) has been a longtime focus of economists and governments. Traditionally, SOEs have been considered as cash-rich giants or dominant players in the strategic industries, such as banking, electricity, gas, water supply, natural sources extraction, telecommunications, and aircraft, especially in the transition countries[1] (La Porta et al., 2002; Holz, 2011; Whittington, 2012; Ru, 2018). Today, SOEs continue to play a significant role in shaping the world economy, contributing around 10% of global GDP (Bruton et al., 2015). According to reports provided by Bank (2014) and OECD (2016), SOEs, even in advanced economies, account for 20% to 30% of economic activity, and this figure can be significantly higher in emerging or resource-dependent countries. Compared to POEs, SOEs possess overwhelming advantages of money wealth, also referred to as soft budget constraints, and political connections in different economic activities. Bai and Wang (1998), Lin et al. (1998), and Cull and Xu (2003) document that SOEs are more likely to have soft budget constraints, politically-oriented state funding, and bankruptcy protection. Other academic research shows that SOEs are granted preferential treatment and access to private information because of their political connections with the local government (Shleifer and Vishny, 1994; Dinç, 2005; Ru, 2018). Given SOEs' money wealth and political connections, it is worthwhile to examine how and why SOEs behave differently from POEs in a non-strategic industry and to understand the economic consequences of their behaviors.

Using a representative and comprehensive data set of land transactions from 2000 to 2016 in approximately 2,300 counties in China and the official registered details of the Chinese companies, we study whether money wealth and political connections prompt SOEs behave differently from POEs in pricing land parcels at auctions, as well as examine the economic consequences of SOEs' behaviors. The reason for using China's land market as a testing ground is fourfold. First, around the globe, China has the highest number of SOEs among its top firms (as shown in Figure B1 in the Appendix). The SOEs in China are considered as cash-rich giants that are free of financial constraints in investment and acquisition because of their access to government-controlled bank funding and their connections with government officials (Peng and Luo, 2000; Allen et al., 2005; Bai et al., 2006; Li et al., 2008; Ayyagari et al., 2010; Deng et al., 2015; Wu et al., 2015). In contrast, POEs, including both private firms and individuals, are highly likely to face financial constraints and a much less favorable political environment (Li et al., 2008; Wu et al., 2015). Second, China's role in the world

[1]The Economist (2012) provides examples of well-known SOEs in a monopolized industry, such as Russia's Gazprom, the world's largest natural gas company, and China Mobile, the world's largest mobile phone operator. Whittington (2012) shows that SOEs represent 80%, 62%, and 38% of the stock market capitalization in China, Russia, and Brazil, respectively.

economy has been increasingly enhanced with the development of international politics in recent years, especially since the global financial crisis in 2007. Third, the boom in China's housing and urban land markets brings significant changes to China's economy[2] (as shown in Figure B2 in Appendix) and has attracted the attention of world economists. Fourth, the availability of land transaction data and the implementation of the economic stimulus policy enable us to perform various tests to provide empirical evidence to support our hypothesis.

In this paper, we show that, among firm bidders (individuals excluded), SOEs pay 9.6% (in the matched sample) to 11.9% (in the full sample) more than do POEs for observably comparable land parcels at auctions. The price premium is even larger for the wholly state-owned enterprises (WSOEs), which are regarded as the most advantageous SOEs. We propose two possible explanations for the price premium paid by SOEs. First, SOEs' soft budget constraint or monetary wealth enables them to overbid for the land they desire. Second, politically connected SOEs' have an information advantage to acquire superior land parcels.

To test the first explanation, we exploit a difference-in-differences (DID) analysis to investigate whether the injected capital from the Stimulus Program[3] increases the price premiums SOEs pay at land auctions after 2008. SOEs were designated to distribute the program funding to various areas to restore and promote economic growth in the country. Therefore, companies that receive the program funding (SOEs) are considered as the treatment group, and companies that do not receive the program funding (POEs) are considered as the control group. The logic for performing the DID test is that if the Economic Stimulus Program exacerbates the flow of credit into already cash-flush SOEs, which have few or no credit constraints (Fang et al., 2014), then SOEs are able to compete for land parcels without consideration of land prices. This would lead to an increase in the price premiums paid by SOEs.

The DID estimations show that the Economic Stimulus Program increases the price premium SOEs pay in land acquisitions by 5.67%. This is consistent with the study by (Deng et al., 2015), which shows that SOEs expanded their real estate investment immediately after the announcement of the Economic Stimulus Program. Moreover, we find that the Economic Stimulus Program has no effect on other types of POEs, which reinforces our argument that

[2]Wu et al. (2012), Deng et al. (2015), and Wu et al. (2016) provide detailed figures on the contribution of housing and land markets to China's GDP. Specifically, the gross capital constitutes over 90% of China's GDP growth. Investment in the private housing sector contributed 15.1% and 13.2% to China's total investment in 2008 and 2009, respectively. The affiliated construction industry constitutes 5.7% of China's GDP, 14.3% of employment in urban areas, and 40% of the consumption of steel and lumber. The real estate sector comprised 6.0% of China's output in 2014.

[3]The explosive growth in housing prices and land prices began to emerge in 2009, coinciding with the implementation of the 4 Trillion Yuan (equivalent to US$586 billion) Stimulus Program in November 2008. In particular, SOEs were designated to distribute the 4 trillion yuan to various areas to restore and promote economic growth in the country.

SOEs' money wealth leads to the price premium. The result also suggests that the Economic Stimulus Program inflames the land market and exacerbates market distortions, infringing upon the intended goal of improving industry structure and people's livelihoods.

To quantify the expansionary effect of the fiscal stimulus, we also examine the dynamic change of the price premiums during the eight-quarter (or two-year) post-announcement period. The results show that the price premiums paid by SOEs emerged two quarters after the announcement of the Economic Stimulus Program and increased gradually to its peak in 2010q2. After 2010q2, the price premium begins to decrease. This is consistent with the design of the Economic Stimulus Program, which was intended to distribute the funds within two years.

To test the second explanation that the land parcels purchased by SOEs are superior, we employ the reserve price of land parcels for the identification. According to a document provided by the Ministry of Land and Resources of the People's Republic of China, the local government authorizes a qualified and independent appraiser to evaluate land parcels and set an appropriate appraisal price based on the proposed land use, average market price, demand and supply conditions, location. Together with the consideration of residential and industrial policy, regulations of land price, macroscopic adjustment, and potential development in the area, the local government then announces the reserve price of a parcel. Therefore, the reserve price contains both public and private information, and reflects the minimum market value of the land, which is barely captured by the observable characteristics of the land. While public information is freely available, as are the observable characteristics of the land parcels, private information, such as the potential plans for urban development and investment, is only available to certain departments in the government. Private information is typically withheld until an explicit date. However, bidders who have connections with the local government have an information advantage.

More specifically, the inclusion of the reserve price explains away the price premium SOEs pay at land auctions, providing evidence that SOEs bid up land prices to acquire quality land parcels. In a two-step regression analysis, we first purge any effects of the observable characteristics on the reserve price and then include the residuals derived from the first step into the main specifications. The results appear to be robust. This confirms our conjecture that the unobservable characteristics of land parcels contribute to the price premiums SOEs pay at land auctions. We also provide empirical evidence to show that both explanations can explain the price premiums paid by SOEs.

Furthermore, to examine whether the land parcels acquired by SOEs are better than those acquired by POEs, we combine another data set and test this hypothesis. We collect the basic information of 157,489 projects in 126 cities from the China Real Estate Index System. If the lands acquired by SOEs are more promising, then so are the projects (such

as residential buildings) around the land parcels acquired by SOEs. That is, the sales prices or the price growth of the projects near the land parcels acquired by SOEs should be higher than that of the land parcels acquired by POEs. To test this, we compute the distance of a land parcel to each project in the data set and keep the projects within the 1/2/3-kilometer radius circle of the land parcels. The regression results show that the sales prices of the projects around the land parcels acquired by SOEs are approximately 1.5% higher, on average, than the sales prices around the land parcels acquired by POEs, which support our argument that land parcels acquired by SOEs are better than those acquired by POEs.

Lastly, to investigate whether SOEs' monetary wealth and political connections crowd out POEs in areas with quality land, we examine the market share of SOEs in the districts that are subject to the purchase restriction, which are presumably more desirable than the districts that are not subject to the purchase restriction. We show that SOEs' market share in the form of transaction volume (value) in the restricted districts increased by 9% (7%) unit after the implementation of the Economic Stimulus Program, relative to SOEs' market share in the unrestricted districts. This result verifies the crowd-out effect on POEs' investment in the restricted districts.

This paper adds to the literature on the profitability and efficiency of SOEs (Boardman and Vining, 1989; Shleifer and Vishny, 1994; Lin et al., 1998; Dewenter and Malatesta, 2001). The predominant argument is that soft budget constraints, as well as the agent problem, are responsible for the poor performance of SOEs. Deng et al. (2015) finds that land auction prices are positively associated with centrally-controlled SOE bidders, at an average premium of 16%. Our paper represents a step forward towards understanding of the different pricing strategies for land acquisition between SOEs and POEs in China. The major contribution of our paper is to examine the underlying mechanisms that drive the price differences. The empirical results suggest that SOEs' money wealth and connections with the local government lead to the price premiums they pay at land auctions. Moreover, the Economic Stimulus Program exacerbates market distortions and crowds out POEs in the more desirable districts. This analysis could help researchers and policy makers to understand the economic consequences of the fiscal policy.

This paper contributes to the literature on China's land market. Perhaps, due to the scarcity of micro-level transaction data of land parcels, only a few studies have focused on urban land sales in China. Qin et al. (2016) examine changes in the distribution of land prices in urban China from 2007 to 2012 and find that the average land price for residential, industrial, and commercial land in 2012 was found to be 57%, 24%, and 41% higher, respectively, than in 2007. Using sample land transactions data from 2006 through 2008 in Beijing, Zheng and Kahn (2008) find that SOE developers paid slightly higher prices at land auctions. Wu et al. (2012) employ a dataset of 815 land transactions from 2003

to 2010 in Beijing and find that the SOEs controlled by the central government paid 27% more than other bidders for an otherwise equivalent land parcel. Cai et al. (2013) provide the first empirical evidence of corruption in China's urban land auctions. Using a sample of 2,302 transactions from 2003 to 2007 in 15 large cities in China, their study shows that corrupt land bureau officials prefer two-stage auctions, which may contain more side deals, over English auctions for popular lands. Cai et al. (2017) and Brueckner et al. (2017) explore the floor-to-area (FAR) regulation in China's land market by employing the national sample of residential land sales. However, few studies have focused on the behavioral difference across bidder groups in China' land market.

We fill the research gap by examining the underlying mechanisms that determine the behaviors of different types of land bidders, and expand the scope from dozens of major cities in existing studies to almost all cities in China. This paper takes advantage of the wide geographical coverage of the dataset to investigates the potential regional and economic heterogeneity of Chinese cities, and explores heterogeneity of land use.

Our study also relates to the literature evaluating the effects of economic stimulus programs on the economy. Deng et al. (2015) discuss the general effect of China's Four-Trillion Stimulus package on land and housing market. Diao et al. (2012) and Burdekin and Weidenmier (2015) assess the impact of stimulus package on China's economic growth. However, few existing studies attempt to influence of China's Stimulus package on economic outcomes at the firm-level. A large number of studies have examined the effects of the stimulus package or quantitative easing on bank lending behavior (Rodnyansky and Darmouni, 2017), interest rate (Christensen and Rudebusch, 2012), and mortgage behavior (Maggio et al., 2016) in developed countries, such as the US and UK. Our paper compliments the literature by investigating the influence of the stimulus package in emerging markets, such as China.

The remainder of the article is organized as follows. Section 2 presents the background on land use acquisition in urban China. Section 3 introduces the data and presents the summary statistics. Section 4 presents the methodology. Section 5 elaborates on the empirical results. Section 6 discusses policy implications and Section 7 concludes.

2 Background

2.1 A Brief History of China's Land Market Auctions

Unlike many other countries, in China, the state retains the ownership of urban land and there is no freehold land[4]. The governments at the municipal and county levels allocate land

[4]The state retains the ownership of urban land in China, with the exception of certain lands in rural areas owned by the collective of peasants and certain lands in urban areas owned by the central government and the military. Land users are not required to pay any fees or resettlement expenses for government or

use rights[5]. As shown in Table 1, the state determines the maximum period for which land use rights may be leased based on the type of land use.

[Table 1 inserted here]

The acquisition of land use rights has undergone drastic changes in the past two decades. On May 19, 1990, the State Council issued a new regulation[6], which stated that land use rights could only be acquired from the local government through negotiated sales (*churang* or *huabo*, which can be translated as "assignment" and "allocation," respectively) through winning land use rights in public auctions or biddings (*zhaopaigua*), or by reaching an agreement with other land users through mergers or acquisitions. In the 1990s, most of the land use rights were transferred through government allocations and assignments and sold for only a fraction of their market value. Because the negotiated sales were conducted in a secretive process, local governments could be flexible with land lease terms, leading to bribery that benefited certain government officials and depleted government revenues (Wu et al., 2012; Cai et al., 2013; Qin et al., 2016) .

To improve fairness and eliminate corruption in the land acquisition process, the government introduced Article 831, which became effective as of August 31, 2004 (Figure B3 in the Appendix presents the trend of land transactions through auctions after 2005). Under the new rule, all land grant transactions were required to be posted publicly, and all developers wishing to acquire land use rights were required to participate in the public auctions. The article allowed for three auction types: English auction (*paimai*), two-stage auction (*guapai*), and sealed bid auction (*zhaobiao*). However, the negotiated sales decreased gradually over time because the article was not strictly enforced across cities.

In practice, an auction and the detailed land characteristics are publicly announced 20 working days in advance. All potential bidders are required to pay a cash deposit (usually 10% of the reserve price) to participate in the auction. Winning bidders are asked to pay the total amount of the land rights assignment fee within 60 days of signing the contract to acquire the Certificate for the Right of Land Usage.

The English auction and the two-stage auction have been the primary auction methods in China since 2004. In English auctions, potential bidders enter simultaneously and raise bids by at least the specified minimum increment amount until the highest bidding price has been

military use.

[5]In China, one can observe the price of a land parcel separately from that of the structure built on it. This is different from most countries, including the United States, where housing transactions comprise both land and building sales concurrently. Therefore, one merit of the data of land transactions in China is that land transactions can be observed separately from housing transactions because the local government owns all urban land and permits leasing of its use.

[6]"Interim Regulations Concerning the Assignment and Transfer of the Right to the Use of State-Owned Land in Urban Areas" (Decree No. 55 of the State Council, May 19, 1990) (Assignment Regulations), Westlaw China.

reached. In two-stage auctions, where bidders can make their entry decisions sequentially, the first stage lasts for 10 working days. The second stage starts as an English auction if more than one bidder is competing for the land use right at the end of the 10^{th} auction day. Although the new article was designed to increase fairness in land distribution, local governments can manipulate regulations by setting specific qualifications in favor of certain companies or by choosing the two-stage auction method, which may benefit insiders with political connections (Cai et al., 2013).

2.2 The Four Trillion Economic Stimulus Program

The effects of the 2007 US financial crisis have rippled across the globe. China's economic condition was seriously affected due to global economic integration. To minimize the impact of the global financial crisis and maintain economic growth, the Chinese government announced the two-year Economic Stimulus Program on November 9, 2008. Costing four trillion Chinese yuan (equivalent to US$586 billion)[7], the program aims to encourage investments in strategic sectors, such as housing, rural infrastructure, building materials, transportation, environment, health and education, industry, tax cuts, and finance. Table 2 presents the details of the disbursement of the four trillion yuan over two years. The sum of this Stimulus Program represents around 16% of China's GDP in 2007 and covers roughly all central and local government spending in 2006. Following ex-premier Jiabao Wen's call to generate a "big, fast and effective" stimulus, the Program was forcefully implemented in record time (Wong, 2011). Accompanying the grand fiscal injection, state-owned banks also loosened their credit to companies, ending up with a total credit boost of more than one-third in 2009.

[Table 2 inserted here]

The anecdotal evidence[8], as well as the academic research (Burdekin and Weidenmier, 2015; Deng et al., 2015)[9] shows that SOEs, especially the central government controlled SOEs in China, play a significant role in transiting the monetary stimulus from central bank into the real economy. In this regard, many SOEs received a large amount of money in 2009. In the meantime, the central government subsidized some SOEs to help them survive the global financial crisis after 2007. For example, SASAC injected three billion yuan into China

[7]Xinhua News, "China's 4 Trillion Yuan Stimulus to Boost Economy, Domestic Demand." China's 4 Trillion Yuan Stimulus to Boost Economy, Domestic Demand, GOV.cn, 9 Nov. 2008, *www.gov.cn/english/2008-11/09/content*$_1$143763.*htm*.

[8]The economist Wu jinglian stated in a conference in 2014 that SOEs took the biggest portion of 4 trillion yuan stimulus and then invested the money into real estate market. http://finance.ifeng.com/a/20140421/12167344$_0$.*shtml*

[9]Deng et al. (2015) document that CPC Organization Department's centralized control over SOE executives' mission turned to be a channel for the delivery of stimulus capital from central bank into the real economy.

Southern Airline and China Eastern Airline in 2009[10]. Therefore, the Chinese government used the SOEs as the instruments or channel to carry out its 4 Trillion Yuan Stimulus Program in 2008.

To support the state's economic stimulation policy and yet to maintain company's performance, SOEs were reluctant to invest in their core business due to the ongoing recession. Instead, massive funds were concentrated in the real estate industry, which is a profitable industry with few entry barriers[11]. A bunch of research has shown that SOE's investment in fixed assets increased sharply after 2009 (Wen and Wu, 2014; Burdekin and Weidenmier, 2015; Deng et al., 2015). This would increase employment in various areas, such as manufacturing, steel, cement and other sectors of the economy whereas generating the risk of inflation and a property bubble[12].Wong (2011) documents how the central government and academia in China started to worry about the nature and quality of the growth motivated by the Stimulus Program and its side-effects. Although SOEs played a key role in stabilizing the Chinese economy (Wen and Wu, 2014), the escalation in loan credit created asset bubbles, leading to steeply increased prices for land and properties by more than doubling prices in some big cities in 2009.

Both economists and the press assert that the Stimulus Program led to the rapid growth of the housing markets in major cities in China in the subsequent years, ending with real estate as an essential asset in the investment portfolio for urban residents, and land sales revenue for local governments across the country. According to the statistics from the National Bureau of Statistics of China, the total value of real estate assets in China climbed to 200 trillion yuan in 2015, compared with the capitalization of the Chinese stock market of about 53 trillion yuan, and accumulated deposits of 136 trillion yuan. It is worth noting that a significant portion of the stimulus funds flowed into the real estate sector. As a result, the general public and industry professionals continue to criticize cash-flush SOEs for bidding up land acquisition prices. Deng et al. (2015) argue that land prices increase more when SOEs are more active buyers.

In this paper, we argue that centrally-controlled SOEs overbid significantly, leading to the ever-rising land prices after 2009. Moreover, China's Stimulus Program may have caused a misallocation of resources, which could lead to economic stagnation and systematic financial risk. The underlying logic of our argument is straightforward: If SOEs consented to implement China's stimulus package, we expect that they pay higher prices than POEs for

[10] *http://www.globaltimes.cn/content/453123.shtml.*

[11] Deng, Yongheng, and Bernard Yeung. "China's Stimulus May Be A Curse In Disguise." Forbes, Forbes Magazine, 25 Aug. 2010, *www.forbes.com/2010/08/25/china-soe-real-estate-property-markets-economy-stimulus*.html.

[12] An article "China's Looming Real-Estate Bubble" published by the Wall Street Journal (Eastern Edition) on August 21, 2010, documents the risk of 4 Trillion Yuan Stimulus. *https://www.wsj.com/articles/SB10001424052748704407804575425600708056076.*

comparable land parcels because they have received the additional funds from the government.

2.3 The Reserve Price at Land Auctions

According to the document provided by the Ministry of Land and Resources of the People's Republic of China, the local government authorizes a qualified and independent appraiser to evaluate the land and set an appropriate reserve price based on the proposed land use, average market price, demand and supply condition, location, industrial policy, regulations of land price, macroscopic adjustment, and potential development. Therefore, the reserve price reflects the minimum market value of the land, which is barely captured by observable characteristics of the land. We can also consider the reserve price as an information pool that contains both public information and private information. The public information is free and open, which is completely mirrored by the observable characteristics of the lands. To the contrary, the private information, such as the urban planning under discussion and the potential investment, is only available to a particular party. This kind of information sometimes is forbidden to be released before an explicit date. To set a reasonable reserve price, the government takes into account of the unobservable characteristics.

3 Data and Descriptive Statistics

3.1 Data on Urban Land Sales in China

In the empirical analysis, we obtain a comprehensive dataset from the Chinese Real Estate Index System (CREIS). CREIS records land transaction information in China from information published by the central, provincial and local governments on a daily basis. We also compile land information from the Bureau of Land and Resources at the municipal level and the Ministry of Land and Resources of the People's Republic of China[13], and the website of China Land Market (*http://www.landchina.com*).

The dataset offers several advantages. To the best of our knowledge, the dataset used in this research is the most representative and comprehensive land transaction data in the field. Relative to the datasets used in existing studies, our sample is much larger with little measurement error and contains more complete information on both land and buyer characteristics. Most studies on Chinese land markets use either regional samples for a relatively short period of time (Wu et al., 2012) or incomplete transaction records of land

[13]Local governments are required to publish data on all land transactions on the website of the local land source authority. The Ministry of Land and Resources of the People's Republic of China also posts the consolidated land transaction data on its website (*http://www.mlr.gov.cn/tdsc*)

sales in China (Cai et al., 2013; Qin et al., 2016), which may have potential selection bias leading to biased inferences. Moreover, very few studies (Wu et al., 2012) collect buyer information, which could help to differentiate SOE buyers from POE buyers, and explain the correlation between buyer type and land auction price.

For this analysis, we use land transaction records from 2001 to 2016. Our dataset[14] consists of 328,489 transactions after eliminating observations without full information. The dataset contains land transaction records from 30 of 31 provinces (excluding Tibet), 291 of 334 municipalities, and 2,319 of 2,850 counties (or districts) in China[15]. Figure 1 shows the geographic distribution of the land transactions across Chinese cities. The quantile distribution of average transaction price and average transaction volume at the city level from 2001 to 2015 are presented in the figure.

[Figure 1 inserted here]

The dataset includes detailed land characteristics such as transaction price, transaction date, listing date, reserve price of an auction, size and location of land parcel, floor area ratio (FAR), land type (residential, commercial, industrial, mixed, and others), transaction type (negotiation [*xieyi*], English auction, two-stage auction, and sealed bid auction), and buyer name (both firm and individual)[16].

The total value of land transactions in our dataset from the initial year (2005) of land reform in China to 2015 is 20 trillion yuan, which represents about 87.5% of the value (22.88 trillion Yuan) reported by the Ministry of Land and Resources of People's Republic of China[17]. This guarantees the repetitiveness of our dataset. In Table 3, we show the distributions of land transactions by city tier. Also, we manually collect the geographic coordinates of the land parcels and the city centers (or CBDs) of the 291 municipalities using *Baidu Maps* and *Google Maps*[18]. Using ArcGIS techniques, we calculate the Euclidean distance of a land parcel to the nearest city center.

[Table 3 inserted here]

Among the 328,489 land parcels, 1.04% sold through sealed bidding; 12.89% sold through English auctions; and 86.07% sold through two-stage auctions. These figures are similar to those of Cai et al. (2013), who assert that sealed bidding was used exclusively in Beijing and Shanghai. The first-tier cities (Beijing, Shanghai, Guangzhou, and Shenzhen), especially

[14]In total, we have 579,102 transactions in the land transaction database, where 424,105 are completed transactions and 158,997 are incomplete (ceased, canceled, delayed, unsuccessful, or unsold).

[15]The National Bureau of Statistics of the People's Republic of China provides the information on province, municipality, and county (*http://www.stats.gov.cn*).

[16]For a limited number of transactions, additional land features are available, including building density, green coverage rate, minimum increment in auction, and status of land development.

[17]http://www.mlr.gov.cn/zwgk/tjxx/.

[18]*Baidu* is one of the largest Internet companies in the world and offers a Chinese search engine for websites, audio files, images, and maps. We find the latitude and longitude coordinates of each land parcel in the sample using *Baidu* and *Google* Geocoding API.

Beijing, conducted more sealed bidding relative to other cities. Due to the limited observations of the sealed bidding, our study only focuses on English and two-stage auctions. After eliminating the sealed bidding transactions, we are left with 325,064 observations. As shown in Panel A of Table 3, more than 97% of lands were transacted through two-stage auctions in the four first-tier cities, and the figure declines to 85% in the second- and third-tier cities. Regarding the distribution across the land use purpose, around half of the lands are designated for Industrial use. Residential and Business/Commercial are two other major uses of the transacted lands.

In Figure 2, we also show the trends of aggregated land transactions for different purposes from 2001 to 2015. The aggregated transaction value (presented in the top figure) and volume (presented in the bottom figure) of all types of land parcels experienced a substantial upsurge after 2008, when the central government distributed four trillion yuan to boost the economy. The market slowed down when the government imposed the first wave of the purchase and financing restrictions in the housing market in 2011; moreover, both transacted value and volume of land sales underwent a sharp drop after 2013, when the government reinforced the housing purchase restrictions across the country.

[Figure 2 inserted here]

3.2 China Company Database

Among the 325,064 successful land auctions (after excluding 1.04% sealed bidding transactions), 89.04% was won by 177,033 firms[19], and 10.96% was won by 26,173 individual buyers[20]. This suggests that institutional buyers or firm buyers dominated the land markets in China. As we have scant information on individual buyers, we consider that the individual buyers are homogeneous. In addition, at the spot of a land auction, the identities of individual buyers are opaque and inaccessible. Although we know the names of the individuals, it is difficult to find out other information such as income, occupation, education, and prior acquisition experience. Firms, however, differ dramatically from each other along various dimensions such as industry, government ownership, and size. These differences across firms are observable and obtainable most of the time.

In February 2014, China's State Administration of Industry and Commerce (SAIC) launched the National Enterprise Credit Information Publicity System (NECIPS)[21], an online resource that provides information about companies to the public. The online system

[19]Firm buyers can be readily distinguished from individual buyers by checking whether the buyer names have more than three Chinese characters and contain any keywords, such as "," "," "," "," and "."

[20]There may be more than 26,173 individual buyers because different individuals may have the same name.

[21]The data is available on the website of the National Enterprise Credit Information Publicity System (*http://www.gsxt.gov.cn/index.html*).

covers companies registered with the SAIC or local Administration of Industry and Commerce (AICs) in the 31 provinces, autonomous regions, and municipalities across the country. The current design of the system covers three broad categories: (i) information obtained by the AICs that they are required to disclose; (ii) information disclosed by the companies themselves; and (iii) information disclosed by government agencies other than the AICs. Companies are expected to file a copy of their annual reports through the online system and to disclose information in their annual reports (except for sensitive business information such as revenues, debt, profit, and total assets), including shareholder and capital contributions, changes in equity interest, administrative licenses, intellectual property rights (IPR) pledge registration, and administrative penalties, among others.

The online National Company Credit Information System is expected to make corporate information more transparent. The database of the NECIPS contains detailed information on all the registered firms in China (over 80 million) such as firm name, registered address, unique registration number, registered business entity, registered capital, firm type, established date, operating period, registration authority, number of employees, industry, number of shareholders, and number of board members. In China, a company's registered name in local AICs is exclusive. Fortunately, the Bureau of Land and Resources requires firm bidders to report their registered names used in AICs before the auctions, which enables us to precisely match the names of firm bidders to the names of companies in the NECIPS.

There are several key features we can extract from the NECIPS for our analyses. First, the information on firm type enables us to differentiate SOEs from POEs. This allows for a clear identification of whether SOEs behaved systematically differently from POEs at land auctions. After the progress of the SOE reform after 1995, most SOEs were no longer fully owned by the government but transformed into limited liability firms or joint-stock companies, with state ownership converted to tradable shares (Lin Germain 2003). This provided private investors with an opportunity to become shareholders of SOEs. There are three types of SOEs: (1) WSOEs with the State as sole owner; (2) SOE with many other shareholders involved, including private individuals, but the State still with dominant control; and (3) firms in which the State owns shares but not enough to control them. In this study, we focus on the first two types.

Second, firms are classified into 20 industries[22] in the NECIPS database. This enables

[22]Firms are classified into 20 industries in the NECIPS database: "transportation, warehousing and postal services;" "accommodation and catering;" "information transmission, software and information technology services;" "public administration, social security and social organization; "agriculture, forestry, animal husbandry and fishery; "manufacturing, "health and social work; " "international organizations;" "residents services, repairs and other services;" "construction industry;" "real estate;" "wholesale and retail; "education;" "culture, sports and entertainment;" "water, environment and public facilities management;" "electricity, heat, gas and water production and supply;" "scientific research and technical services;" "leasing and business services;" "mining industry;" and "financial industry."

us to examine whether real estate companies pay differently relative to their non-real estate counterparts. Third, we can match the location of the purchased land with the location of the firm[23] to determine whether the firm buyer is located in the same municipal city where the purchased land belongs. Doing so enables us to examine whether local buyers reap the benefits of physical proximity in the land acquisition process. In general, combining the comprehensive land transaction data with the extensive information on firm buyers makes it possible for us to explore the role of various types of buyers affecting China's urban land market, and to examine the underlying mechanisms that drive the price premiums at land auctions.

3.3 Descriptive Statistics

We use the land transaction records from 2001 to 2016 for this analysis and eliminate the observations without full information such as incomplete transactions and completed transactions with missing information on price, land size, or buyer details. We also drop land transactions (bottom 0.5% and top 0.5%) that are extremely large or small along three dimensions: land size, transacted total price, and transacted unit price.

As shown in Panel A of Table 4, our final sample[24] consists of 282,941 transactions, with 26,609 transactions made by 9,714 SOEs and 256,322 transactions made by 143,579 POEs. Both the reserve unit price and the transacted unit price of the land parcels purchased by SOEs are greater than for land parcels purchased by POEs. It is worth noting that the difference in the mean reserve unit price (536.86 yuan) is comparable to the difference in the mean transacted unit price (545.63 yuan) between the lands purchased by SOEs and POEs, implying that the variation in the reserve unit price may largely explain the variation in the transacted unit price.

[Table 4 inserted here]

Figures 3 and 4 reveal similar results: Figure 3 shows that both the reserve unit price and transacted unit price of the land parcels purchased by SOEs are higher than that of the land parcels purchased by POEs. Similarly, Figure 4 illustrates that SOEs pay a higher price than their POE counterparts for each size decile. The unconditional results suggest that the difference in reserve price between SOEs and POEs give rise to their discrepancy in the transacted unit price at the land auctions.

[Figure 3 inserted here]

[Figure 4 inserted here]

The mean values of the distance to CBD, the two-stage auction indicator, FAR, the Real

[23]The locations of individual buyers are not provided in the dataset.

[24]The final sample used for the empirical analysis only includes observations with full details of land characteristics and buyer information.

Estate dummy, and the Local dummy are similar for land parcels purchased by SOEs and POEs. However, the mean Registered Cap of SOEs is nine times larger than for POEs, which suggests that SOEs are cash-flush bidders relative to POEs.

4 Empirical Methodology

4.0.1 Propensity Score Matching

To control for observable differences between land parcels acquired by different types of bidders, we use a propensity score matching process to generate a comparable sample following the matching literature surveyed by Imbens and Wooldridge (2009). The aim is to identify land parcels that are observably similar in various characteristics. Specifically, we compute propensity scores based on a logistic regression using land size, FAR, distance to CBD, transacted city, land usage, and auction type. We employ the nearest-neighbor matching with replacement based on the computed propensity score[25]. Specifically, we match the land parcels acquired by SOEs with those acquired by POEs.

Panel B of Table 4 presents the matched sample of land parcels purchased by SOEs and POEs. After matching, the differences between the two samples in size, distance to CBD, and FAR become statistically and economically indistinguishable. In addition to the mean statistics, distributions of land size, floor area ratio, and distance to CBD of SOEs versus POEs after matching are also similar and comparable (Figure 5). Therefore, we have transaction-level data of reasonably balanced land parcels, which allows us to compare the price for lands purchased by various types of bidders at land auctions.

[Figure 5 inserted here]

4.1 Hedonic Regression of Land Price

In our empirical analysis, we employ the standard hedonic pricing model for land as follows (Sirmans et al., 1997; Wu et al., 2012; Cai et al., 2013):

$$ln(price_{i,j,t}) = \alpha \cdot SOE + \beta \cdot X'_{i,j,t} + \gamma \cdot Y' + \rho + \omega_j + \varphi_t + \epsilon_{i,j,t} \quad (1)$$

where $ln(price_{i,j,t})$ is the natural logarithm of the transacted unit price (per square meter in yuan) for land i in district j, which is sold at year-month t. SOE is the variable of interest, which is a dummy that equals 1 if the buyer is an SOE, and 0 otherwise. X is a vector

[25]Our following empirical results are robust to using radius matching and kernel matching. Smith and Todd (2005) document that the matching with replacement induces a trade-off between bias and efficiency. High quality matches could lower the bias, whereas efficiency is reduced concurrently as fewer observations are used. When we match with no replacement, the results do not change much.

of structural variables that accounts for observable land characteristics such as the auction type, land size, FAR, logarithmic distance to CBD, and auction type. Y is a vector that captures a buyer's key characteristics such as whether the buyer is specialized in the real estate industry, whether the buyer is a local company, and the registered capital. Since land price differs dramatically across government-pointed land uses, we include ρ to control for the land use fixed effect. We also include the district fixed effect ω_j to control for the any differences across districts, and year-month fixed effect φ_t to control for the time trend. $\epsilon_{i,j,t}$ is the error term. Standard errors are clustered at the district level in the usual manner because land prices within a district are likely to be significantly correlated.

In Equation [1], we exclude transactions made by individual buyers for two reasons: 1). individuals differ from SOEs in nature, therefore it is inappropriate to compare the lands purchased by individual to that purchased by SOEs; and, 2). we do not have information about individuals, therefore we cannot control for a buyer's key characteristics in Y' for individuals. Therefore, all land parcels used in Equation [1] are purchased by firms (SOEs and POEs).

4.2 Difference-in-Difference Approach

We analyze the bidder responses to the Economic Stimulus Program using a DID regression methodology. The treatment group is comprised of SOEs that receive capital from the central government's Stimulus Program and are designated to execute the investment plan in various fields. The control group is comprised of POEs that do not receive capital from the Stimulus Program. The pre-treatment period is from Jan 2001 to Dec 2008, and the post-treatment period is from Jan 2009 to Deb 2012. Although our full sample covers the period 2001 to 2016, we exclude the post-treatment period after 2013 in the DID analysis to avoid any contamination from the extensive, strong macro-prudential restrictions in the housing market (Du and Zhang, 2015; Somerville et al., 2018).

We first estimate the average responses of SOEs to the Economic Stimulus Program using the following DID estimation:

$$ln(price_{i,j,t}) = \alpha \cdot SOE + \gamma(SOE \cdot After) + \beta \cdot X'_{i,j,t} + \rho + \omega_j + \varphi_t + \epsilon_{i,j,t} \qquad (2)$$

As defined in Equation [1], $ln(price_{i,j,t})$ is the natural logarithm of the transacted unit price (per square meter in yuan). X is a vector of structural variables that accounts for observable land characteristics such as land size, FAR, logarithmic distance to CBD, and auction mode. SOE is a binary variable taking the value of 1 (treatment) if the bidder is an SOE and 0 (control) if the bidder is a POE. After is a dummy that equals 1 for the year after 2008, and 0 otherwise. $SOE * After$ is the interaction term that captures the

DID estimation of the treatment effect. Therefore, γ is the key coefficient of interest, which estimates the change in the price premium of land parcels purchased by SOEs due to the Stimulus Program. All the other terms share the definitions as in Equation [1]. Standard errors are clustered at the district level in the usual manner.

Since the 4 Trillion Yuan Stimulus Program was designed to distribute all the funds within two years and the ex-premier Jiabao Wen proposed implementing the stimulus under the principle of "big, fast and effective," we expect the SOEs' responses to the stimulus program to occur instantly and to gradually decrease with the passing of time. To investigate this expectation, we study the dynamic pricing response in different post-announcement periods. Specifically, we re-estimate Equation [4] in the same pre-announcement period (before Nov 2008), but in eight different post-announcement quarters (2009q1, 2009q2,..., and 2010q4). The coefficients γ_{2009q1}, γ_{2009q2},..., and γ_{2010q4} measure the price premiums paid by SOEs in the first, second,..., and eighth quarter after the announcement of the Economic Stimulus Program, respectively. By performing a dynamic analysis, we can assess at what point the SOEs appear to respond to the program as well as whether the price premiums the SOEs pay at the land auctions decrease with the depletion of the program funds over time.

4.3 Two-Step Process

As the reserve price acts as a proxy for both the land's observable and unobservable characteristics, we can first purge any effects of the observable characteristics on the reserve price by estimating the following equation over the sample period:

$$ln(ReservePrice_{i,j,t}) = \beta \cdot X'_{i,j,t} + \rho + \omega_j + \varphi_t + \epsilon_{i,j,t} \tag{3}$$

where $ln(ReservePrice_{i,j,t})$ is the natural logarithm of the reserve price for land i located in district j in year-month t. X is a vector of structural variables that accounts for observable land characteristics such as land size, FAR, and logarithmic distance to CBD, as well as auction mode. In addition, we calculate the residual from Equation [3], $\eta_{i,j,t}$, which captures the effect of unobservable characteristics on the reserve price. The residual is orthogonal to the effect of observable hedonic characteristics on the reserve price.

5 Main Results

5.1 SOEs and Price Premiums

We first estimate the hedonic pricing model following Equation [1] for the price premiums SOEs pay at land auctions. Table 5 reports the results of ordinary least squares (OLS)

regressions of the logarithmic unit price on our main explanatory variables, with Columns (1) to (3) corresponding to the full sample and Columns (4) to (6) corresponding to the matched sample. All regressions include land use fixed effect, district fixed effect, and year-month fixed effect. Following Petersen (2009), we report standard errors that are robust to heteroscedasticity and clustered at the district level.

Column (1) of Table 5 shows that SOE is positively related to the transacted unit price of the land parcel after controlling for the three fixed effects, suggesting that SOEs pay higher prices relative to POEs at the land auctions. On average, SOEs pay 13.6% more than POEs at the auctions. This translates to 171.06 yuan per square meter, or 5,740,212 yuan per land parcel[26]. Similarly, Wu et al. (2012) find that SOEs pay 27.4% more than POEs at land auctions in Beijing, but leave the explanation of the price difference open ended.

[Table 5 inserted here]

Column (2) of Table 5 adds the structural explanatory variables suggested by auction theory and extant land literature. The results of the structural explanatory variables are consistent with results in literature. The choice of auction type play a significant role in affecting the transacted land price. Column (2) shows that the prices in two-stage auctions are 29% lower than those in English auctions, which is 11% higher than the figure found by Cai et al. (2013). Wu et al. (2012) also found a price discount, albeit insignificant, in two-stage auctions in the land market of Beijing. Two-stage auctions are similar to English auctions, but differ in the implementation process (e.g., duration and entry decisions)[27]. Cai et al. (2013) ascribe the lower prices in two-stage auctions to corruption, which facilitates the under-the-table transactions between bidders and government officials. Specifically, Cai et al. (2013) assert that favored developers signal to other potential bidders that the auction is corrupt, deterring the entry and participation of other bidders. As a consequence, two-stage auctions are less competitive than English auctions, resulting in lower transaction prices.

The land size is negatively associated with the transacted unit price as expected. Following Zheng and Kahn (2008) and Qin et al. (2016), we include the linear form of the FAR in the price regression and find a statistically significant and positive association between FAR and price. That is, developers are willing to pay more to buy land with a permit for the construction of more stories. Distance to CBD acts as a proxy for local traits, which suggests that land parcels closer to the city center are more valuable. The results in Column (2) confirm this prediction, indicating a magnitude of -0.09 on the logarithmic distance to CBD. Most importantly, the SOE dummy increases from 0.136 to 0.143 and remains statistically

[26]Among all the land transactions made by firms (including both SOEs and non-SOEs), the mean unit price and mean size of the lands were 1,257.811 yuan per square meter and 33,556.72 square meters, respectively. Therefore, the 12.07% price premium paid by SOEs can be translated into 1,257.811*13.6%=171.06 yuan per square meter and 171.06*33,556.72=5,740,212 yuan per land parcel.

[27]See Cai et al. (2013) for a detailed introduction to two-stage auctions and English auctions.

significant. Therefore, we conclude that the observable characteristics of land do not explain the price premiums paid by SOEs because the SOE dummy remains highly significant.

Column (3) of Table 5 studies other channels that may explain the price premiums paid by SOEs at land auctions with including the firm buyers' observable characteristics[28]. First, we find that real estate companies tend to pay 6.7% more than other companies at land auctions. This could be explained by the real estate company's inclination towards residential land, whose unit price is, on average, higher than that of industry use land.

Second, we show that local buyers pay 5.7% less than non-local buyers. This result is consistent with the literature on home bias (Coval and Moskowitz, 1999; Van Nieuwerburgh and Veldkamp, 2009; Chinco and Mayer, 2015), which documents that local buyers have information advantages over non-local buyers and hence outperform non-local buyers in trading.

Third, we add the buyer's registered capital, which serves as a proxy for the buyer's financial resources or firm size. It is reasonable to think that buyers with deeper pockets possess an advantage at land auctions, especially in any price war[29]. The estimated coefficient of the logarithmic registered capital is 0.0249 (t-statistic=7.55), which means that a 1% increase in registered capital is associated with a 2.5% increase in the transacted price. This result indicates that cash-rich buyers could outbid other participants by lifting the bidding price.

Most importantly, the inclusion of the three variables in Column (3) of Table 5 barely changes the magnitude and significance of the SOE dummy, which is estimated at 0.119 (t-statistic=7.35). Using the matched sample, we find similar results in Columns (4) to (6) that the SOE dummy remains economically and statistically significant, suggesting that SOEs pay more than POEs for a comparable land parcel. That is, the price premiums the SOEs pay at land auctions cannot be explained by the observable characteristics of the buyers such as industry attributes, private information, and capital abundance. In general, industrial land is very different from residential or commercial land in terms of the regulations and the setting of the reserve price. Local governments tend to deliberately lower the reserve price of industrial land in order to attract more industrial firms. In this regard, we replicate the analyses with industrial land parcels excluded and report the results in Table B3 in the Appendix. The results are consistent with those in Table 5. In Table 5, we do not include the transactions by individual bidders for two reasons. First, the information on individual bidders is scant. Second, individual bidders are not comparable to SOEs in nature. As

[28]The observation decreases from 282,931 to 240,844 because not all firms in the all land dataset match the firms in the NECIPS.

[29]In this context, the "price war" refers to increasing prices rather than decreasing prices, which may lead to so-called diwang, which refers to land plots that have broken previous sales records in comparable districts.

a robust check, we include the transactions of individual bidders into the regressions and report the results in Table B4 in the Appendix. As we do not have information on the characteristics of individual bidders, we only control for the observable characteristics of the land parcels and the fixed effects in Table B4. Still, the results are consistent with the baseline results in Table 5.

5.2 Wholly State Owned Enterprises and Price Premiums

As discussed in section 4.2, the SOEs are divided into three sub-types: wholly state-owned enterprises (WSOEs), State Controlling Enterprises, and firms in which the State owns shares but not enough to control them. WSOEs are considered as the strongest SOE bidders because of their full ownership by the State. In this section, we examine whether WSOEs pay even more than other SOEs at land auctions.

We define a new dummy variable, WSOE, taking the value of 1 if the firm is a fully state-owned enterprise, and 0 otherwise. We then create interaction between SOE and WSOE to add to Equation [1]. The results are reported in Table 6. As shown in Columns (1) and (2), the interaction terms are significantly positive after controlling for the structural variables and firm characteristics in both the full and matched samples, suggesting that WSOEs pay even more than ordinary SOEs at the land auctions.

[Table 6 inserted here]

5.3 Why Do SOEs Pay Price Premiums at Land Auctions?

In Sections 5.1 and 5.2, we show that SOEs pay higher prices than POEs for comparable land parcels at auctions, which is in line with the results in literature (Wu et al. 2012). There are two possible explanations for the price premiums SOEs pay at land auctions.

First, money wealth enables SOEs to overbid at land auctions. SOEs in China are considered as cash-rich giants without financial constraints on investment and acquisition because of their special access to credit from the GCBs (Allen et al., 2005; Li et al., 2008; Ayyagari et al., 2010; Deng et al., 2015; Wu et al., 2015). Second, since the land parcels acquired by SOEs are better than those obtained by POEs, the transaction prices SOEs pay are higher. SOEs' connections with local governments give them an advantage in acquiring quality land parcels as they can access private information on potential policy privileges and proposed MRT lines, school districts, and high-tech zones.

5.3.1 The First Explanation: SOEs' Money Wealth

To test the first explanation, we take advantage of the Economic Stimulus Program implemented in late 2008. As introduced in Section 3.2, SOEs in China are designated as the third

party to channel the program funds into different areas. This allows us to employ the DID strategy to analyze the effect of the Economic Stimulus Program on land prices. In the DID setup, the SOEs that received funds from the Economic Stimulus Program are the treatment group, and the POEs that received no funds from the Economic Stimulus Program are the control group. If the hypothesis that SOEs pay price premiums at land auctions because of their money wealth is true, then the price premiums SOEs pay should increase after they receive the funds from the Economic Stimulus Program.

We first examine the pattern of SOE's market share in China's land market from 2001 to 2015 before proceeding to the statistical analysis of the effect of the Economic Stimulus Program on the SOE's price premium. To demonstrate the indispensable role of the Economic Stimulus Program in the land market, we plot the SOE's unconditional market share (based on the transactions of all types of land) in terms of total transacted value and total transacted volume during the sample period, as shown in Panel A of Figure 6.

Before 2008, the SOE share in total transacted volume was approximately equal to its share in total transacted value, except for 2001 and 2002. Abruptly, its value share rose to outweigh its volume share from 2008 onwards. With the slow growth of the SOE share in total transaction volume, and its fast expanding share in total transacted value after 2008, we thus conjecture that the SOEs tended to bid on land parcels with higher transaction prices once they had received the additional funds from the 4 Trillion Yuan Stimulus Program in 2008.

We also plot small entrepreneurs' unconditional market share in China's all land transactions (Panel B of Figure 6) and China's residential land transactions (Panel C of Figure 6) during the sample period. Panel B (Panel C) of Figure 6 shows that the value of the small entrepreneurs' share in the transactions of all land (residential) barely changes and even decreases a bit in recent years. The three graphs in Figure 6 indicate that the SOE share in China's land market continues to expand and crowds out small entrepreneurs to some extent.

[Figure 6 inserted here]

In Figure 7, we plot the unconditional mean transacted unit price of SOEs and POEs during the period from 2004 to 2014. Before 2009, we find that no consistent price premiums were paid by either SOEs or POEs. SOEs and POEs paid similar unit prices for land parcels before the announcement of the 4 Trillion Yuan Stimulus Program in November 2008, which supports the underlying identifying assumption of a common trend for the DID analysis. However, the consistent higher unit price paid by SOEs relative to POEs appears after 2009 quarter one, providing the suggestive evidence of SOEs' response to the 4 Trillion Yuan Stimulus Program.

[Figure 7 inserted here]

Notably, people might question why the general trend of the average transacted prices of lands decrease after 2009, which contradicts the reality that land prices in China continue on an upward trend in recent years. This anomaly is caused by a significant increase after 2009 in the proportion of lands transacted at a relatively low price (lands in the third tier cities and industrial lands), which, therefore, drags down the average price (see the distribution of land transactions before and after 2009 in Table B2 of the Appendix).

Additionally, there may be some concerns as to whether there is an anticipation effect of the Stimulus Program, which might bias our estimation to some extent. We do not believe this is the case in our study. First, to stabilize the stock market and guarantee the reputation and authority of the central government, the State Council classified the date of the announcement of the Stimulus Program as highly confidential. Second, even if some SOEs had private information on the establishment of the Stimulus Program, they would not be getting this money until its implementation.

Column (1) of Table 7 reports the results. We find the coefficient of the interaction term significantly positive at 0.057, implying that the price premiums paid by SOEs increase by 5.7% after the implementation of the Economic Stimulus Program in 2008. The findings support our hypothesis that SOEs pay price premiums at land auctions because of their money wealth and the price premiums increase when SOEs receive funds from the Economic Stimulus Program. Deng et al. (2015) reveal a similar result.

It is worth noting that we do not have information on whether all SOEs, or some POEs, obtained funds from the program. However, this lack of information can only lead to underestimations and does not hurt our results. The estimated coefficient of interaction term should be larger if all SOEs, or some POEs, received program funds[30].

To reinforce our conclusion that the funds injection into the SOEs increase the price premiums paid by SOEs, we perform several falsification tests using different types of POEs, such as real estate companies (POEs), local firms (POEs), and individuals separately as the treatment groups. We do not expect to see any POEs responding to the stimulus policy at land auctions as they are not the beneficiaries of the program. The results are reported in Columns (2) to (4) of Table 7. We find that all the interaction terms are statistically insignificant, which implies that the Economic Stimulus Program does not allocate funds to different types of POEs or private individuals and hence has no effect on their price premiums.

[Table 7 inserted here]

In addition, to quantify the expansionary effect of the fiscal stimulus, we examine the dynamic change of the SOE price premium response during the eight quarters (two years) post-announcement period. The reason we choose a two-year post-announcement time period

[30]In all probability, only some of the SOEs received stimulus funds from the government.

is twofold: first, the 4 Trillion Yuan Stimulus Program is designed to distribute the funds within two years; second, the Chinese central government imposed a series of market cooling measures in the real estate market in 2011, which was two years after the announcement of the 4 Trillion Yuan Stimulus Program. Focusing on the two-year post-announcement period avoids the contamination by the macro-prudential housing restriction policy[31].

Figure 8 graphs the entire paths (2009q1, 2009q2, ..., and 2010q4) of the coefficient of the interaction term in Equation [4] and the dotted lines depict the corresponding 95% confidence intervals. The results can be interpreted as an event study, with 2009q1 being the first quarter after the announcement of the 4 Trillion Yuan Stimulus Program. As Figure 8 shows, the price premium paid by SOEs emerges two quarters after the announcement of the 4 Trillion Yuan Stimulus Program and increases gradually to a peak in 2010q2. This is consistent with the design of the 4 Trillion Yuan Stimulus Program, which distributed the funds within two years. After 2010q2, the price premium begins to decrease.

Taken together, the results in Table 8 and Figure 8 suggest that the SOEs, which act as the treatment group, respond strongly to the 4 Trillion Yuan Stimulus Program by increasing their price premiums at land auctions. Moreover, the magnitude of the response of the price premiums paid by SOEs begins to decrease six quarters after the announcement of the 4 Trillion Yuan Stimulus Program.

We also study the dynamics of the heterogeneous responses of the SOEs to the 4 Trillion Yuan Stimulus Program by city tiers and land use types (see discussions in Figures B4 and B5 in Appendix B).

[Figure 8 inserted here]

5.3.2 The Second Explanation: SOEs' Political Connection

To test the second explanation, we employ the reserve price introduced in Section 3.3 for our identifications. As aforementioned, the reserve price captures a land parcel's observable hedonic features and unobservable characteristics, such as policy consideration, urban planning, location advantage, and growth potential. In Equation (1), we control for the observable characteristics of the land parcels, and the results in Table 5 show that the observable characteristics cannot explain the price premiums SOEs pay. To investigate whether SOEs pay price premiums at land auctions to acquire land parcels that are superior in quality, we add the reserve $ln(ReservePrice_{i,j,t})$ to Equation (1) to measure its effects on the logarithm of the transacted unit price and the SOE dummy. More specifically, if the inclusion explains away the price premiums SOEs pay, then SOEs pay higher prices than do POEs because the lands acquired by SOEs are better. The merits of the land parcels can hardly be reflected

[31] *https://www.wsj.com/articles/SB10001424052702304911104576445513471134364.*

by the observable characteristics. However, bidders who have connections with the local government have access to information on the merits of land parcels.

The results are reported in Table 8. The headers in the second row indicate the sample used for the regressions. In Column (1), the inclusion of the reserve price reduces the magnitude of the SOE dummy from 0.118 (as shown in Table 5) to -0.006. Although the SOE dummy is statistically significant at the 5% level, its economic magnitude is approximately equal to zero, which is trivial. The coefficient of the logarithmic reserve price is estimated at 0.99 (t-statistic=51.6), implying that a 1% increase in the reserve price is associated with an increase of approximately 1% in the transacted price. In conclusion, the reserve price, which serves as a proxy for both observable features and unobservable heterogeneity, explains away the price premiums SOEs pay at land auctions.

[Table 8 inserted here]

In Column (2) of Table 8, we conduct a two-step analysis introduced in Section 5.4 to support the argument that the unobservable characteristics explain the price premiums paid by SOEs. As the reserve price acts as a proxy for the land parcel's observable and unobservable characteristics, we can first purge any effects of the observable characteristics on the reserve price by estimating Equation (3). In a table not reported here, we find that the observable characteristics explain 78.4% of the reserve price, implying that the residual explains the remaining 21.6%. In the second step, we re-estimate Equation (1) by replacing the reserve price used in Column (1) with the residual $\eta_{i,j,t}$. As shown in Column (2) of Table 8, $\eta_{i,j,t}$ is significantly positive and drives the SOE dummy to nearly zero. This further confirms our conjecture that the unobservable characteristics of land parcels contribute to the price premiums SOEs pay at land auctions.

Using the matched sample, we repeat the regression process exhibited in Columns (1) and (2) of Table 8 and report the results in Columns (3) and (4) of Table 8. The additions of the reserve price (in Column 3) and the residual (in Column 4) render the SOE dummy statistically insignificant and economically indifferent from zero. This is consistent with the results in the full sample regressions. Therefore, we conclude that the unobservable characteristics of the land parcels lead to the price premiums SOEs pay in urban land auctions in China.

5.3.3 Robustness Check: Are Lands Acquired by SOEs Really Better?

In sections 5.3.2, we document that the reason SOEs pay higher prices for comparable properties than POEs is because the lands they target are better. SOEs have an edge on the private information because of their born connection with the local governments. They are better informed which lands are promising and have great potential in the near future. To examine whether the lands acquired by SOEs are indeed better, we combine another data

set and test this hypothesis in this section.

We collect the basic information of 157,489 projects in 126 cities from Fang.com. The information regarding the project is rich, including name, location (which can be translated into coordinate data through *Google* and *Baidu*), opening date, sales prices (Yuan/per square meter), FAR, green ratio, distance to CBD, project size, project type (apartment or detached house), and decoration type. If the land parcels acquired by SOEs are more promising, so are the projects around the lands of SOEs. That is, the sales prices or the price growth of the project near the lands of SOEs should be higher than that of POEs.

Specifically, we first compute the distance of a land parcel to each project in the data set and keep the projects within the 3-kilometer radius circle of the lands. We illustrate this in Figure 6. The dot-shade circles in the center represent two land parcels, one is acquired by SOE and one is acquired by POE. The shade-triangles represent the projects that start to sales after the auctions of the lands. If the land acquired by SOEs enjoy preference treatment from the local government, then the projects the surround the land would also get the similar benefit, reflected by the higher sales. As shown in Figure 9, the sales prices of the projects in the left circle should be higher than that of the projects in the right circle. To avoid the confounding effect, we exclude the projects located in the overlap areas.

[Figure 9 inserted here]

Table 9 reports the results of regressing the logarithmic sales prices on SOE dummy and other observable characteristics of the projects. The project type fixed effect, decoration type fixed effect, district fixed effect, and year-month fixed effect are included in all regressions. Column (1) includes all the projects that enter the market within the 3km-radius circles after the land auctions. Columns (2) to (4) contain the projects that enter the market between the second year and the third year after the land auctions only[32], and Columns (3) and (4) shrink the circles to 2km-raduis and 1km-radius, respectively. The SOE dummy remains positive and significant in all columns, implying that the sales prices of the projects around the lands acquired by SOEs are approximately 1.5% higher, on average, than the sales prices around the lands acquired by POEs. The results support our argument that lands acquired by SOEs are better than those acquired by POEs.

A competing argument could be that SOEs' development projects may have positive externalities on the neighborhood. As such, we employ a probit regression on various land characteristics and reserve price, with dependent variable being a dummy indicating whther the land is won by an SOE or not. Appendix Table B6 investigates the likelihood of SOEs winning hot land parcels and shows that SOEs are more likely to win land parcels with

[32] According to the land regulation, developers cannot leave the land vacant for more than two years after the transaction year, thus we construct a subsample that includes projects started to sell during the second and the third year after the land transaction. In the subsample, we exclude projects that started to sell after the third year of land transaction to avoid potential contamination of the new land sales.

higher reserve price, larger size, and are located closer to the CDB area, which support our argument that SOEs are more likely to win hot land parcels.

[Table 9 inserted here]

6 Discussion

Land transactions in China are different from those in other countries (Wu et al., 2012, 2015). In most other countries, the land value is not directly observable because it is bundled with the housing sales, which is not the case in China. Since 2004, local governments have been selling land use rights (70 years for residential lands, 50 years for industrial lands, and 40 years for commercial lands) to private parties (including both firms and individuals) through auctions. China's land market offers an ideal environment to study the determinants of land values as well as price difference across investors. In addition, as China's role in the world economy and politics continues to grow, it is essential for both the government and academics to identify the most influential players in China's land market.

6.1 Two Explanations for SOEs' Price Premiums: Monetary Wealth and Political Connection

We propose two possible explanations for the price premiums SOEs pay at land auctions in China. In this section, we include the *residual* term in the DID analysis to test whether both explanations contribute to the highly significant price premium on SOEs. As shown in Table 10, the coefficients on $SOE * After$ and *residual* are positive and significant in both the full sample and matched sample regressions, implying that monetary wealth and information advantage jointly explains the price premiums paid by SOEs.

[Table 10 inserted here]

6.2 Crowd-Out Effect

This study reveals that the SOEs in China not only play a vital role in shaping the economy, but also raise the land and housing prices. SOEs, which are widely regarded as powerful players in the land market due to their deep pockets and inherent connection with government, are able to acquire quality land parcels by offering higher prices that POEs cannot pay. This leads to a crowd out effect in the land market, with an increasing number of quality lands going to the SOEs and an increasing number of inferior lands going to the POEs.

To test the crowd-out effect, we divide a city into desired districts and ordinary districts. Since 2010, China's central government has imposed a series of macro-prudential policies to combat speculative behaviors in the housing market. Purchasing second and third homes

has been strictly restricted in more than 46 cities in China since 2012. In 20 of the 46 cities, the purchase restriction is implemented in select districts. In this paper, it is reasonable to assume that housing units located in districts subject to the macro-prudential policies are more attractive to investors. Therefore, land parcels (with the exception of industrial land) in the restricted districts are considered as quality land parcels relative to those in the unrestricted districts. If the program funds enable SOEs to pay higher prices to acquire quality land parcels, then the funds should also increase SOEs' market share in the restricted districts, leading to a crowd-out effect on POEs. In Table 11, we present the impact of the crowd-out effects. The regression Equation (4) is as follows:

$$Share_{soe,j,t} = \beta \cdot After + \gamma(Treat \cdot After) + \omega_j + \varphi_t + \epsilon_{i,j,t} \tag{4}$$

$Share_{soe,j,t}$ represents SOEs' market share in a district in semi-annual t. $Share_{soe,j,t}$ is calculated based on the number of transactions or the value of transactions in a district in semi-annual t. $After$ is a dummy that equals 1 after the four-trillion stimulus program is established in Nov 2008, and 0 otherwise. $Treat$ is a dummy that equals 1 if a district j is subject to a purchase restriction, and 0 otherwise. $Treat * After$ is the interaction term that measures the crowd-out effect. It is expected to be positive, implying that SOEs' market share in a restricted district increased after the implementation of the Economic Stimulus Program, compared to SOEs' market share in an unrestricted district.

Consistent with the prediction, we find that the interaction term is positive and statistically significant regardless of the methods used to calculate the market share. Specifically, it is implied that, after the implementation of the Economic Stimulus Program, SOEs' market share in the form of transaction volume (value) in the restricted districts increased by 9% (7%) unit, relative to SOEs' market share in the unrestricted districts. This result verifies the crowd-out effect on POEs and suggests that SOEs run counter to the order issued by the SASAC in April 2010, which states that 78 of the 128 centrally-controlled SOEs, whose main businesses are not real estate, should exit the real estate industry[33].

[Table 11 inserted here]

The 4 Trillion Yuan Stimulus Program announced in November 2008 exacerbated the existing imbalance between SOEs and POEs. The reality is that the original purpose of Stimulus Program to improve the industrial structure and the people's livelihoods was violated, and that instead the Program inflated the land and housing markets. Based on the results of our study, the government should evaluate the efficacy of designating SOEs to distribute the program funding to the intended areas.

Unlike the study by Cai et al. (2013), which attributes the lower transacted prices in two-stage auctions relative to English auctions to possible corruption issues between bidders and

[33] *http://book.dzwww.com/book/story.php?id=40691*

government officials, we leave the explanation open-ended for future research. If the corruption explanation holds, the price difference between English and two-stage auctions should be larger in second and third tier cities than in first tier cities because of the more opaque markets and larger information asymmetry in second and third tier cities. As corruption is not our focus in this study, we would like to investigate this issue in the future.

7 Conclusion

SOEs are endowed with inherent political connections to the central and local governments, which play dominant roles in strategic industries, such as nuclear, mining, energy, and aerospace, all of which are lucrative. Also, as cash-rich participants in the market, SOEs are widely regarded as powerful participants, especially in the land acquisition process.

This study examines the price differentials between SOEs and POEs and attempts to explain the reasons for the price differences. Specifically, we find that SOEs pay 9.7% (the matched sample) to 11.9% (the full sample) more than their POE counterparts for a comparable land parcel at auctions. We then test two possible explanations for the price premiums SOEs paid at land auctions.

We first employ a DID analysis, in which the SOEs and POEs are considered as the treatment and control group, respectively, to investigate whether the injected capital increases the price premiums SOEs pay at land auctions after 2008. Using the 2008 Stimulus Program as an exogenous shock, we find that the coefficient of the interaction term is significantly positive at 0.056, implying that the price premiums paid by SOEs increase by 5.6% after the implementation of the Economic Stimulus Program. The findings support our hypothesis that the SOEs' money wealth contributes to their price premiums at land auctions.

Moreover, other types of POEs do not respond to the Economic Stimulus Program, which reinforces our argument that SOEs are responsible for inflating the land price because they have virtually unlimited financial resources (provided by the government) and they are targeting those superior land parcels. To quantify the expansionary effect of the fiscal stimulus, we examine the dynamic change of the SOE price premium during eight-quarters (two years) post-announcement period. Specifically, the price premium paid by SOEs emerges two quarters after the announcement of the 4 Trillion Yuan Stimulus Program and increases gradually to a peak in 2010q2. This is consistent with the design of the 4 Trillion Yuan Stimulus Program, which looked to distribute the funds within two years.

Then, we show that the reserve price plays a significant role in explaining the price premiums SOEs pay at land auctions, implying that the unobservable characteristics of the land also lead to the price difference between the lands purchased by SOEs and POEs. This is because the reserve price for a given auction takes into account not only the observable

characteristics (which are measurable and included in our model), but also the unobservable characteristics (which are unmeasurable) such as location advantage, growth potential, and preferential policies. Accordingly, SOEs desired to win these superior lands at the auctions by offering high bids.

By collecting the information of all the projects from another source, we show that the sales prices of the projects around the lands acquired by SOEs are approximately 1.5% higher, on average, than the sales prices around the lands acquired by POEs. The results support our argument that lands acquired by SOEs are better than those acquired by POEs.

We also show that that after the stimulus program being established, SOEs' market share in the form of transaction volume (value) in the restricted districts increase by 9% (7%) unit, relative to SOEs' market share in the unrestricted districts. This result verifies the crowd out effect on POEs.

To sum up, this study extends the existing knowledge by exploring the underlying mechanisms driving the price premiums SOEs pay at land auctions. We draw two conclusions from the DID estimations. First, SOEs are responsible for inflating land prices. Second, the Economic Stimulus Program magnifies the resource distortions in China's land market as SOEs with both political power and monetary wealth crowd out other players seeking to acquire quality land parcels.

This paper suggests that the active involvement of SOEs in the land market weakens the Chinese government's intervention to dampen the housing prices through intensive restrictive policies in recent years. To curb the soaring property prices, the central government announced a new order in March 2010, which requires central-government-owned enterprises, whose core businesses are not real estate, to withdraw from the real estate sector after they complete their existing housing projects. However, without a set deadline and strict enforcement, SOEs appear reluctant to leave the real estate market due to the substantial profits and continue to act as big players in China's land market.

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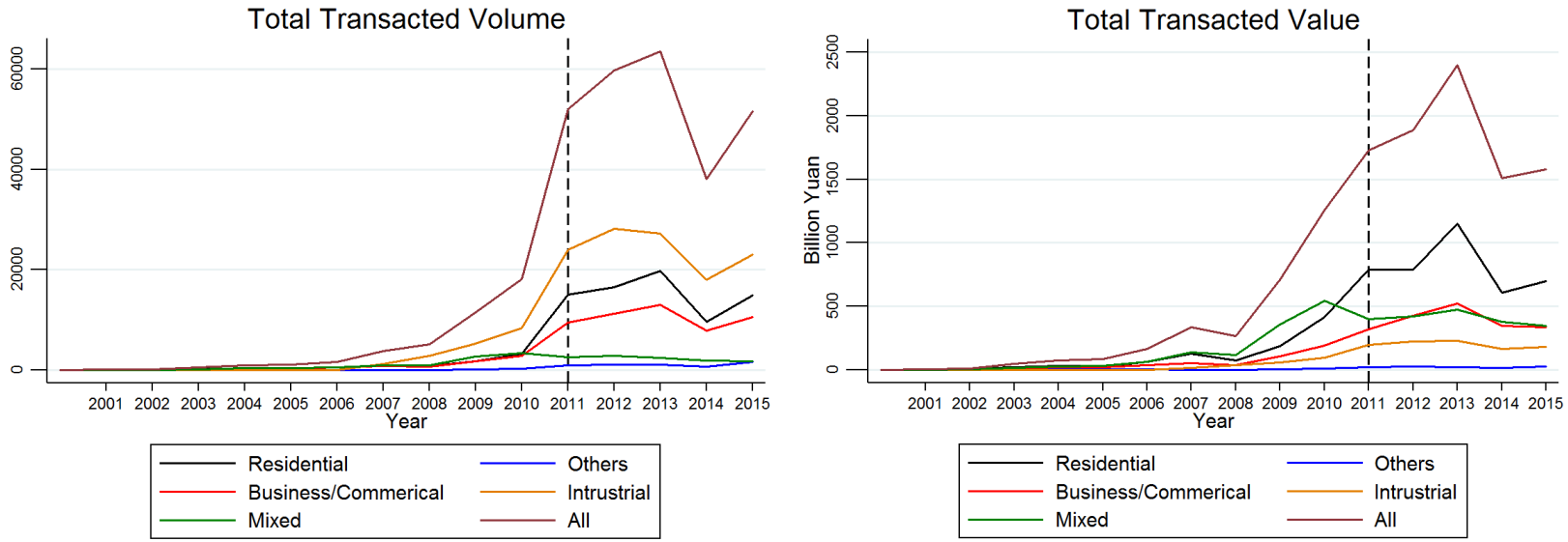
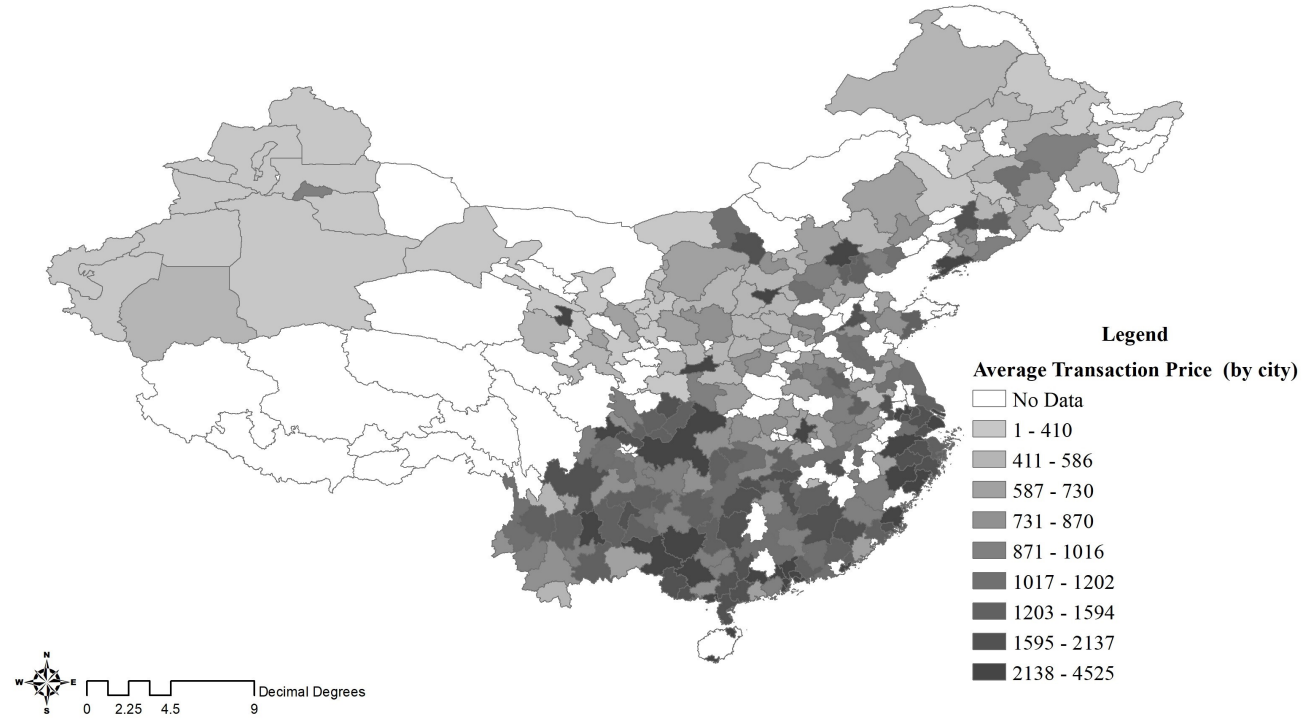
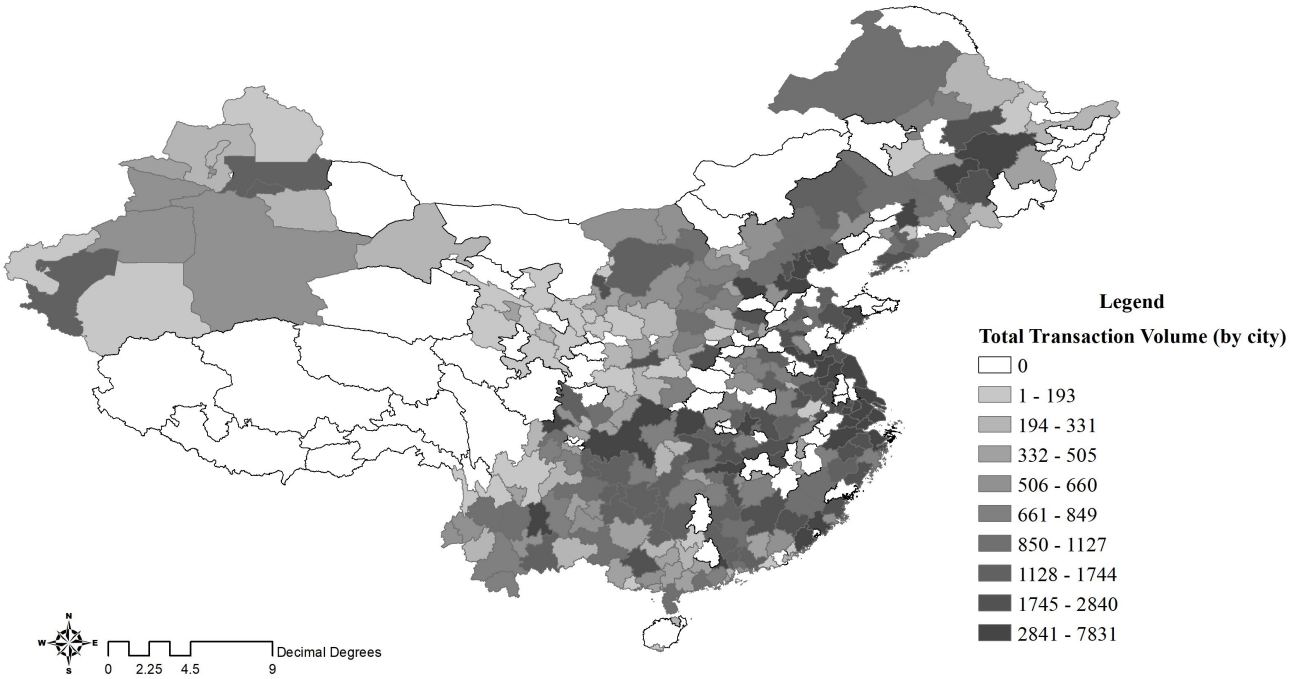
Figure 1: The Distribution of Land Parcel Transactions by Land Use



Notes: This figure shows the trends of aggregated land transactions for different purpose from 2001 to 2015. The right graph presents the aggregated transaction value, and the left figure shows the aggregated transaction volume. The vertical dash line at year 2011 represents the implementation of the first wave of the purchase and financing restrictions in the housing market.

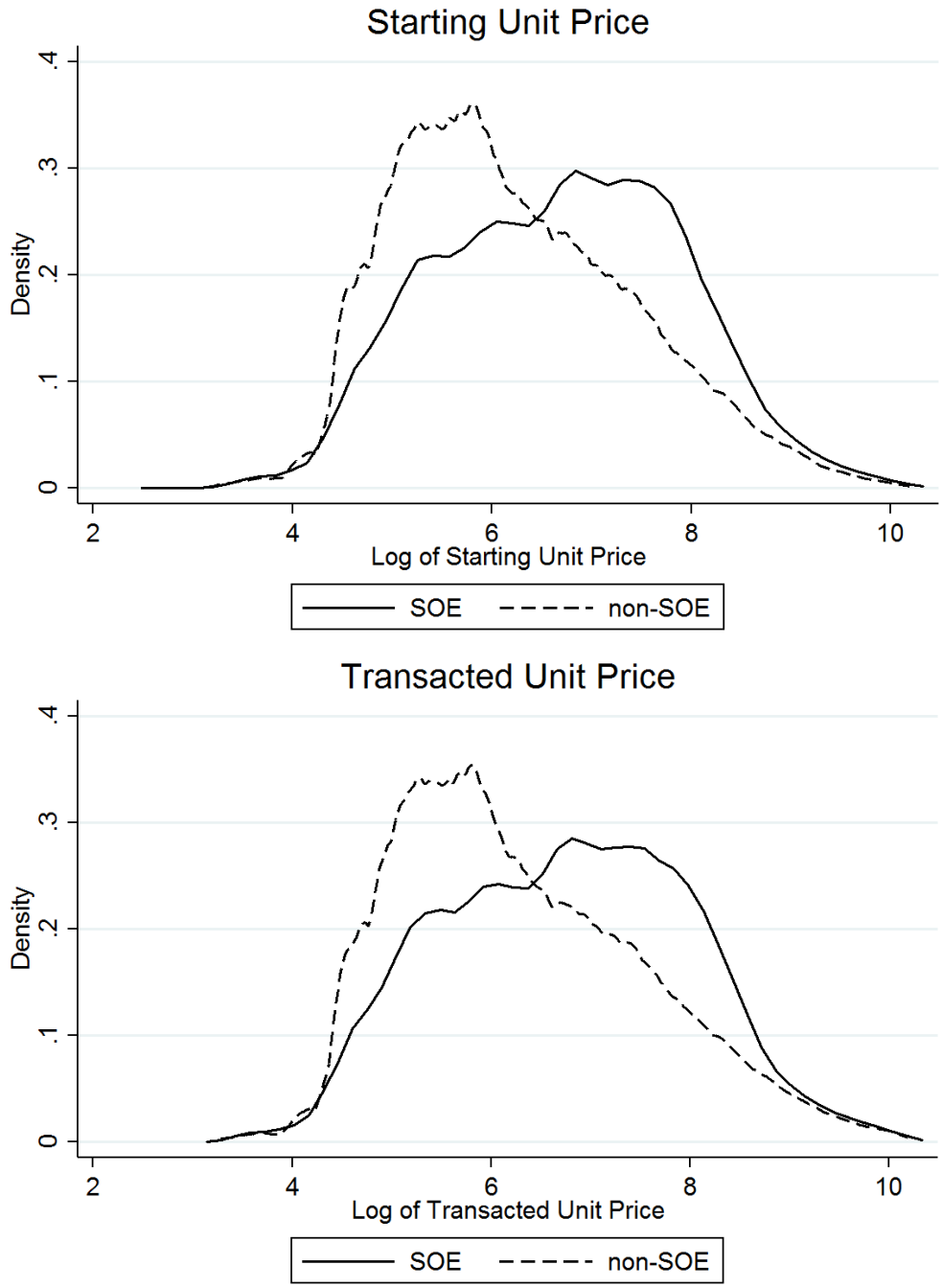
Figure 2: Geographic Distribution of Land Transaction Outcomes across Chinese Cities





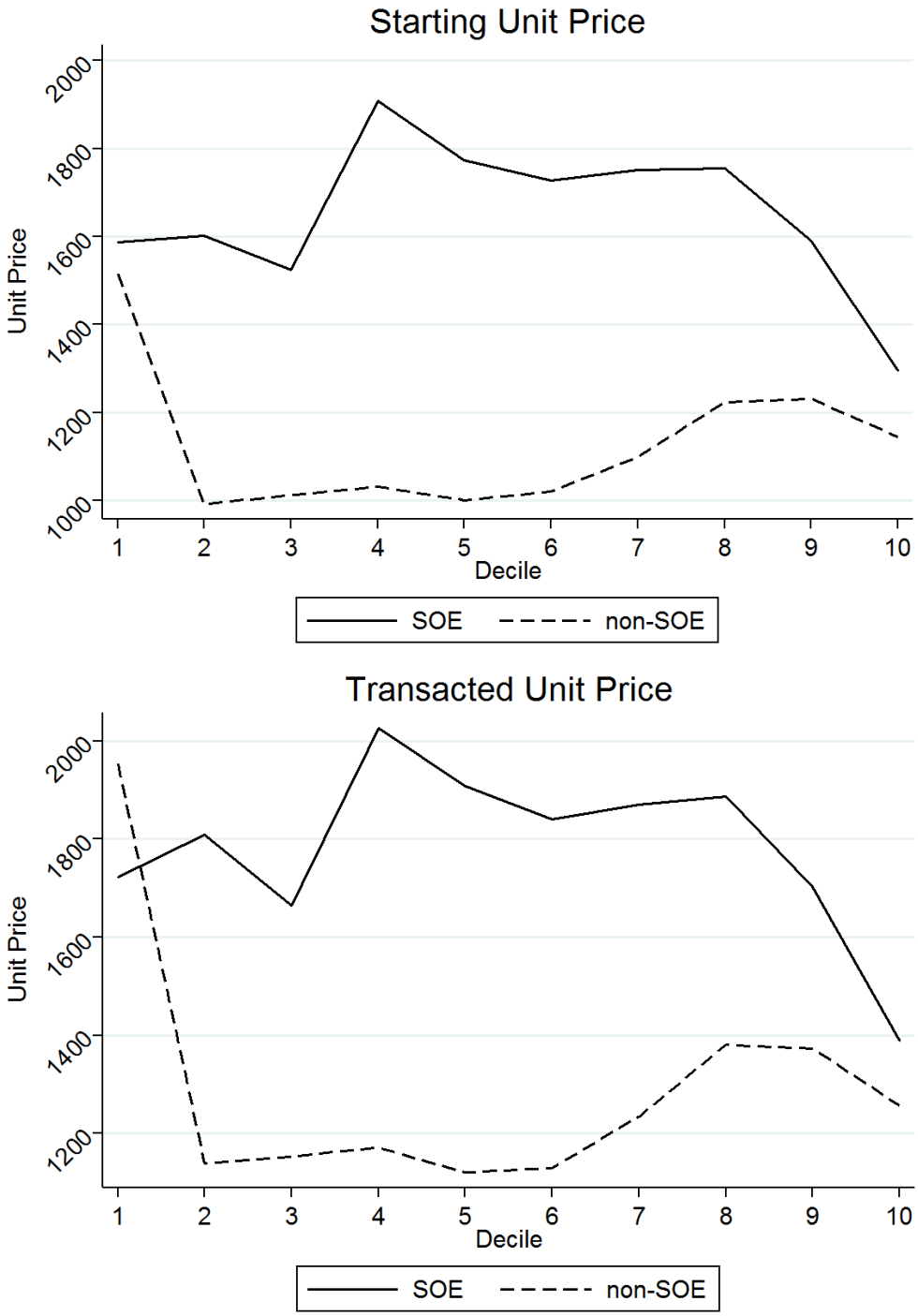
Notes: This figure presents the geographic distribution of the land transactions used in the analysis. The top graph shows the quantile distribution of average transaction price at the city level and the bottom one shows the quantile distribution of average transaction volume at the city level from 2001 to 2015.

Figure 3: The Distribution of Unit Price for Different Types of Bidders



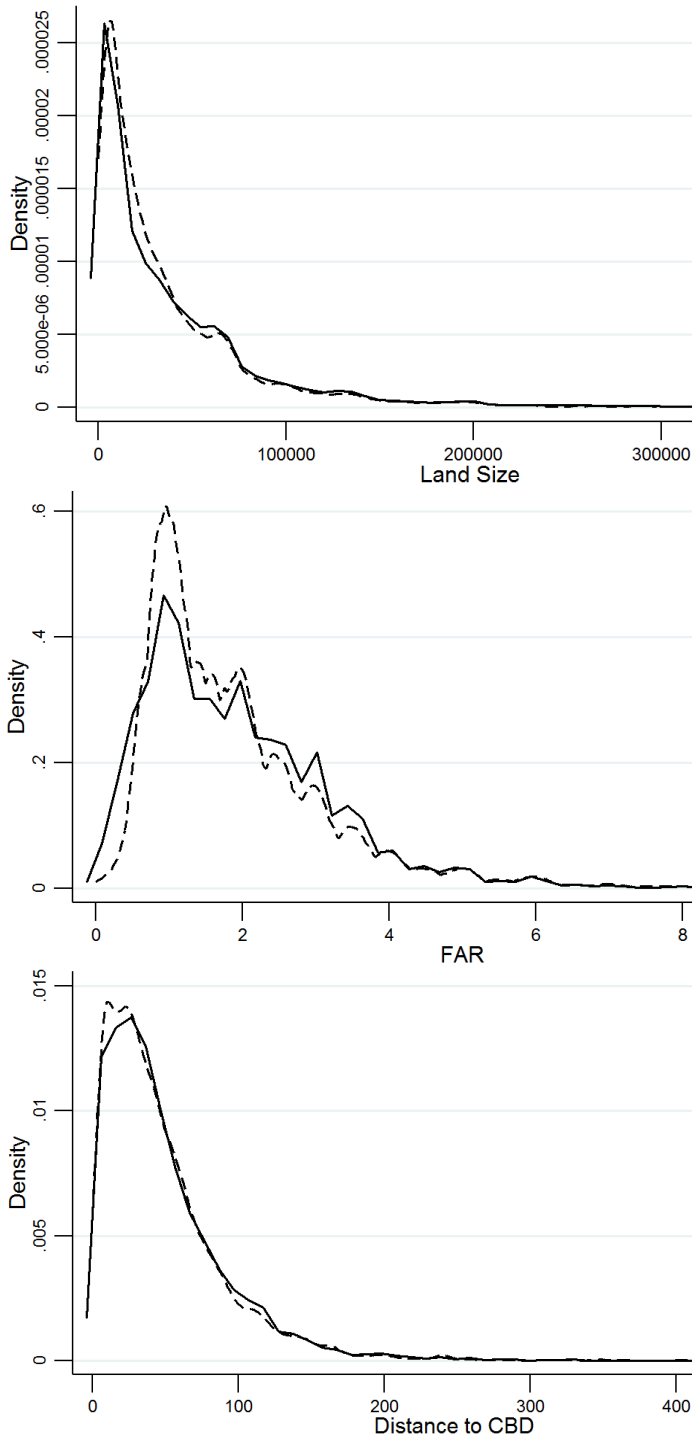
Notes: This figure shows the distribution of reserve unit price, as well as transacted unit price for SOEs and POEs.

Figure 4: The Distribution of Price Difference



Notes: This figure shows the price difference at each decile of land size for SOE and POE. Decile 1 represents the bottom 10% lands in terms of size (sq.m), and decile 10 represents the top 1% land parcels.

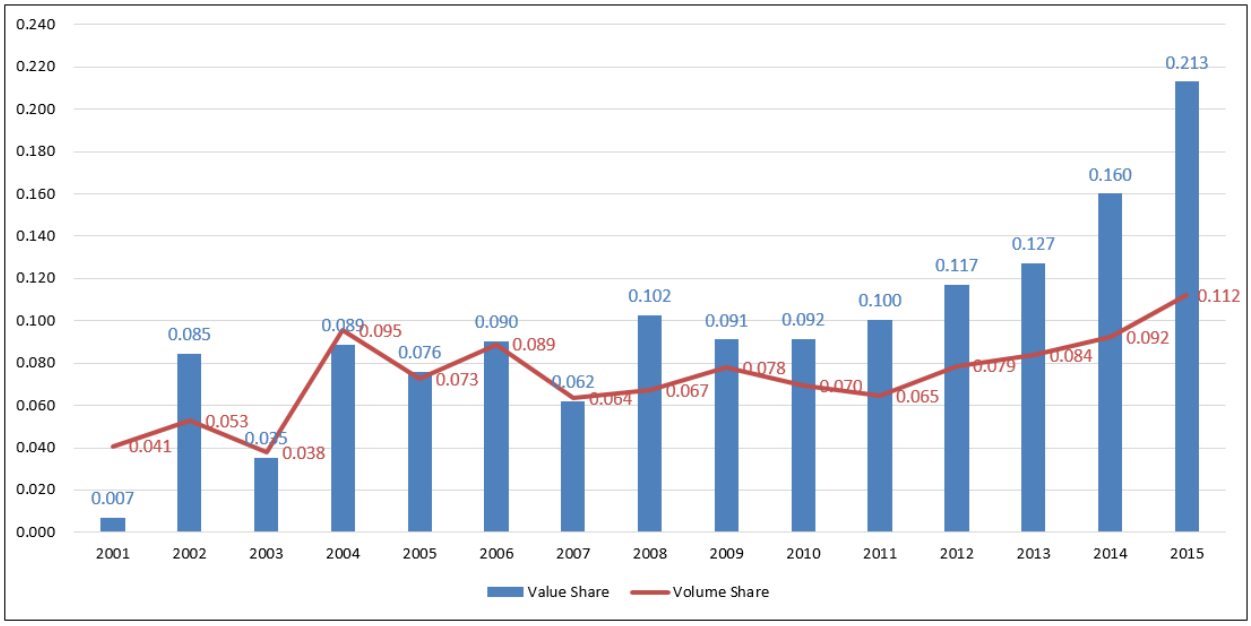
Figure 5: The Distribution of Price Difference



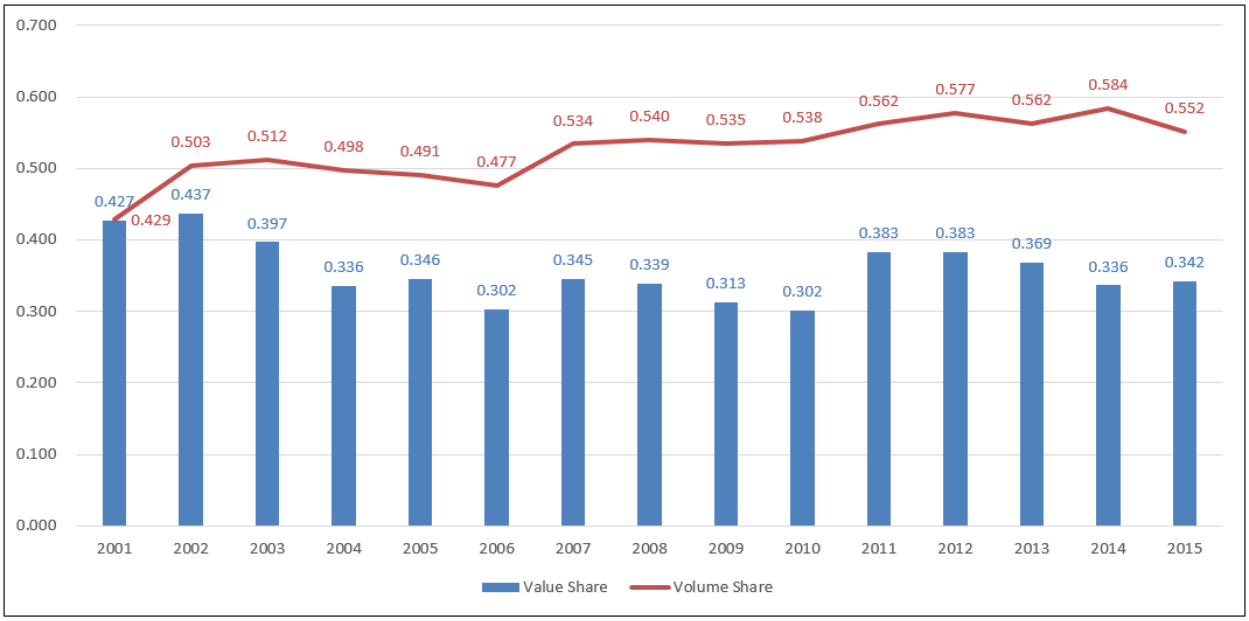
Notes: This figure presents the kernel distribution of land size, floor area ratio, and distance to CBD of SOEs versus POEs after the propensity score matching.

Figure 6: SOEs' and Small Entrepreneurs' Share in China Land Transactions

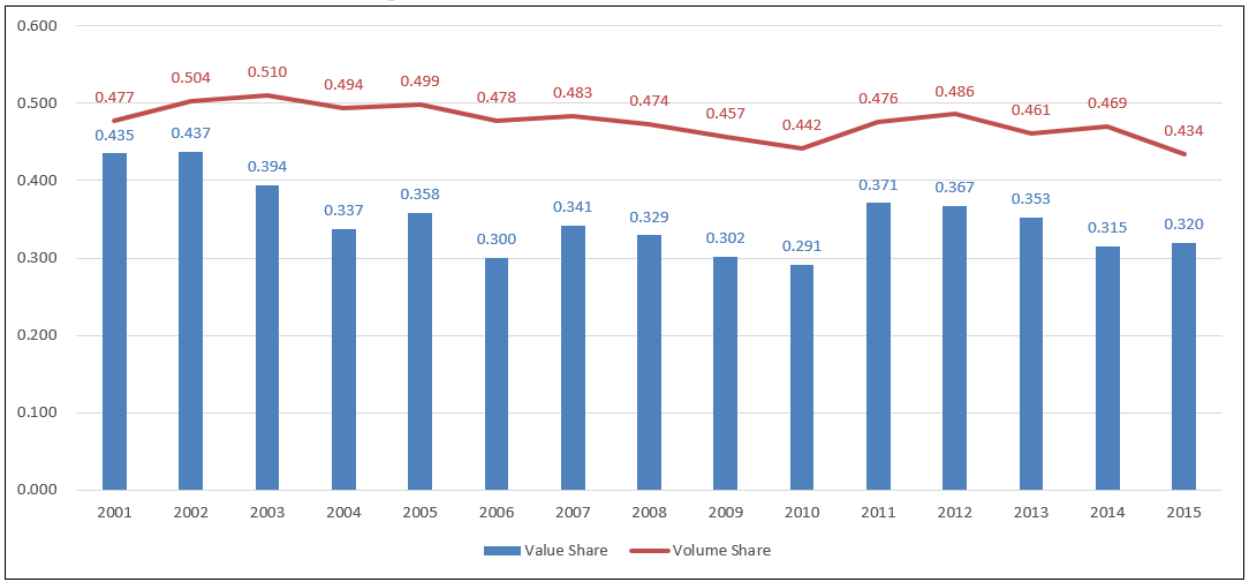
Panel A: SOE's Share in China Land (all types of lands) Transactions



Panel B: Small Entrepreneurs' Share in China Land (all types of lands) Transactions

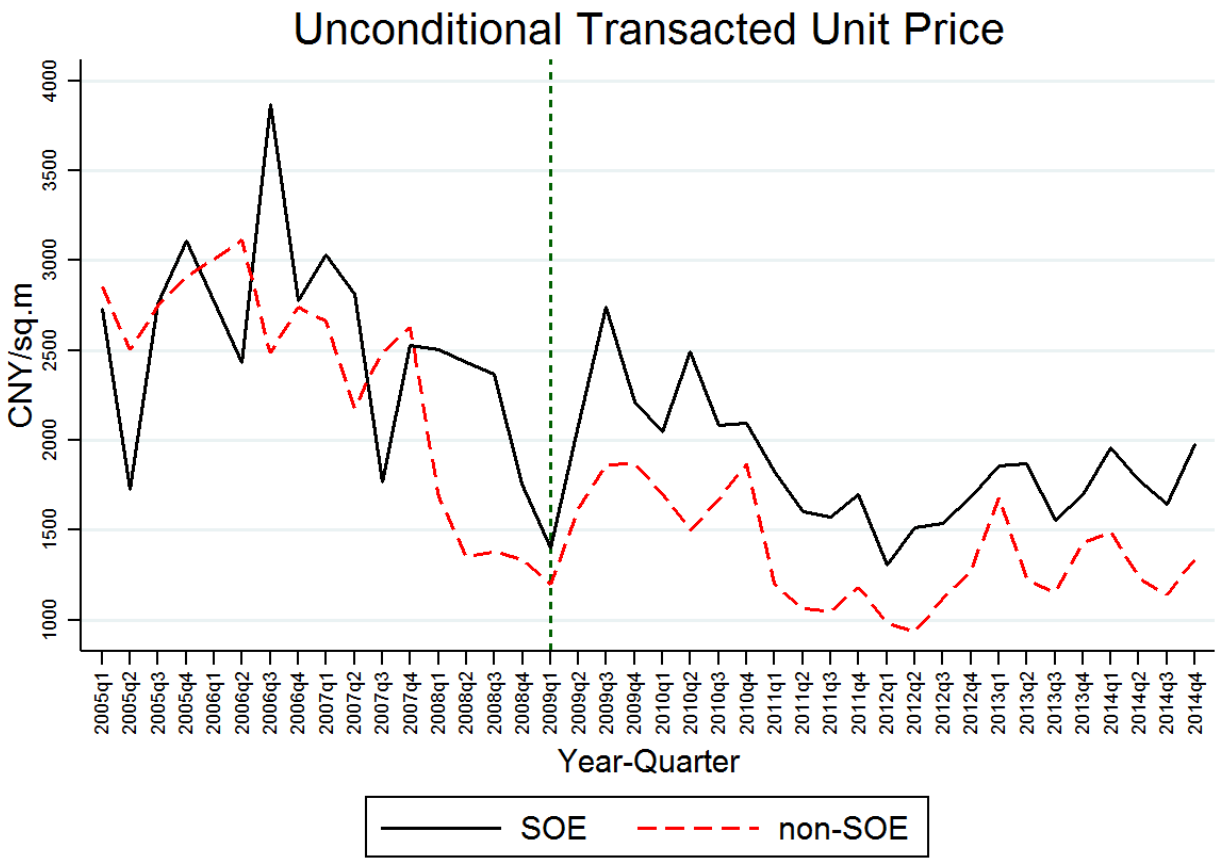


Panel C. Small Entrepreneurs' Share in China Residential Land Transactions



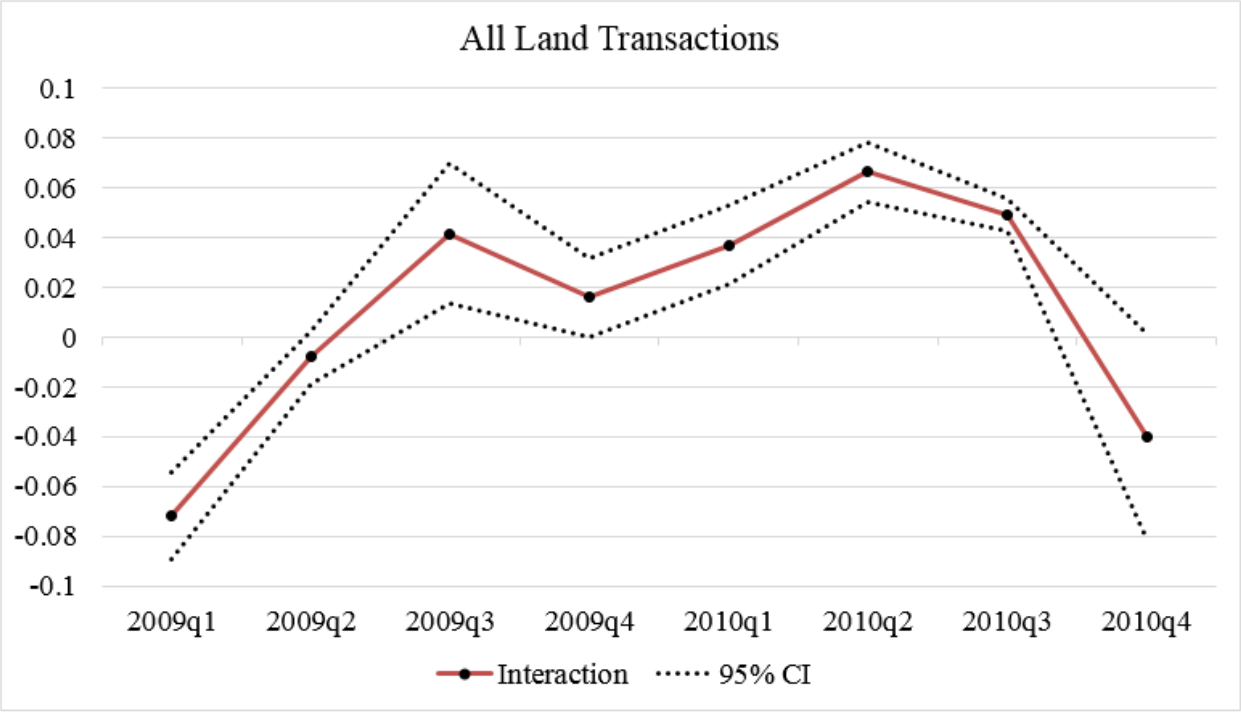
Notes: This figure presents the variation of investors' share in land transactions in terms of value and volume from 2001 to 2015. Panel A plots the SOE unconditional market share (based on the transactions of all types of land) in terms of total transacted value and total transacted. Small entrepreneurs' unconditional market share in China's all land transactions is presented in Panel B, and the share in China's residential land transactions is presented in Panel C. The small entrepreneurs are defined as the firms, whose official registered capital are less than 100 million Yuan (translated in to 2016 Yuan). The solid bar in each panel represents bidders' value share and the line represents bidders' volume share.

Figure 7: Unconditional Transacted Unit Price of SOEs and POEs



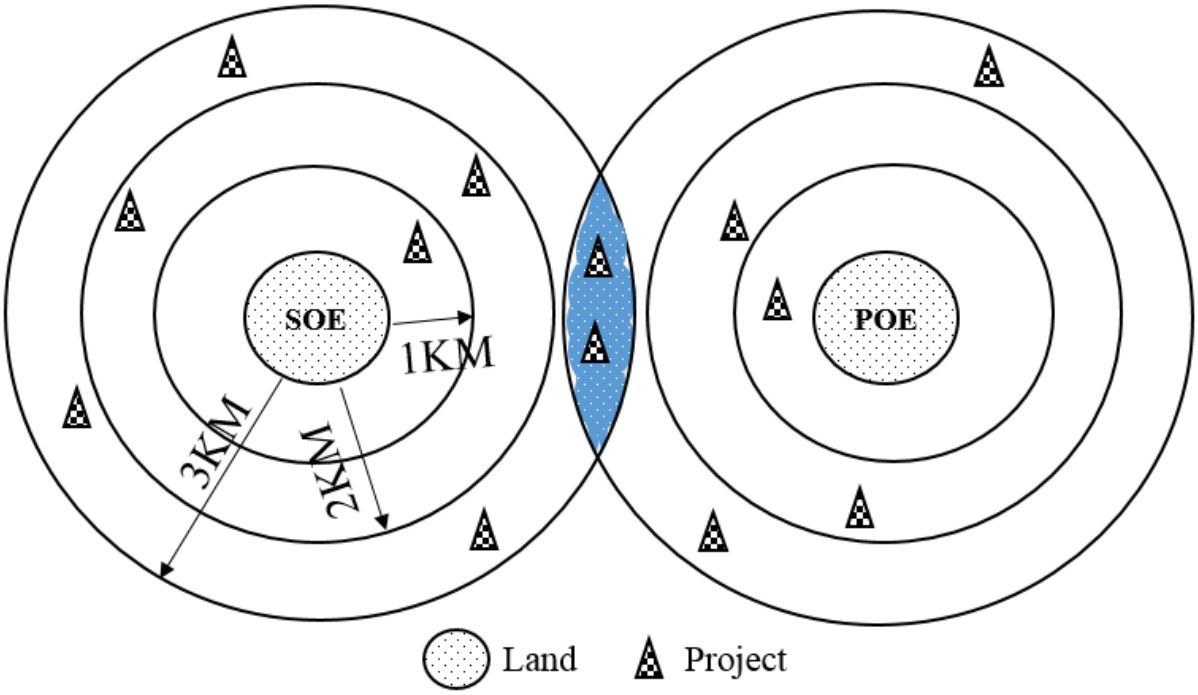
Notes: The Figure plots the unconditional mean transacted unit price of SOEs and POEs during the period from 2004 to 2014. The vertical dash line marks the announcement of the 4 Trillion Yuan Stimulus Program in November 2008.

Figure 8: Estimated SOEs' Responses Dynamics for All Lands Transactions



Notes: This figure presents the estimated SOEs' dynamic responses to the 4 Trillion Yuan Stimulus Program in the aggregated land transactions. The solid line shows the trend of the interaction term (SOE * After) in different post policy periods (as measured in quarter) and the two dotted lines denote the 95% confidence interval of the estimated coefficient.

Figure 9: Lands and Projects in a Circle



Notes: This figure exhibits the distributions of projects located around the lands acquired by SOEs and POEs.

Table 1: Tenure of Land Use

Types of Land Use	**Time Limit**
Residential	70 years
Industrial	50 years
Education, science, culture, public health and physical education	50 years
Comprehensive/mixed usage	50 years
Commercial, tourist and recreational purposes	40 years

Notes: This table presents the land tenure of the major types of land use in China.

Table 2: Disbursement of the 4 Trillion Yuan Stimulus, 2008-2010

Disbursements	**Period**	**Amount (CNY billion)**
First Wave	2008Q4	108
Second Wave	2009Q1	130
Third Wave	2009Q2	70
Fourth Wave	2009Q3	80
Fifth Wave	2009Q4	223.8
Sixth Wave	2010	992.7
Total Amount		1604.5

Notes: Data source: the official website of the NDRC (National Development and Reform Commission), China.

Table 3: Distributions of Land Transactions

Panel A: By Land Use and Auction Mode

City Tier		Land Use					Auction Mode	
		Residential	Others	Commercial	Industrial	Mixed	English Auction	TS Auction
1st Tier Cities (4)	Obs.	1,341	103	1,553	4,337	831	164	8,001
	Percent	16.42%	1.26%	19.02%	53.12%	10.18%	2.01%	97.99%
2nd Tier Cities (34)	Obs.	18,969	2,018	15,881	42,100	11,075	13,430	76,613
	Percent	21.07%	2.24%	17.64%	46.76%	12.30%	14.92%	85.08%
3rd Tier Cities (253)	Obs.	68,085	4,346	45,744	98,320	10,361	28,743	198,113
	Percent	30.01%	1.92%	20.16%	43.34%	4.57%	12.67%	87.33%

Panel B: By Bidder Group

City Tier		Bidder Group 1		Bidder Group 2		Bidder Group 3		Bidder Group 4	
		Individual	Firm	non-SOE	SOE	RE Company	non-RE Company	Local	non-Local
1st Tier Cities (4)	Obs.	84	8,079	7,630	535	1,997	6,168	7,026	546
	Percent	1.03%	98.97%	93.45%	6.55%	24.46%	75.54%	92.79%	7.21%
2nd Tier Cities (34)	Obs.	4,135	85,903	83,088	6,955	26,142	63,901	77,113	5,455
	Percent	4.59%	95.41%	92.28%	7.72%	29.03%	70.97%	93.39%	6.61%
3rd Tier Cities (253)	Obs.	31,386	195,454	206,799	20,057	54,348	172,508	170,198	18,214
	Percent	13.84%	86.16%	91.16%	8.84%	23.96%	76.04%	90.33%	9.67%

Notes: This table shows the distributions of land transactions by city tier, land use, auction mode, and different combinations of bidder groups (Bidder Group1: Individuals versus firms; Bidder Group2: SOE versus POE; Bidder Group3: POE real estate companies versus POE non-real estate companies; Bidder Group4: POE bidders local bidders and POE non-local bidders). Land Use includes residential use, business/commercial use, industrial use, mixed use, and others. Auction Mode contains the English auction and the two stage auction. Our sample includes four 1st tier cities, 34 2nd tier cities, and 253 3rd tier cities.

Table 4: Descriptive Statistics

Panel A. SOEs versus POEs (Full Sample)

Sample	SOE			POE			SOE-POE
Variables	Mean	Median	S.D	Mean	Median	S.D	Diff. in Means
Reserve price (per sq.m/Yuan)	1,621.03	851.90	2,350.00	1,084.17	384.00	2,019.00	536.86***
Unit Price (per sq.m/Yuan)	1,752.12	898.80	2,576.00	1,206.49	389.00	2,342.00	545.63***
Total Price (Mill. Yuan)	59.09	16.43	117.10	40.29	7.40	104.70	18.8***
Land Size (sq.m)	38,986.00	21,641.00	49,439.00	32,993.00	18,639.00	41,725.00	5,993***
CBD Dis. (km)	49.75	38.56	44.46	47.11	37.18	41.80	2.64***
Two-Stage Auction	0.87	1.00	0.34	0.89	1.00	0.31	-0.025***
FAR	1.92	1.60	1.28	1.78	1.50	1.18	0.14***
Real Estate	0.16	0.00	0.36	0.30	0.00	0.46	-0.142***
Local	0.91	1.00	0.28	0.92	1.00	0.28	-0.004***
Registered Cap. (Thou. Yuan)	183.36	23.44	1225.00	20.34	2.69	134.45	163.02***
No. of Transactions	26,609			256,322			
No. of SOEs or POEs	9,714			143,579			

Panel B. SOEs versus POEs (Matched Sample)

Sample	SOE			POE			SOE-POE
Variables	Mean	Median	S.D	Mean	Median	S.D	Diff. in Means
Reserve price (per sq.m/Yuan)	1,621.00	851.90	2,350.00	1,138.00	417.20	1,990.00	483***
Unit Price (per sq.m/Yuan)	1,752.00	898.80	2,576.00	1,265.00	430.20	2,309.00	487***
Total Price (Mill. Yuan)	59.09	16.43	117.10	49.35	9.75	116.00	9.74**
Land Size (sq.m)	38,986.00	21,641.00	49,439.00	39,155.00	23,331.00	46,334.00	-169
CBD Dis. (km)	49.75	38.56	44.46	47.24	36.13	44.06	2.51
Two-Stage Auction	0.87	1.00	0.34	0.88	1.00	0.32	-0.013
FAR	1.92	1.60	1.28	1.86	1.50	1.24	0.058
Real Estate	0.16	0.00	0.36	0.32	0.00	0.47	-0.16
Local	0.91	1.00	0.28	0.91	1.00	0.29	0.003
Registered Cap. (Thou. Yuan)	183.36	23.44	1,225.00	20.18	2.99	101.88	163.182***
No. of Trans.	26,609			20,002			
No. of SOEs or POEs	9,710			18,242			

Notes: This table presents the descriptive statistics for the full samples and matched samples of Individuals, firms, SOSs, and POE. ***, **, and * indicating a difference that is statistically significant at the 1%, 5%, and 10% level, respectively.

Table 5: SOEs' Price Premium

Model	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full Sample			Matched Sample		
SOE	0.1359***	0.1438***	0.1189***	0.1175***	0.1381***	0.0965***
	(0.0188)	(0.0168)	(0.0161)	(0.0180)	(0.0163)	(0.0162)
Real Estate			0.0673***			0.0330
			(0.0140)			(0.0207)
Local			-0.0572***			-0.0275
			(0.0150)			(0.0212)
ln(Capital)			0.0249***			0.0289***
			(0.0018)			(0.0037)
TS Auction		-0.2825***	-0.2796***		-0.2396***	-0.2387***
		(0.0208)	(0.0206)		(0.0272)	(0.0271)
ln(Land Size)		-0.0126***	-0.0262***		-0.0254***	-0.0385***
		(0.0035)	(0.0033)		(0.0058)	(0.0056)
FAR		0.2263***	0.2216***		0.2284***	0.2239***
		(0.0049)	(0.0049)		(0.0080)	(0.0080)
ln(CBD dis.)		-0.0911***	-0.0899***		-0.0751***	-0.0743***
		(0.0087)	(0.0086)		(0.0101)	(0.0101)
Constant	6.4024***	6.4746***	6.4289***	4.4285***	4.6949***	4.5607***
	(0.0239)	(0.0522)	(0.0543)	(0.5947)	(0.6657)	(0.7043)
Observations	240,844	240,844	240,844	37,693	37,693	37,693
R-squared	0.765	0.798	0.800	0.767	0.799	0.800
landuse FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES	YES	YES

Notes: This table reports the results of stepwise regressions based on Equation (1), which estimates the price difference between lands achieved by SOEs and POEs. Specifically, the table compares the price difference in the full sample in Columns (1) to (3), and the matched sample in Columns (4) to (6). The samples used in this table excludes the transactions made by Individuals. For variable definitions and details of their constructions, see Appendix A. The dependent variable is the logarithmic transacted unit price. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table 6: WSOEs' Price Premium

Model	(1)	(2)
Sample	Full Sample	Matched Sample
SOE	0.0327	0.0383
	(0.0345)	(0.0282)
SOE*WSOE	0.1095***	0.0782***
	(0.0352)	(0.0264)
Real Estate	0.0698***	0.0393*
	(0.0139)	(0.0206)
Local	-0.0579***	-0.0299
	(0.0151)	(0.0210)
ln(Registered Cap.)	0.0246***	0.0282***
	(0.0018)	(0.0037)
TS Auction	-0.2793***	-0.2386***
	(0.0206)	(0.0271)
ln(Land Size)	-0.0262***	-0.0384***
	(0.0033)	(0.0056)
FAR	0.2216***	0.2242***
	(0.0049)	(0.0080)
ln(CBD dis.)	-0.0897***	-0.0736***
	(0.0086)	(0.0101)
Constant	6.4275***	4.5650***
	(0.0543)	(0.7094)
Observations	240,844	37,693
R-squared	0.800	0.801
landuse FE	YES	YES
District FE	YES	YES
Year-Month FE	YES	YES

Notes: This table reports the results of stepwise regressions by adding an interaction term ($SOE * WSOE$) to Equation (1), which estimates the price premium paid by WSOEs. Specifically, the table compares the price difference in the full sample in Column (1), and the matched sample in Column (2). The sample used in this table excludes the transactions made by Individuals. For variable definitions and details of their constructions, see Appendix A. The dependent variable is the logarithmic transacted unit price. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table 7: DID Estimation on Four-Trillion-Yuan Policy

Treatment Group	SOE	Real Estate	Local	Individual
Model	(1)	(2)	(3)	(4)
SOE	0.0889***			
	(0.0311)			
SOE*After	0.0567*			
	(0.0315)			
Real Estate		-0.0261		
		(0.0269)		
Real Estate *After		0.0370		
		(0.0279)		
Local			-0.0957**	
			(0.0394)	
Local*After			0.0319	
			(0.0411)	
Individual				-0.0044
				(0.0649)
Individual *After				0.0648
				(0.0664)
TS Auction	-0.2825***	-0.3575***	-0.2145***	-0.3490***
	(0.0059)	(0.0217)	(0.0237)	(0.0211)
ln(Land Size)	-0.0126***	-0.0220***	-0.0114***	-0.0174***
	(0.0011)	(0.0042)	(0.0036)	(0.0036)
FAR	0.2263***	0.2268***	0.2185***	0.2275***
	(0.0017)	(0.0047)	(0.0067)	(0.0046)
ln(CBD dis.)	-0.0911***	-0.0919***	-0.0791***	-0.0926***
	(0.0020)	(0.0088)	(0.0091)	(0.0088)
	6.4740***	6.3006***	5.5792***	6.2574***
	(0.0632)	(0.0483)	(0.0675)	(0.0463)
Observations	240,844	212,133	171,765	316,320
R-squared	0.805	0.890	0.781	0.748
landuse FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Notes: This table reports the results for DID regressions. Column (1) reports the baseline results on Equation [1], with SOE corresponding to the treatment group vis-à-vis POE. We perform three falsification tests using reak estate companies (POEs), local firms (POEs), and individuals separately as treatment groups, and present the results in Column (2) to (4). After is a dummy that is equal to 1 if the transaction occurs after 2008, 0 otherwise. SOE*After, Real Estate*After, Local*After, and Individual*After interact SOE, Real Estate, Local, and Individual with After, respectively. The dependent variable is the logarithmic transacted unit price. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table 8: The Inclusion of the Reserve Price and Residual

Model	(1)	(2)	(3)	(4)
Sample	Full Sample		Matched Sample	
SOE	-0.0061	-0.0056	-0.0031	-0.0031
	(0.0059)	(0.0063)	(0.0032)	(0.0035)
Reserve Price	0.9997***		0.9971***	
	(0.0019)		(0.0029)	
Residual		0.9985***		0.9948***
		(0.0022)		(0.0032)
Real Estate	0.0032	0.0527***	0.0056	0.0546***
	(0.0025)	(0.0025)	(0.0043)	(0.0047)
Local	-0.0175**	-0.0522**	-0.0205***	-0.0533***
	(0.0086)	(0.0258)	(0.0061)	(0.0068)
ln(Registered Cap.)	0.0004	0.0293***	-0.0000	0.0291***
	(0.0004)	(0.0004)	(0.0008)	(0.0010)
TS Auction	-0.0735***	-0.2761***	-0.0633***	-0.2620***
	(0.0049)	(0.0052)	(0.0073)	(0.0078)
ln(Land Size)	-0.0064***	-0.0274***	-0.0060***	-0.0276***
	(0.0007)	(0.0008)	(0.0012)	(0.0012)
FAR	0.0016*	0.2215***	0.0021	0.2214***
	(0.0009)	(0.0008)	(0.0015)	(0.0015)
ln(CBD dis.)	-0.0008	-0.0901***	0.0006	-0.0894***
	(0.0009)	(0.0011)	(0.0015)	(0.0017)
Constant	0.0932***	6.2681***	0.1596	5.5899***
	(0.0166)	(0.0109)	(0.1093)	(0.1060)
Observations	240,844	240,844	37,693	37,693
R-squared	0.985	0.985	0.986	0.986
landuse FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Notes: This table reports the results of including reserve price to Equation (1). Headers in the second row indicate the sample used for regressions. The samples used in this table excludes the transactions made by Individuals. For variable definitions and details of their constructions, see Appendix A. The dependent variable is the logarithmic transacted unit price. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table 9: Projects around Lands (SOEs versus POEs)

Model	(1)	(2)	(3)	(4)
Sample	After Auction	Between the 2^{nd} and 3^{nd} Year after the Auction		
Distance	3KM	3 KM	2 KM	1 KM
SOE	0.016***	0.015**	0.019**	0.017*
	(0.005)	(0.008)	(0.009)	(0.010)
ln(size)	-0.027***	-0.024***	-0.023***	-0.023***
	(0.005)	(0.005)	(0.006)	(0.008)
FAR	0.000*	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Green Ratio	-0.000	-0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
ln(CBD dis.)	-0.111***	-0.110***	-0.113***	-0.121***
	(0.018)	(0.017)	(0.017)	(0.019)
Constant	8.070***	8.090***	8.160***	8.529***
	(0.107)	(0.109)	(0.108)	(0.128)
Observations	831,024	157,028	78,773	20,914
R-squared	0.509	0.471	0.466	0.513
Project Type FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Decoration Type FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Notes: This table reports the results of testing whether the sales prices of projects located around the lands acquired by SOEs are higher than the sales prices of projects located around the lands acquired by POEs. The dependent variable is the logarithmic opening unit price for the project. "After Auction" includes housing projects that start to sell after the land transaction in certain radius (1-3 km). Similarly, "Between the 2^{nd} and 3^{nd} Year after the Auction" includes housing projects that start to sell during the 2^{nd} and 3^{nd} year after the land transaction in certain radius. For variable definitions and details of their constructions, see Appendix A. All specification include project type effect, district fixed effect, decoration type fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table 10: Underlying Mechanisms: Money Wealth and Political Connection

Model	(1)	(2)
Sample	Full Sample	Matched Sample
SOE	0.0112	-0.0051
	(0.0166)	(0.0692)
SOE*After	0.0162**	0.0486***
	(0.0067)	(0.0093)
Residual	0.9372***	0.9528***
	(0.0006)	(0.0014)
TS Auction	-0.0739***	-0.0639***
	(0.0014)	(0.0035)
ln(Land Size)	-0.0061***	-0.0060***
	(0.0003)	(0.0007)
FAR	0.0017***	0.0020**
	(0.0004)	(0.0009)
ln(CBD dis.)	-0.0008	0.0005
	(0.0005)	(0.0013)
Constant	0.0753	0.1658*
	(0.1081)	(0.0901)
Observations	240,844	37,693
R-squared	0.961	0.972
landuse FE	YES	YES
District FE	YES	YES
Year-Month FE	YES	YES

Notes: This table reports the regression results of Equation (2) with including the reserve price simultaneously. Headers in the second row indicate the sample used for the regressions. The dependent variable is the logarithmic transacted unit price. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table 11: Crowd-Out Effect

Model	(1)	(2)
Dependent Variable	Volume Share	Value Share
After	0.0588	0.1481
	(0.0821)	(0.0905)
Treat*After	0.0962***	0.0701*
	(0.0365)	(0.0411)
Constant	0.4028*	0.2256
	(0.2153)	(0.2385)
Observations	6,010	6,010
R-squared	0.598	0.540
District FE	YES	YES
Time FE	YES	YES

Notes: This table reports the regression results of Equation (4) to examine the crowd out effect on POEs in the restricted districts. Headers in the second row indicate the calculation of the dependent variable. The dependent variable is the SOEs market share in a district. All specification include land use district fixed effect, and semi-annual fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Appendices

Appendix A. The Definitions of Variables

Reserve price is the reserve price per sq.m/Yuan. In China, Bureau of Land and Resources at the municipal or county level hires an independent appraisal agency to estimate the value of each land parcel, and the local government sets the reserve price of the land being auctioned based on a thorough evaluation of the proposed land use, average land market price, demand and supply condition, location, industrial policy, regulations of land price, macroscopic adjustment, and potential development.

Unit Price is the transacted unit price measured in per sq.m/Yuan.

Total Price is the transacted total price measured in Mill. Yuan. **Land Size** is the size of the transacted land measured in sq.m.

CBD Dis. is physical distances (in kilometres) between the land parcel and the CBD of the host city.

Two-Stage Auction is a dummy variable taking value of 1 if the land parcel is transacted through a Two-Stage Auction, 0 otherwise.

FAR is short for floor area ratio, which measures a building's total floor area (zoning floor area) to the size of the piece of land upon which it is built.

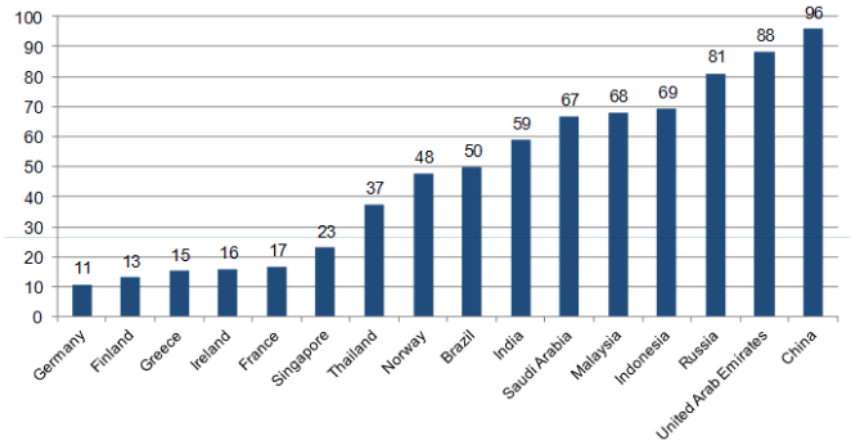
Real Estate is a dummy variable taking value of 1 if the firm is a real estate company, 0 otherwise.

Local is a dummy variable taking value of 1 if the firm is located in the same city as the purchased land.

Capital is short for registered capitalization (in thousand Yuan), which serves as a proxy for a firm's size. A firm's registered capitalization is provided by NECIPS.

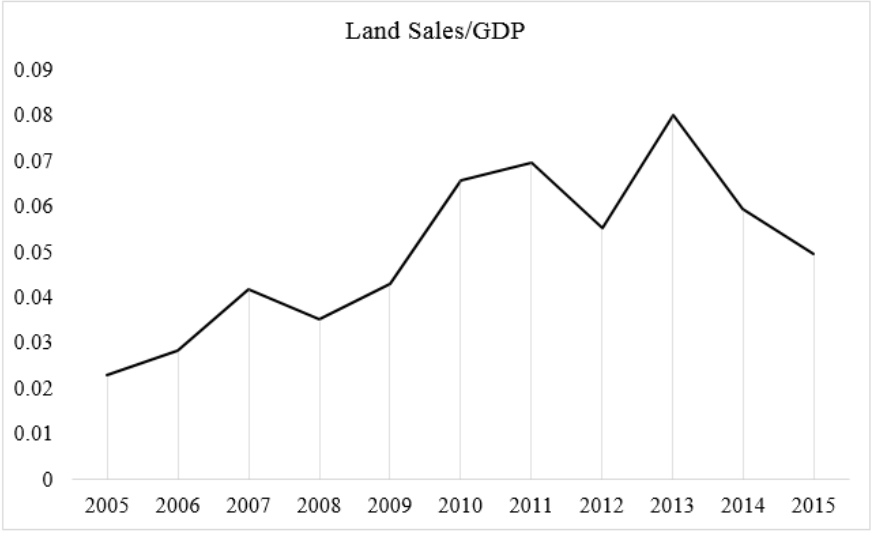
Appendix B. Supplementary Figures and Tables

Figure B1: SOE shares among countries' top ten firms (%)



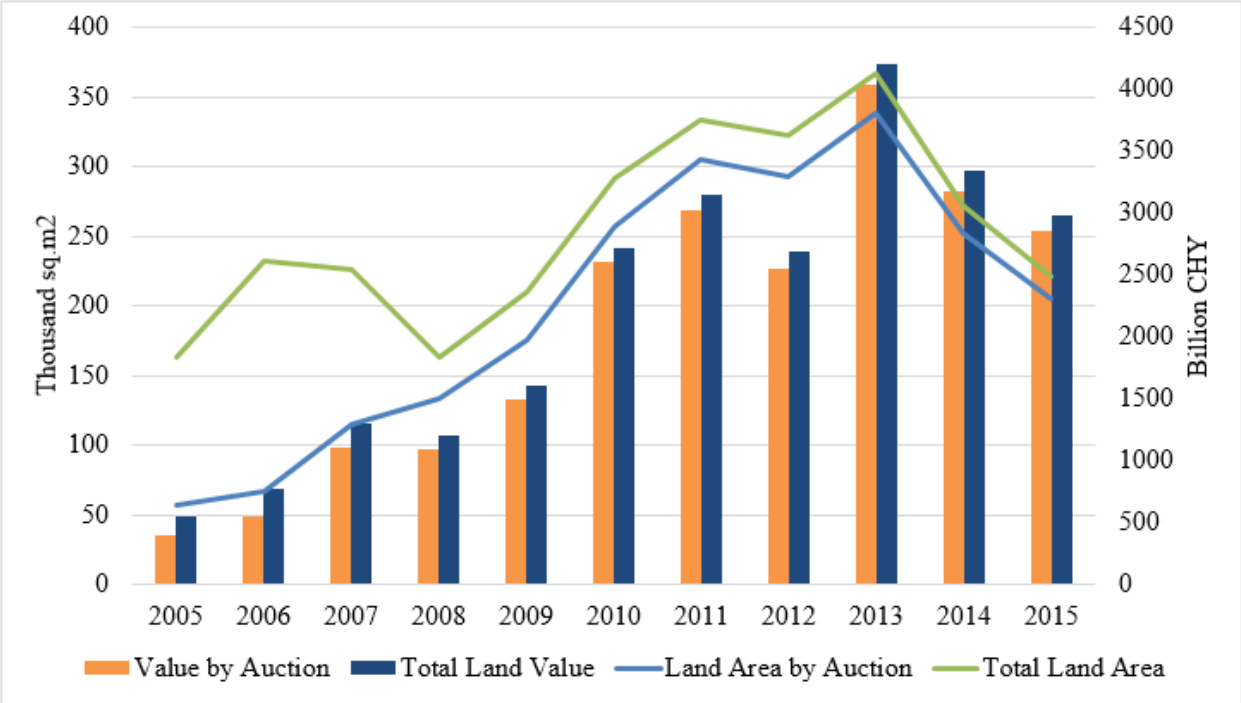
Notes: Source: OECD report (2016)

Figure B2: Ratio of Land Sales to GDP (%)



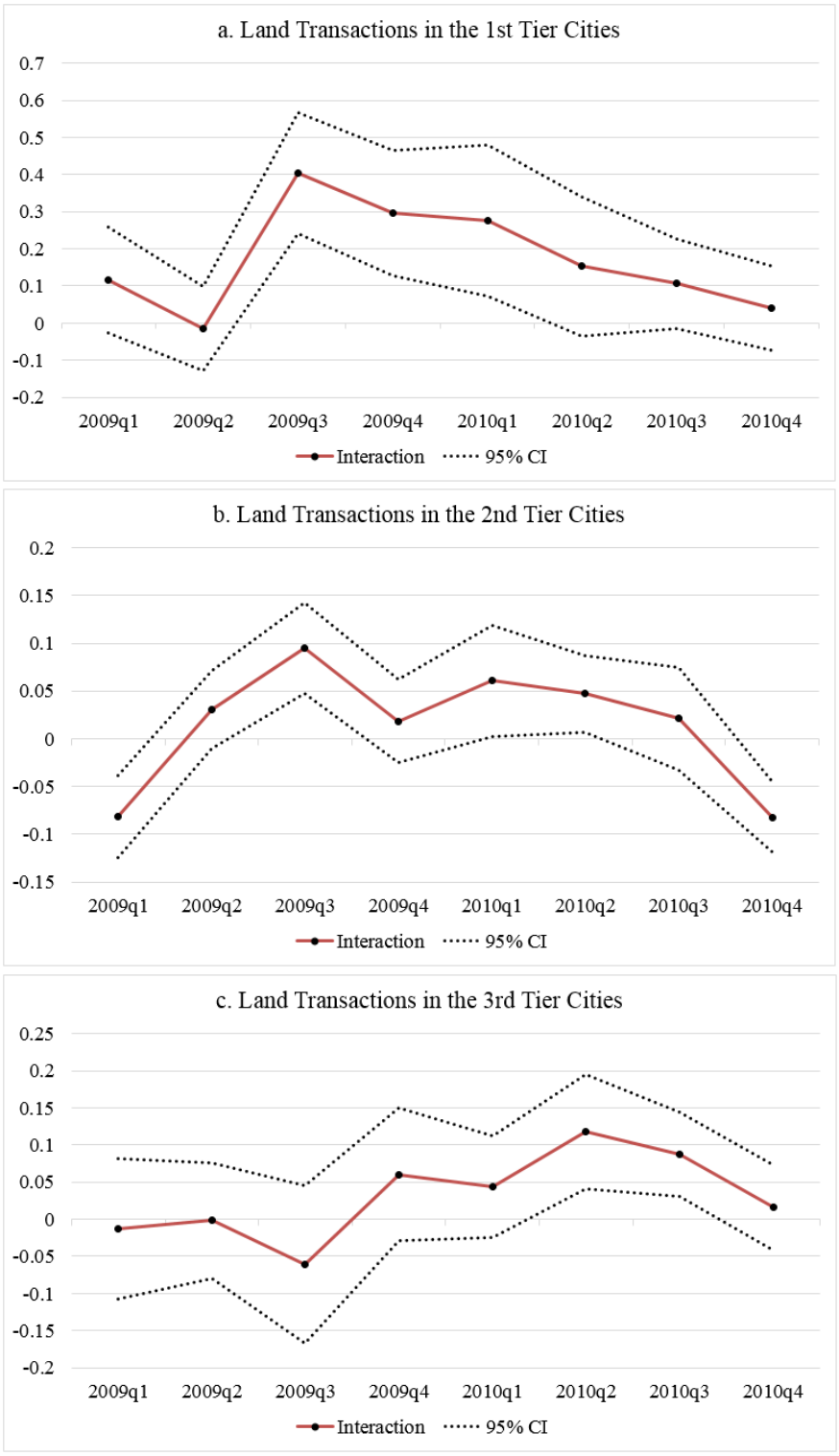
Notes: This figure shows the ratio of land sales to GDP.

Figure B3: The Trend of Land Transactions by Auction after 2005



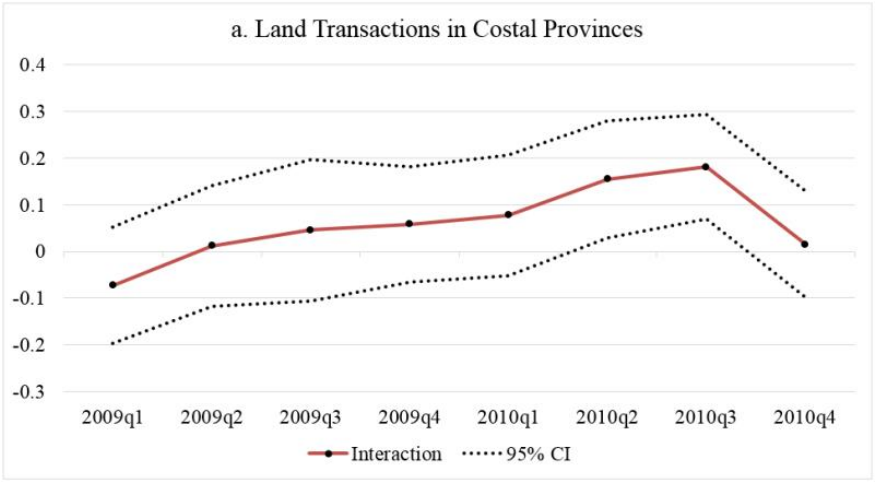
Notes: This figure shows the trend of land parcels transacted through public auction from 2005 to 2015.

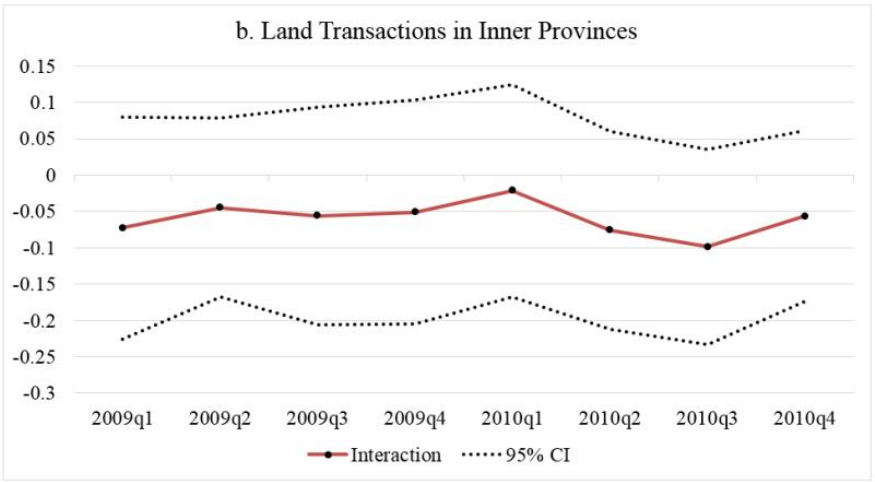
Figure B4: Estimated SOEs' Responses Dynamics by City Tier



Notes: This figure presents the estimated SOEs' dynamic responses to the 4 Trillion Yuan Stimulus Program in the aggregated land transactions by city tier. The solid line shows the trend of the interaction term ($SOE * After$) in different post policy periods (as measured in quarter), and the dotted lines denote the 95% confidence interval of the estimated coefficients.

Figure B5: Estimated SOEs' Responses Dynamics by Geographic Region





Notes: This figure presents the estimated SOEs' dynamic responses to the 4 Trillion Yuan Stimulus Program in the aggregated land transactions by geographic location. The cities are categorized as coastal cities and inner cities. The solid lines show the trends of the interaction terms ($SOE*After$) in different post policy periods (as measured in quarter) and the dotted lines denote the 95% confidence interval of the estimated coefficients.

Heterogeneity of SOEs' Responses across City Tiers and Geographic Region

Housing prices and land prices vary dramatically across cities in China (Wu et al. 2012, 2015). The dataset of land transactions provide wide geographic coverage of land transactions in China. We categorized the cities into three tiers and studied the heterogeneous responses of the price premiums paid by SOEs in depth[34].

In this subsection, we estimated the interaction term ($SOE*After$) in Equation [4] for different groups of cities. As shown in Figure B4, we found that the price premiums paid by SOEs relative to POEs in the second tier cities showed the quickest responses, and those in the first tier cities showed the strongest responses to the 4 Trillion Yuan Stimulus Program, but took two quarters to take place.

More specifically, the price premiums paid by SOEs in the first, second, and third tier cities start to respond in 2009q3, 2009q1, and 2009q4, respectively. In terms of their magnitude, the coefficient of the interaction term increased to a culmination of 0.4 in the first tier cities, 0.1 in the second and third tier cities. This is consistent with our argument that SOEs bid up the land prices because they were chasing superior lands. The land parcels in China's first tier cities are limited and are the most expensive ones, thus they have the greatest potential for capital appreciation, which provides a possible explanation as to why the SOEs paid higher price premiums in the first tier cities[35].

Figure B5 shows the dynamic responses of the price premiums paid by SOEs in coastal providences[36] and inner provinces[37] to the stimulus program, respectively. Price premiums paid by SOEs increased quickly after the introduction of the stimulus program in costal areas, and the effects are significant positive in the next eight quarters. Conversely, SOEs' price premiums did not increase much in inner cities, suggesting substantial regional differences.

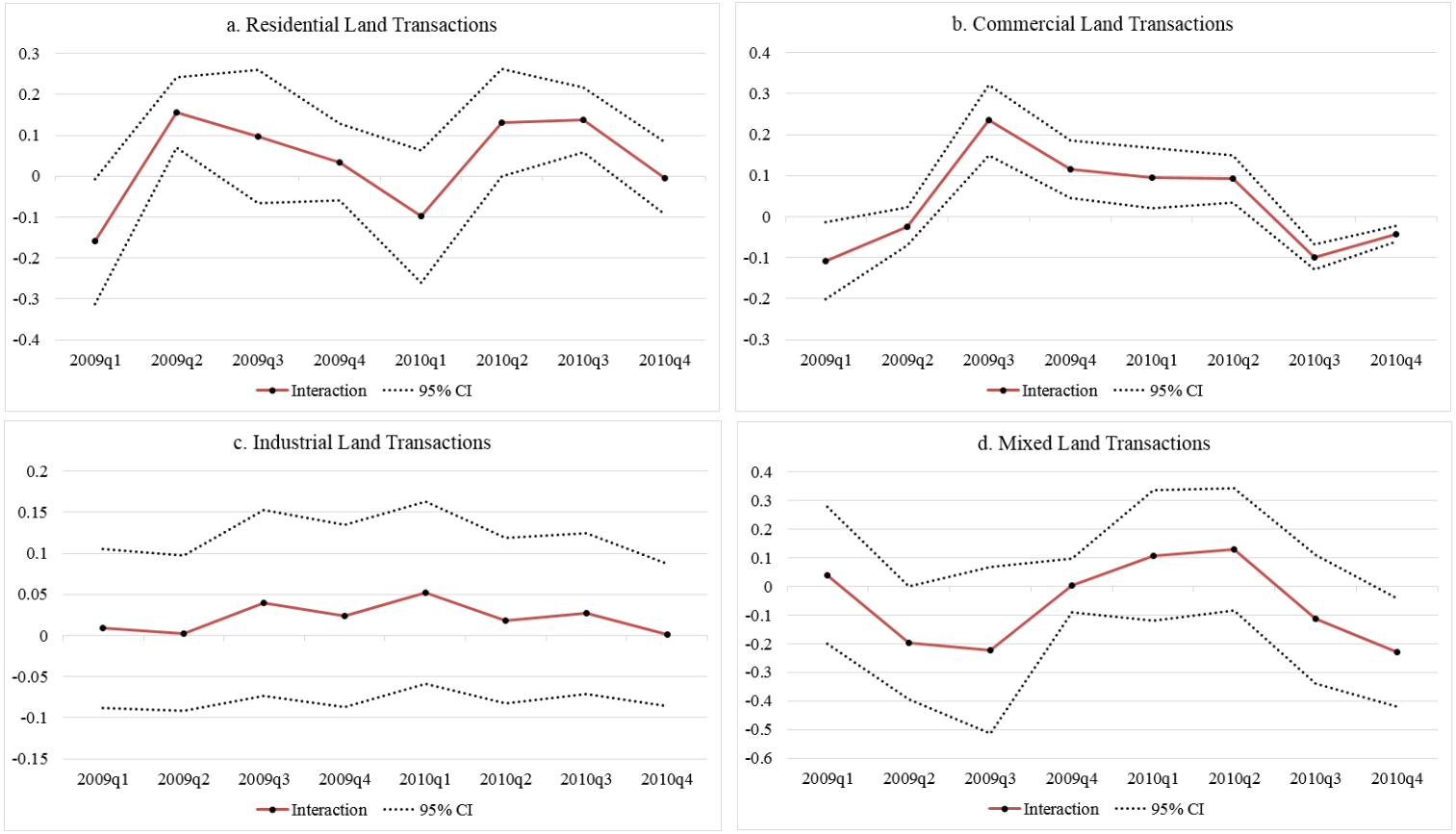
[34]First tier cities: Beijing, Shanghai, Guangzhou, and Shenzhen; Second tier cities: Tianjin, Chongqing, Shijiazhuang, Taiyuan, Huhehaote, Shenyang, Dalian, Changchun, Haerbing, Nanjing, Hangzhou, Ningbo, Hefei, Fuzhou, Xiamen, Nanchang, Jinan, Qingdao, Zhengzhou, Wuhan, Changsha, Nanning, Haikou, Chengdu, Guiyang, Kunming, Xi'an, Lanzhou, Xining, Yinchuan, Wulumuqi, Wuxi, Suzhou, Beihai, and Sanya. The rest of the cities are third tier cities.

[35]According to our dataset of land transactions, the mean transacted prices of first tier cities, second tier cities, and third tier cities were 3,239 yuan, 1,898 yuan, and 1,044 yuan, respectively.

[36]Coastal areas included: Shanghai, Tianjin, Shandong, Guangdong , Jiangsu, Hebei, Zhejiang, Fujian, Liaoning, Hainan.

[37]Inner areas included: Yunan, Neimenggu, Beijing, Jilin, Sichuan, Ningxia, Anhui, Shanxi, Guangxi, Xinjiang, Jiangxi, Henan, Hubei, Hunan, Gansu, Xizang, Guizhou, Chongqing, Shanxi, Qinghai, Leilongjiang

Figure B6: Estimated SOEs' Responses Dynamics by Land Type



Notes: This figure presents the estimated SOEs' dynamic responses to the 4 Trillion Yuan Stimulus Program in the aggregated land transactions by land type. The solid lines show the trends of the interaction terms ($SOE * After$) in different post policy periods (as measured in quarter) and the dotted lines denote the 95% confidence interval of the estimated coefficients.

Heterogeneity of SOEs' Response across Land Types

Here we study the dynamics of the heterogeneous responses of SOEs to the 4 Trillion Yuan Stimulus Program across four land types in Figure A6. As prices also differ in a wide range across different types of land, we found the response of the price premiums paid by SOEs to be the strongest (around 0.2) and quickest (in the first quarter) for relatively expensive land parcels: residential and commercial lands.

For the industrial land parcels, which are transacted at relatively lower prices, the response trend was flat. The response of the price premiums paid by SOEs in mixed land transactions seemed to have been irregular. The reason for this could be the composition of the land categories in mixed land transactions. Unlike the other three types of land transactions, which were designated for explicit use, mixed land transactions contain land for various development purposes. Consequently, the response of the price premiums paid by SOEs could also be controversial in mixed land transactions.

Table B1: The Proportion of SOEs

Year	No. of SOEs	Percentage SOEs to Total Firms
2001	369,000	0.1219
2004	192,000	0.0591
2008	156,000	0.0315
2012	159,644	0.0193
2015	133,631	0.0106

Notes: This table presents the number and proportion of SOEs from 2001 to 2015. Data source: National Bureau of Statistics of China.

Table B2: The Distribution of Lands Transactions before and after 2009

Sample Period	Before 2009	After 2009
Residential	22.57%	27.42%
Others	1.29%	1.99%
Commercial	19.95%	19.32%
Industrial	30.31%	45.46%
Mixed	25.87%	5.81%
1st Tier Cities	14.00%	1.77%
2nd Tier Cities	57.68%	26.41%
3rd Tier Cities	28.32%	71.82%

Notes: This table summarizes the land transactions before and after the implementation of the 4-Trillion Stimulus Program (in 2009) by land type and city tier.

Table B3: SOEs' Premium with Industrial Land Excluded

Model	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full Sample			Matched Sample		
SOE	0.1061***	0.1181***	0.1054***	0.0915***	0.1081***	0.0848***
	(0.0214)	(0.0186)	(0.0181)	(0.0231)	(0.0202)	(0.0202)
Real Estate			0.1165***			0.0819***
			(0.0131)			(0.0224)
Local			-0.0792***			-0.0408
			(0.0142)			(0.0282)
ln(Registered Cap.)			0.0325***			0.0326***
			(0.0029)			(0.0049)
TS Auction		-0.3149***	-0.3080***		-0.2456***	-0.2418***
		(0.0202)	(0.0200)		(0.0312)	(0.0311)
ln(Land Size)		-0.0309***	-0.0430***		-0.0437***	-0.0536***
		(0.0041)	(0.0040)		(0.0074)	(0.0072)
FAR		0.2511***	0.2438***		0.2392***	0.2328***
		(0.0053)	(0.0052)		(0.0087)	(0.0087)
ln(CBD dis.)		-0.1039***	-0.1015***		-0.0799***	-0.0780***
		(0.0098)	(0.0098)		(0.0114)	(0.0114)
Constant	6.3380***	6.5362***	6.4005***	4.5323***	4.9105***	4.7077***
	(0.0285)	(0.0598)	(0.0640)	(0.5309)	(0.6351)	(0.6910)
Observations	121,787	121,787	121,787	24,062	24,062	24,062
R-squared	0.560	0.642	0.646	0.595	0.663	0.666
landuse FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES	YES	YES

Notes: This table replicate the main analyses with industrial land parcels excluded. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table B4. SOE's Premium with Individual Bidders Included

Model	(1)	(2)	(3)	(4)
Sample	Full Sample		Matched Sample	
SOE	0.0959***	0.1475***	0.0992***	0.1427***
	(0.0163)	(0.0140)	(0.0158)	(0.0143)
TS Auction		-0.3576***		-0.2786***
		(0.0214)		(0.0246)
ln(Land Size)		-0.0233***		-0.0263***
		(0.0040)		(0.0052)
FAR		0.2292***		0.2136***
		(0.0046)		(0.0067)
ln(CBD dis.)		-0.0918***		-0.0814***
		(0.0088)		(0.0092)
Constant	6.1908***	6.3000***	6.3336***	6.4985***
	(0.0223)	(0.0467)	(0.0457)	(0.0699)
Observations	316,320	316,320	48,482	48,482
R-squared	0.742	0.782	0.746	0.778
landuse FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Notes: This table includes the transactions of individual bidders into the regressions as a robustness check. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table B5. Projects around Lands (Individuals versus Firms)

Model	(1)	(2)	(3)	(4)
Sample Period	After Auction	Between the 2^{nd} and 3^{nd} Year after the Auction		
Distance	3KM	3 KM	2 KM	1 KM
Individual	-0.008	0.006	0.001	-0.029
	(0.010)	(0.014)	(0.012)	(0.020)
ln(size)	-0.027***	-0.024***	-0.023***	-0.023***
	(0.005)	(0.005)	(0.006)	(0.008)
FAR	0.000*	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Green Ratio	-0.000	-0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
ln(CBD dis.)	-0.111***	-0.110***	-0.113***	-0.122***
	(0.018)	(0.017)	(0.017)	(0.019)
Constant	8.070***	8.088***	8.159***	8.530***
	(0.107)	(0.109)	(0.108)	(0.128)
Observations	831,024	157,028	78,773	20,914
R-squared	0.509	0.471	0.466	0.513
Project Type FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Decoration Type FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Notes: This table reports the results of testing the price differences between land parcels purchased by individuals and firms. The dependent variable is the logarithmic opening unit price for the project. "After Auction" includes housing projects that start to sell after the land transaction in certain radius (1-3 km). Similarly, "Between the 2^{nd} and 3^{nd} Year after the Auction" includes housing projects that start to sell during the 2^{nd} and 3^{nd} year after the land transaction in certain radius. All specification include project type effect, district fixed effect, decoration type fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Table B6. The likelihood of SOEs Winning Hot Land Parcels

Model	(1)	(2)
Sample	Full	Matched
Reserve Price	0.1917***	0.2129***
	(0.0181)	(0.0221)
TS Auction	0.0276	0.0579
	(0.0495)	(0.0592)
ln(Land Size)	0.1000***	0.0554***
	(0.0083)	(0.0101)
FAR	-0.0581	-0.0858
	(0.0601)	(0.0925)
ln(CBD dis.)	-0.0352***	-0.0681***
	(0.0125)	(0.0166)
Constant	-3.8808***	-2.3595***
	(0.2206)	(0.5822)
Observations	240,606	37,665
Landuse FE	YES	YES
District FE	YES	YES
Year-Month FE	YES	YES

Notes: This table examines the likelihood of SOEs winning hot land parcels using a probit regression. All specification include land use fixed effect, district fixed effect, and year-month fixed effect. Heteroscedasticity-consistent standard errors clustered at the district level as shown in the brackets. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.