

The Political Economy of China's Housing Boom*

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Abstract

This paper provides causal evidence that the Chinese Communist Party's cadre promotion system contributed to China's real estate boom between 2003 and 2015. We first show that promotions of city-level communist leaders to higher ranks were largely based on city GDP performances. We then identify exogenous shocks to their promotion chances, caused by new social tie establishments between city-level officials and their superiors, using provincial party leader changes initiated by the central government. An incumbent city leader who shared the same hometown with a newly appointed provincial leader was 50% more likely to be promoted than average, regardless of the city's GDP performance. Cities where leaders had hometown connections experienced 40% higher supplies of residential land, while industrial and commercial land supplies both dropped by 30% and total land supplies were not affected. House price growth rates were also 50% lower than average in such cities.

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I Introduction

From early 2000s, China has been experiencing a remarkable boom in its real estate sector. Figure 1 shows that between 2004 and 2013 house price and residential land price in 35 major Chinese cities¹ have grown by almost 400%. The strong rise in housing prices has raised pressing concerns; the fear is that a bubble has emerged in China's land and housing markets, the burst of which might damage China's economy, as Japan experienced in the 90s or the U.S. before the financial crisis.

With the national average real house price doubling within ten years since 2004, China's sizzling housing market also drew widespread attention from economists and policy makers (Liu and Xiong, 2018). However, a consensus has yet to be reached on the causes of China's rapidly growing residential land and housing prices. Past research has analyzed this spectacular housing boom from various perspectives, pointing out urbanization, speculative investment, sex ratio, and other demand side factors as possible culprits. Garriga et al. (2017), however, concludes supply side factors should account for more than 60% of the Chinese housing boom. To our knowledge, there has not been any systematic study on the supply side of the Chinese housing market.

Our paper finds that features of China's political institutions explain a sizeable fraction of the Chinese housing boom. The Communist Party of China (CPC) is the sole supplier of urban land in China. Although conjectured by many, no work has been able to pinpoint how the political structure of the CPC has affected China's housing market. Figure 2 plots average annual house price growth rates for the 35 major cities between 2004 and 2013, against each city government's average residential-to-total land supply ratio. Cities with higher residential-to-total land supply ratios saw lower average house price growths. Past conjectures have all turned to local governments' reliance on land financing as a possible connection between the CPC and the Chinese housing boom. Some have further argued that the GDP-based promotion system contributes to the housing boom by encouraging extra public investments such as

¹The National bureau of statistics of China collects data on 35 largest and economically important cities since 1998; the cities included in the list can be found in Fang, Gu, Xiong, and Zhou (2016).

infrastructure, therefore, exacerbating local governments' fiscal pressure, which distorts city governments' land supply behavior. To our knowledge, no evidence has been provided for this fiscal pressure channel that connects the GDP-based promotion system to the Chinese housing boom. Our paper argue that the GDP-based promotion system for local communist politicians contributes to China's spectacular housing boom via the margin of land use type allocation. Through a static general equilibrium framework, we analyze how the promotion system suppresses residential land supply and fuels fast appreciation in residential land and housing prices. We then show causal evidence for this channel using exogenous shocks to communist leaders' career incentive. We find that around 60% of the Chinese housing boom can be explained by the proposed career incentive channel.

In this paper, we propose that the GDP-based promotion system in the CPC leads to house price appreciation by suppressing residential land supply and encouraging industrial land allocation. As Figure 3 illustrates, while residential land price in China has been ascending, unit price for industrial land has seen no growth at all. City communist leaders who foster higher economic growths are favored in promotion evaluation. In an effort to drive up local economic performance, city governments, as the sole suppliers of urban land in China, allocate a large amount of land to industrial production. Given that the annual total land supply in a city is subject to a fixed quota, elevated allocation to industrial production results in curbed land supply for residential projects. As wage rises and population grows with economic advancement, residential land supply does not increase accordingly, generating upward pressure for house prices.

Through the lens of a static general equilibrium model, we demonstrate the key trade-off a city leader faces in making land allocation decisions. Under the GDP-based promotion system, a city communist leader is incentivized to allocate land for industrial production and vitalize local industrial activities. Constrained by the annual quota, however, any increase to industrial land supply means a shrinkage in residential land supply. Local residents suffer from reduced residential land supply on which housing is built on. The more a city leader cares about economic performance, the less land is supplied for residential purposes. We

call our proposed channel the career incentive channel. In addition, within this theoretic framework, we uncover the key assumptions in the fiscal pressure conjecture and derive testable implications.

We further substantiate our proposition with causal evidence for the career incentive channel. To causally identify the proposed channel, we resort to a novel empirical exercise utilising exogenous shocks regarding city leaders' hometown ties. The fabric of contemporary Chinese society is woven together closely by the needle of social ties, among which the most common and established is hometown favouritism. We collect biographical data on prefecture-level communist leaders and compare them with provincial communist leaders' birthplaces. City-level Chinese politicians' promotion, demotion, and re-appointment decisions are made by higher level officials at the same province. The appointments of new provincial leaders during the city leader's term is made confidentially by the central communist committee, and hence unexpected by the city leaders in office. We conjecture that sharing hometown with the provincial communist leaders shifts city communist leaders' promotion probabilities, and hence changes their career perspectives. We identify the city leaders who share hometowns with their corresponding provincial communist leaders in our data, and found supporting evidence in the empirical tests: sharing hometown with a provincial leader almost eliminates the sensitivity of promotion on GDP, which is identified as the utmost important factor when it comes to promotions ((Li and Zhou, 2005)). Taking advantage of this novel instrument, we are able to causally identify how political career perspectives affect city leaders' land allocation decisions, and ceteris paribus the influence on local housing prices.

Our findings bear major policy implications for the Communist Party of China. For a long time, facing pressing complaints and criticisms, the Chinese government has implemented various policies to cool down the sizzling housing market. For example, the central bank has adjusted interest rates on mortgage lending and loans to real estate developers several times; the minimum mortgage down-payment was lifted to 30%-40% for the first time buyers (Liu and Xiong, 2018). However, relatively speaking, political institutions of China have received little attention from the authority on this regard. Our paper suggests that the CPC should

re-evaluate its promotion system to curb the soaring housing prices.

We propose a novel channel that the GDP-based promotion system of CPC contributes to the Chinese housing boom through the margin of land use type. To our knowledge, our paper is the first to formally model, causally identify, and structurally quantify the effect of the proposed career incentive channel.

This paper is structured as follows: Section II reviews related literature. Section III then introduces China's institutional background. Section IV formally models the proposed career incentive channel and lays out the theoretical framework to analyze previously conjectured mechanisms. Section V provides a detailed account of our data construction. Section VI presents causal evidence that the career incentive channel plays a major role in explaining the Chinese housing boom. Section VIII carries out robustness checks for empirical exercises. Section IX delivers conclusion.

II Literature Review

The striking real estate boom in China over the past decade has spurred an extensive literature on the Chinese housing market. Using a broad set of factors including population, wage, income, land supply, along with construction costs, Wang and Zhang (2014) find that fundamental factors cannot explain the rising residential housing prices in China. Wu, Gyourko, and Deng (2016) followed up with an extensive empirical exploration of Chinese housing market; they find low residential low vacancy rates across provinces and no evidence of housing over-supply. Using a structural approach, Chow and Niu (2015) find that the supply of housing is explained by relative price and the cost of construction. In addition, Fang, Gu, Xiong, and Zhou (2016) provide a thorough examination of the demand side by analyzing characteristics of mortgage borrowers, where it is also mentioned that local governments play a role in housing price expectation formation.

Our paper connects the political career incentive of Chinese city mayors to the Chinese real estate market. Our paper is not the first to show political distortions in the Chinese housing supply; previous research has repeatedly hinted at the institution frictions in the Chinese

housing market. Glaeser, Huang, Ma, and Shleifer (2017) compare the U.S. housing boom prior to the global financial crisis to the Chinese counterpart, and allude to a greater role of government in the Chinese real estate market. Many previous studies also highlight the significance of land financing in local government, and it is proposed that local governments' fiscal pressure is the most prominent political economy factor of residential land supply (Gong, 2012; Li, Hong, and Huang, 2013; Liu and Xiong, 2018). Our paper is based on an alternative hypothesis where land supply decision is driven by city mayors' career incentive. Our empirical evidence suggests that career incentives are of the utmost importance in land supply, in lieu of fiscal pressure concerns. The evidence also supports the conjecture proposed by Steven Cheung, who reckons a major role of land supply in modern China's growth (Cheung, 2009).

Our mechanism relies heavily on the fact that China comprises a large amount of self-sufficient regions, and local politicians' political competition affects their land allocation decisions. The idea is built upon the literature regarding the political tournament and regional competition in China. Lazear and Rosen (1981) first propose that compensation schedule based on relative performance rather than output level can be efficient; the idea is later applied to political economy (Shleifer, 1985), and in particular to the Chinese political system (Maskin, Qian, and Xu, 2000), where politicians at the lower levels are constantly ranked by their relative performance using the principle of *yardstick competition*. The evaluation of city leaders based on relative economic performance within provinces has ample implications on our empirical specifications. To our knowledge, we are the first to connect the political tournament game among local Chinese governments and housing price growth.

In our model, low industrial land price is a natural result of local governments' GDP competition; city governments essentially subsidize the price of land to the production sector. Interestingly, a parallel phenomenon is also drawing attention in the U.S. at the state level. Slattery (2018) show that in the U.S., state governments use subsidies to attract large firms, which increases local welfare in the form of indirect job creation; however, the welfare gain is captured entirely by the firm. In a same vein, our paper finds that local residents' welfare

induced from housing is compromised by the production sector. The welfare transfer from local residents to firms could be higher than our simple model suggested, since the interventions from governments also boost the impact of positive productivity shocks on housing price appreciation (Zhang, Fan, and Mo, 2017).

Finally, our empirical identification is inspired by a recent literature that ties China's political promotion system to social connections. Fisman, Shi, Wang, and Xu (2018) show that in fellow election of the Chinese Academies of Sciences, ties to selection committee members increase candidates' election probability by 39 percent. When it comes to politics, it is found that hometown connections are associated with a 5-9 percentage point reduction in the election of Politburos (Fisman, Shi, Wang, and Wu, 2020). However, in Fisman, Shi, Wang, and Wu (2020), the main empirical model does not involve economic performance due to the heterogeneous source of Politburo candidates (for example, some of the candidates are from military background hence have no comparable economic performance background). With our provincial/prefectural promotion setting, we are able to identify the exact mechanism through which social ties hurt candidates' promotion chances: hometown tie offsets the positive impact of stellar GDP performance for city leaders.

III Institutional Background

A. *The Communist Party of China*

The Communist Party of China (CPC) is the ruling party of the Chinese government. Within the CPC are four different levels of administration, as illustrated in Figure 4. On the top of the hierarchy is the central party committee made of 25 Politburo members. Below the central committee are provincial party committees: for each of the 34 provincial-level administrative units, there is a corresponding provincial CPC committee empowered by the party constitution to enact policies within the administrative unit. Each province typically comprises 4 to 21 prefectural-level cities. Each city has a corresponding CPC committee in charge of local policies, in particular, land allocation decisions.

The leader of a party committee is called a party committee secretary. Party committee secretaries are in charge of political promotion, state asset allocation, and economic policy decision at their levels of administration. For example, the party secretary of the central committee is also the President of China. Provincial party secretaries are leaders of Chinese provinces, and city party secretaries are leaders of city governments.

The personnel of each party committee is *de jure* elected by a party Congress, but is *de facto* managed by the party leadership one level of administration above. In particular, the provincial party committee makes appointment, promotion, and demotion decisions for city leaders within its jurisdiction. It has also long been argued that promotion decisions along the CPC political ladder is based on many factors such as GDP performance and demographics; we confirm in our paper that social ties also play central roles for the promotion decision making.

B. The Chinese Land Market

a. Overview

After gaining control in 1949, the Communist Party of China nationalized the ownership of land in mainland China, and started to provide highly subsidised housing to Chinese citizens. The socialist policies led to both under-investment and shortage in housing supply, and were eventually torn down during waves of large-scale property privatization since 1978. The central government of China embraced and pushed a series of housing reforms from the 1980s, and finally established a market-based housing provision system in 1998. The supply of land, in turn, has been a major component in the development of the Chinese real estate market. Indeed, alongside of the spectacular housing boom, China's land market also experienced striking growth in price ever since the start of land and housing privatization in 1998 (Figure 5). The total land sales revenue grew 1,597% in the 10 years following the 1998 reform (around 160% annually), and amounts to 1.7 trillion RMB in the year of 2014.

b. Land Quota System and Land Supply

Starting in 1998, China adopted a land quota system regarding urban land supply.² On the national level, the Ministry of Land Resource Management drafts long term plans for urban land development and arable land protection. In this long term plan, each province is then allowed a certain amount of rural-to-urban land conversion for a period of time. The department of land resource management of each provincial government, following guidelines set by the Ministry of Land Resource Management, then divides this land conversion quota among cities in its jurisdiction. One example of such guideline set by the Ministry of Land Resource Management is that land quota allocation should be proportional to a city's GDP and projected population growth (Wang, Zhang, and Zhou, 2019). Within this assigned land quota, the city land development committee, headed by the communist leader of the city government, decides on the type of use (industrial, residential, commercial, and others), price, size, etc., of land parcels for lease. The city government then posts land parcel information online, looking for land renters. In a case where multiple renters have expressed interests in purchasing the usufruct right for a land parcel, the land is then sold through a public auction (Cai, Henderson, and Zhang, 2013). In summary, from the standpoint of city leaders, he (she) decides on the ratio of industrial land supply and residential land supply, given the fixed quota.

Different types of land parcels are leased out for varying time lengths. Residential land is rented out for 70 years, industrial land for 50 years, and commercial land for 40 years. Categorized by the kind of activities legally allowed, there are four types of land uses: industrial, residential, commercial, and others. Industrial land can only be used for industrial production purposes. Residential land is used for housing projects. Commercial land hosts businesses such as shopping malls and offices. Other land uses include government buildings, parks, etc. Figure 6 plots the composition of land supply in China between 2003 and 2016 by land use type. The omitted categories are water facilities, transportation, and special purpose land.

²Wang, Zhang, and Zhou (2019) provides a detailed summary of China's land quota system.

Throughout this period of time, industrial and residential land supply take the lion's share of total land supplied. Commercial and public service land is a small share of the total during this sample period.

Under very restrictive conditions, land renters are permitted to resell the leasehold to a third party in the secondary land market. However, compared to the primary land market, the secondary land market is only about 3.75% of all land transactions in terms of payment from 2000 to 2015 (Chen, Liu, Xiong, and Zhou, 2017).

C. The 1994 Tax Sharing Reform

In 1994, the CPC implemented a tax sharing reform which leads to fiscal decentralization: while sharing more fiscal revenue with the central government, after the reform, local governments obtain financial and budgeting autonomy. By allowing local governments to make independent fiscal expenditure decisions while maintaining the control of tax code at the central level, the reform spurred economic competition among local governments for fiscal revenue. However, it is also blamed for leaving heavier financial burden to local governments and make the local fiscal authority more dependent on land sales revenues in order to make ends meet. As land is deemed a state-owned asset, local Chinese governments have grown a strong dependence on land financing over the time (Figure 7). Meanwhile, following the 1994 tax reform, local governments have been developing increasing reliance on transfer payments from the central government to finance local fiscal expenditure. In 2003, the land market reform took place and reshaped China's land markets to public auctions and sales, so as to improve the market transparency; land sales revenue and land-related taxes have since been expanding at an astonishing rate in local governments' fiscal budgets. In total, land financing accounts for a third of local government fiscal revenue, at par with central transfers and with local government in-budget revenue (taxes and fees).

Motivated by the peculiar phenomenon of land financing, many works have argued in the past a fiscal pressure channel through which the GDP-based promotion evaluation spills over into China's house prices. The argument states that local communist leaders' career incentives

encourage increasing local fiscal spending on infrastructure, driving up GDP through the public sector. Depending on the perceived elasticity of local residents' housing demand, city leaders would then either increase or decrease residential land supply to raise land sales revenue or boost GDP growth, hence affect house prices. In Section IV, we analyze this alternative channel using our theoretical framework. We further show in Section VI that the empirical evidence is not in accordance with this channel. In fact, our estimates for China's residential land demand are close to unit elasticity, breaking the fundamental assumption of the fiscal pressure channel.

IV Model

This section sets up a perfect foresight general equilibrium model of a small open economy with three agents: a representative firm, a representative household, and a city leader. **Subsection C** demonstrates this paper's newly proposed mechanism through which China's GDP-based promotion system for city leaders contributes to house price appreciation. **Subsection D** further studies, in the same framework, alternative mechanisms that previous works have conjectured. Besides showcasing the mechanisms of the political economy perspective, the model provides a theoretical framework that guides the empirical exercise detailed in later sections.

A. *Environment and Preferences*

A city is a static small open economy with four agents: a representative firm that is competitive and produces a homogeneous consumption good (numeraire) using capital, labor, and industrial land; a representative household that supplies labor inelastically, and consumes numeraire good along with housing services; a city leader who decides on land allocation between residential and industrial uses subject to a quota on the total land supply; and finally a continuum of monopolistically competitive real estate developers. In equilibrium, wage, residential land price, and industrial land price adjust so that labor and land markets clear locally.

a. Representative Firm

The representative firm is competitive and produces a homogeneous consumption good (numeraire) using capital, labor, and industrial land, with a constant returns to scale production technology

$$\max_{K,L,D} AK^\alpha L^\beta D^{1-\alpha-\beta} - rK - wL - p_{ind}D.$$

Firm knows productivity A , which is a constant, and maximizes profit by choosing the amount of capital K rented from the global capital market, labor L hired from the local labor market, and the amount of industrial land D purchased from the local city government that is managed by the city leader. The firm takes the rental rate of capital r , wage w , and industrial land price p_{ind} as given.

Profit maximization suggests the marginal product of capital equals rental rate of capital in equilibrium. Hence, in equilibrium

$$K = \left(\frac{\alpha A}{r}\right)^{\frac{1}{1-\alpha}} D^{\frac{1-\alpha-\beta}{1-\alpha}}, \quad (1)$$

where equilibrium labor demand, implied by local labor market clearing conditions, equals the city population (normalized to be 1).³ Equation (1) then implies the equilibrium production is

$$Y(D) = A^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}} D^{\frac{1-\alpha-\beta}{1-\alpha}} = \Gamma D^\gamma \quad (2)$$

where

$$\Gamma = A^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}}$$

$$\gamma = \frac{1-\alpha-\beta}{1-\alpha} \in (0, 1).$$

Equation (2) suggests that equilibrium production is increasing in the amount of industrial

³By normalizing city population to be 1, the model abstracts away from inter-city migration. An argument that can be made against this abstraction is that expensive living costs of a city deter labor migration, which could impede economic growth. However, labor has been relative abundant in China in this period of time. Also, China's inter-city migration policy has been notoriously restrictive, as documented in [Zhang and Tao \(2012\)](#).

land in the economy.

b. Representative Household

The representative household consumes numeraire good and housing services, with Cobb-Douglas utility

$$u^h(C, H) = C^{1-\eta}H^\eta,$$

where C is the amount of numeraire good, and H is housing services. The household supplies labor and earns post-tax labor income $(1 - \tau)\omega L$ to finance his (her) consumption bundle. By choosing the amount of numeraire good to consume, and the amount of residential land to purchase from the city government, the household maximizes utility subject to budget constraint

$$C + pH = (1 - \tau)\omega L.$$

The household problem first order conditions imply that housing demand has a constant elasticity $-\epsilon$

$$p = H^{-\frac{1}{\epsilon}},$$

and the equilibrium household welfare is obtained by substituting in equilibrium housing and numeraire consumption

$$v^h(D, H) = \frac{1}{\epsilon - 1}H^{1-\frac{1}{\epsilon}} + \beta(1 - \tau)Y(D), \quad (3)$$

where $\beta(1 - \tau)Y(D)$ is the equilibrium wage rate.

Equation (3) shows that even though in equilibrium household benefits from boosted industrial land supply through a higher wage rate, suppressed residential land supply can lead to welfare losses due to low housing consumption.

c. Real Estate Developers

There is a continuum of monopolistically competitive real estate developers $j \in [0, 1]$ offering housing within the city: $H = (\int_0^1 h_j^{\frac{\epsilon-1}{\epsilon}} dj)^{\frac{\epsilon}{\epsilon-1}}$. Real estate developers convert residential land N_j into housing services H_j via a linear technology $H_j = \xi N_j$ ($\xi > 0$).

d. City Leader

The city leader maximizes utility by allocating ζ unit(s) of land between industrial and residential uses

$$N + D = \zeta, \quad (4)$$

Where N is the amount of land allocated for residential housing and D is the amount of land allocated for production.

Preferences of the city leader compose of household welfare, government consumption, as well as expected payoff from promotion.⁴ The leader has rational expectations about the equilibrium outcomes; therefore, the leader's preferences can be expressed as

$$u^s(D, N) = \underbrace{v^h(D, H)}_{\text{household welfare}} + \Omega \underbrace{\log[F(D, H)]}_{\text{utility from fiscal income}} + \underbrace{E[V^P]}_{\text{expected promotion payoff}}, \quad (5)$$

where household welfare $v^h(D, H)$ is defined in equation (3). Ω denotes the weight on government consumption, and government consumption is financed by taxes levied on capital and labor incomes plus land sales

$$F(D, H) = \underbrace{\tau(rK + wL)}_{\text{tax revenue}} + \underbrace{pH}_{\text{residential land sales}} + \underbrace{p_{ind}D}_{\text{industrial land sales}}. \quad (6)$$

Following [Xiong \(2018\)](#), we impose the same tax rate on capital and labor incomes for simplicity. However, allowing tax rates to differ will not change conclusions of the model.

⁴The interpretation of government consumption can be flexible. Public employee wages, infrastructure investments, or even corruption are all fair interpretation of government consumption in this model.

Promotion outcome is a Bernoulli random variable where the payoff from promotion has been normalized to 1.⁵ The probability of being promoted is a function of local GDP, $Y(D)$, as defined in equation (2).⁶

$$V^P = \begin{cases} 1 & \text{w/ prob. } \mathcal{P}(Y(D)) \\ 0 & \text{otherwise} \end{cases}$$

We further assume that the promotion probability is linear in GDP

$$\mathcal{P}(Y(D)) = \chi Y(D),$$

then government preferences can be re-written as

$$u^g(D, H) = v^h(D, H) + \Omega \frac{[F(D, H)]^{1-\sigma}}{1-\sigma} + \chi Y(D), \quad (7)$$

where χ is called *GDP concern* since χ is the weight on local GDP performance. The city leader's utility maximization problem can be summarized by equations (3), (4), (6), and (7).

B. Equilibrium

An equilibrium consists of prices (w^*, p_{ind}^*, p^*) and allocation $(K^*, L^*, D^*, H^*, C^*)$ such that:

- Given equilibrium prices, (K^*, L^*, D^*) solves firm's profit maximization problem.
- Given equilibrium prices, (H^*, C^*) maximizes household utility subject to budget constraint.
- $(p^*, p_{ind}^*, D^*, H^*)$ solves city government's monopoly problem.
- Labor and land markets clear.

⁵This normalization is innocuous from a modeling perspective, because relaxing this assumption will not make any difference to the trade-off that the city leader faces.

⁶China's GDP statistics do not include land sales because governments are not economic entities. House sales, however, are included in GDP statistics. We decide to exclude GDP generated from house sales in the model for house sales are not a major component in GDP for the majority of cities. See figure...

Theorem 1. Existence and Uniqueness. An equilibrium exists. When productivity A is sufficiently high, the equilibrium is unique.

Proof. See Mathematical Appendix. □

C. GDP Concern and House Prices

China's GDP-based promotion system for local leaders amplifies concerns over local economic performance. Compared to political systems in which the leader's objective is forced to align with constituents' well-being, such as democratic election, a GDP-based promotion system is much more prone to the classic principal agent problem. One of the unintended consequences of having such a promotion system is incentivizing local leaders to pursue excessive economic development, even when economic advancement comes at the cost of local residents' welfare. Combined with China's unique institutional setup that local government is the sole supplier of land in a city, such an unintended consequence manifests through city leaders' distorted preferences over industrial and residential land supply, adding fuel to the already spectacular Chinese housing boom.

Proposition 1. GDP Concern. Residential land supply is decreasing in *GDP concern* χ .

$$\frac{\partial H}{\partial \chi} < 0$$

Proof. See Mathematical Appendix. □

Facing immense pressure to boost local economy, the city leader responds by suppressing residential land supply in favor of industrial land supply, in an attempt to drive up local GDP. The city leader weights between local resident welfare and promotion likelihood. As *GDP concern*, χ , increases, the leader's marginal utility from expected promotion increases relative to the marginal utility from resident welfare, causing higher land allocation to industrial uses.

Corollary 1. House price is increasing in *GDP concern* χ .

$$\frac{\partial p}{\partial \chi} > 0$$

Higher *GDP concern*, χ , leads to higher industrial land supply and lower residential land supply. A direct consequence is elevated residential land price/house price, as residential land in the economy becomes scarcer.

To summarize, China's GDP-based promotion system induces city leaders to favor industrial land supply over residential land, leading to high house prices. The main challenge for identifying the proposed channel lies in measuring *GDP concern*. Previous works have resorted to age, job tenure, etc. as proxies. This paper not only offers an alternative measurement of *GDP concern*, χ , but also a new way to causally identify its effect using exogenous movements in χ . The next section illustrates the intuition behind this paper's empirical strategy in measuring *GDP concern*, χ .

D. Alternative Mechanism: Fiscal Pressure

Previous literature has conjectured alternative mechanisms in which China's GDP-based promotion system can affect China's house prices. These alternative mechanisms argue through local governments' budget constraint. This section illustrates how the model incorporates these alternative mechanisms and derives testable implications of these alternatives.

There are two major alternatives that attempt to explain local governments' land allocation behavior. Both mechanisms argue that China's GDP-based promotion evaluation prompts local governments to invest in infrastructure so as to boost the local economy. In other words, the GDP-based promotion system creates fiscal pressure for local governments. In the model's language, $\Omega = \chi$ in local government preferences. Local government directly intervenes in the local economy rather than inducing private sector production activity through land allocation.

Hence, the alternative mechanisms correspond to the following government preferences

$$u^g(D, H) = v^h(D, H) + \Omega \frac{[F(D, H)]^{1-\sigma}}{1-\sigma}, \quad (8)$$

However, the two alternative mechanisms disagree on how land and housing markets are affected. Alternative 1 assumes elastic residential land demand and states that local governments increase residential land supply to increase residential land sales. Local governments then use residential land sales revenue to invest in infrastructure projects. Alternative 2 assumes inelastic residential land demand. Under this assumption, local governments have incentives to suppress residential land supply to raise residential land sales revenue which can be used to finance infrastructure investments.

Alternative 1 predicts opposite land allocation behavior to this paper's mechanism. Under alternative 1, residential land supply increases in $\Omega = \chi$. As shown in the empirical results section, this prediction is not correct, casting doubts on alternative 1.

Alternative 2 can generate the same land allocation behavior as the mechanism proposed in this paper. Residential land price increases in χ , whereas residential land supply decreases. However, a unique implication of alternative 2 that distinguishes itself from this paper's mechanism is that residential land sales is increasing in $\Omega = \chi$.

Proposition 2. Fiscal Pressure. Assuming inelastic residential land demand, residential land sales are increasing in the weight on government consumption, Ω .

$$\frac{\partial}{\partial \Omega} p^H > 0$$

Proof. See Mathematical Appendix. □

As shown in the empirical results section, this prediction is not true, undermining validity of the fiscal pressure channel.

V Data

In this section, we first detail the data collection process of Chinese politician biographical data, followed by procedures that we employed to construct the measure of political promotion. We then explain city-level real estate, land supply, and other macro-economic data collected from a variety of sources, and present relevant descriptive statistics.

A. *Political Data*

We combine two sources of data to construct our political sample. Our main source of political data, Chinese Political Elite Database (CPED), contains extensive demographic information for provincial/prefecture-level politicians.

Politicians in CPED include all city party secretaries and mayors between 2000 and 2015, all standing committee members between 2000 and 2012, all provincial party secretaries and governors between 1995 and 2015, and all other full and alternate CPC Central Committee members between 1997 and 2012. We manually extend CPED to 2015 to include all prefectural, provincial, and national leaders of interest.

CPED provides information on the start and end dates, the place of work, the name of employer, and the political rank of all job assignments during each politician's career. CPED is hand-collected from government websites, yearbooks, and other creditable online sources; albeit very comprehensive, it is also prone to mistakes and errors. We verify the biographical information in CPED using a mainstream commercial political database in China, the Provincial and City Leader Database (PCLD), maintained by China Stock Market & Accounting Research Database. To account for the misinformation in CPED, whenever there is disparity between CPED and PCLD, we manually check and correct the underlying data with a third source, e.g. official website of the Chinese government and verified pages from the Chinese equivalent of Wikipedia (Baidu Baike).

To conclude, we observe the entire universe of all city and province party committee leaders who assumed office between 2001 and 2015. For each leader, we obtain his/her biographical

information and the entire career path including educational background. There are 1,636 city-term observations between 2001 and 2015, which map to 1,302 Chinese politicians.

a. Promotion

The Chinese government is a highly unitary institution; instead of elections, promotions of provincial and prefectural politicians are decided by government officials of higher political ranks. The power structure of Communist Party of China is best characterized as a pyramid (Figure 4). At the top are the 25 central CPC Committee members (Politburos), followed by the provincial CPC Committee members (13 members each, 34 provincial divisions in total), and then the prefecture (city) level CPC committee members (10-11 members each, 334 prefecture divisions in total). The political trajectory of these leaders are predictable in the sense that local leaders are generally promoted up the power ladder level by level. County leaders with better performance are promoted into the city committee, then provincial committee if promoted again, and eventually into the central committee. The tournament for promotion is only at the local regional level; in other words, a city leader's performance is evaluated relative to other city leaders' from the same province. We focus on city leaders in this paper and follow a simple rule of thumb to construct our promotion data, based on the explicit political hierarchy in China⁷: based on the observed career path of politicians in data, we define that a government official is promoted if he is appointed to a new position with a higher political rank within three months after the end date of term-in-office.

b. Promotion for Local Communist Leaders

There has been an extensive literature on the Chinese government's personnel control. **Li and Zhou (2005)** find that for the turnover of provincial leaders, annual GDP growth rate,

⁷The literature on Chinese promotion system has not yet reached a consensus on the definition of promotion (Tao, Su, Lu, and Zhu, 2010); ambiguity is largely from the ambivalent orders of precedence in China. The orders of precedence for Chinese political leaders is not formally published, and varies both by person and by period of time. However, the Chinese government also has a regimented system of political ranks, which can serve as a rough order of precedence when dictating official protocol when multiple officials attend same events and are adopted here for our empirical exercise.

age, education, central connections, and years in office are among the most influential factors. We impute city-level politicians' expected promotion probabilities as a linear projection using these key variables.

B. Real Estate Data

We obtain urban planning and land sales data aggregated at city level from China Real Estate Index System (CREIS) database maintained by China Index Academy. CREIS collected land transaction data from the Ministry of Land and Resources, and local Land Reserve Centers.

We restrict our sample period from 2003 since the marketization of urban land supply in China took off in that year (Liu, Cao, Yan, and Wang, 2016). Information available in CREIS includes acreage, price and land use type for each parcel of land.

C. Macroeconomic Series

National Bureau of Statistics of China (NBS) maintains annual macroeconomic series on city-level. For each city, we collect population (measured by usual residence), government in-budget revenue, total city-wide deposit, average wage, GDP, residential prices, secondary industry GDP, tertiary industry GDP, fixed investment, floor area sold for residential building, residential housing prices, and real estate investment by year during 2003 and 2015. Summary statistics are reported in Table 3; all price-related variables are normalised to a base year using CPI published by NBS. To maintain a balanced sample, we keep cities that span for at least half of the sample period; the 195 cities included in the final sample account for around 90% of all floor area sold nation-wide (Figure 8).

VI Empirical Results

In this section, we begin by showing evidence that the promotion evaluation for city level communist leaders is based on past economic performance. We then test implications of our model using data introduced. Our empirical findings confirm that the career incentive channel spills over into house prices through the land use type allocation margin. At last, we

address the alternative fiscal pressure channel and show that the data does not support this hypothesis.

A. *GDP, Promotion, and Hometown Tie*

To study China’s promotion system for city leaders, we estimate the following linear probability model

$$Y_{i,t} = \beta_0 + \underbrace{(\beta_1 + \beta_2 \text{Hometown Tie}_{i,t})}_{\text{Career Incentive: } \chi_{i,t}} \times \text{GDP Growth}_{i,t} + \beta_3 X_{i,t} + \epsilon_{i,t} \quad (9)$$

where $Y_{i,t}$ is a promotion dummy for city i in year t . GDP growth is defined as the first difference of the city’s GDP as output added value is an important concept from the communist point of view.

Hometown tie is an indicator variable that takes the value one if and only if in the following scenario: during the city leader’s term, the central government appoints a new provincial leader to the province in which the city leader works; and, the newly appointed provincial leader has the same city of birth as the city leader. The measurement for hometown tie is constructed from hometown tie, which is a bond between a city leader and a newly appointed provincial leader who both share the same city of birth. As aforementioned, city-level Chinese politicians’ promotion decisions are made by higher level communist officials at the same province. The appointments of new provincial leaders during the city leader’s term is made confidentially by the central communist committee, and hence unexpected by the city leaders in office. To avoid the possibility that a provincial leader might have favored his hometown comrades and hence appointed mayors endogenously, we restrict our definition of hometown tie to the city leaders who already assumed office when the tie is established (i.e., the provincial leader is appointed *after* the city leader assumed office). Connection via place of birth is a special bond in the Chinese culture. The Chinese term *lǎoxiāng* is a phrase to describe people who share the same hometown. As the ancient saying goes, *lǎoxiāng* burst into tears when they meet, which illustrates the special bond between people who share the same birthplace.

We therefore conjecture that sharing hometown with the provincial communist leaders shifts city communist leaders' promotion probabilities, and hence changes their career perspectives.

β_1 indicates the correlation between GDP growth and promotion outcome, in the absence of any hometown tie. β_2 captures the effect of hometown tie on the sensitivity of promotion to GDP growth. A positive β_2 indicates that the effect of GDP on promotion is enhanced in the presence of a hometown tie, whereas a negative estimate for β_2 means a hometown tie diminishes the effect of GDP growth on promotion.

A comprehensive set of fixed effects have been included to control for unobserved characteristics that might affect a leader's promotion probability beyond the GDP-promotion linkage. In column (1), province-startyear fixed effects are added so that the comparison is for city leaders who are in the same province and who start office in the same year. This is because leaders who assume office in the same province in the same year are likely to be competing with each other for the same promotion opportunity. City fixed effects, person fixed effects, and rank fixed effects are further included, considering promotion probability averages can vary across cities, across leaders, and across ranks in the CPC. In column (2), fixed effects in column (1) are replaced with more stringent city-term fixed effects. Hence, in column (2), the variation comes from the same leader within the same term. In other words, estimates in column (2) can be interpreted as what predicts a city leader's promotion within the same term. In column (3), one-year lagged annualized term GDP growth, which is the annualized GDP growth since the start of office, is added as control because a leader's promotion outcome can also depend on his/her performance in prior years. Column (4) further includes an interaction term between GDP growth and ethnic minority status of the leader. The estimates of interest, namely, the coefficients for GDP growth and its interaction with hometown tie stay precisely estimated across all specifications.

Higher GDP growth is associated with a greater likelihood of being promoted. As estimates in column (4) suggest, growing a city's GDP by 1 billion RMB can lead to a 347.7 percent increase in the leader's promotion probability, in the absence of a hometown tie. Throughout 2003-2015, the average GDP growth among Chinese cities is 0.016 billion, and the standard

deviation is 0.02 billion. Hence, all else equal and without a hometown tie, a one standard deviation increase in GDP growth increases a city leader's promotion probability by 6.95%. GDP performance in the prior years since the start of office also appears important in one's promotion evaluation, and its magnitude is comparable to or even bigger than that of contemporaneous GDP growth. However, adding prior GDP performance does not affect the importance of contemporaneous GDP growth and its interaction with hometown tie.

A hometown tie tremendously reduces the importance of GDP performance in someone's evaluation for promotion. As the estimates in column (4) show, having a hometown tie cuts the sensitivity of promotion to GDP by 2.891, which is equivalent to an 83% deduction. That is to say, the presence of a hometown tie makes GDP growth 83% less crucial to one's promotion considerations. The null hypothesis that hometown tie completely obviates the importance of GDP growth to a leader's promotion outcome is not rejected under a Wald test at 0.1 significance level.

Hometown tie itself boosts a city leader's promotion probability. In columns (2) and (3), the estimates for hometown tie dummy is positive and statistically significant at 0.1 significance level. Literature on the promotion system for Chinese communist leaders is still debating between hometown favoritism (Kung and Zhou 2017; Fisman, Shi, Wang, and Xu 2018) and faction control (Francois, Trebbi, and Xiao, 2016). The estimates provided here supports the hometown favoritism hypothesis.

To summarize, OLS estimates in Table 4 suggest that GDP growth and its interaction with hometown tie, ethnic minority status are important factors in a city communist party leader's promotion decision. Developing a city's economy greatly boosts a city leader's promotion probability. A hometown tie, however, substantially diminishes the importance of GDP growth to the leader's promotion outcome. The GDP-based promotion system does not apply to ethnic minority leaders.

Hometown tie for city i in year t is then constructed using estimates in column (3) of Table 4. The variation of hometown tie comes from hometown tie.

B. Event Study

This section studies a city's changes in land allocation within a five year period surrounding the establishment of a hometown tie. As argued above, after the establishment of a hometown tie, the city leader's hometown tie, χ , is diminished. The model then predicts a drop in industrial land allocation but a boost in residential land supply. As a result, house price will experience a slow down in growth.

An event refers to the five years surrounding the establishment of a social tie. The year in which a hometown tie forms is normalized to be 0, before which there is no hometown tie, after which hometown tie is present.

To examine the validity of this prediction, the following specification is estimated using city-year observations:

$$Y_{i,t} = \beta_0 + \sum_{\tau \neq -1} \beta_{1,\tau} \mathbb{1}\{\tau\}_{i,t} \mathbb{1}\{event\}_{i,t} + \beta_2 X_{i,t} + \epsilon_{i,t}$$

where $Y_{i,t}$ is the outcome variable in city i in year t . The outcomes studied include residential/industrial land supply as a ratio of total land supply as well as house price growth rate.

$\mathbb{1}\{\tau\}_{i,t}$ is an indicator variables that equals 1 if and only if a hometown tie is established τ years relative to year t . $\mathbb{1}\{\tau\}_{i,t}$ indicates whether observation is in an event. The year $\tau = -1$ is the omitted year, hence $\tau \in \{-2, 0, 1, 2\}$. The coefficients $\beta_{1,\tau}$ show how the outcomes change relative to the year just before the establishment of a social tie. If the model predicts correctly changes in land allocation behavior, β_1 's should be positive for residential land ratio but negative for industrial land ratio and house price growth rate. The reason is that the establishment of a social tied reduces χ . Land allocation then changes per **Proposition 1**.

$X_{i,t}$ are control variables, which include land quota, government budget, population, GDP, etc. Year polynomials up to the fourth order are further included to take out year trends. Also included are city-term fixed effects, province fixed effects, and event fixed effect.

Figure 10 illustrates estimates with 95 percent confidence intervals from the reduced form event study. As predicted by the model, residential land ratio rises, industrial land supply ratio plunges, and house price growth slows down, following the establishment of a hometown tie, which diminishes the importance of GDP growth to a city leader’s promotion outcome.

Residential/Industrial land supply ratio and house price growth rate do not appear statistically different in the two years prior to the formation of a hometown tie. Following the establishment of a hometown tie, however, residential land supply ratio and industrial land supply ratio diverge on almost mirrored paths. In the year when a hometown tie forms, relative to the year before, residential land supply ratio goes up by 5 percentage points, whereas industrial land supply ratio dives by also 5 percentage points. House price growth rate reduces by 7 percentage points relative to the year before. Thereafter, residential land ratio continues to rise and reaches, two years after tie establishment, around 15 percentage points higher than the year just before tie formation. Industrial land ratio keeps shrinking and plummets, in two years after tier formation, at 15 percentage points lower than the year before tie formation. House price growth rate further falls to and stabilizes, in the two years following tie establishment, around 10 percentage points below the pre-tie level.

Figure 11 carries out a similar event study for (log) land quota around the establishment of a hometown tie. The event study does not find any difference in the evolution of the land quota process before and after the formation of a hometown tie. This finding further testifies to the exclusion restriction satisfaction of hometown tie as an instrument for GDP-promotion linkage.

C. Reduced Form Analysis

This section studies the effect of career concern, χ , on housing market and land markets. The following specification is estimated using ordinary least squares

$$Y_{i,t} = \beta_0 + \beta_1 \text{Career Incentive}_{i,t} + \beta_3 X_{i,t} + \epsilon_{i,t} \quad (10)$$

The outcomes studied include land allocation ratios, land prices, land supply, housing supply, and house price growth rate. The key coefficient is β_1 in front of career concern proxied by the hometown tie.

A rich set of controls and fixed effects have been added to check the robustness of the estimates. The full set of controls: land quota, annual GDP growth, GDP, (log) government in-budget fiscal revenue, and (log) resident population are included cumulatively as robustness checks. Throughout, estimated coefficients for hometown tie remain precisely estimated and almost identical in magnitude. The fact that estimation results barely change in the process of adding in full control variables suggests that land quota, annual GDP growth, GDP, government in-budget fiscal revenue, population, and job tenure are not driving the estimation results.

Omitted variable biases are unlikely in equation (10) given that the variation in career concern comes from hometown tie. Provincial communist party committee personnel is managed by the 25 Politburo members. For an omitted variable to pose any endogeneity threat, the variable has to be systematically correlated with the Politburo's appointment decision and with the housing/land market conditions in a city, through the city leader's city of birth and through the new appointee's birth city.

Reverse causality related endogeneity is not a major concern either. For a reverse causality argument to go through, a city's housing/land market conditions must prompt the politburo to appoint a candidate who shares the same hometown as the city leader. This scenario is not very likely.

The possible endogeneity concern here comes from measurement error. The measurement for career concern is constructed from OLS estimates in column (4) of Table 4. Hence, the reduction of a hometown tie in someone's hometown tie is an averaged measurement, masking potentially heterogeneous treatment effect of a hometown tie to hometown tie. The endogeneity concern here fits well with the classical setting for measurement error bias, in which case, the OLS estimates are biased towards 0 and should be interpreted as conservative estimates for the hometown tie channel. However, as shown in later sections, the estimates

are statistically significant, and magnitudes are economically meaningful, partially obviates the possible measurement error biases.

a. Hometown Tie and Pre-trend of House Price

To address the concern that hometown tie formation is expected by the city leader or that cities with a hometown tie might be different from the ones without, this section shows that the five year pre-trend of house price in cities with hometown tie is not different from cities without a hometown tie.

Cities experiencing a hometown tie are assigned into the treatment group. The year in which a hometown forms has been normalized to be 0. -5 to -1 corresponds to the five years before the hometown tie establishment. A city-year pair, in the same province as the treatment city, is in the control group if and only if the leader of the city in that year has no hometown tie throughout the entire term in office. The two groups in each province are then aggregated across provinces.

Figure 8 shows that cities that receive a hometown tie do not show a different path house price evolution compared to their same-province counterparts who do not have a hometown tie. In other words, hometown tie is not selectively given to cities that have already been experiencing declines in house price growth prior to the tie formation. Neither do cities leaders who experience the hometown tie foresee the formation. In the year a hometown tie forms, the treatment group sees a dramatic drop in its house prices.

b. Housing Market

Table 5 shows the estimated effect of hometown tie on a city's house price growth rate. The effect of hometown connection is captured by the establishment of a shared hometown between a mayor and the corresponding province leader, in the current year or the year before, to capture the slow-moving nature of relationship effects. In columns (1) to (3), contemporaneous/one-year-lag land quota, annual GDP, and contemporaneous/one-year-lag resident population are added gradually to check the robustness of the estimates. Lagged land

quota is included as well because it could have affected house price in the previous year, hence affecting the house price growth rate. Lagged resident population and contemporaneous resident population are both included as a way to control for migration. Throughout all specifications, the estimate for hometown tie remains robust and similar in magnitude.

Estimates in Table 5 suggests the hometown tie channel plays a large part in China's house price boom. Column (3) suggests that the establishment of hometown tie decreases house price growth rate by 5.1 percentage points. Given that the average annual house price has been growing at 9%, estimates in column (3) suggests more than half of China's house price appreciation can be explained by the hometown tie channel proposed in this paper. However, we caution against interpreting the number as the counterfactual estimate for the scenario in which hometown tie of communist leaders are shut down. The counterfactual estimate is that house price could reflect people's expectation about the duration of a hometown tie, which could lead to endogeneity concerns and, therefore, biased estimates.

c. Land Market

This section focuses on how a city leader's land allocation behavior changes with hometown tie. As stated in **Proposition 1**, an increase in career concern suppresses residential land supply but elevates industrial land supply. Table 6 to Table 7 show precise and robust estimates that validate the model's implications.

As predicted by the model, estimates in Table 6 show that residential, measured as the ratio to total land supply, decreases with career concern, whereas industrial land supply increases. Estimates in column (1) of Table 6 indicate that the introduction of a hometown connection increases residential land supply ratio by 13.8 percentage points but reduces industrial land supply ratio by 11.1 percentage points. Furthermore, Table 7 demonstrate that the quantity of residential land supply, as measured by land area or floor area, increases as hometown tie appears, but the quantity of industrial land supply goes down.

The baseline control variable is land quota. This is because the quantity supplied by a city leader is hard constrained by the land quota imposed. From column (2) to column (7), annual

GDP growth, GDP, (log) government in-budget fiscal revenue, (log) resident population, and job tenure fixed effects are included to check robustness. Estimates stay precisely estimated and remain almost identical in magnitude.

Table 6-7 also reveal that GDP-promotion linkage does not move industrial land prices, as measured per land area or per floor area. This could be a result of the fact that firms can easily substitute between industrial land supplied in different cities. As a result, industrial land price does not respond as much as residential land price. Further investigation into this issue is left to future research.

d. Heterogeneity in Career Concern

This section further substantiates the proposed career concern channel by exploring heterogeneity in career concern. The two sources of career concern considered are ethnic minority status and above-provincial rank. As shown in column (4) of Table 4, GDP-based promotion system does not apply to ethnic minority leaders. One would expect the proposed career concern channel to have reduced effect on housing and land markets for this group of leaders. On the contrary, above-provincial ranked leaders face more heated competition for promotion. Unlike prefecture or city ranked officials, provincial or politburo ranked city leaders are competing for scarce seats in the central government or the chance to become president. The proposed hometown tie channel should be enhanced for this group of leaders.

Table 9 studies how housing and land markets in cities led by either of this two group of leaders respond to hometown tie. As conjectured, movements in hometown tie do not change housing and land market conditions for ethnic minority leaders, but above-provincial leaders respond more drastically than prefecture/city ranked leaders. In columns (1) to (3), an interaction term between hometown tie and ethnic minority status is included to investigate how ethnic minority status changes the effect of the proposed hometown tie channel. As expected, even though hometown tie increases house price growth, suppresses residential land supply, and boosts industrial land supply, this is not the case for ethnic minority leaders. Sums of the coefficients for hometown tie reveal that the hometown tie channel does not

have any economically meaningful impact on a city's housing and land markets if the city leader is exempt from the GDP-based promotion system due to ethnic minority status. On the other hand, for above-provincial ranked leaders, the effects of hometown tie on housing and land markets are amplified. As estimates in columns (4) to (6) suggest, compared to prefecture/city ranked leaders, hometown tie leads to higher house price growth, represses further residential land supply, and inflates extra industrial land supply if the city leader has provincial or politburo ranks. Controls in columns (1) to (6) are kept to a minimal amount due to small sample sizes of ethnic minority leaders and of above-provincial ranked leaders who experience a hometown tie within term.

e. Alternative Mechanism: Fiscal Pressure

This section tests the implications of the alternative fiscal pressure mechanism. As discussed in the modeling section, a direct implication of the fiscal pressure mechanism is that residential land sales is increasing in hometown tie.

Estimates in Table 10 show no support for this mechanism. The estimates for hometown tie are not statistically different from 0 and the signs are mixed across specifications. From column (1) to column (7), the full set of controls and fixed effects are included gradually. Residential land sales do not move in career concern, casting doubt on the fiscal pressure channel.

VII Full Model

In this section, the model is extended to capture heterogeneity across Chinese cities. Compared to the stylized model shown before, the full model distinguishes the concept of stock vs. flow of land. In addition, a competitive real estate development sector is added to distinguish residential land price and house price. The model is calibrated to match three moments: industrial/residential land supply ratio, house price, and fiscal expenditure share of GDP, for 35 major cities between 2007 and 2015. The hometown tie channel is then shut down for quantitative counterfactual exercise. Consistent with our reduced form estimates, the hometown tie channel explain 60% of average house price growth rate for these cities.

A. Model Extension

The environment of the extended model remains to be static, general equilibrium, small open economy with three agents.

a. Representative Firm

The representative firm maximizes profit by renting capital, hiring labor, and purchasing industrial land from city leader. The newly purchased industrial land, together with industrial land stock from the previous period, are used to (competitively) produce the homogeneous consumption numeraire good.

$$\max_{K,L,D} AK^\alpha L^\beta (D_{-1} + D)^{1-\alpha-\beta} - rK - wL - p_{ind}D \quad (11)$$

where D_{-1} is the amount of industrial land from the previous period. D is the amount of industrial land newly purchased.

b. Representative Household

The representative household maximizes (quasi-linear) utility by choosing housing and numeraire consumption

$$u^h(C, H) = \frac{H^{1-\frac{1}{\epsilon}}}{1-\frac{1}{\epsilon}} + \eta C \quad (12)$$

where η is the weight on numeraire consumption, and $-\epsilon$ is the implied housing demand elasticity. Consumption is financed with post tax labor income

$$pH + C = (1 - \tau)wL \quad (13)$$

c. Real Estate Developer

The competitive real estate development sector converts residential land into housing using a linear conversion technology

$$H = \xi N \quad (14)$$

where ξ is the efficiency parameter. The implied house price and residential land price satisfy

$$p_{res} = \xi p$$

d. City Leader

The city leader has rational expectations and cares about household welfare, government consumption, and expected promotion payoff.

$$u^g(D, H) = v^h(D, H) + \Omega \log(F(D, H)) + \chi Y(D) \quad (15)$$

where Ω is fiscal pressure parameter, and χ is hometown tie. Government consumption is composed of taxes and land sales

$$F(D, H) = \tau(rK + wL) + p_{res}N + p_{ind}D$$

The leader maximizes utility by allocation land to industrial and residential uses subject to land quota

$$N + D = \zeta \quad (16)$$

B. Equilibrium

An equilibrium consists of prices $(w^*, p_{ind}^*, p_{res}^*, p^*)$ and allocation $(K^*, L^*, D^*, N^*, H^*, C^*)$ such that:

- Given equilibrium prices, (K^*, L^*, D^*) solves firm's profit maximization problem.
- Given equilibrium prices, (H^*, C^*) maximizes household utility subject to budget con-

straint.

- Given equilibrium prices, (H^*, N^*) solves real estate developer's profit maximization problem.
- $(p_{res}^*, p_{ind}^*, D^*, N^*)$ solves city government's monopoly problem.
- Labor, land, housing markets clear.

C. Calibration

For each city-year pair, the model is first calibrated by a set of pre-set parameters as shown in Table 18. The capital and labor shares are calculated based on capital and labor income shares of GDP for each city in each year. To circumvent the challenge of not observing capital stock on the city level, a growth rate approach is adopted to back out a city's capital stock in 2003. The assumption with the growth rate approach is that investment counters depreciation and maintains a constant growth rate of capital. The growth rate of capital in 2003 is assumed to be equal to the average growth rate of investment between 2001 and 2005. Productivity is then defined as the Solow residual for each city-year pair. Conversion efficiency is calculated as the ratio of residential land price to house price, as implied by equation (15), in each city in each year. The rental rate of capital, population, industrial land stock, and annual land quota are taken from the data. The tax rate on labor and capital income is set to be 10% as suggested by the World Bank's data on China's tax-revenue-to-GDP ratio in this period of time. Residential land demand elasticity is estimated to be -1.05 as illustrated in column (4) of Table 18.

Three remaining preference parameters are calibrated targeting moments from the data, as illustrated in Table 19. The hometown tie parameter governs the relative weight of industrial production to household welfare in the city leader's preferences. Hence, χ is calibrated by targeting the ratio of industrial land supply to residential land supply. Given the land quota, the industrial to residential land supply ratio pins down the amount of residential land supply in equilibrium. Given that demand elasticity is also fixed to be -1.05, as estimated, any movement in η , weight on numeraire consumption in household preferences, directly

translates into house prices. Hence, η is calibrated to match the house price of city i in year t . Fiscal parameter, Ω is the weight on government consumption, and it is calibrated to target fiscal expenditure as a share of GDP.

On average, the model matches house prices and land supply ratios well. Fiscal expenditure share is higher in the model than data. This could stem from following reasons. Firstly, in reality, converting rural land to urban land is not cost free, which means the effective revenue from land sales is much lower than calculated in the model. Secondly, there exist transfer payments between central and local governments as illustrated in Figure 4, which is unfortunately unobservable but manifests in city governments fiscal expenditures. Thirdly, although tax code is set by the central government, tax revenues as a share of GDP differ across cities because of composition effects. That is to say activities subject to higher or lower tax rates might be more prominent in some cities than others.

Figures 12-17 further confirm fitting of the model. In these figures, each dot represents a city-year pair. For house prices and land supply ratios, data moments and model moments roughly line up along the 45 degree line, showing promising model fit. The fiscal expenditure share graph, however, points out the model's tendency to overstate fiscal expenditure of the city government.

D. Quantitative Counterfactual

To quantify the contribution of hometown tie channel to China's housing boom, hometown tie parameter χ is set to 0, with the rest of parameters left as calibrated. The equilibrium of each city-year pair is then re-calculated.

Figure 18 plots the average annual house price (million per hectare) for the 35 major Chinese cities between 2007 and 2015, as in the data, in the model, and in the no hometown tie counterfactual exercise. The house prices implied by the model track very closely to the data. When hometown tie is shut down, however, the average house price follows a drastically different trajectory. The first thing stands out is that, instead of merely experiencing a mild slow down in growth rate, house prices in the 35 cities would have experienced a big hit

during the financial crisis period. In the absence of hometown tie, China's house prices in the 35 major cities would not recover to its 2007 level until 2011. Even after this recovery, the house prices follow a different growth path as indicated in the data. On average, the 35 cities' house prices have growth at 10% per year. In the no hometown tie counterfactual exercise, the growth rate in the same time frame would have only been 4%, equivalent to a 60% reduction. This finding is almost identical with the OLS estimates shown before.

Figure 19 and 20 shows the counterfactual results for residential/industrial land prices and supply. Over the period, residential land price in the data and implied by the model are similar in level and in growth. After a drop in 2008, the price has recovered strongly. When hometown tie is shut down, however, the recovery would have been much more sluggish. Instead of more than tripling from 2008 to 2015, the residential land price in the 35 cities would have only grown a little more than twice.

VIII Robustness Checks

In this section, we carry out a series of exercises to check the robustness of our findings. We begin by addressing the bad control problem. In addition, we again show hometown tie and land quota are not correlated using reduced form analysis.

A. Bad Controls Check

As suggested in Angrist and Pischke (2009), controlling for intermediates correlated with hometown tie can lead to the "bad control" problem which biases the estimates. This section addresses this concern by dropping all controls. The obtained estimates are statistically significant and remain similar in magnitudes, testifying to the estimates are driven by bad controls.

In Table 12, house price growth rate, residential land supply ratio, and industrial land supply ratio are directly regressed on hometown tie without including any controls. The estimates are statistically significant and remain very similar in magnitudes as baseline estimates, providing confidence that the baseline estimates are not biased by "bad controls."

B. Hometown Tie and Land Quota

This section further shows hometown tie is not correlated with land quota with regression analysis. Throughout all specifications, the estimated coefficients for hometown tie are not statistically different from 0.

Column (1) of Table 13 show that the level of land quota does not move with respect to the presence of hometown tie, while city-term and year fixed effects are controlled for. In other words, in a city leader's term, a hometown tie formation does not bring more land quota. Column (2) further adds job tenure fixed effects but does not show a different conclusion from column (1). In column (3) province-year fixed effects and city-fixed effects are included to show whether a city with a hometown tie gains more land quota compared to other cities in the same province in the same year. As the estimates suggest, the answer is no. Column (4) further adds job tenure fixed effects in addition to controls in column (3). Finally, column (5) incorporates city-term, job tenure, and province-year fixed effects all together but shows no significant effect of hometown tie to land quota allocation.

Table 14 displays estimates for the same exercise as in Table 13, except for the log level of land quota. The conclusion that hometown tie does co-move with land quota remains the same.

IX Conclusion

In this paper, we modeled the career incentive channel on house price growth. The channel has been causally identified with extensive checks on robustness. Our findings imply that policy makers should evaluate the CPC's promotion system to relieve ongoing concerns about China's housing market conditions. Taking advantage of the unique cultural background in China (hometown tie), we propose a novel identification strategy and delivered causal evidence that the career incentive channel is a major player in China's rapid house price growth. The empirical counterfactual exercise suggests 60% of average Chinese house price growth rate can be explained by the channel proposed. Through a static general equilibrium model,

this paper has formally analyzed how the GDP-based promotion system in the CPC suppresses residential land supply and leads to house price appreciation. Researchers and scholars have not hitherto reached an agreement on the factors driving China's house price appreciation. The lack of formal analysis on the connection between CPC's GDB-based promotion system and house price growth has retarded the process of understanding the Chinese housing boom. Continued ascension in China's house price and residential land price will undoubtedly cause further qualms over the state of China's financial sector and the Chinese economy. Our paper sheds light on the importance of political institution in housing markets. It is shown that the CPC promotion system is key to both understanding the spectacular Chinese housing boom, and finding an effective solution to ease the ever increasing uncertainty over China's land and housing market conditions.

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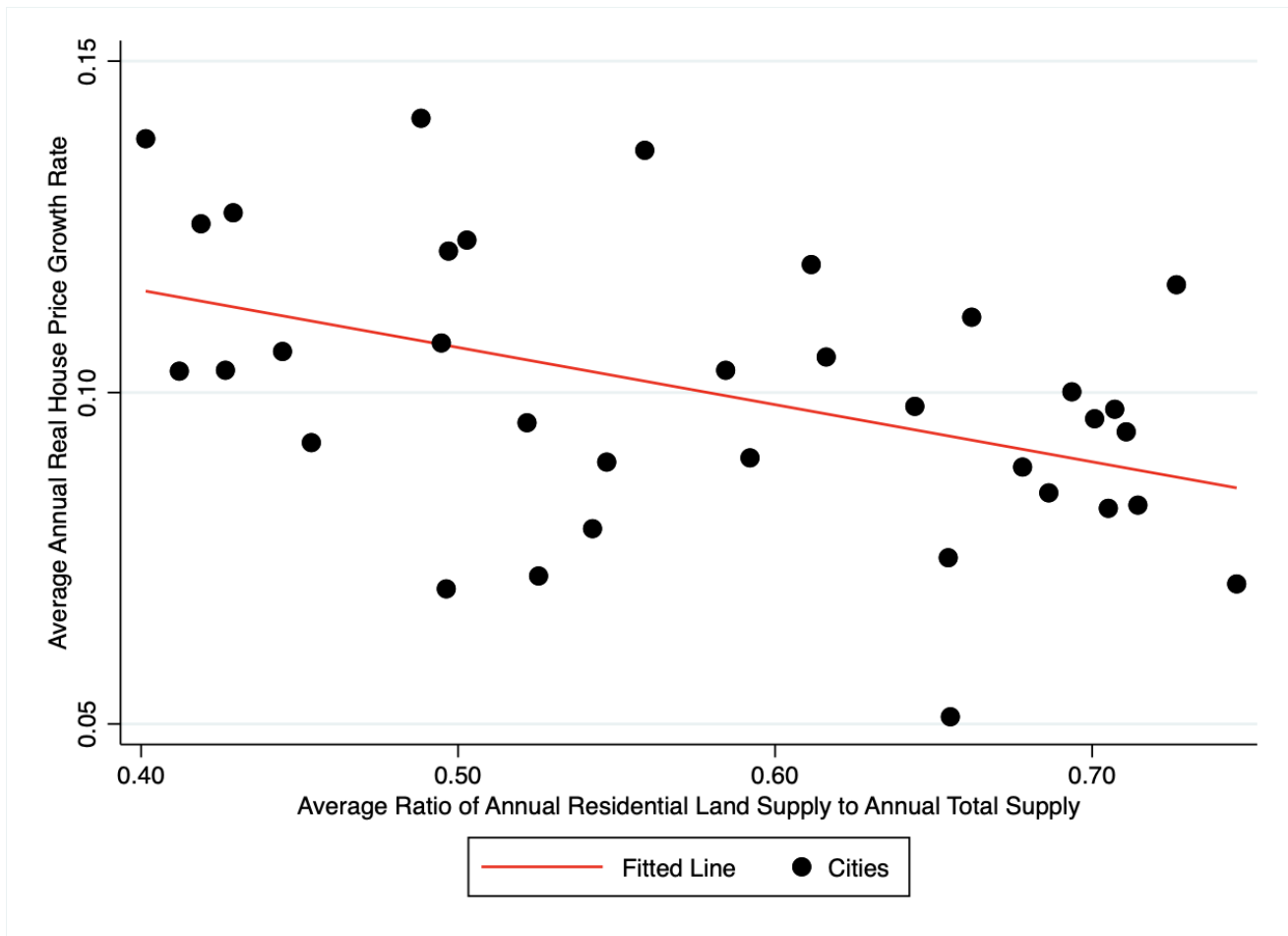
Figures

Figure 1: House Price and Residential Land Price



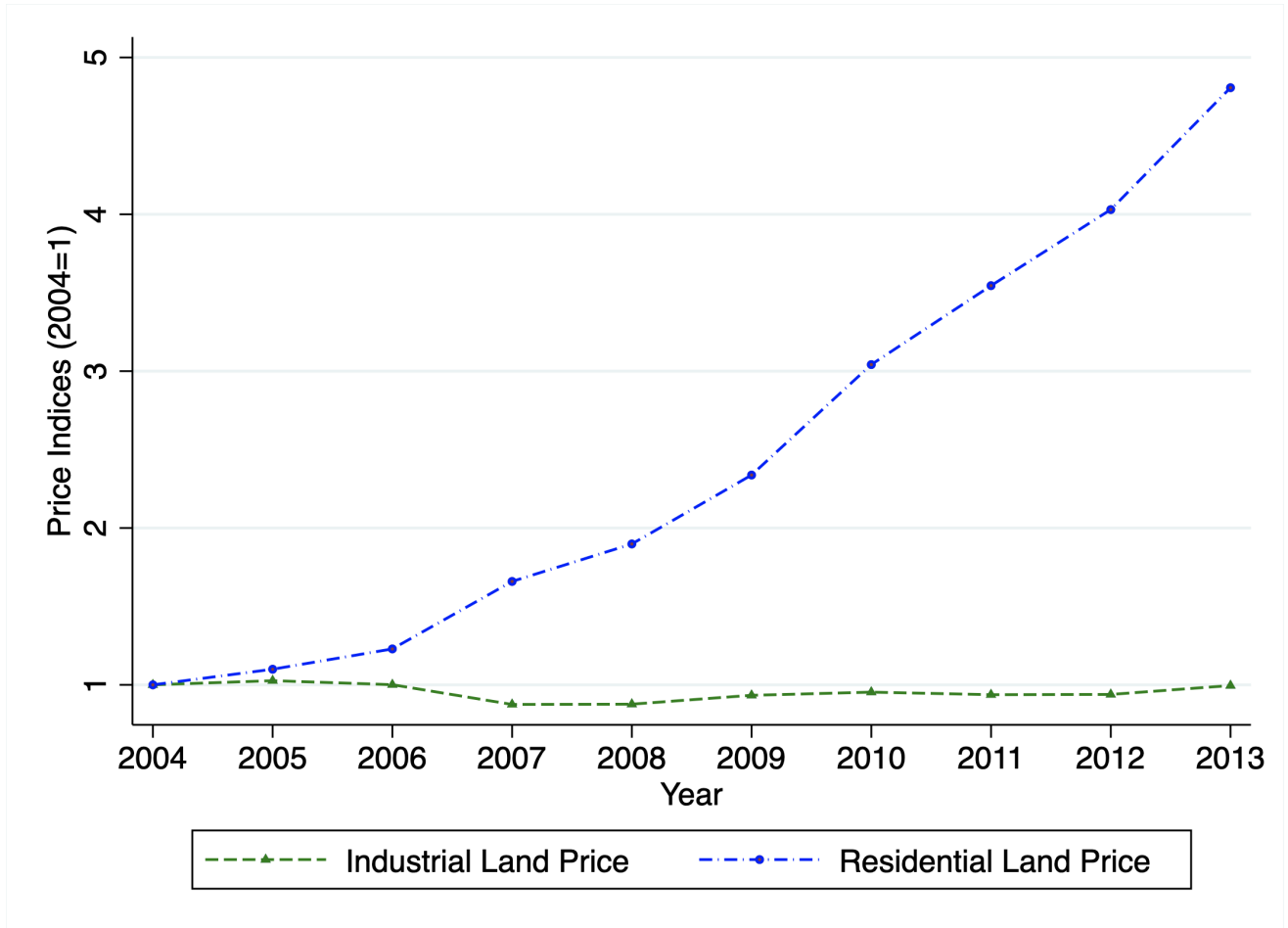
Note: This graph plots quarterly, constant quality, real housing and residential land price indices for 35 major Chinese cities between 2004 and 2013. Both indices have been normalized to 1 in the initial quarter, and the unit for both indices is price per unit floor area. House price index is from Fang et al. (2016). Residential land price comes from Wharton/Tsinghua Chinese Residential Land Price Indexes (CRLPI).

Figure 2: Land Allocation and House Price Growth Rate



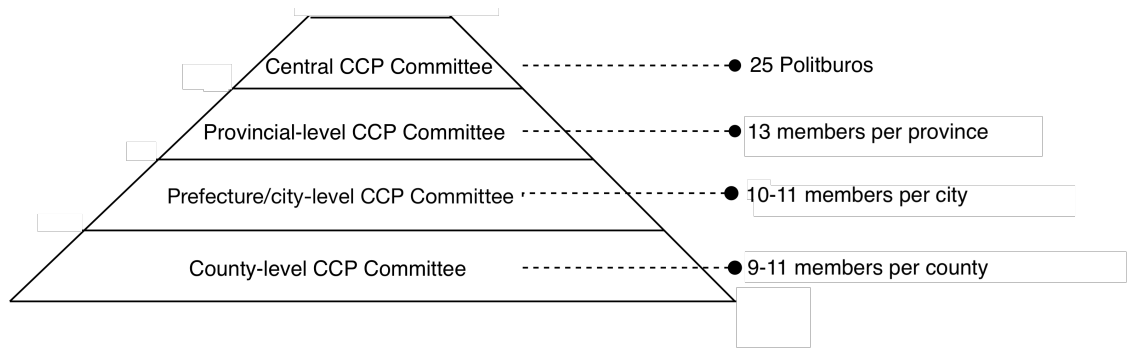
Note: This graph plots average annual house price growth rate against average annual residential land supply as a ratio of total land supply for 35 major Chinese cities between 2004 and 2013. R-squared is 20% for the regression line. Total land supply is defined as the sum of industrial, residential, commercial, and other land supplied. City level house prices come from NBS and land data comes from CREIS.

Figure 3: Land Price by Use Type



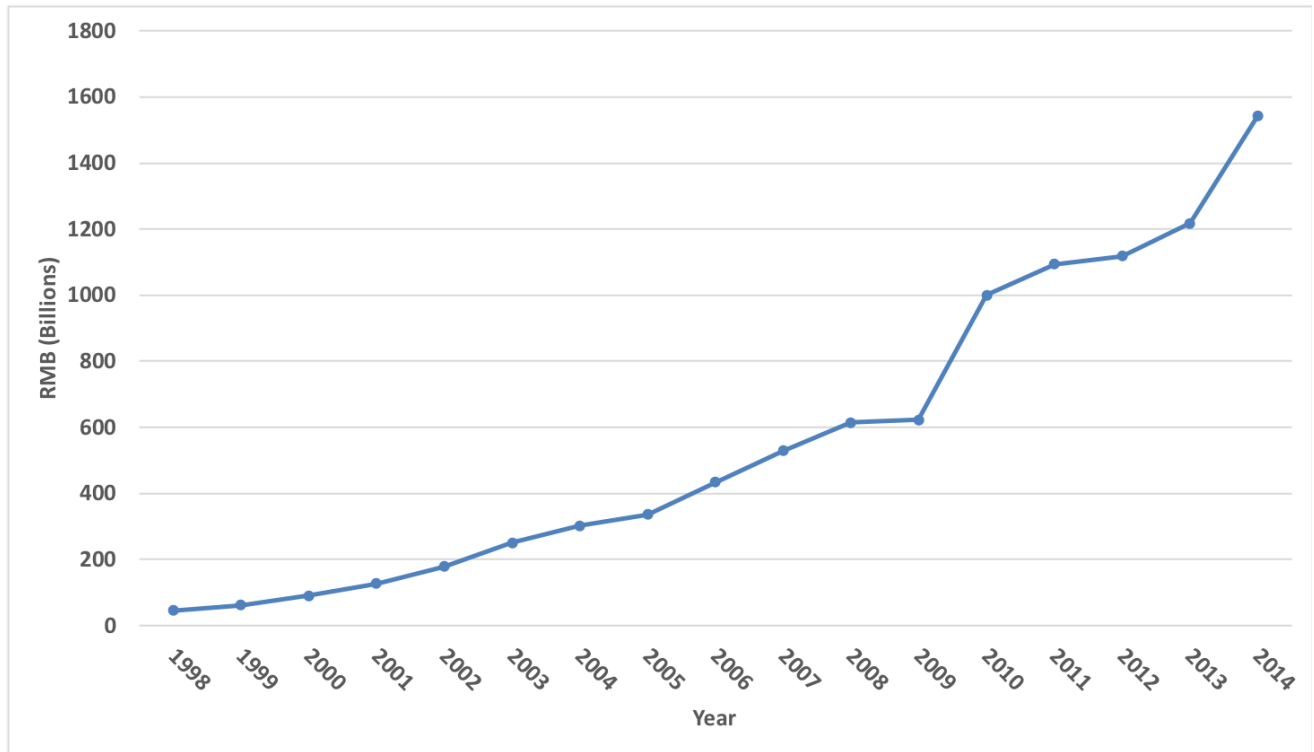
Note: This graph plots yearly, constant quality, national real land price indices by land use type. Data comes from Chen et al. (2017).

Figure 4: The Political Pyramid of the Communist Party of China



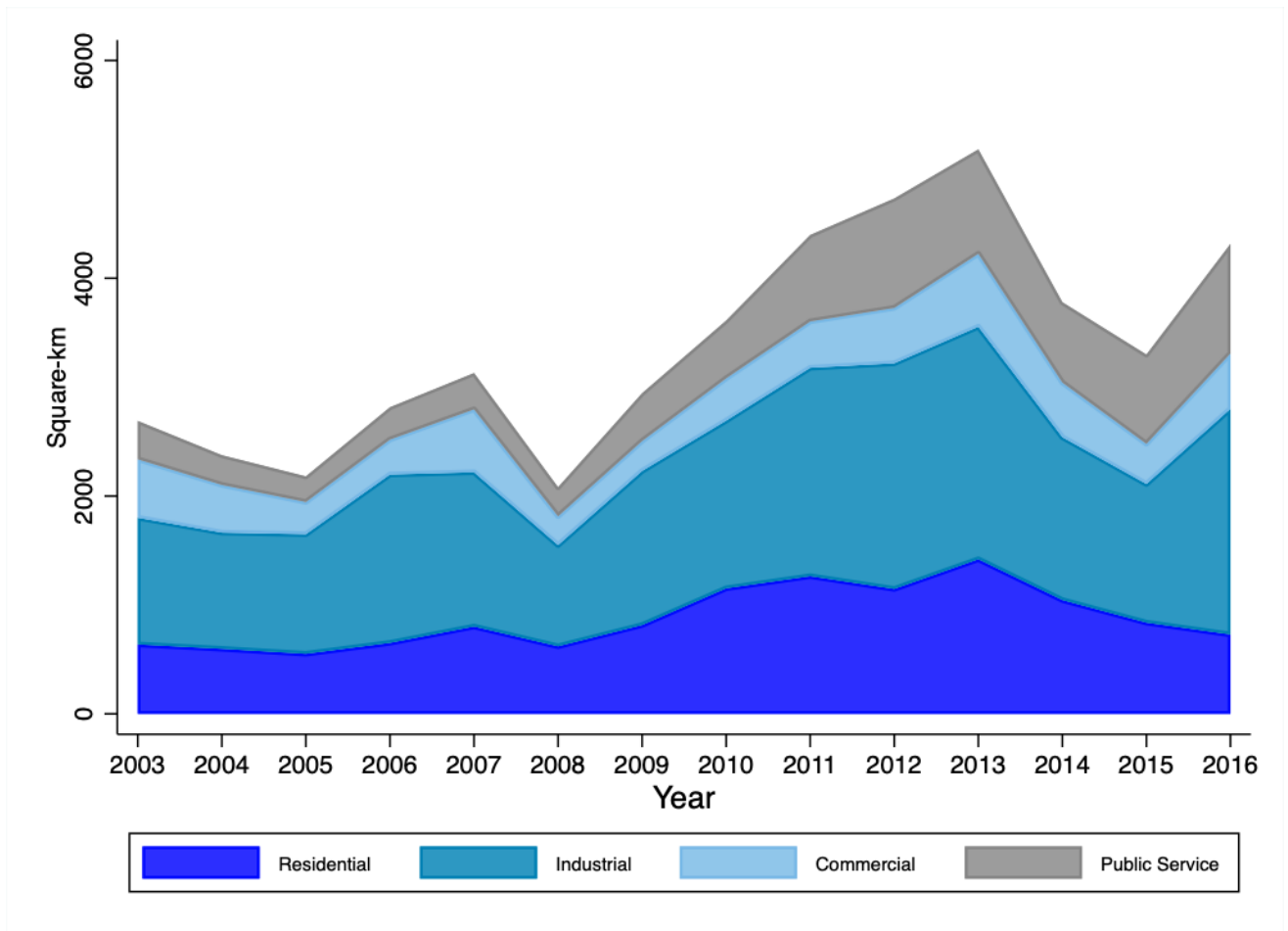
Note: This graph plots the organizational structure of the Communist Party of China.

Figure 5: Total Land Sales to Real Estate Developers (RMB Billions)



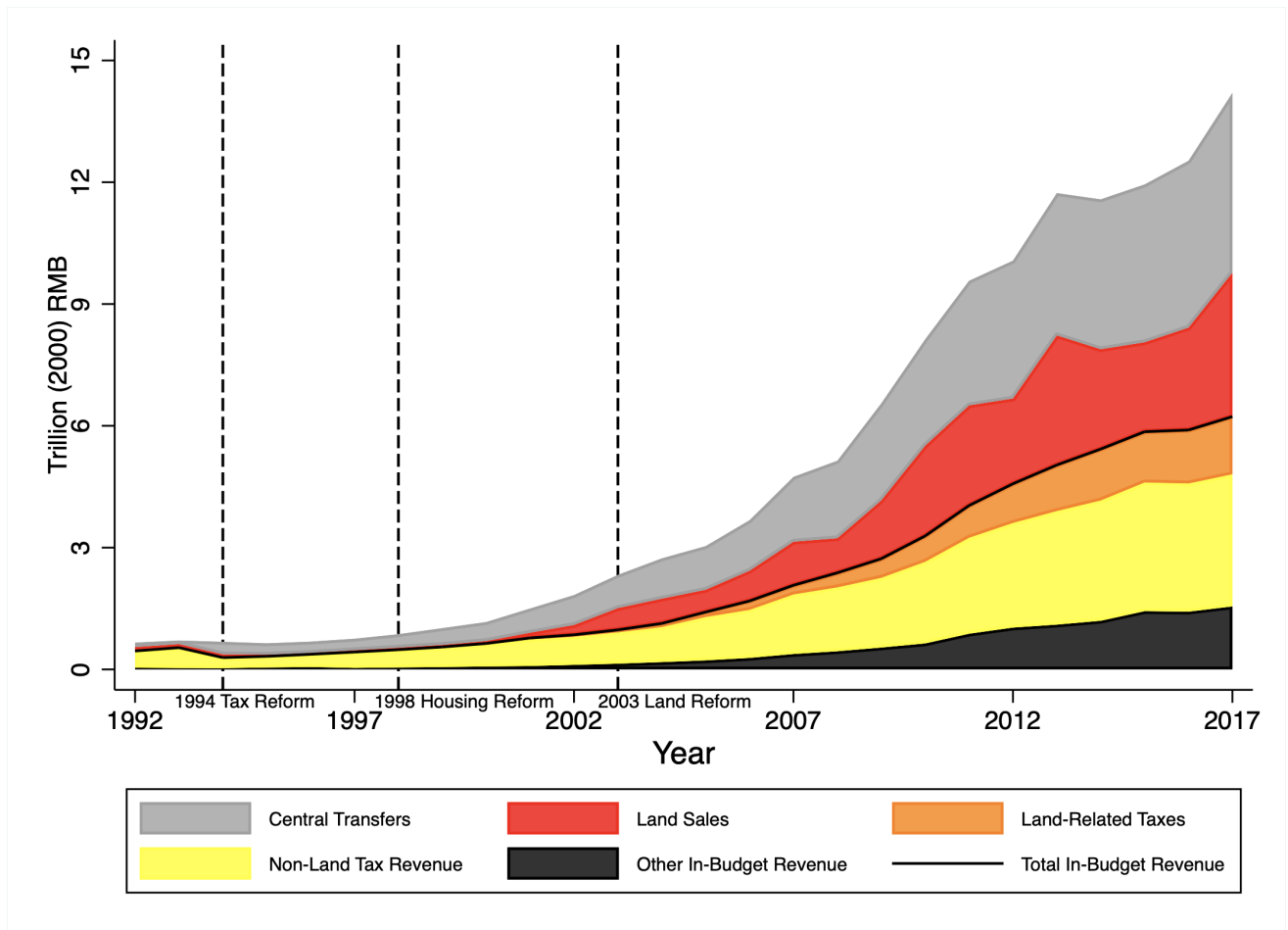
Note: This graph shows annual sales growth in the Chinese land market. We collected data from China Statistics Yearbook (1999-2016). Price are adjusted by CPI (2010=1).

Figure 6: Land Allocation by Use Type



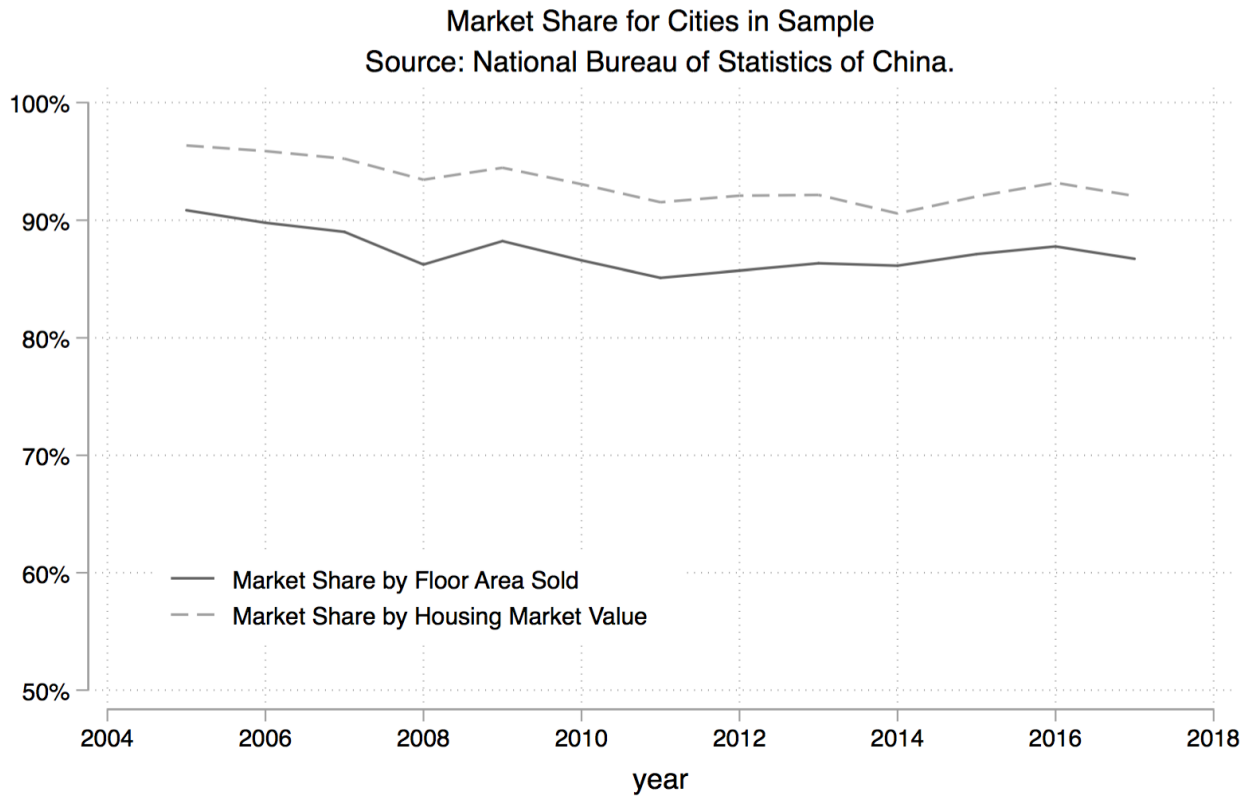
Note: This graph plots the composition of land supplied between 2003 and 2016 in China. Omitted categories are land for water facilities, transportation, and special purpose. Data is collected by China National Bureau of Statistics.

Figure 7: Local Governments' Financial Structure



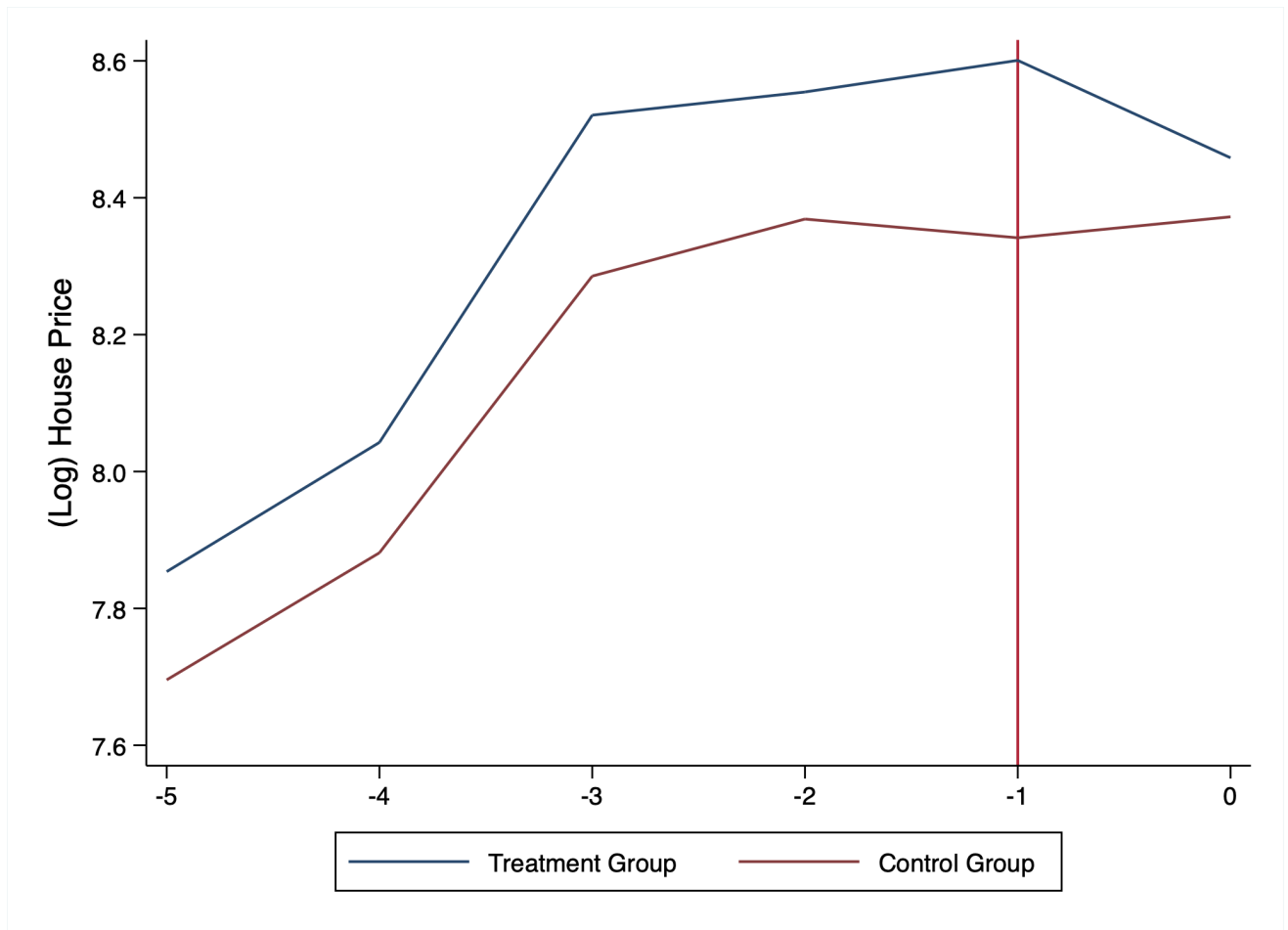
Note: This graph plots local Chinese governments' financial structure between 1992 and 2017. Land sales data is from Zhang (2009) for 1992-1999 and from Finance Yearbook of China for 2000-2017. Government budget data comes from China National Bureau of Statistics.

Figure 8: Housing Market Shares for Cities in Sample



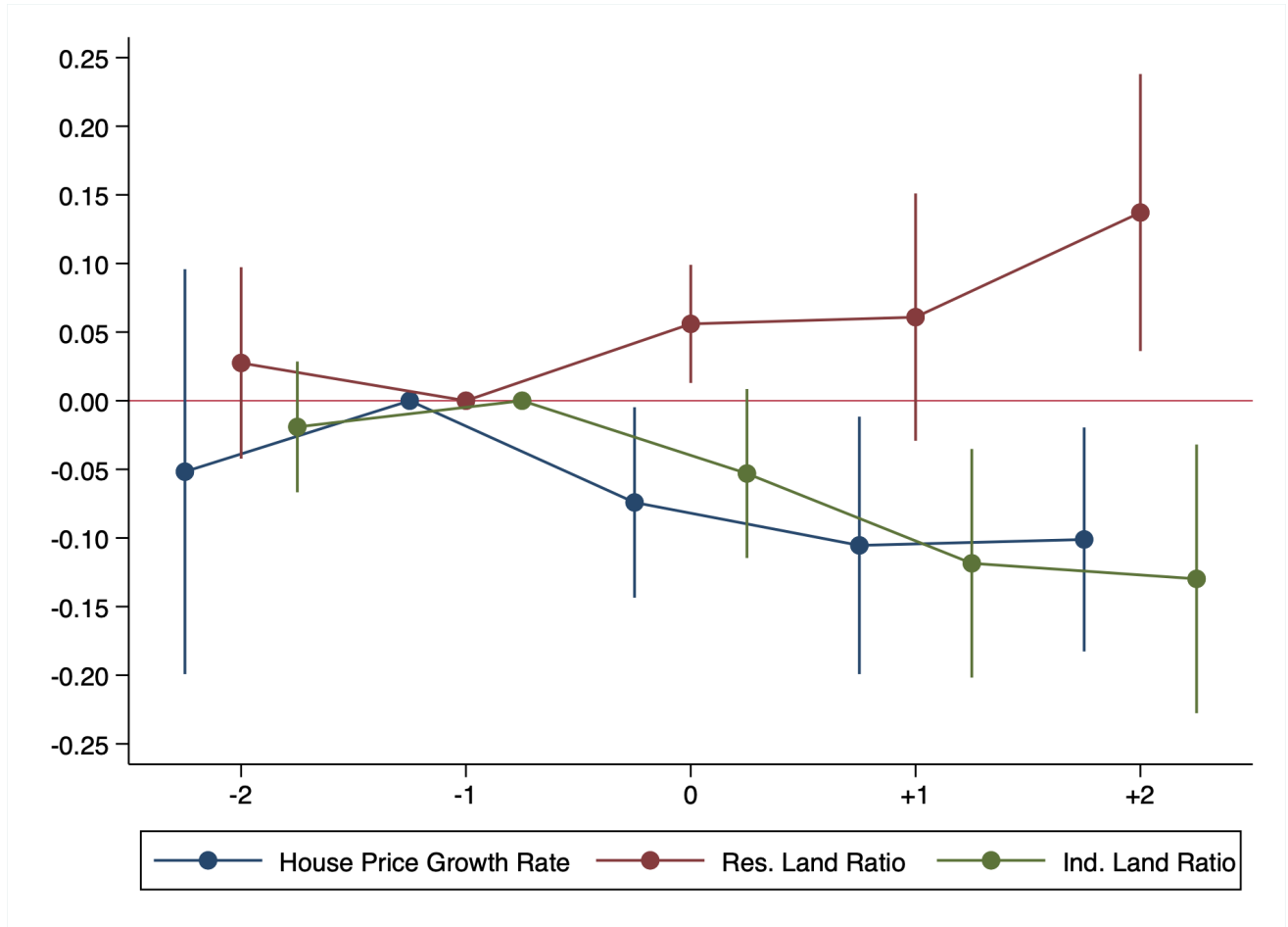
Note: This graph plots the housing market shares by floor area and by annual housing sales for the cities in sample. Data comes from China National Bureau of Statistics.

Figure 9: Housing Price Growth and Social Ties



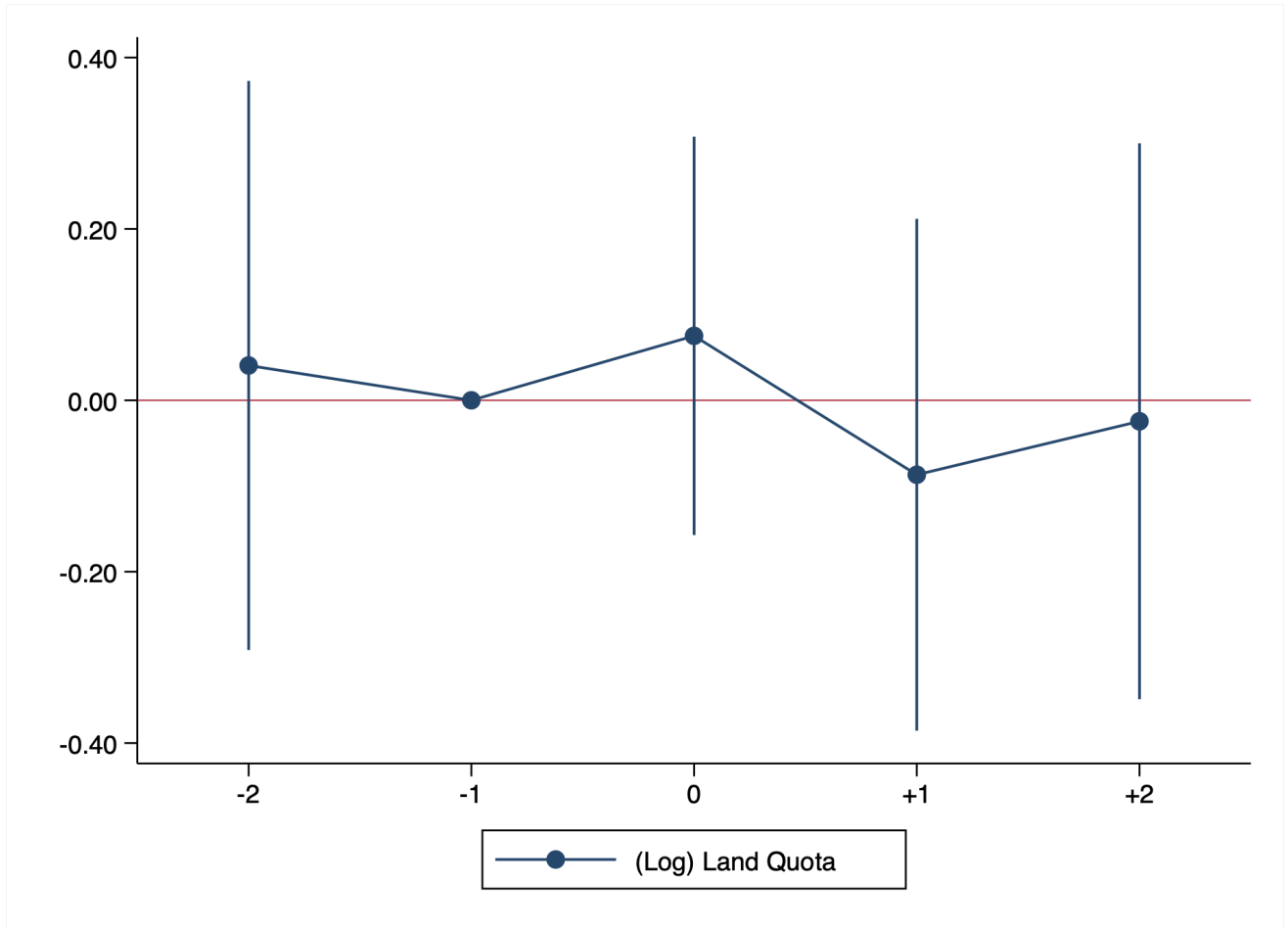
Note: This graph plots the five year pretrend of house prices for cities with and without a hometown tie. The time in which a city experiences a hometown tie has been normalized to 0. A city-year pair in the control group if and only if the leader of that city in that year has no hometown tie within the entire term. The comparison is drawn for cities in the same province, and the graph then aggregates across all provinces. House price data comes from China National Bureau of Statistics. Political data is from Chine Political Elite Dataset.

Figure 10: Land Allocation and Social Ties



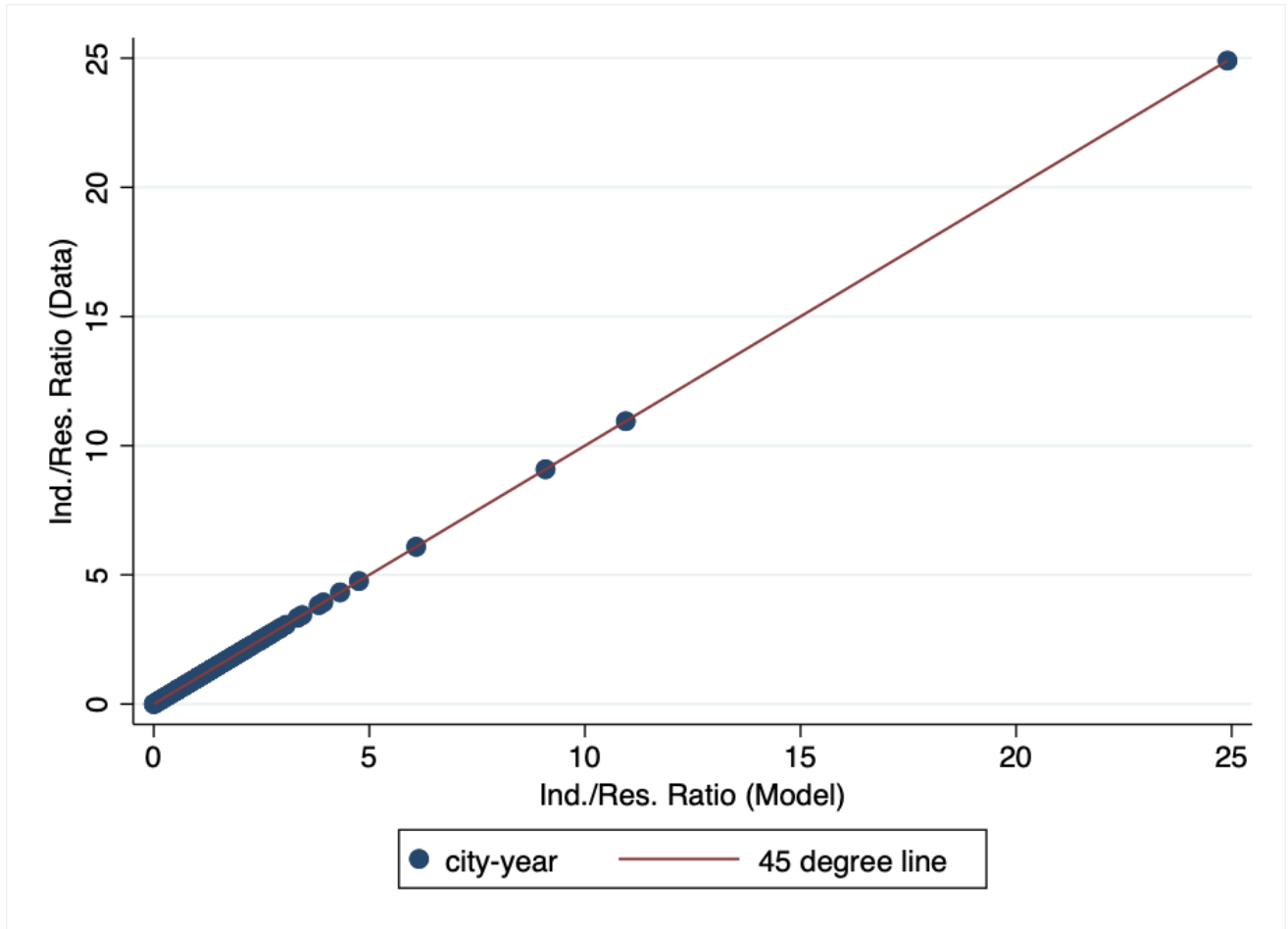
Note: This graph plots the event study for land and housing markets before and after the establishment of a hometown tie. The year in which a hometown tie forms has been normalized to be 0. The left out group is -1. House prices come from China National Bureau of Statistics. Land data comes from China Real Estate Index System. Political data is from China Political Elite Dataset.

Figure 11: Land Quota and Social Ties



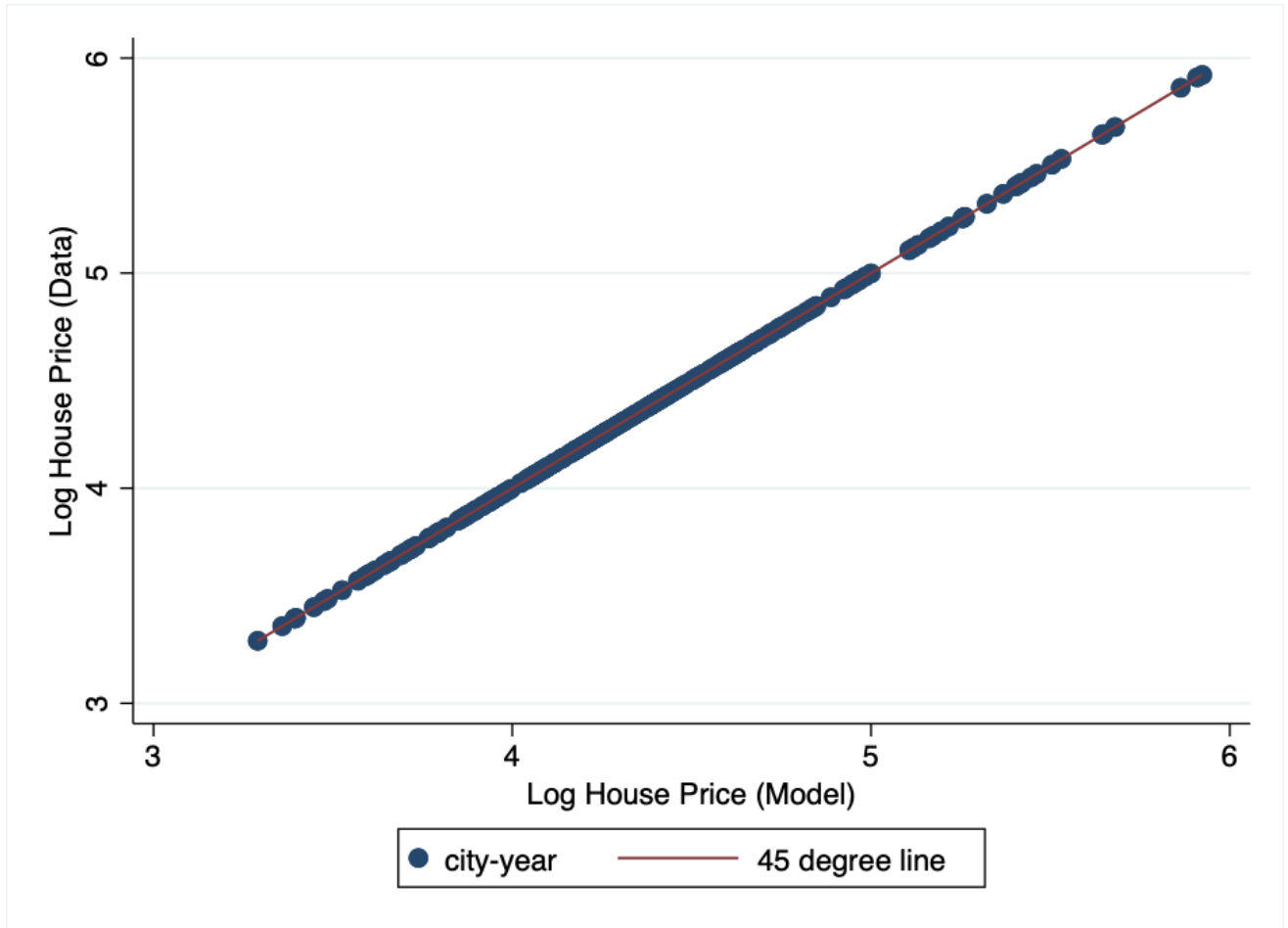
Note: This graph plots the event study for land quota before and after the establishment of a hometown tie. The year in which a hometown tie forms has been normalized to be 0. The left out group is -1. Land data comes from China Real Estate Index System. Political data is from China Political Elite Dataset.

Figure 12: Model Fit: Industrial/Residential Land Supply Ratio



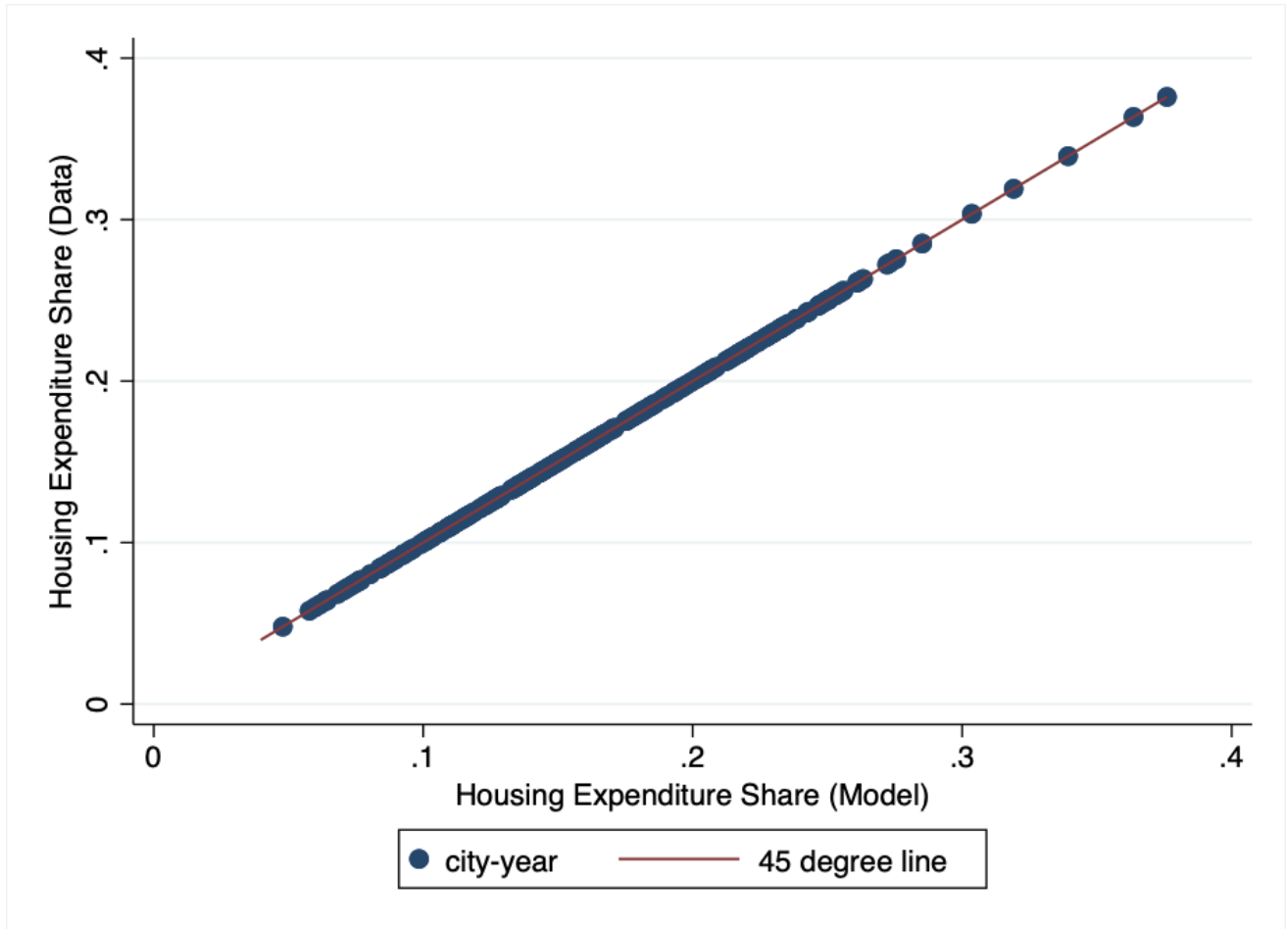
Note: This graph plots the ratios of industrial land supply to residential land supply for city-year pairs in the calibration exercise. Land data comes from China Real Estate Index System.

Figure 13: Model Fit: House Price



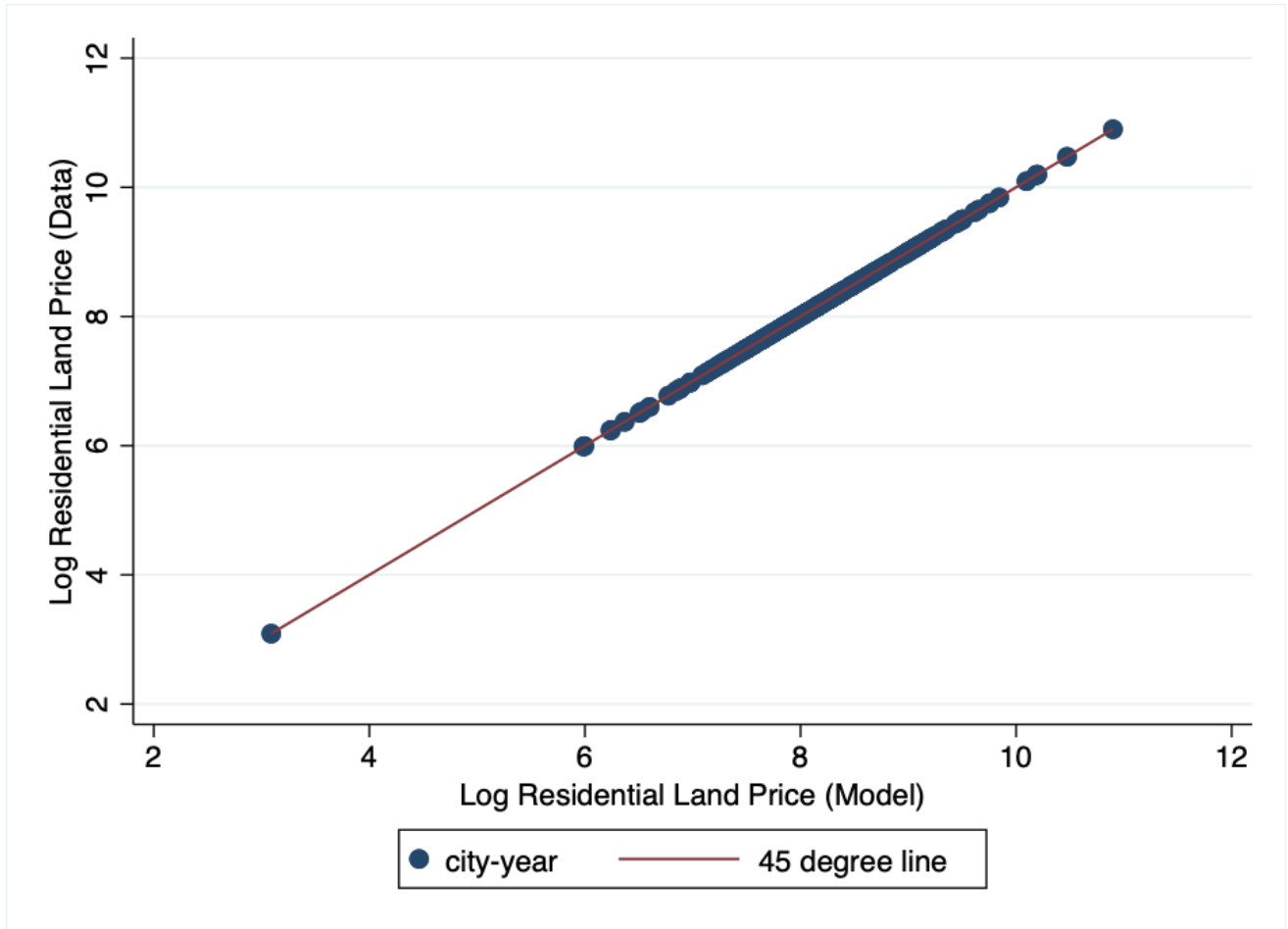
Note: This graph plots the house prices for city-year pairs in the calibration exercise. House price data comes from China National Bureau of Statistics.

Figure 14: Model Fit: Housing Expenditure Share



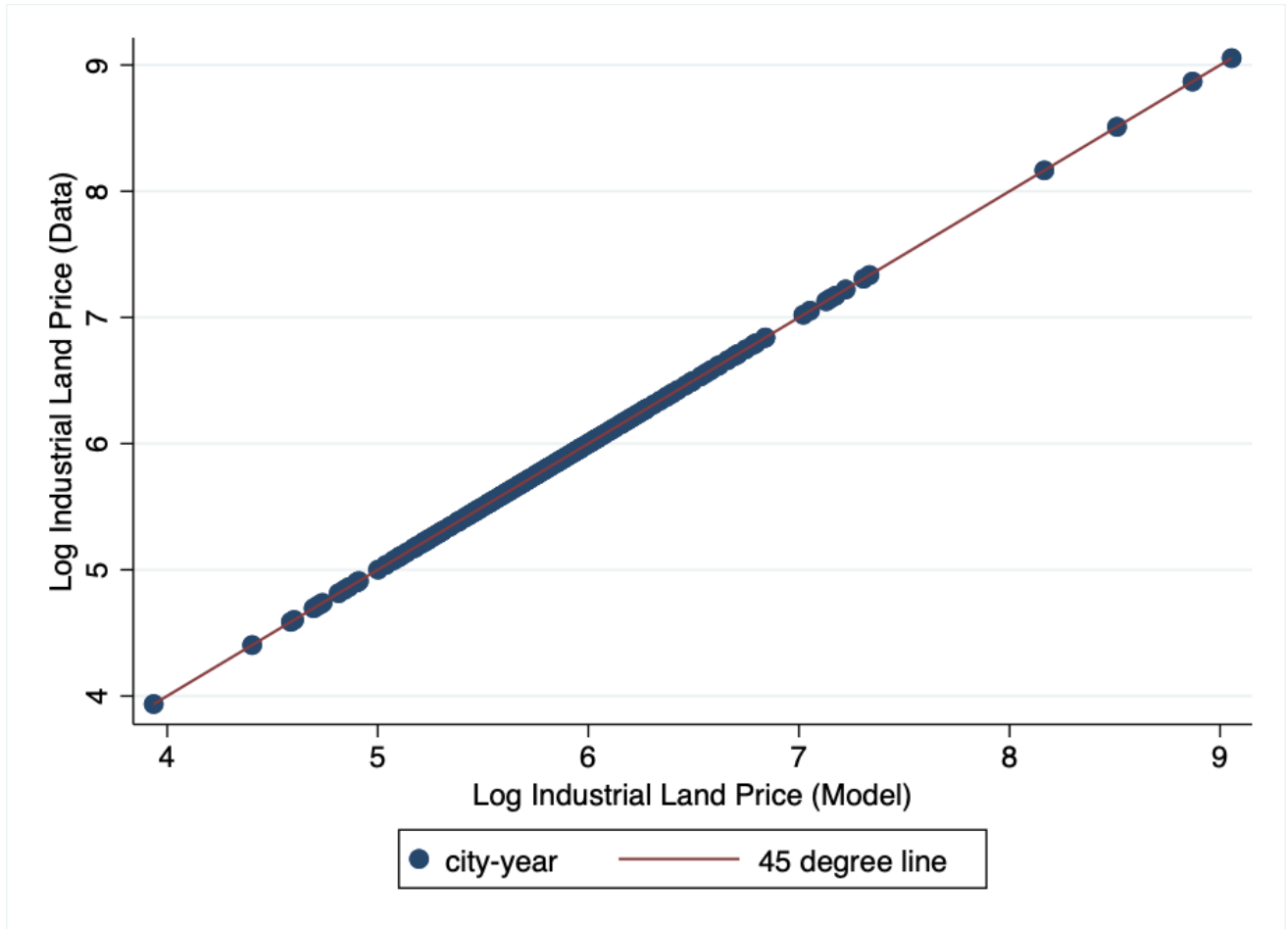
Note: This graph plots the housing expenditure shares of GDP for city-year pairs in the calibration exercise. Fiscal expenditure and GDP data comes from China National Bureau of Statistics.

Figure 15: Model Fit: Residential Land Price



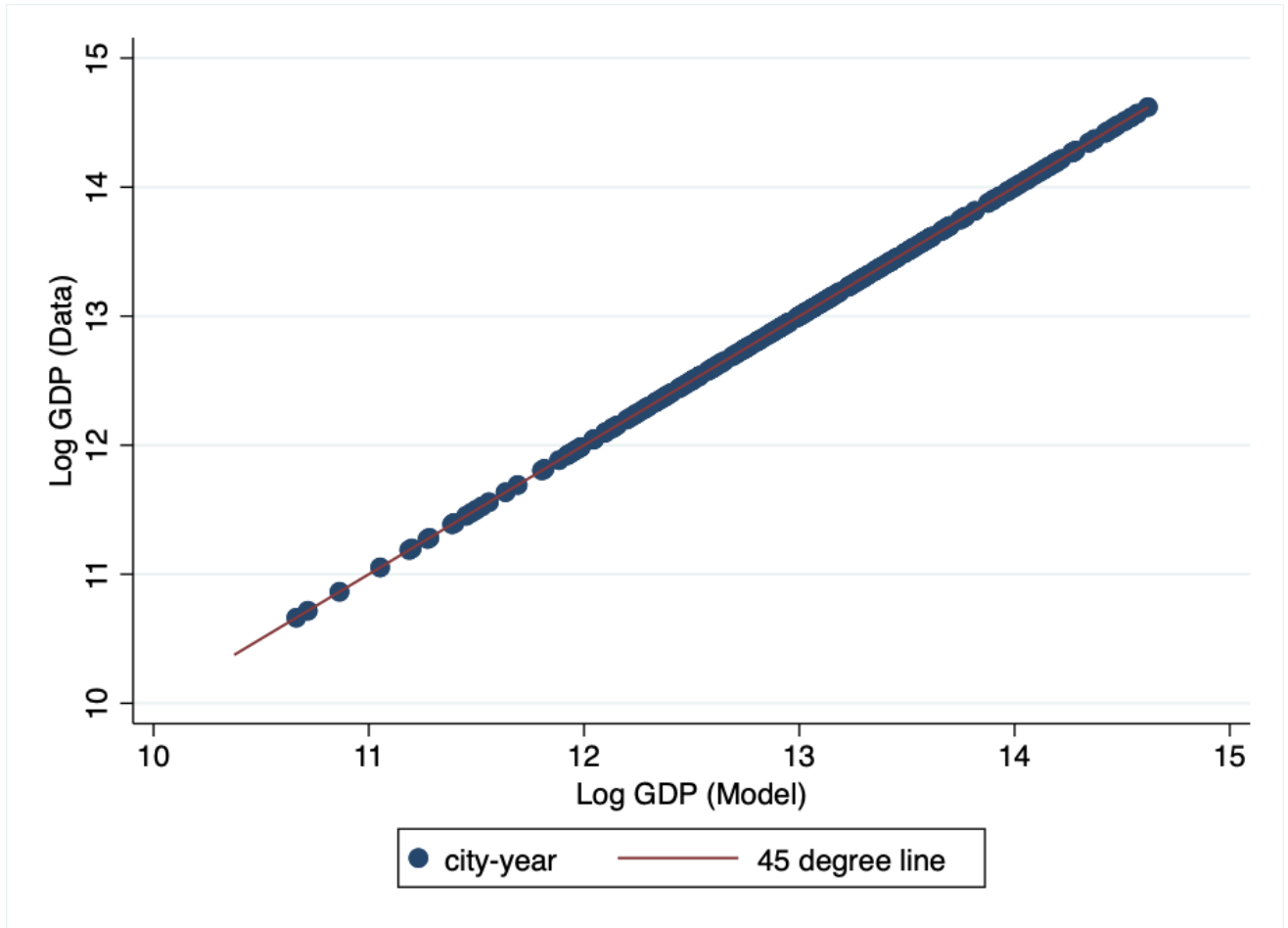
Note: This graph plots the residential land prices for city-year pairs in the calibration exercise. Fiscal expenditure and GDP data comes from China National Bureau of Statistics.

Figure 16: Model Fit: Industrial Land Price



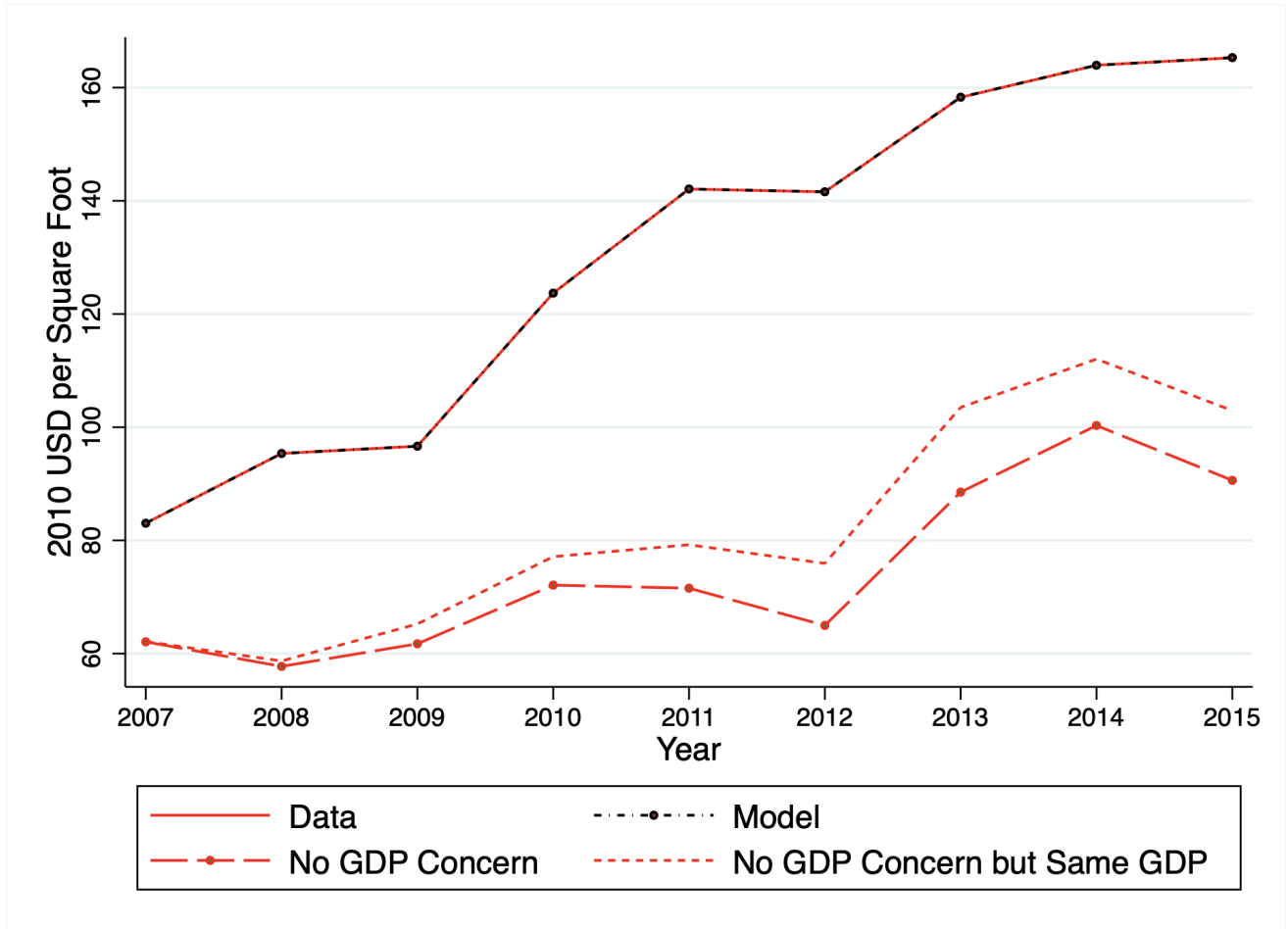
Note: This graph plots the industrial land prices for city-year pairs in the calibration exercise. Fiscal expenditure and GDP data comes from China National Bureau of Statistics.

Figure 17: Model Fit: GDP



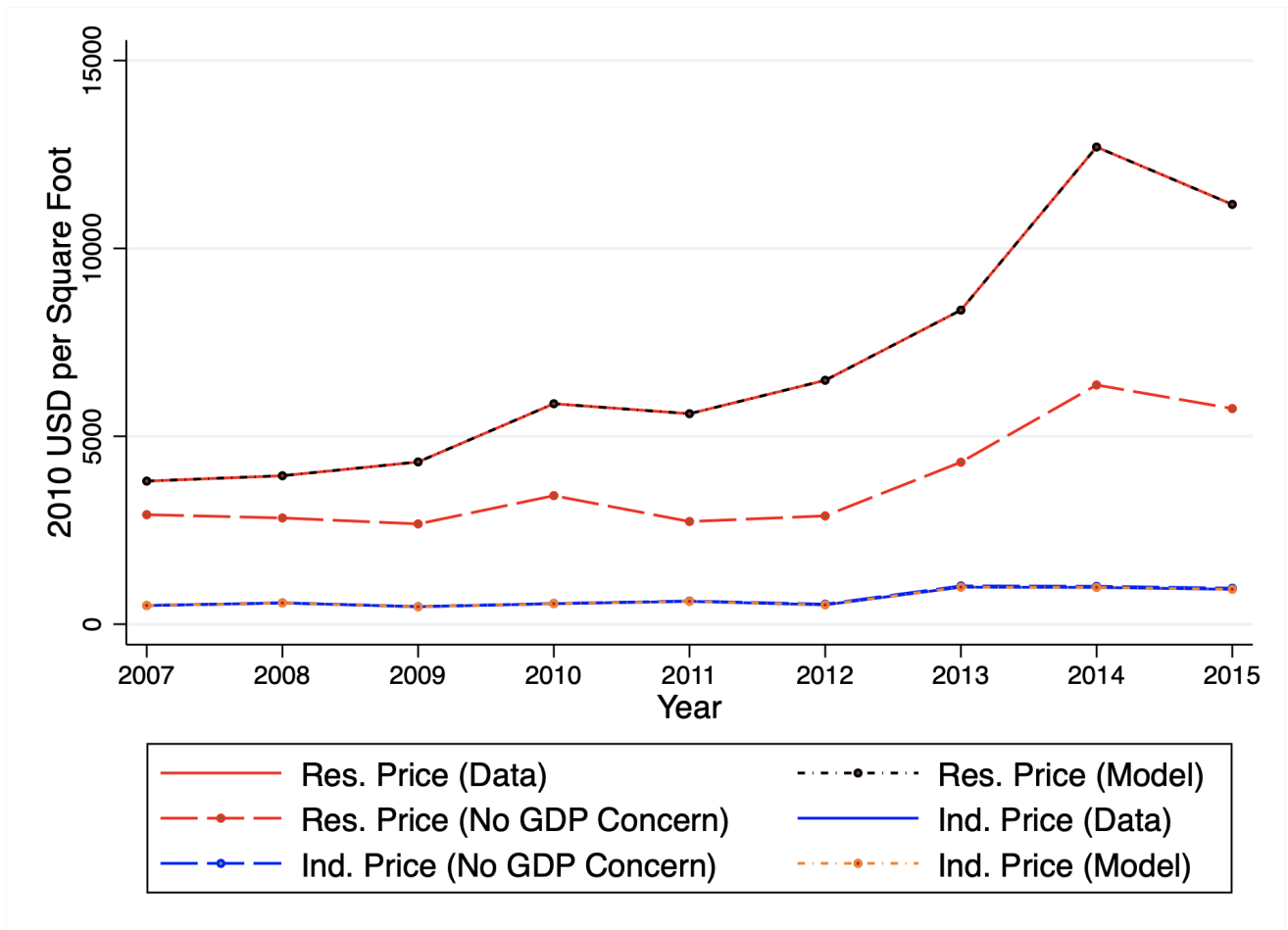
Note: This graph plots the GDP for city-year pairs in the calibration exercise. Fiscal expenditure and GDP data comes from China National Bureau of Statistics.

Figure 18: Counterfactual: House Price



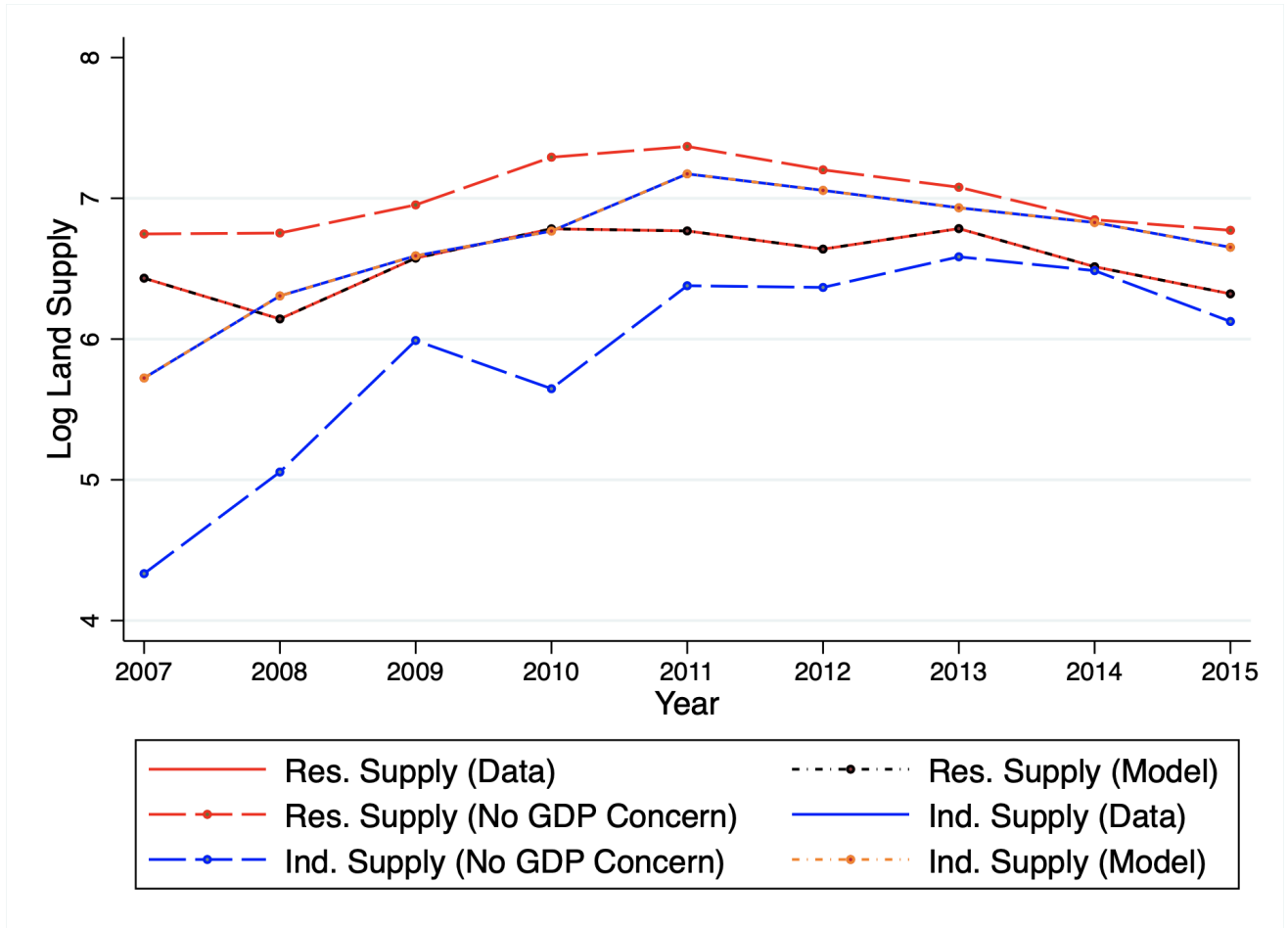
Note: This graph plots the average yearly house price in the counterfactual exercise. House price data comes from China National Bureau of Statistics.

Figure 19: Counterfactual: Residential Land Price



Note: This graph plots the average yearly residential land price in the counterfactual exercise. Residential land price data comes from China Real Estate Index System.

Figure 20: Counterfactual: Residential Land Supply



Note: This graph plots the average yearly residential land price in the counterfactual exercise. Residential land price data comes from China Real Estate Index System.

Tables

Table 1: Summary Statistics of City Party Secretaries, by Term

Total	1,636
By next job assignment	
Promotion	339
Lateral transfer	1,255
Retirement	390
Termination during term in office	42
By political rank during term-in-office	
National Deputy	11
Provincial Leaders	7
Provincial Deputy	262
Prefectural Leaders	1,356
Term length	
Median	4
Std. Dev.	1.9
Mean	4.06

Note: This table shows summary statistics for the complete sample of Chinese city party secretaries who were ever in office between 2000 and 2015. Political data comes from China Political Elite Dataset.

Table 2: Summary Statistics of Planned and Sold Land Area, by City

	Land Area		Building Area		Ratio
	Residential	Industrial	Residential	Industrial	<i>Industrial/Residential</i>
unit	10,000 sq. m.	10,000 sq. m.	10,000 sq. m.	10,000 sq. m.	
count	195	195	195	195	195
mean	329.39	472.43	768.22	523.10	1.83
Std.	299.56	388.00	674.70	427.92	1.57
min	42.50	20.05	63.13	22.62	0.35
median	238.97	378.09	589.34	404.95	1.48
max	2,605.24	2,587.58	6,417.12	2,634.38	17.65

Note: This table shows summary statistics for the land markets of the 195 cities in sample. Land data comes from China Real Estate Index System.

Table 3: Summary Statistics of Macro Variables, by City

	Housing Price	Fixed Investment	Real Estate Investment	GDP	Δ GDP	Average Wage
unit	RMB/sq m	RMB mn	RMB mn	RMB bn	RMB bn	RMB
count	195	195	195	195	195	195.00
mean	3750.41	105752.95	21748.16	0.1826	0.0168	31,342.38
std	2166.56	103832.76	33869.33	0.2245	0.0196	7,339.60
min	1657.70	9653.58	773.28	0.0146	0.0008	16,316.36
median	3017.30	66654.79	9738.30	0.1047	0.0097	29,810.69
max	16364.43	679984.85	258079.90	1.7508	0.1200	70,256.63

Table 3: Summary Statistics of Macro Variables, by City (Continued.)

	Paved Road	Household Registration	Usual Residence	Govt. Revenue	Govt. Expenditure	Deposits
unit	sq m mn	Person th	Person th	RMB mn	RMB mn	RMB mn
count	195	186	186	195	195	195
mean	0.02	4,769.80	5,023.02	15.82	23,486.48	298,465.74
std	0.03	3,278.12	3,519.75	31.97	36,146.12	655,356.56
min	0.00	553.39	633.81	0.77	3,989.12	23,897.36
median	0.01	3,915.89	4,332.87	7.03	14,843.67	108,967.86
max	0.26	32,745.60	28,922.84	313.28	349,434.69	6,200,904.56

Note: This table shows summary statistics for city level economic data for 195 cities in sample between 2004 and 2015. Data comes from China National Bureau of Statistics.

Table 4: Promotion, GDP, and Hometown Tie

	Promotion Outcome		
	(1)	(2)	(3)
Annual GDP Growth	3.695** (1.629)	3.633** (1.761)	3.640*** (1.395)
Annual GDP Growth×Hometown Tie	-4.655*** (1.273)	-4.662*** (1.360)	-4.666*** (1.076)
Hometown Tie	0.0891*** (0.0278)	0.0873*** (0.0297)	0.0873*** (0.0235)
Past GDP Growth	9.129*** (1.678)	9.204*** (1.798)	9.205*** (1.423)
Annual GDP Growth×Ethnic Minority	-17.32*** (6.197)	-13.71** (6.116)	-13.71*** (4.840)
_cons	0.00792 (0.0190)	0.00659 (0.0204)	0.00255 (0.0162)
N	3050	3050	3004
R-Squared	0.349	0.354	0.319
Prov-Start Year FE	Y	Y	N
Person FE	Y	Y	N
City FE	N	Y	N
Rank FE	N	Y	N
City-Term FE	N	N	Y

Note: This table shows estimates for the linear probability model on promotion, GDP growth, hometown tie, ethnic minority status, and their interactions. Sample includes the universe of city party secretaries who were ever in office between 2000 and 2015. Each observation is a city-year pair. Hometown tie equals 1 if the province leader is appointed after the city mayor and shares the same hometown with the city leader this year or in the last year. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 5: Hometown Tie and House Price Growth Rate

	House Price Growth Rate		
	(1)	(2)	(3)
Hometown Tie	-0.0591** (0.0247)	-0.0561** (0.0249)	-0.0510** (0.0249)
L.(Log) Land Quota	0.0117 (0.0171)	0.0116 (0.0168)	0.0114 (0.0163)
(Log) Land Quota	-0.0239 (0.0194)	-0.0249 (0.0195)	-0.0335* (0.0192)
(Log) Real GDP		-0.0746 (0.235)	0.148 (0.261)
L.(Log) Real GDP		0.265 (0.214)	0.104 (0.283)
(Log) Population			-0.338** (0.163)
L.(Log) Population			0.756*** (0.181)
_cons	1.163*** (0.178)	0.214 (1.097)	-3.560* (1.846)
N	472	472	457
R-squared	0.682	0.684	0.698
City-Term FE	Y	Y	Y
Prov-Year FE	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on house price growth rate. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Hometown tie equals 1 if the province leader is appointed after the city mayor and shares the same hometown with the city leader this year or in the last year. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 6: Hometown Tie and Residential Land Ratio

	Land Supply Ratios			
	(1) Residential	(2) Industrial	(3) Commercial	(4) Other
Hometown Tie	0.138*** (0.0314)	-0.111*** (0.0403)	-0.0358** (0.0159)	0.00334 (0.0429)
(Log) GDP	-0.168 (0.133)	0.0906 (0.159)	0.0419 (0.0868)	0.0661 (0.0499)
(Log) Population	-0.0692 (0.0842)	-0.129 (0.129)	0.103 (0.0816)	0.127 (0.104)
L.Residential Land Supply	-1.734 (2.329)			
L.Industrial Land Supply		-4.530** (1.795)		
L.Commercial Land Supply			-15.12** (6.690)	
L.Other Land Supply				-18.14*** (6.119)
_cons	1.777* (0.916)	1.136 (1.304)	-0.912 (0.779)	-1.370 (0.944)
N	729	702	717	529
R-squared	0.699	0.677	0.625	0.536
City-Term FE	Y	Y	Y	Y
Prov-Year FE	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on residential land supply as a ratio of land quota. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Hometown tie equals 1 if the province leader is appointed after the city mayor and shares the same hometown with the city leader this year or in the last year. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 7: Hometown Tie and Residential Land Supply

	(Log) Land Supply, Land Area			
	(1) Residential	(2) Industrial	(3) Commercial	(4) Other
Hometown Tie	0.396*** (0.0873)	-0.332 (0.202)	-0.303** (0.134)	-0.919 (0.781)
(Log) Land Quota	0.875*** (0.0596)	1.073*** (0.0644)	0.991*** (0.0901)	0.732*** (0.230)
(Log) GDP	-0.0920 (0.360)	0.130 (0.450)	-0.0728 (0.683)	1.702 (1.916)
(Log) Population	-0.844 (0.617)	-0.394 (0.255)	0.734 (0.477)	6.252*** (1.662)
L.Residential Land Supply	3.877 (12.92)			
L.Industrial Land Supply		-13.03*** (4.786)		
L.Commercial Land Supply			-96.08** (37.99)	
L.Other Land Supply				-604.9** (265.5)
_cons	7.170 (5.339)	1.409 (2.840)	-19.24*** (4.869)	-63.16*** (17.09)
N	729	702	717	529
R-squared	0.928	0.944	0.860	0.614
City-Term FE	Y	Y	Y	Y
Prov-Year FE	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on residential land supply (land area). Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Hometown tie equals 1 if the province leader is appointed after the city mayor and shares the same hometown with the city leader this year or in the last year. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 8: Hometown Tie and Residential Land Price

	(Log) Residential Land Price per Unit Land Area			
	(1) Residential	(2) Industrial	(3) Commercial	(4) Other
Hometown Tie	-0.272* (0.156)	0.223 (0.169)	0.0986 (0.114)	0.203 (0.309)
(Log) Land Quota	-0.0497 (0.0480)	-0.0682 (0.0587)	-0.00603 (0.0679)	-0.00969 (0.155)
(Log) GDP	0.169 (0.314)	0.413 (0.387)	0.713 (0.443)	0.639 (1.129)
(Log) Population	0.560 (0.737)	-0.314 (0.744)	0.489 (0.509)	1.696 (2.022)
L.Residential Land Supply	-1.249 (5.874)			
L.Industrial Land Supply		9.415 (5.878)		
L.Commercial Land Supply			36.43** (16.42)	
L.Other Land Supply				6.179 (129.8)
_cons	1.376 (5.952)	6.309 (6.116)	-1.224 (4.159)	-11.34 (18.31)
N	739	705	727	480
R-squared	0.870	0.764	0.810	0.541
City-Term FE	Y	Y	Y	Y
Prov-Year FE	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on residential land price per unit land area. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Hometown tie equals 1 if the province leader is appointed after the city mayor and shares the same hometown with the city leader this year or in the last year. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 9: Hometown Tie and Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)
	Commercial		Industrial		Residential	
Above Median	N	Y	N	Y	N	Y
Hometown Tie	0.0246 (0.0479)	0.255** (0.117)	-0.0598*** (0.0210)	0.0339 (0.0766)	-0.465*** (0.0854)	-0.358** (0.149)
N	209	271	209	274	220	281
R-squared	0.879	0.935	0.885	0.897	0.912	0.951
$\frac{CommercialLandSales}{TotalLandSales}$	Y	Y	Y	Y	Y	Y
GDP per capita	Y	Y	Y	Y	Y	Y
(Log) Resident Population	Y	Y	Y	Y	Y	Y
City-Term FE	Y	Y	Y	Y	Y	Y
Prov-Year FE	Y	Y	Y	Y	Y	Y

Note: This table shows OLS estimates for the interaction between hometown tie and ethnic minority status, above-provincial rank. Ethnic minority is defined as being non-Han. Above-provincial ranks include provincial rank and politburo rank. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 10: Hometown Tie and Residential Land Sales

	(Log) Residential Land Sales					
	(1)	(2)	(3)	(4)	(5)	(6)
Career Incentive	-0.0394 (0.0391)	0.00643 (0.0238)	0.00547 (0.0244)	0.00428 (0.0241)	0.00350 (0.0247)	0.00947 (0.0261)
(Log) Land Quota		0.709*** (0.0747)	0.713*** (0.0764)	0.724*** (0.0777)	0.706*** (0.0761)	0.713*** (0.0774)
Annual GDP Growth			-1.099 (2.457)	-1.347 (2.408)	-2.371 (2.362)	-2.324 (2.417)
GDP				0.372 (0.722)	0.379 (0.694)	0.282 (0.736)
(Log) Government In-Budget Revenue					0.441** (0.195)	0.370* (0.192)
(Log) Population						-1.115** (0.449)
_cons	12.64*** (0.128)	8.152*** (0.508)	8.153*** (0.511)	7.989*** (0.597)	3.945** (1.876)	13.95*** (3.822)
N	1574	1021	1021	1021	1021	1009
R-squared	0.882	0.921	0.921	0.921	0.921	0.922
City-Term FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on residential land sales. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 11: Residential Land Demand Elasticity

	(Log) Residential Land Floor Area			
	(1)	(2)	(3)	(4)
(Log) Residential Land Price	-0.995** (0.405)	-0.957** (0.385)	-0.970** (0.430)	-1.046** (0.464)
(Log) Land Quota	0.771*** (0.0735)	0.763*** (0.0711)	0.769*** (0.0735)	0.744*** (0.0711)
(Log) Population	-0.719* (0.382)	-0.717* (0.389)	-0.741* (0.388)	-0.889** (0.409)
L.(Log) Population	0.854 (0.907)	0.842 (0.864)	0.835 (0.856)	0.777 (0.922)
Annual GDP Growth		2.296 (2.284)	2.171 (2.219)	0.523 (2.100)
GDP			0.235 (0.932)	0.411 (0.960)
(Log) Government In-Budget Revenue				0.685*** (0.183)
N	979	979	979	979
1st Stage F-Stat	6.033	6.399	5.302	5.324
City-Term FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Note: This table shows 2SLS estimates for the demand elasticity of residential land (floor area). (Log) residential land price per unit floor area is instrumented with hometown tie. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 12: Robustness Check: Bad Controls

	HP Growth Rate	Res. Land Ratio	Ind. Land Ratio
	(1)	(2)	(3)
Career Incentive	0.0130*** (0.00457)	-0.0163*** (0.00533)	0.0147** (0.00672)
_cons	1.047*** (0.0148)	0.418*** (0.0174)	0.426*** (0.0220)
N	1715	1029	1029
R-squared	0.423	0.688	0.674
City-Term FE	Y	Y	Y
Year FE	Y	Y	Y

Note: This table shows main OLS estimates without including any controls. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 13: Hometown Tie and Land Quota

	(Log) Land Quota				
	(1)	(2)	(3)	(4)	(5)
Hometown Tie	0.0878 (0.0935)	0.0415 (0.0825)	-0.0412 (0.0667)	-0.0499 (0.0682)	-0.0122 (0.0829)
_cons	6.782*** (0.0102)	6.786*** (0.00913)	6.764*** (0.00667)	6.764*** (0.00686)	6.825*** (0.00546)
N	1032	1031	1120	1119	965
R-Squared	0.905	0.908	0.878	0.879	0.942
City-Term FE	Y	Y	N	N	Y
Year FE	Y	Y	N	N	N
Job Tenure FE	N	Y	N	Y	Y
City FE	N	N	Y	Y	N
Prov-Year FE	N	N	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on the logarithmic level of land quota. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Table 14: Hometown Tie and Land Quota

	Land Quota				
	(1)	(2)	(3)	(4)	(5)
Hometown Tie	90.43 (206.8)	10.34 (190.0)	-39.68 (125.8)	-51.45 (122.4)	-54.21 (169.8)
_cons	1257.3*** (19.01)	1263.2*** (17.88)	1242.3*** (8.392)	1243.3*** (8.194)	1298.1*** (10.98)
N	1032	1031	1120	1119	965
R-Squared	0.894	0.897	0.878	0.880	0.940
City-Term FE	Y	Y	N	N	Y
Year FE	Y	Y	N	N	N
Job Tenure FE	N	Y	N	Y	Y
City FE	N	N	Y	Y	N
Prov-Year FE	N	N	Y	Y	Y

Note: This table shows OLS estimates for the effect of hometown tie on the level of land quota. Sample includes 195 prefecture level cities in mainland China between 2004 and 2015. Each observation is a city-year pair. Standard errors are two-way clustered at city-term and province-year. Political data comes from China Political Elite Dataset. Land data comes from China Real Estate Index System. City level economic data is from China National Bureau of Statistics. Standard errors in parentheses.

Appendix

A. Mathematical Appendix

a. Proof to Theorem 1

Proof. Rewrite the maximization problem by substituting in fiscal budget constraint equation(6) and quota constraint equation(3) into city leader's objective function equation(5)

$$u^s(H) = \underbrace{\frac{1}{\epsilon - 1} H^{1-\frac{1}{\epsilon}}}_{u(H)} + [\beta(1 - \tau) + \chi]Y(H) + \Omega \frac{[F(D, H)]^{1-\sigma}}{1 - \sigma},$$

where

$$F(D, H) = \underbrace{\tau(\alpha + \beta)Y(D)}_{\text{tax revenue}} + \underbrace{H^{1-\frac{1}{\epsilon}}}_{\text{residential land sales}} + \underbrace{(1 - \alpha - \beta)Y(D)}_{\text{industrial land sales}}.$$

Notice the maximization problem has a continuous objective function over a compact interval $[0, \zeta]$. Extreme value theorem guarantees existence. Inada condition suggests $H^* \in (0, \zeta)$. Hence, $\exists \eta > 0$ such that $H^* \in [\eta, \zeta]$. Without loss of generality, we restrict $H \in [\eta, \zeta]$. Now take second derivative of the objective function

$$\frac{\partial^2}{\partial H^2} u^s(H) = \underbrace{u''(H)}_{<0} + [\beta(1 - \tau) + \chi] \underbrace{Y''(H)}_{<0} + \Omega \frac{F''(H)[F(H)]^\sigma - \sigma[F'(H)]^2[F(H)]^{\sigma-1}}{[F(H)]^{2\sigma}}.$$

Hence, a sufficient condition that ensures $F''(H) < 0$ would imply the objective function is strictly concave, therefore, would guarantee uniqueness of the solution. Notice

$$F'''(H) = -[(\alpha + \beta)\tau + 1 - \alpha - \beta]\Gamma\gamma(\gamma - 1)(\gamma - 2)(\zeta - H)^{\gamma-3} + \left(-\frac{1}{\epsilon} - 1\right)\frac{1 - \epsilon}{\epsilon^2} H^{-\frac{1}{\epsilon}-2} < 0.$$

Hence, a condition that ensures $F''(\eta) < 0$ would imply $F''(H) < 0$ over $[\eta, \zeta]$. Under the assumption that productivity is sufficiently high,

$$A^{\frac{1}{1-\alpha}} > \frac{\frac{1-\epsilon}{\epsilon^2}}{\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}} [(\alpha + \beta)\tau + 1 - \alpha - \beta]\gamma(1 - \gamma)\eta^{1+\frac{1}{\epsilon}}(\zeta - \eta)^{\gamma-2}}$$

the condition needed is satisfied

$$F''(\eta) = [(\alpha + \beta)\tau + 1 - \alpha - \beta]\Gamma\gamma(\gamma - 1)(\zeta - \eta)^{\gamma-2} + \frac{1 - \epsilon}{\epsilon^2} \eta^{-\frac{1}{\epsilon}-1} < 0.$$

□

b. Proof to Proposition 1

Proof. Take first order condition and set to 0

$$\frac{\partial}{\partial H} u^g(H) = \frac{1}{\epsilon} H^{-\frac{1}{\epsilon}} + [\beta(1 - \tau) + \chi] Y'(H) + \Omega \frac{F'(H)}{[F(H)]^\sigma} = 0$$

Applying implicit function theorem yields

$$\frac{\partial H}{\partial \chi} = \frac{-Y'(H)}{u''(H) + [\beta(1 - \tau) + \chi] Y''(H) + \Omega \frac{F''(H)[F(H)]^\sigma - \sigma [F'(H)]^2 [F(H)]^{\sigma-1}}{[F(H)]^{2\sigma}}} < 0$$

under the assumption that productivity is sufficiently high. □

c. Proof to Proposition 2

Proof. Applying implicit function theorem yields

$$\frac{\partial H}{\partial \Omega} = \frac{-\frac{F'(H)}{[F(H)]^\sigma}}{u''(H) + [\beta(1 - \tau) + \chi] Y''(H) + \Omega \frac{F''(H)[F(H)]^\sigma - \sigma [F'(H)]^2 [F(H)]^{\sigma-1}}{[F(H)]^{2\sigma}}} < 0$$

under the assumption on productivity and inelastic residential land demand. Hence,

$$\frac{\partial}{\partial \Omega} p_H = \left(1 - \frac{1}{\epsilon}\right) H^{-\frac{1}{\epsilon}} \frac{\partial H}{\partial \Omega} > 0.$$

□