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A Tale of Two Cities – A Comparative Study of Land Conveyance Decisions Upon National Policies and Their Impacts on Land Transaction Prices in Beijing and Shanghai

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Abstract

Although urban land leasing is supposedly a local government matter, local leaderships' proactive pursual of economic growth for their career advancements can sometimes be at odds with national policies. Yet, how land conveyance decisions are made in midst of the implementation of national policies and land financing has been a rather overlooked aspect in the studies of China's land market. Hence, this paper explores this issue through a study of land conveyance decisions in Beijing and Shanghai's residential and commercial land markets from 2007 to 2018, and their subsequent land price effects. Deploying endogenous treatment effect models, it is revealed that land conveyance decisions in Beijing were highly subject to national policies and the status of its City Party Secretary, but not in Shanghai. Also, the use of *Guapai* resulted in higher residential and commercial land prices in Shanghai, but lower prices for Beijing's commercial land parcels. The findings indicate that Beijing, due to its closer proximity to the Central Government, appears to have stringently followed the national policy directions, whereas land officials in Shanghai seem to have had a higher degree of autonomy in their decisions. Additionally, the contrasting price effect of *Guapai* on land prices for residential and commercial land parcels enabled Beijing's government to compensate for the latent losses in land revenue when leasing residential land parcels, due to Nation #10, by leasing commercial parcels at higher prices via tender.

Keywords: Land conveyance; National Policies; *Guapai*; Tender; Land Price; Beijing; Shanghai

1. Introduction

Fiscal decentralization has been instrumental in China's economic development, since Deng Xiaoping launched the Open-Door Policy in 1978. Under this mechanism, local governments within China pursue their own economic growth, by competing for private-sector investment with other cities, while maintaining financial self-sufficiency. Local economic growth, in turn, is a primary indicator for the assessment of local leadership's performance under the cadre evaluation system, which has implications for these officials' career advancement. However, the tax reform of 1994, which was subsequently revised in 2002, requires local governments to hand over a stipulated portion of their tax revenue to the Central Government. In return, the Central Government permits these local governments to retain the revenue obtained from the leasing of state-owned urban land, which was made possible by the separation of land ownership rights and land-use rights in the late 1980s. A result of this policy development is the growing importance of land conveyance among local governments in financing public infrastructure projects and for other public programmes. To have an idea of the magnitude of land conveyance revenue in local government finance, it was reported that, by 2016, the land conveyance fees generated from the leasing of urban land amounted to 3.46 trillion yuan, compared to 51.4 billion yuan in 1999 (Ministry of Land and Resources of China (2000; 2017). In terms of the size of land conveyance fees with reference to local government revenue, according to several studies (Li, 1999; Ho and Lin, 2003; Ye & Wu, 2014), 30-70% of municipal revenue was generated from the sale of land-use rights alone. The national average, according to official data (National Bureau of Statistics, 2018), was close to 50% by 2016. As the development of public infrastructure, as well as the improvement of existing infrastructure, can further attract private-sector investment, which triggers economic growth for a city, local officials, hence, have the incentives to maximize land revenue.

Since 2002, land use rights of state-owned urban land have been transacted via one of the following three methods: 1) English auction (*paimai*); 2) tender (*zhaobiao*); and 3) *Guapai* (also known as listed auction or two-stage auction) which was introduced to replace negotiation. In western countries, auction and tender are primarily used for land conveyance. Of the three modes of land conveyance, English auction is perceived as the most market-oriented. Tender, by contrast, is an invitation issued by local governments usually to a selected group of potential buyers to bid for a particular land parcel. Unlike auction which is open-bid, tender is sealed-bid as the bidders do not know the strategies of others until the winner is announced by local

governments. Besides, the bid price is not the sole determinant of winning (Yang et al., 2015). Meanwhile, the novel land conveyance arrangement known as *Guapai* consists of two stages. During the first stage, which has a duration of at least ten days, the listing of an urban land parcel is announced by a local government and the bid(s) are subsequently disclosed to the public at a designated land exchange centre. Unlike English auctions, should there only be one bidder in the race by the time the listing expires, this sole bidder is declared the winner and the land parcel is leased at its offering price. Otherwise, the process then enters the second stage, in which the parcel is leased under an English auction where the highest bidder wins. Of these three modes of land leasing, tender, given its sealed-bid characteristic, is less open and more subject to official discretions than auction and *Guapai*. As of the use of these three methods by local governments, auction or *Guapai* is prevalently used in land leasing in most Chinese cities. The only exceptions are Beijing and Shanghai, the subjects of this study, in which tender and *Guapai* have been primarily deployed instead.

Despite the high degree of discretions by local officials in land matters, local land conveyance decisions may not be entirely autonomous as they can be under the influence not only of the local leadership's need to push for economic growth for career-related reasons, but also of the Central Government's policy directions, such as the i) Nation #10 policy which demands local governments to devise measures to curb the consistently-soaring housing prices and ii) the nationwide Anti-Corruption Campaign launched by President Xi Jinping. These exogenous policies, therefore, could have implications for the land conveyance decisions to be made (and thus, land revenue local governments are able to obtain), the degree of urbanization (Li et al., 2019; 2020), housing prices (Zhang et al., 2015) and the subsequent effects on consumption (Dong et al., 2017).

In consideration of the complex dynamics between the Chinese Central Government and local governments, this paper aims to address the following two research questions through an empirical study of land transactions in Shanghai and Beijing from 2007 to 2018:

- Do land conveyance decisions follow the national policy directions proposed by the Central Government or city leaderships' considerations towards their careers via pursuing economic growth?
- Which mode of land leasing (i.e. *Guapai* or tender) yields higher land transaction prices?

The rest of this paper is presented as the following: The next section provides a review of the literature with regard to land conveyance in China and its subsequent impact on a variety of aspects. It is then followed by a section in which the research methodology and data are described. The descriptive statistics of the land transactions are reported in Section 4, followed by the presentation of the research findings in Section 5. Afterwards, Section 6 proffers a discussion of the implication of the findings reported in Section 5, and the final Section 7 concludes the study.

2. Literature Review

What distinguishes the land ownership structure in China from other countries is that all urban land is under the ownership of the State whereas all rural land is owned by the Collectives. Yet, since the Open-door policy was launched in 1978, foreign investment was urgently needed for China's economic development. This required the development of China's immense state-owned urban land resources. However, to do so without compromising the land ownership structure unique to China, institutional changes were inevitable. Therefore, during the Seventh People's Congress in 1988, the separation of land ownership rights and land-use rights were determined, and that land-use rights could be transferred in the market (Xu et al., 2009). This, effectively, has turned China's urban land ownership structure into a leasehold arrangement as seen primarily in the U.K., as well as Asian cities/nations such as Hong Kong, Vietnam, Indonesia, and Laos.

As the fiscal decentralization arrangement promotes competitions amongst local governments across China, urban land, rather than taxation in western countries, has become a tool for local governments to compete with one another to attract foreign investment (Huang and Du, 2017). With reference to the resource flow hypothesis (see Tiebout, 1956; Brueckner, 2003), the emphasis on land in triggering economic growth in China is in stark contrast to neoclassical growth models (Van der Veen and Otterh, 2001) which view land resources as a minor factor. This not only provides local governments a high degree of control as to land development in areas under their governance, but also an important source of income. The role of land conveyance has become even more pronounced in the aftermath of the Tax-sharing system in 1994 (which was revised in 2002). In exchange, the land conveyance fees can be kept by local governments as part of their "extra-budgetary" revenue (Liu, 2008; Zhang, 2008). This arrangement, in effect, centralizes the authority of tax collection while decentralizing the

responsibilities for China's urban development (see Cao et al., 2019; Liu and Lin, 2014; Mello, 2000). Since then, land conveyance fees have become a crucial means for local governments to raise capital for the urban infrastructural development needed to pursue economic growth (Yeh, 2005; Wu et al., 2007), the latter of which is used by the Central Government to evaluate local officials' performance (and possible promotions; see Solé-Ollé and Viladecans-Marsal, 2012; Li, 2014) in essentially a top-down version of the yardstick competition hypothesis developed by Besley and Case (1995).

However, as local governments increasingly depend on land revenue in pursuing economic growth as well as local officials' promotional prosects, how land conveyance influences social development has been vigorously studied by Chinese scholars. For instance, a significant positive relationship between land development and urban economic growth was revealed in Fan et al. (2016), in which the authors opine that urban economic growth is achieved as land development provides the funding for the construction of public infrastructure which in turn triggers economic growth. Liu and Lin (2014) reach a similar conclusion albeit the relationship between the ratio of land revenue to budgetary revenue and economic growth is non-linear. Besides infrastructure projects, the leasing of state-owned urban land also enhances the strength of local public finance (Tao et al., 2010; Wu, 2010; Lin & Yi, 2011). From a non-financial perspective, several other investigations have instead placed their attentions to the impact of land financing (or fiscal decentralization) on the degree of urbanization in Chinese cities. Ye & Wu (2014) reveal that land financing contributes significantly to the level of urbanization in China. More specifically, in cities with higher degrees of fiscal decentralization, the dominance of large cities, as a sign of urban agglomeration, was found to be more pronounced (Wu et al., 2018).

By contrast, some issues also inevitably emerge (Wang et al., 2018). First, as local governments can raise more capital for public infrastructure projects via higher land prices, housing under their jurisdictions becomes less affordable. This poses a substantial risk for land finance should the property bubble burst, as land is commonly used as a collateral to obtain bank loans (Lin and Ho, 2005; Xu and Yeh, 2005). Second, the land finance does not generate a sufficiently stable source of income for local governments, as the amount of land conveyance fees in a given period is intertwined with the demand for public investment in infrastructure projects which is constantly changing. Third, the pursuit of revenue from land leasing gives rise to the

conversion of rural land on a massive scale for urban development. This, especially when 1) the rural villagers are not sufficiently reimbursed in the land acquisition process (Deng et al., 2006; Lichtenberg and Ding, 2008; Tan et al., 2011; Lin and Zhu, 2014; He et al., 2014) and 2) some illegalities are involved in land conveyance (Jia and Liu, 2012; Wu and Heerink, 2016), could lead to social unrest. Fourth, from the land-use efficiency aspect, in a study of Chongqing, Liu et al. (2018) identify rapid urban sprawl towards the city's peri-urban areas, filled with industrial parks, residential communities, and other peri-urban informal development.

In addition, another research area focuses on the effects of land conveyance decisions on land prices. While in western studies, there have been investigations on the price differences between land leased via i) auctions and tender (Milgrom and Weber, 1982; Lusht, 1996) or ii) auctions and negotiations (Allen and Swisher, 2000; Dotzour et al., 1998; Lusht, 1996; Mayer, 1995, 1998). The introduction of *Guapai* in land leasing in China, if anything, adds another dimension to the discussions in this subject area. For instance, Cai et al. (2013) find that, land parcels leased under *Guapai*, in particular "hot" properties (defined by the authors through an *estimated* number of potential participants in the bidding process), are leased to "favoured enterprises" usually at base prices, which are as much as 70% lower than they otherwise would have been if leased under auctions. This, in other words, means lower land revenue for local governments. The authors, hence, view this as evidence of corruption in the land market, in that the use of *Guapai* enables them to send a "signal" to other potential bidders during the first stage of the two-stage auction that the parcel is already "taken", to deter them from entering the bidding process for the land parcel as if the outcome has already been pre-determined. This, according to the authors, makes it easier for local governments to manipulate the process so that "favoured enterprises" can obtain land parcels at lower prices. Likewise, the negative price effects of *Guapai* are also reported in Wang and Hui (2017). By contrast, Yang et al. (2015) focused on *Guapai* and tender in Beijing's land market as English auctions have been hardly, if ever, utilized in land conveyance in China's capital city. They find that, the average price of land leased via *Guapai* is around 10% higher than land leased by tender.

The notion of "favoured enterprises" is also the subject of a recent study of local governments' bid preferences in Wu and Yang (2020). Unlike western nations in which firms either from specific regions (McAfee and McMillan, 1989), or specialize in new technologies or military equipment (Athey et al., 2013; Brannman and Froeb, 2000; Marion, 2007), state-owned

enterprises (SOE) are favoured in engaging in a variety of activities that boost investment and employment, supply crucial resources, gain access to financial markets (Chen and Wu, 2020; Feng et al., 2020; Lei, 2016; Wu, 2019; Wu et al., 2018), as well as those that help achieve political goals (Chen and Kung, 2018; Nian and Wang, 2018). Similar to the findings in Cai et al. (2013), Wu and Yang (2020) also find that SOEs are able to secure land parcels, albeit of lower quality rather than "hot" properties, at substantial price discounts under *Guapai*[1].

However, a notable knowledge gap arises, as the existing studies on local governments' land conveyance decisions have yet to explore the impact of Central Government's nationwide policy directions on these decisions. In recent years, several national policies have been promulgated which could influence local officials' land conveyance decisions within the context of fiscal decentralization. These national policies are Nation #10[2] and the Anti-Corruption Campaign announced following the 18th National Congress of the Communist Party of China, respectively. The significance of studying the potential impact of Nation #10 on land conveyance is self-explanatory, as the primary objective of this policy is to curb the excessive growth in housing prices. As for the Anti-Corruption Campaign, corruptions in the real estate industry have been well-known and prevalent (see Zhu, 2012). President Xi Jinping's call to fight against corruption across China, if anything, could have significant implications for the land conveyance practices of local officials as their behaviours, since the inception of this campaign, are expected to be more closely watched by the Central Government authorities.

Given that a city's economic growth is a vital indicator for the Central Government to evaluate the performance of city leaderships, the research question, as already proposed in the introduction section, as to whether land conveyance decisions are in line with national policy directions promulgated by the Central Government or the city leaderships' concerns towards their careers is raised. To address this research question, this paper explores the effects of the two national policies on decisions made by officials for the conveyance of residential and

[1] It should be noted that, Wu and Yang (2020) compared the land transaction prices in a rather controlled manner, in that the sample comprised only listed enterprises.
[2] http://www.gov.cn/zhengce/content/2010-04/17/content_4639.htm

commercial land parcels in Beijing[3] and Shanghai, and subsequently, the impact of such decisions on the eventual land prices.

3. Methodology & Data

A total of four hypotheses are to be tested in this study. Hypotheses 1 and 2 are related to how the two city governments under study mold their land conveyance decisions in response to the two national policies promulgated by the Central Government, respectively. As the aim of Nation #10 is to curb the excessive growth in housing prices, it is expected that the conveyance method that leads to lower land price (i.e. tender based on the findings in Yang et al. [2015]) would be utilized more likely by land officials upon the introduction of this nationwide policy. Second, should the notion of corruption through the use of *Guapai* in land conveyance hold (see Cai et al., 2013), the Anti-corruption campaign, which is applicable to China as a whole, could result in the less frequent use of this particular method in land conveyance in order not to raise the suspicions of the Central Government.

Meanwhile, Hypothesis 3 concerns the choices made by local officials with reference to how long the city's Party Secretary (CPS) has been servicing the city in this capacity. It is found in Wang and Hui (2017)[4] that, in the earlier phase of a City Party Secretary's tenure, land officials in Chinese cities tended to use auctions more often, rather than *Guapai*, in land conveyance. In short, a land conveyance means which allows for land revenue maximization for the development of infrastructure, which facilitates economic growth, would be preferred. In Beijing and Shanghai, however, state-owned land parcels are almost always leased via either tender or *Guapai*. Of these two means of conveyance, land parcels transacted by *Guapai* were approximately 10% more expensive than those by tender (Yang et al., 2015). In view of these linkages, Hypothesis 3 will test whether *Guapai* is a preferrable means for the sale of land-use rights of state-owned land parcels in the earlier phase of a City Party Secretary's tenure. Additionally, grounded on the findings in Yang et al. (2015), Hypothesis 4 will test whether these authors' findings hold in the study of the conveyance of residential and commercial land parcels alike in Beijing and Shanghai. These four hypotheses are presented as follows:

[3] The only previous study which compared the price differences between land leased by *Guapai* and tender is Yang et al. (2015), which investigated land parcels designated for residential and commercial uses in a single model.

[4] Similarly, the promotional pressure amongst city leadership, under the cadre evaluation system, is also found to have influenced the debt levels and debt risks of local governments (see Zhang et al., 2021)

Hypothesis 1: Tender is more likely to be used for land conveyance in Beijing and Shanghai in response to the Nation #10 policy

Hypothesis 2: Tender is more likely to be used for land conveyance in Beijing and Shanghai in response to the announcement of the Anti-Corruption Campaign

Hypothesis 3: The likelihood of *Guapai* being used for land conveyance in Beijing and Shanghai is negatively related to the duration of the City Party Secretary's tenure

Hypothesis 4: The price of land transacted via *Guapai* in Beijing and Shanghai is higher than that leased via tender.

The dependent variable for testing Hypotheses 1, 2, and 3 is a binary dummy variable (GUAPAI), which distinguishes the two methods normally used by the governments of Beijing and Shanghai in land leasing exercises: *Guapai* ("1") and tender ("0"). The probability of *Guapai* to be chosen by local officials over tender is subject to several vectors of explanatory variables under the probit model specification, for instance 1) factors relating to the City Party Secretary (CPS) such as the duration of his/her tenure (in months), his/her age, and his/her duration of Chinese Communist Party membership (in years); 2) a vector of central government policy-related dummy variables (NPP) which take into account the Nation #10 policy [September 30, 2010-] and the Anti-Corruption Campaign under President Xi Jinping [Nov 15, 2012-][5]. In addition, a land-specific variable, namely the maximum allowable gross floor area of the land parcel (LnMAXGFA), and local economic variables (ECON) such as the city's GDP growth in the previous year (GDPG) and the amount of total investment in fixed assets in the previous year (LnTIFA) will also be included. Furthermore, of the local economic variables, GDP growth reflects the economic performance of a city which is seen as a primary indicator for city leadership's performance (thus, his/her prospects of career advancement), as land revenue maximization is not as necessary for cities with relatively higher level of GDP growth. Meanwhile, an increase in the investment in fixed assets may indicate the need for more infrastructure development (hence, more land revenue) in support of the economic activities generated by such investment. The formula for the land conveyance decision model is as follows:

[5] It should be noted that, these two national policies are partially overlapping with one another in terms of time. As a result, two mutually-exclusive National Policy Period (NPP) dummy variables are established for this study. While NPP1 represents the effect, if any, of the Nation #10 policy alone, NPP2 is interaction terms between National #10 and the Anti-corruption Campaign.

$$GUAPAI = c + \sum_{k=1}^{n} \theta_k CPS_{kt} + \sum_{k=1}^{n} \beta_k NPP_k + \sum_{k=1}^{n} \gamma_k LnMAXGFA + \sum_{k=1}^{n} \rho_k ECON_{kt-1} + \varepsilon_t$$

Where k = variable within a vector; t = time.

Then, to test Hypothesis 4, the dependent variable, akin to previous studies (see Cai et al., 2013; Yang et al., 2015; Wang and Hui, 2017; Wu and Yang, 2020), is the transaction price of land parcels (in natural log; LnPrice). It should be noted that, rather than deploying the nominal transaction price, the transaction prices used in this study are in real terms as the nominal transaction prices have been deflated with reference to the two cities' respective consumer price indices in 2007. On the other hand, the explanatory variables include the GUAPAI dummy variable as well as a vector of land-related variables (LAND) including LnMAXGFA (which is a confounding variable that affects both GUAPAI and land prices), the parcel's ranking decided by the city's government for the purpose of setting base land prices (RANK) (for a comparison of base prices between Beijing and Shanghai, see the Appendix), and two dummy variables with respect to the parcel's designated land use(s) (SLLT) and development plot ratio restrictions (FPR). Also, several property market variables (PM), which reflect the price levels of properties for various uses (residential, office, commercial, and others), are incorporated in the land price model to gauge how property market conditions influence land prices. In addition, two national economic variables (NECON), namely real interest rate (RIR) and real Renminbi exchange rate (LnREER), are included as control variables. Considering China's role as the world's largest exporter, adjustments in RIR dictate the cost of capital for enterprises operating in China, as an increase in RIR raises the cost of capital which reduces the demand for loans (and hence, the land needed for industrial production). Meanwhile, a higher REER indicates a stronger Renminbi, which also means more expensive Chinese products and cheaper imports. The reduced competitiveness of Chinese products, due to a stronger Yuan, discourages production and thus results in lower demand for industrial land. Changes in the demand for industrial land, in turn, could have implications for the prices of residential and commercial land parcels alike within the context of land revenue maximization, since local governments have the incentives to at least compensate for the loss in land revenue from the lower industrial land demand through the leasing of residential/commercial land parcels. The resultant equation is presented as follows:

$$LnPrice = c + \partial_1 GUAPAI + \sum_{k=1}^{n} \theta_k LAND_k + \sum_{k=1}^{n} \beta_k PM_{kt-1} + \sum_{k=1}^{n} \rho_k NECON_{kt-1} + \varepsilon_t$$

However, rather than using two separate models and methodologies as seen in previous studies, meaning one for GUAPAI and the other for land price, an endogenous treatment effect model using the maximum likelihood estimator (MLE) is deployed to test all four hypotheses at the same time. The reason is twofold. First, the method used for the conveyance of state-owned land is by no means randomly assigned, which may suggest selection bias. Second, as shown in Cai et al. (2013) and Wang and Hui (2017), the status of the City Party Secretary, the city's economic growth, and other factors are instrumental in explaining the land conveyance decisions made by local officials. This prompts an endogeneity problem when GUAPAI is incorporated in the land price model as an exogenous treatment effect variable under an Ordinary Least Squares (OLS) specification. Several types of modelling methods have been deployed in other studies in attempt to tackle these issues, for instance the inclusion of Instrumental Variables (IV), Two-stage Least Squares (2SLS), Generalized Method of Moments (GMM), Heckman Maximum Likelihood Estimation (see Cai et al., 2013), Heckman Two-step estimator (see Heckman, 1979), etc. Nevertheless, these methods are not altogether ideal, as the first three mainly address the endogeneity issue whereas the Heckman methods primarily deal with the selection bias issue. This study, instead, incorporates the elements of these methods, through the use of an endogenous treatment effect model while treating GUAPAI as an endogenous treatment effect that is explained by the variables described above. In doing so, the effects, if any, of the independent variables on GUAPAI (which enables us to test Hypotheses 1, 2, and 3**)**, as well as the relationship between GUAPAI and land price (for testing Hypothesis 4), would also be revealed unlike the aforementioned models. A summary of the variables to be incorporated in the model (and the GUAPAI treatment effect) is shown in Table 1 below.

Name of Explanatory Variable	Type of Variable	Description	Explanatory Variables to be included in		
			GUAPAI (Treatment Effect)	LnPrice (Endogenous Treatment Effect Model)	LnPrice (OLS)
CORE VARIABLES					
Treatment Effect Variable					
GUAPAI	Dummy	1 when a land parcel was leased via *Guapai*; 0 via tender		✓	✓
City Party Secretary Variables (CPS)					
AGE	Numerical	The City Party Secretary's Age by the time when the land parcel was leased	✓	✓	
TENURECPS	Numerical	The duration of the City Party Secretary's existing tenure (in months)	✓	✓	
CCPMEMBER	Numerical	The duration of the City Party Secretary's Chinese Communist Party Membership (in years)	✓	✓	
National Policy Period Variables (NPP)					
NPP1	Dummy	1 when a land parcel was transacted after only the Nation #10 policy was in effect (i.e. September 30, 2010-November 14, 2012), 0 otherwise	✓	✓	
NPP2	Dummy	1 when a land parcel was transacted after both the Nation #10 policy and the Anti-corruption Campaign were in effect (i.e. November 15, 2012-May 18, 2015), 0 otherwise	✓	✓	
CONTROL VARIABLES					
Land-related Variables (LAND)					
LnMAXGFA	Numerical	The maximum allowable gross floor area for the development of the land parcel (in square metres in natural log form)	✓	✓	✓
RANK	Categorical	Ranking for land parcel provided by the government		✓	✓
SLLT	Dummy	1 when a land parcel only allows a singular land use (thus one specific lease term); 0 otherwise		✓	✓
FPR	Dummy	1 when a singular fixed development plot ratio was assigned for the land		✓	✓

		parcel; 0 when a minimum development plot ratio and a maximum development plot ratio were assigned for the land parcel			
Local Economic Variables (ECON)					
LnTIFA	Numerical	The city's total investment in fixed assets (in natural log form) in the previous year	✓	✓	
GDPG	Numerical	The city's GDP growth in the previous year	✓	✓	
Property Market Variables (PM)					
LnResidential	Numerical	The city's per square metre price for residential properties in the previous year (in 2007 price level)		✓	✓
LnOffice	Numerical	The city's per square metre price for office properties in the previous year (in 2007 price level)		✓	✓
LnCommercial	Numerical	The city's per square metre price for non-office commercial properties in the previous year (in 2007 price level)		✓	✓
LnOthers	Numerical	The city's per square metre price for properties other than residential, office, and commercial in the previous year (in 2007 price level)		✓	✓
National Economic Variables (NECON)					
RIR	Numerical	China's real interest rate in the previous year		✓	✓
LnREER	Numerical	China's real Renminbi exchange rate in the previous year		✓	✓

Table 1: Description of variables included in the study

As for the data, the data that forms the basis of the land-specific variables, parcel-level land transactions from 2007 to 2018 are collected from Landchina.com. Then, data for the formation of the city-specific variables are gathered from the various issues of the *China City Statistical Yearbook*. Lastly, as for the exogenous economic variables, we gather interest rate data from the World Bank and use the Real Effective exchange rate index for China provided by the Bank for International Settlements (BIS) as a proxy for Renminbi's exchange rate.

4. Descriptive Statistics

4.1 Residential Land Parcels

The land transaction sample deployed in this study includes a total of 1,813 transactions of residential land parcels. 638 of these land sites are located in Beijing whereas the remaining 1,175 parcels are situated in Shanghai.

Of the sampled land parcels, 73.6% of them in Beijing were leased by *Guapai*, which is lower than the 87.3% for residential land in Shanghai (Figure 1). The vast majority of these residential land parcels in the two major Chinese cities only allow for singular (i.e. residential) land use, and hence singular lease terms (Figure 2). As for the quality of parcels determined by the respective governments, over half of those in Beijing were categorized as 7^{th} rank or below, whereas nearly 60% of sampled residential land in Shanghai were categorized as 8^{th} rank or below (compared to 24.7% for Beijing) (Table 2). A slightly larger proportion of land parcels in Beijing (41%) have more flexible development plot ratios, in comparison to only 20% in Shanghai (Figure 3).

In addition, the sampled residential land parcels in Beijing (84,900 sq. metres), on average, are larger than those in Shanghai (65,000 sq. metres), so as their respective transaction price and maximum allowable GFA. Besides, the mean maximum plot ration for residential land sites in Beijing (2.04) is bigger than that in Shanghai (1.45) as well.

4.2 Commercial Land Parcels

On the other hand, a total of 1,213 transactions for commercial land parcels are included in the sample, consisting of 453 cases in Beijing and 960 cases in Shanghai.

The statistical patterns for commercial land parcels are largely similar to those for residential land parcels. A higher proportion of these land sites in Shanghai (89.3%) were leased via *Guapai*, which is more than 20% higher than the percentage for Beijing (66.9%) (Figure 1). As over 90% of residential land sites in both Shanghai and Beijing only allow the development of housing properties, these parcels only have singular land use lease terms (70 years) (Figure 2). While 57% of commercial land sites in Beijing were within the highest 6 ranks, only 37% of all commercial land parcels in Shanghai were categorized within the highest 6 ranks (Table 2). Additionally, over 88% of sampled commercial land parcels in Shanghai have rigid development plot ratio, compared to 72% amongst sites in Beijing (Figure 3).

Similarly, the sampled commercial land parcels in Beijing (53,396 sq. metres), on average, are larger than those in Shanghai (38,609 sq. metres). The same can also be said for the mean transaction price, maximum allowable plot ratio (2.59 compared to 1.59), and maximum allowable GFA (115,850 sq. metres compared to 59,270 sq. metres).

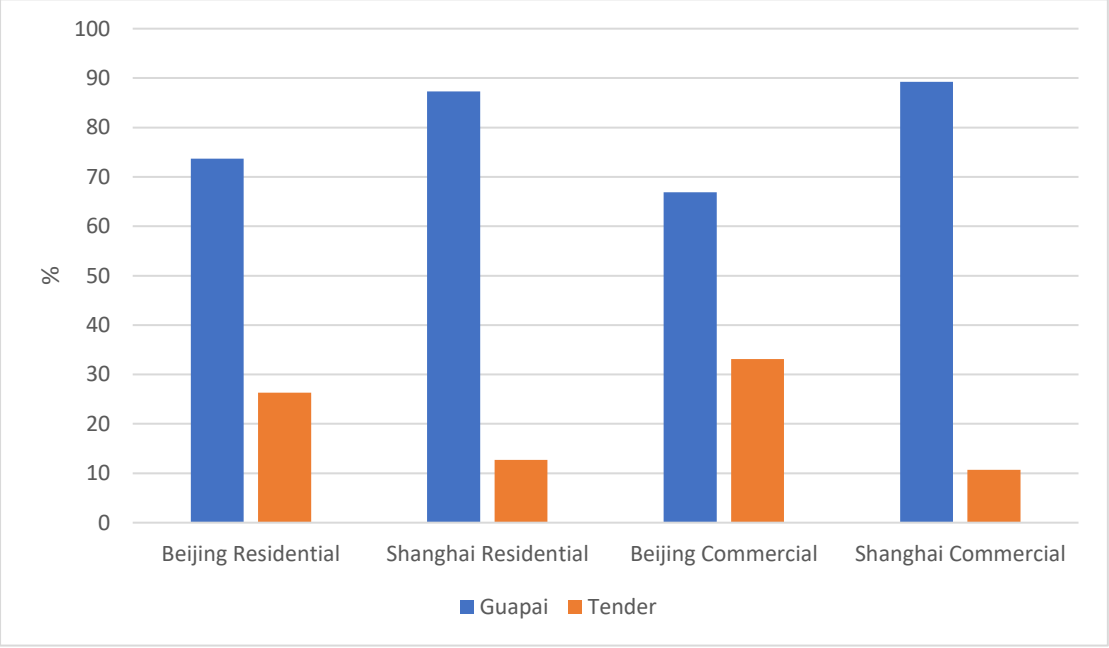

Figure 1: Means of land conveyance by officials in Beijing and Shanghai by land use

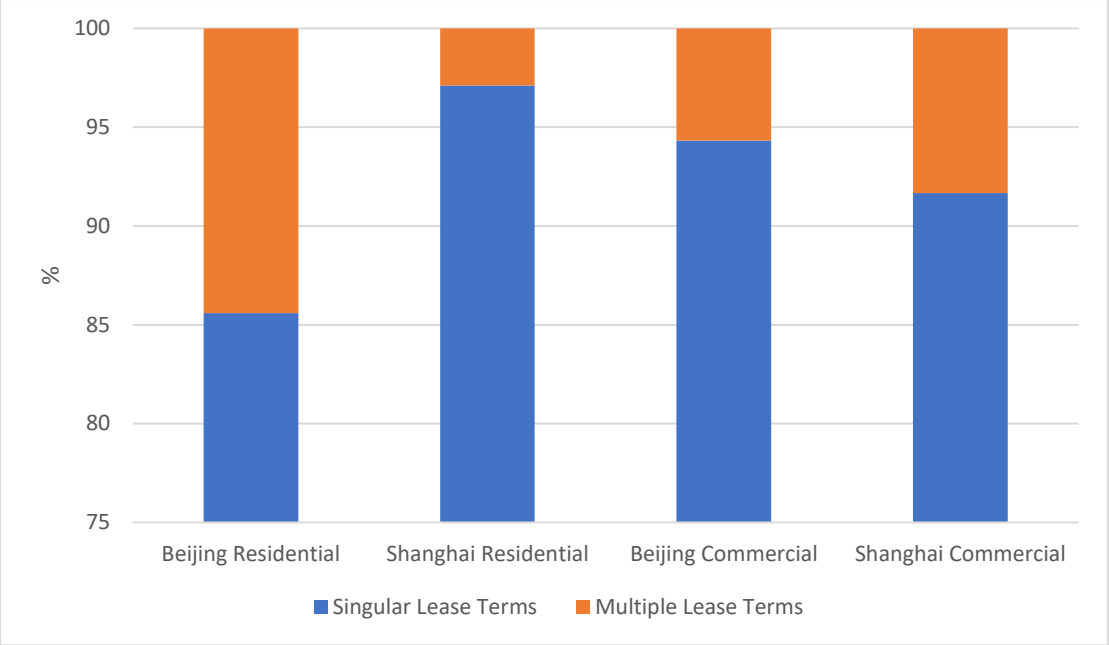

Figure 2: Lease terms conditions of sampled land parcels by land use

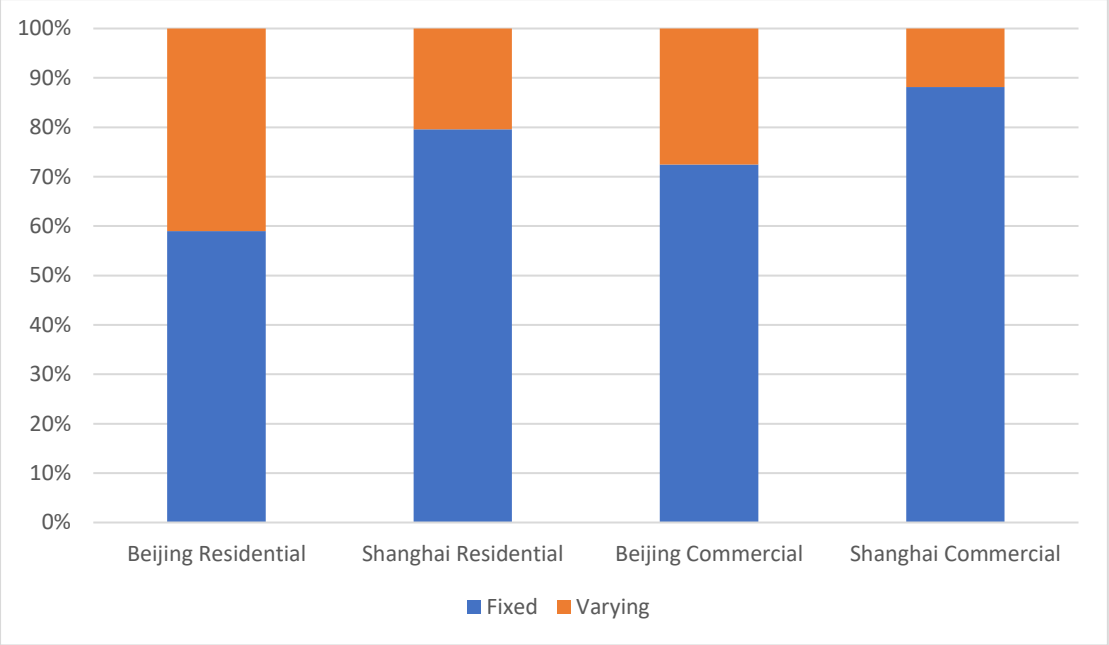

Figure 3: Conditions concerning development plot ratio of land parcels by land use

Parcel Ranking (RANK)	Residential		Commercial	
	Beijing	Shanghai	Beijing	Shanghai
1	2.66	5.70	2.84	9.06
2	0.63	0.17	3.93	1.25
3	2.66	1.11	5.90	4.27
4	3.76	3.57	6.33	6.98
5	14.08	3.40	17.25	7.71
6	21.44	7.14	21.40	9.92
7	30.05	21.17	25.76	18.96
8	17.37	38.52	10.26	30.00
9	4.85	14.71	4.80	8.13
10	1.88	4.51	1.31	5.73
11	0.63	0.00	0.00	0.00
12	0.00	0.00	0.22	0.00

Table 2: Parcel rankings (determined by local government) of the sampled land parcels by land use

5. Research Findings

5.1 Residential Land Parcels

For the conveyance of residential land parcels in Beijing (Table 3) and Shanghai (Table 4), the findings from the endogenous treatment effect model reveal, first, that land officials in these two major Chinese cities reacted to the Central Government's nationwide policy directions very differently. For Beijing, both national policy period dummy variables, namely NPP1 and NPP2, are significant at 1% level. The negative coefficients for these two variables indicate that, following the announcement of Nation #10 and the Anti-corruption campaign, Beijing's land officials were more likely to use tender, rather than *Guapai*, to lease state-owned land parcels designated for housing development. The larger negative coefficient for NPP2, compared to NPP1, suggests that by the time President Xi launched the Anti-corruption campaign, tender had been even more prominently deployed in land conveyance than it was before the commencement of this campaign. By contrast, for Shanghai, NPP1, which denotes the Nation #10 policy introduced with the expressed purpose to curb the excessive rise in housing price, is statistically significant at 1% level. Interestingly, unlike Beijing, the effect is positive, which means that, rather than a more prevalent use of tender as in the nation's capital, officials in Shanghai had a higher likelihood of using *Guapai* instead in the leasing of residential land parcels in response to the same national policy. The same can also be said for NPP2, which yields a significant and substantial positive effect on the GUAPAI treatment variable. An interpretation of this particular finding is that the use of *Guapai* became all the

more prominent following President Xi's announcement of the Anti-corruption campaign, despite it was argued in Cai et al. (2013) that corruptions amongst officials were made feasible through the use of *Guapai* in land conveyance. With reference to Hypotheses 1 and 2, they are supported in Beijing but rejected in Shanghai.

Then, regarding the relationship between the status of the City Party Secretary (CPS) and land conveyance decisions, the findings show that the CPS's tenure in this capacity, his age, as well as his duration as a member of the Chinese Communist Party are all significant in explaining the decisions for the conveyance of residential land parcels in Beijing, at 1% level of significance. Of these three factors, the CPS's tenure in this post is negatively correlated with the GUAPAI treatment variable. This indicates that in the earlier phase of the CPS's tenure, officials responsible for land conveyance in Beijing tended to utilize *Guapai*, which contrasts the findings in Wang and Hui (2017). Yet, the likelihood to lease land parcels via tender increased further into the CPS's term. By contrast, the CPS's duration as a CCP member and his own age are positively related with the GUAPAI variable, suggesting that in the reign of older CPSs (and more senior CCP members), *Guapai* would be the preferred choice for the leasing of residential land sites. By contrast, the three CPS-related variables are insignificant in Shanghai within 5% significance levels. Hence, with respect to Hypothesis 3, it is supported in Beijing but not in Shanghai.

On the other hand, the findings point out that the GUAPAI treatment variable has a significant, and positive, price effect in Shanghai, under both the MLE specification and the supplementary OLS specification. This means that, similar to the findings in Yang et al. (2015), the price of residential land parcels transacted by means of *Guapai* is higher than that of residential land parcels otherwise leased by tender, albeit by much a wider margin. For Beijing, by contrast, the coefficient for the GUAPAI variable, though also positive, is not significant within 5% level. Therefore, Hypothesis 4 is supported in Shanghai's land market but rejected in Beijing's.

In addition, some other control variables are found to be significant in explaining the eventual land transaction prices in the two Chinese cities. For instance, among the economic factors, real interest rate is found to be positively correlated to land price in both Beijing and Shanghai whereas the impact of the Renminbi exchange rate is significant and positive in Shanghai only. Meanwhile, GDP growth is positively related to the likelihood to use *Guapai* as a means of

conveyance in Beijing, but not in Shanghai. These findings provide evidence that land conveyance decisions (and the subsequent land prices) in Chinese cities are subject to exogenous factors such as China's economic conditions as a whole. Also, the majority of land-related variables included in the models are found to be significant in explaining land transaction prices, with consistent effects across the two cities.

Variable/Model	OLS	Endogenous Treatment Effect Model (Maximum Likelihood)
Dependent Variable: LnPrice		
GUAPAI	0.078	0.360
LnMAXGFA	0.852**	0.869**
RANK		
1	1.768**	1.818**
2	1.971**	2.044**
3	2.615**	2.678**
4	2.301**	2.360**
5	1.932**	1.982**
6	1.696**	1.745**
7	1.290**	1.351**
8	1.198**	1.247**
9	1.019**	1.069**
10	0.504	0.561
SLLT	-0.112	-0.123
FPR	0.243**	0.250**
LnResidential	0.250	0.172
LnOffice	0.586	0.916
LnCommercial	1.357**	1.315**
LnOthers	0.929**	0.900*
RIR	0.105**	0.115*
LnREER	0.021**	0.014
Constant	-23.113**	-24.671**
Treatment Effect Variable: GUAPAI		
LnMAXGFA	N.A.	-0.180*
AGE		0.586**
TENURECPS		0.035**
CCPMEMBER		-0.042**
GDPG		0.335**
LnTIFA		1.233
NPP1		-1.283**
NPP2		-1.798**
Constant		-80.969**
/athrho		-0.276
/lnsigma		-0.435**
Rho		-0.269
Sigma		0.647
lambda		-0.174
N	638	
R-square	0.734	N.A.
Root MSE	0.649	
Log pseudolikelihood	N.A.	-882.165
Wald Chi-square		1405.89
F-statistic	71.10	N.A.

Table 3: Model findings for residential land parcels in Beijing
Notes: ** denotes significance at 1%; * at 5%

Variable/Model	OLS	Endogenous Treatment Effect Model (MLE)
Dependent Variable: LnPrice		
GUAPAI	2.074**	2.084**
LnMAXGFA	0.885**	0.893**
RANK		
1	0.276	0.260
2	2.109	2.107
3	1.829**	1.811**
4	1.449**	1.422**
5	1.796**	1.813**
6	0.980**	0.998**
7	0.501**	0.495**
8	0.215	0.217
9	-0.187	-0.193
SLLT	-0.388	-0.404
FPR	0.430**	0.432**
LnResidential	0.121	0.338
LnOffice	-1.164*	-1.468**
LnCommercial	0.369	0.360
LnOthers	0.357	0.378
RIR	0.074**	0.085**
REER	0.028**	0.027**
Constant	7.783**	8.614**
Treatment Effect Variable: GUAPAI		
LnMAXGFA	N.A.	-0.042
AGE		0.227
TENURECPS		-0.012
CCPMEMBER		-0.002
GDPG		-0.061
LnTIFA		-0.271
NPP1		0.459*
NPP2		5.444**
Constant		0.203
/athrho		-0.007
/lnsigma		0.111**
Rho		-0.007
Sigma		1.117
lambda		-0.008
N	1135	
R-square	0.477	N.A.
Root MSE	1.123	
Log pseudolikelihood	N.A.	-2010.546
Wald Chi-square		823.05
F-statistic	40.58	N.A.

Table 4: Model findings for residential land parcels in Shanghai
Notes: ** denotes significance at 1%; * at 5%

5.2 Commercial Land Parcels

On the other hand, the findings for the conveyance of commercial land parcels in Beijing (Table 5) and Shanghai (Table 6) reveal vastly different patterns compared to those for the leasing of residential land parcels in these two major Chinese cities. Firstly, with reference to Hypotheses 1 and 2, neither NPP1 nor NPP2 is significant in explaining the GUAPAI treatment effect variable in both Chinese cities. In other words, the findings do not provide sufficient evidence that land officials in these two cities responded to either Nation #10 or the Anti-corruption campaign, when it comes to the leasing of land parcels for the development of offices and/or other commercial premises. Hence, both Hypotheses 1 and 2 are rejected for both Beijing and Shanghai.

Likewise, the CPS' tenure as such, his age, and his duration as a Chinese Communist Party member are also not found to be statistically significant, within 5% significance levels, in explaining the land conveyancing decisions made by the officials in Beijing and Shanghai. Thus, Hypotheses 3 is also rejected.

The findings for the price effect of using *Guapai* in land conveyance for commercial land parcels, meanwhile, are rather peculiar. While a significant and positive correlation is identified between land transaction price and the *Guapai* treatment effect variable for Shanghai, which is consistent to the findings for the conveyance of residential land parcels, a significant and negative land price effect for the *Guapai* variable is found for Beijing instead, which is further amplified under the MLE specification compared to the OLS specification. To put it differently, the use of *Guapai* in the conveyance of commercial land sites resulted in much higher land prices for Shanghai, but substantially lower land prices for Beijing. The findings for Shanghai are consistent, albeit much more magnified than what was reported in Yang et al. (2015), probably due to i) the inclusion of only commercial land parcels in this model rather than a combination of residential/commercial/industrial land parcels deployed in Yang et al. (2015), as well as difference in methodologies used. The same conclusion, however, cannot be reached for Beijing. With respect to Hypothesis 4, therefore, it is supported by the findings in Shanghai but rejected by those in Beijing.

Additionally, other control variables are found to be significant factors in explaining the resultant commercial land price. For instance, property market conditions, such as residential

property prices (negative) and office/commercial property prices (positive), are found to be highly significant factors in explaining commercial land prices in both Beijing and Shanghai. Interestingly, prices of properties for uses other than residential and commercial yield opposite price effects for the two Chinese cities. As for the national economic factors, the price of commercial land parcels in Beijing is found to be subject to adjustments in both real Renminbi Effective Exchange Rate and real interest rate, while only the relative strength of the Chinese Yuan is significantly affecting the transaction price of parcels designated for commercial use in Shanghai.

Variable/Model	OLS	Endogenous Treatment Effect Model (MLE)
Dependent Variable: LnPrice		
GUAPAI	-0.332**	-1.366**
LnMAXGFA	0.646**	0.645**
RANK		
1	2.008**	2.099**
2	2.566**	2.587**
3	2.442**	2.498**
4	2.140**	2.172**
5	1.506**	1.580**
6	1.772**	1.843**
7	1.197**	1.261**
8	1.053**	1.117**
9	0.357	0.368
10	-0.191	-0.100
SLLT	-0.490**	-0.546**
FPR	0.482**	0.514**
LnResidential	-1.553*	-1.476
LnOffice	3.932*	4.033*
LnCommercial	0.595	0.562
LnOthers	1.199	1.659
RIR	0.132**	0.135**
REER	0.025**	0.025*
Constant	-31.509*	-36.322**
Dependent Variable: LnPrice		
LnMAXGFA	N.A.	-0.026
AGE		0.171
TENURECPS		0.013*
CCPMEMBER		0.001
GDPG		0.023
LnTIFA		-0.569
NPP1		-0.587
NPP2		0.123
Constant		-2.397
/athrho		0.730*
/lnsigma		0.043
Rho		0.623
Sigma		1.044
lambda		0.651
N	453	
R-square	0.630	N.A.
Root MSE	0.947	
Log pseudolikelihood	N.A.	-879.855
Wald Chi-square		525.08
F-statistic	43.92	N.A.

Table 5: Model findings for commercial land parcels in Beijing
Notes: ** denotes significance at 1%; * at 5%

Variable/Model	OLS	Endogenous Treatment Effect Model (MLE)
Dependent Variable: LnPrice		
GUAPAI	2.160**	2.300**
LnMAXGFA	1.050**	1.050**
RANK		
1	0.654*	0.657*
2	2.877**	2.971**
3	2.286**	2.211**
4	1.944**	1.929**
5	1.565**	1.560**
6	0.995**	1.015**
7	0.176	0.156
8	0.070	0.046
9	-0.415*	-0.423*
SLLT	-0.160	-0.177
FPR	0.555**	0.502**
LnResidential	-1.125**	-1.221**
LnOffice	-0.059	-0.001
LnCommercial	1.218**	1.266**
LnOthers	-1.762**	-1.716**
RIR	-0.013	0.009
REER	0.008*	0.008*
Constant	18.721	18.174**
Treatment Effect Variable: GUAPAI		
LnMAXGFA	N.A.	-0.111*
AGE		-0.054
TENURECPS		-0.003
CCPMEMBER		0.007
GDPG		0.094
LnTIFA		1.706*
NPP1		-0.187
NPP2		0.276
Constant		-36.212
/athrho		-0.062*
/lnsigma		0.211**
Rho		-0.061
Sigma		1.235
lambda		-0.076
N	960	
R-square	0.684	N.A.
Root MSE	1.226	
Log pseudolikelihood	N.A.	-1783.4267
Wald Chi-square		2004.05
F-statistic	110.06	N.A.

Table 6: Model findings for commercial land parcels in Shanghai
Notes: ** denotes significance at 1%; * at 5%

5.3 Sensitivity Tests

Having presented the findings in Sections 5.1 and 5.2, this section aims to verify these findings via sensitivity tests. Three alternative model specifications are tested to see whether 1) the national policy variables (NPP) in the land conveyance decisions model and 2) the GUAPAI treatment variable in the land price model change in response to inclusion (or exclusion) of other variables in the original specification. The three Alternative Specifications (AS) are as follows:

AS1: The variables relating to the City Party Secretary (CPS) are excluded from the land conveyance decisions model;

AS2: The economic variables (GDPG and LnTIFA) are excluded from Alternative Specification 1; and

AS3: Land-specific variables (SLLT and FPR) are incorporated in Alternative Specification 2.

For the residential land market in Beijing (Table 7), first, it is reported that the estimates for either the NPP variables or the GUAPAI treatment variable deviate to a much lesser degree under AS1 than in aAS2 & 3. This alludes to the point that, despite the removal of CPS-related variables, the estimates of the GUAPAI/NPP variables remain relatively stable. The same, however, cannot be said when the economic variables are removed. Then, for the commercial land market of China's capital city (Table 8), the coefficients of the GUAPAI variable, in particular, change rather noticeably amongst the various specifications, especially after both the CPS-related and economic variables are removed (AS2 & 3). However, in comparison with the OLS specification (Table 5) under which GUAPAI is designated as an exogenous treatment variable, the estimate in the original specification is the most consistent.

Unlike the land markets in Beijing, the effects of the i) NPP variables on the GUAPAI treatment variable in the land conveyance decisions model and ii) the GUAPAI treatment variable on land transaction price in the land price model are much more consistent under the three Alternative Specifications when compared with the original MLE and OLS specifications (Tables 9 & 10). The comparatively stable estimates for the Shanghai land markets can be attributed to i) the insignificance of the CPS-related variables in the two Shanghai models and ii) the larger amount of transactions in these two land markets compared to their Beijing counterparts.

Variable/Model	Original Specification	Alternate Specification 1	Alternate Specification 2	Alternate Specification 3
Dependent Variable: LnPrice				
GUAPAI	0.360	0.385*	0.103	0.130
LnMAXGFA	0.869**	0.872**	0.854**	0.856**
RANK				
1	1.818**	1.800**	1.768**	1.768**
2	2.044**	2.014**	1.972**	1.973**
3	2.678**	2.664**	2.616**	2.618**
4	2.360**	2.332**	2.302**	2.302**
5	1.982**	1.958**	1.932**	1.933**
6	1.745**	1.720**	1.696**	1.696**
7	1.351**	1.332**	1.291**	1.292**
8	1.247**	1.229**	1.198**	1.199**
9	1.069**	1.054**	1.019**	1.019**
10	0.561	0.544	0.504	0.505
SLLT	-0.123	-0.128*	-0.114	-0.112
FPR	0.250**	0.249**	0.244**	0.246**
LnResidential	0.172	0.105	0.246	0.242
LnOffice	0.916	0.910	0.591	0.596
LnCommercial	1.315**	1.356**	1.364**	1.372**
LnOthers	0.900*	0.920*	0.928*	0.927*
RIR	0.115*	0.115**	0.104**	0.104**
LnREER	0.014	0.015*	0.021**	0.020**
Constant	-24.671**	-24.676**	-23.193**	-23.300**
Treatment Effect Variable: GUAPAI				
LnMAXGFA	-0.180*	-0.186**	-0.191**	-0.221**
SLLT				-0.187
FPR				-0.102
AGE	0.586**			
TENURECPS	0.035**			
CCPMEMBER	-0.042**			
GDPG	0.335**	0.350**		
LnTIFA	1.233	5.519**		
NPP1	-1.283**	-1.099**	-0.048	-0.051
NPP2	-1.798**	-0.612	1.131**	1.127**
Constant	-80.969**	-136.328**	2.481**	3.064**
/athrho	-0.276	-0.292	-0.022	-0.048
/lnsigma	-0.435**	-0.432**	-0.448**	-0.448**
Rho	-0.269	-0.284	-0.022	-0.047
Sigma	0.647	0.649	0.639	0.638
lambda	-0.174	-0.185	-0.014	-0.030
N	638			
Log pseudolikelihood	-882.165	-898.119	-933.586	-932.639
Wald Chi-square	1405.89	1391.64	1518.43	1511.24

Table 7: Sensitivity test for the Beijing residential land market

Variable/Model	Original Specification	Alternate Specification 1	Alternate Specification 2	Alternate Specification 3
Dependent Variable: LnPrice				
GUAPAI	-1.366**	0.226	0.837**	0.831**
LnMAXGFA	0.645**	0.649**	0.646**	0.641**
RANK				
1	2.099**	2.051**	1.950**	1.974**
2	2.587**	2.609**	2.566**	2.574**
3	2.498**	2.467**	2.418**	2.427**
4	2.172**	2.185**	2.175**	2.189**
5	1.580**	1.537**	1.484**	1.496**
6	1.843**	1.815**	1.780**	1.792**
7	1.261**	1.237**	1.186**	1.198**
8	1.117**	1.094**	1.070**	1.080**
9	0.368	0.391	0.428	0.439
10	-0.100	-0.154	-0.117	-0.084
SLLT	-0.546**	-0.492**	-0.520**	-0.361
FPR	0.514**	0.484**	0.506**	0.438**
LnResidential	-1.476	-1.617*	-1.469	-1.492*
LnOffice	4.033*	4.054**	3.762*	3.794*
LnCommercial	0.562	0.487	0.800	0.810
LnOthers	1.659	1.050	0.803	0.824
RIR	0.135**	0.133**	0.125**	0.125**
LnREER	0.025*	0.023*	0.022**	0.021*
Constant	-36.322**	-30.024*	-29.655**	-30.074*
Treatment Effect Variable: GUAPAI				
LnMAXGFA	-0.026	-0.006	0.012	0.022
SLLT				-0.482
FPR				0.158
AGE	0.171			
TENURECPS	0.013*			
CCPMEMBER	0.001			
GDPG	0.023	0.030		
LnTIFA	-0.569	2.013**		
NPP1	-0.587	-0.713**	-0.149	-0.159
NPP2	0.123	-0.822*	0.207	0.207
Constant	-2.397	-48.977**	0.251	0.499
/athrho	0.730*	-0.374**	-0.804**	-0.800**
/lnsigma	0.043	-0.400	0.073	0.070
Rho	0.623	-0.358	-0.666	-0.664
Sigma	1.044	0.961	1.075	1.073
lambda	0.651	-0.344	-0.717	-0.712
N	453			
Log pseudolikelihood	-879.855	-888.396	-891.720	-889.751
Wald Chi-square	525.08	718.88	759.03	828.79

Table 8: Sensitivity test for the Beijing commercial land market

Variable/Model	Original Specification	Alternate Specification 1	Alternate Specification 2	Alternate Specification 3
Dependent Variable: LnPrice				
GUAPAI	2.084**	2.058**	2.054**	2.077**
LnMAXGFA	0.893**	0.884**	0.884**	0.885**
RANK				
1	0.260	0.275	0.276	0.276
2	2.107	2.110	2.110	2.109
3	1.811**	1.829**	1.828**	1.829**
4	1.422**	1.449**	1.449**	1.449**
5	1.813**	1.796**	1.796**	1.796**
6	0.998**	0.980**	0.980**	0.980**
7	0.495**	0.501**	0.500**	0.501**
8	0.217	0.215	0.214	0.215
9	-0.193	-0.188	-0.188	-0.188
SLLT	-0.404	-0.388	-0.388	-0.388
FPR	0.432**	0.430**	0.430**	0.430**
LnResidential	0.338	0.121	0.121	0.121
LnOffice	-1.468**	-1.172*	-1.173*	-1.163*
LnCommercial	0.360	0.378	0.381	0.367
LnOthers	0.378	0.352	0.350	0.358
RIR	0.085**	0.074**	0.074**	0.074**
LnREER	0.027**	0.027**	0.028**	0.028**
Constant	8.614**	7.830*	7.848*	7.775*
Treatment Effect Variable: GUAPAI				
LnMAXGFA	-0.042	-0.059	-0.049	-0.067
SLLT				0.962
FPR				-5.019**
AGE	0.227			
TENURECPS	-0.012			
CCPMEMBER	-0.002			
GDPG	-0.061	-0.014		
LnTIFA	-0.271	1.137		
NPP1	0.459*	0.742**	0.900**	0.796**
NPP2	5.444**	6.158**	6.046**	6.486**
Constant	0.203	-26.873	0.767	5.027**
/athrho	-0.007	0.009	0.011	-0.001
/lnsigma	0.111**	0.108**	0.108**	0.108**
Rho	-0.007	0.009	0.011	-0.001
Sigma	1.117	1.114	1.114	1.114
lambda	-0.008	0.010	0.012	-0.001
N	1135			
Log pseudolikelihood	-2010.546	-2076.295	-2077.373	-2069.632
Wald Chi-square	823.05	837.39	837.52	847.37

Table 9: Sensitivity test for the Shanghai residential land market

Variable/Model	Original Specification	Alternate Specification 1	Alternate Specification 2	Alternate Specification 3
Dependent Variable: LnPrice				
GUAPAI	2.300**	2.313**	2.281**	2.251**
LnMAXGFA	1.050**	1.053**	1.053**	1.052**
RANK				
1	0.657*	0.654*	0.651*	0.652*
2	2.971**	2.872**	2.874**	2.875**
3	2.211**	2.285**	2.286**	2.286**
4	1.929**	1.943**	1.944**	1.944**
5	1.560**	1.562**	1.564**	1.565**
6	1.015**	0.992**	0.994**	0.995**
7	0.156	0.173	0.174	0.175
8	0.046	0.069	0.070	0.070
9	-0.423*	-0.407*	-0.406*	-0.406*
SLLT	-0.177	-0.160	-0.159	-0.155
FPR	0.502**	0.555**	0.555**	0.563**
LnResidential	-1.221**	-1.111**	-1.121**	-1.119**
LnOffice	-0.001	-0.085	-0.066	-0.069
LnCommercial	1.266**	1.233**	1.220**	1.223**
LnOthers	-1.716**	-1.734**	-1.738**	-1.746**
RIR	0.009	0.013	0.013	0.013
LnREER	0.008*	0.008	0.008	0.008
Constant	18.174**	18.361**	18.427**	18.499**
Treatment Effect Variable: GUAPAI				
LnMAXGFA	-0.111*	-0.116*	-0.104*	-0.131**
SLLT				-0.501
FPR				-1.110**
AGE	-0.054			
TENURECPS	-0.003			
CCPMEMBER	0.007			
GDPG	0.094	0.110*		
LnTIFA	1.706*	0.851		
NPP1	-0.187	-0.009	-0.176	-0.272*
NPP2	0.276	0.921**	0.703**	0.498**
Constant	-36.212	-19.894	2.139	4.031**
/athrho	-0.062*	-0.067**	-0.053**	-0.405*
/lnsigma	0.211**	0.195**	0.195**	0.195**
Rho	-0.061	-0.067	-0.053	-0.040
Sigma	1.235	1.215	1.215	1.215
lambda	-0.076	-0.082	-0.064	-0.049
N	960			
Log pseudolikelihood	-1783.427	-1847.549	-1850.207	-1841.939
Wald Chi-square	2004.05	2158.02	2153.68	2147.44

Table 10: Sensitivity test for the Shanghai commercial land market

6. Implications of Findings

Grounded on the findings, as presented in Section 5, several implications are worth discussing. The first implication relates to the very different land conveyance decisions made by officials in Beijing and Shanghai for residential land parcels in response to national policy directions by the Central Government. To be specific, the findings reveal that, after the Nation #10 policy was announced, tender was more likely to be deployed in leasing state-owned land designated for residential development in Beijing. By contrast, a much higher likelihood for *Guapai* to be used, which yielded higher land transaction prices, in the conveyance of residential land lots in Shanghai is found. These findings are unique, especially within the context of Nation #10 itself, as officials in Beijing, probably due to much closer proximity to the Central authorities, appear to have followed the Central Government's intention under this policy, even though the price differences between land parcels leased via *Guapai* and those by tender are not significant. Land officials in Shanghai, on the other hand, seem to have gone subtly against the Central Government's objective as *Guapai* was deployed even more often in the conveyance of residential land parcels. This helped boost the city's land revenue through substantially higher land transaction prices, despite what Nation #10 was supposed to achieve. Shanghai, albeit being another major Chinese city, is not being watched as closely by the Central Government as Beijing is due to geographical reasons. Under this circumstance, land officials in Shanghai seem to have prioritized the interest of the city leadership in boosting economic development over the interests as perceived by the Central Government, all the while rendering housing in the city more expensive[6] as housing development became costlier owed to higher land prices. These findings proffer new discoveries not seen in previous studies, which have viewed the decisions of numerous Chinese cities as a whole, in terms of how different cities responded to the same policy directions promulgated by the Chinese Central Government.

Besides, the findings also show noticeable differences in terms of the relationship between the City Party Secretary's tenure and the decisions made by land officials between the two major Chinese cities. The status of the CPS, in terms of the time he/she

[6] Changes in housing prices, in turn, would also have implications for the pricing of various housing attributes (see Wen et al., 2019; Xiao et al., 2019; Zhang et al., 2019).

had been serving in this capacity, did have a statistically significant relationship with the conveyance decisions for residential land parcels. The negative correlation between the number of months a CPS had served in this capacity and the *Guapai* treatment effect variable indicates that, the likelihood for land officials in Beijing to use *Guapai* as a means of leasing residential land lots was the highest in the earlier phase of the CPS's tenure. Even though the eventual price disparity between land leased by *Guapai* and land leased by tender is not significant at 5% level, this finding does show how the status of Beijing's leadership (i.e. its Party Secretary), in particular the need for economic development to advance their careers under the cadre evaluation system, shaped the decisions made by land officials in Beijing. Similar findings, however, did not appear in Shanghai, which might allude to a higher degree of autonomy amongst land officials of the city.

The third implication concerns the price effects of deploying *Guapai* in land leasing in Beijing. Unlike the consistently positive relationship between using *Guapai* as the means of land conveyance in Shanghai, the use of *Guapai* resulted in remarkably different impacts on the transaction prices of residential land and commercial land in China's capital city. Yet, the Nation #10 policy (NPP1) that aimed to curb the excessive residential property prices resulted in higher land revenue obtained from the leasing of commercial land parcels due to i) the more prevalent use of tender and ii) the higher transaction price associated with the use of tender. The findings for the residential and commercial land markets in Beijing, when viewed together, can also be interpreted as the Beijing government's attempt to compensate for some of the lost revenue through leasing commercial land parcels by tender, which allows for a higher degree of discretions in determining the eventual winner of a bidding race, due to its stringent adherence to the Central Government's intentions through the Nation #10 policy, unlike the Shanghai government.

7. Conclusion

This paper, through an investigation of land conveyance decisions in Beijing and Shanghai for residential and commercial land parcels alike, has explored how local governments responded to national policies, and the subsequent effects of these

decisions on land transaction prices. In so doing, this study contributes to the literature with regard to the interactions between the Central Government and local governments, and between economic growth and the promotion of local government officials, within the context of fiscal decentralization and land finance.

Deploying endogenous treatment effect models, the research findings first reveal that the governments of Beijing and Shanghai had responded to national policies promulgated by the Central Government in vastly different manners. This is especially noticeable through the two cities' respective land conveyance decisions following the announcement of the Nation #10 policy, which called for local governments to devise measures in order to curb the excessive upward movements in housing prices. On the one hand, officials in Beijing appear to have followed the Central Government's intentions through a comparatively prevalent use of tender in leasing land parcels designated for housing development. On the other hand, officials in Shanghai seemingly went against the Central Government's wishes in this regard for the sake of the city's fiscal well-being by deploying *Guapai* more prevalently after the announcement of this policy, resulting in substantially higher land prices. Also, it is found that the decisions of officials in Beijing in leasing state-owned residential land parcels were highly subject to the status of City Party Secretary, in that the likelihood of *Guapai* being deployed for the leasing of residential land lots was significantly higher in the earlier phase of the CPS's tenure. The same, however, does not apply to Shanghai's residential and commercial land markets. With reference to the literature, the findings reflect the role of national policies and city leadership's concerns for career advancement, as described under the yardstick competition hypothesis (Besley and Case, 1995), in shaping land conveyance decisions in Beijing given its proximity to the Central Government, whereas government officials in Shanghai enjoyed a relatively higher degree of autonomy in their decision-making which resembles what has been depicted in western literature.

As for the price effects of land conveyance decisions, the findings are mixed for the two Chinese cities. On the one hand, the use of *Guapai* in the conveyance of residential and commercial land parcels alike was positively associated with land transaction prices in Shanghai, which is in line with the findings reported by Yang et al. (2015). On the

other hand, the deployment of *Guapai* in the conveyance of commercial land lots in Beijing, surprisingly, yielded much lower land prices than they otherwise should have been if leased under tender. As commercial land prices in Beijing are found to have been positively associated with the use of tender, which is less open (i.e. sealed-bid) and more subject to official discretions than *Guapai*, the more prevalent use of tender after the announcement of the Nation #10 policy, effectively, enabled Beijing's government to generate more revenue through a higher degree of discretions in determining the eventual winners for land parcels to compensate for some of the latent losses in revenue from the leasing of residential land parcels due to the city's stringent adherence to this national policy, in order to secure funding for infrastructure development to promote economic growth as indicated under the resource flow hypothesis (see Tiebout, 1956; Brueckner, 2003).

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