



The gradients of power: Evidence from the Chinese housing market[☆]

Hanming Fang^{a,c,e,*}, Quanlin Gu^b, Li-An Zhou^d

^a Department of Economics, University of Pennsylvania, 133 S. 36th Street, Philadelphia, PA 19104, United States of America

^b China Center for Internet Economy Research, Central University of Finance and Economics, Beijing, 100081, China

^c National Bureau of Economic Research, United States of America

^d Department of Applied Economics, Guanghua School of Management, Peking University, Beijing 100871, China

^e School of Entrepreneurship and Management, ShanghaiTech University, Shanghai 201210, China



ARTICLE INFO

Article history:

Received 26 September 2018

Received in revised form 27 May 2019

Accepted 28 May 2019

Available online 18 June 2019

JEL classifications:

D73

H1

O18

Keywords:

Government power

Corruption

Housing market

ABSTRACT

Using a large, unique dataset on the Chinese housing market, we propose to measure the value of rents associated with government power using the price differences paid by bureaucrat buyers and non-bureaucrat buyers in the housing market. We find that the housing price paid by bureaucrat buyers is significantly lower than non-bureaucrat buyers, after controlling for a full set of characteristics of buyers, houses and mortgage loans. More importantly, we find that the bureaucrat price discounts exhibit salient *gradients* with respect to their hierarchical ranks, the criticality of their government agencies to real estate developers, and geography. Our empirical results also reveal interesting interactions of hierarchical, critical and geographical gradients of power. Our paper sheds new light on our thinking of private gains of public positions and market value of power in a broader context.

© 2019 Elsevier B.V. All rights reserved.

1. Introduction

The discretionary power of government officials often puts them in a position to extract rents and solicit favors from individuals or firms, especially in developing and transition economies with weak institutions. Rent-seeking distorts resource allocations, enlarges inequality, and impedes economic growth (Tullock, 1967; Krueger, 1974; Murphy et al., 1993; Shleifer and Vishny, 1993; Mauro, 1995). There is a large literature in economics that attempts to identify rent-seeking activities, investigate their causes and consequences, and study policies to reduce it. Khwaja and Mian (2011) and Olken and Pande (2012) provide

excellent surveys on the recent development in the economics and finance literature regarding these questions.¹

Despite the difficulties in detecting corruption and rent-seeking due to their illicit and secretive nature, significant advances have been achieved in the last decade in measuring corruption and rent-seeking using observational data (see Oklen and Pande, 2012, for a detailed review). One method is to estimate corruption by *direct observation*. For example, McMillan and Zoido (2004) use records kept by a police chief in Peru on the bribes he paid to judges, politicians and the news media, which became public after the fall of the Fujimori regime, to estimate the cost of bribing various officials. Olken and Barron (2009) measure corruption via direct observations in the field on bribery payments made by truck drivers to local police on their routes.

A second method to measure corruption is by “*subtraction*” or “*cross-checking*.” For example, Reinikka and Svensson (2004) use the Public Expenditure Tracking Survey to estimate the leakage of government funds by comparing the amount of a special education block grant allocated from the central government in Uganda with the amount of the block grant received by schools. Fisman and Wei (2004) measure the extent of tax evasion by estimating the difference between Hong Kong’s reported exports and China’s reported imports of the same products.

[☆] This is a revised version of our NBER Working Paper (No. 20317, Fang, Gu and Zhou, 2014). We would like to thank the Co-Editor Maria Petrova, three anonymous referees, Zhiwu Chen, Matthew Kahn, Shang-jin Wei, Wei Xiong and participants at the NBER China Working Group Conference (Spring 2014), the Princeton Conference on “The Political Economy of Bureaucrats: Careers, Incentives, Rules, and Behavior” (February 2015), UCSD-Tsinghua Conference on Chinese Economy (January 2016), and the annual conference of the Chinese Economic Society of Australia (Summer 2016), for useful discussions and comments. We are responsible for all remaining errors.

* Corresponding author at: Department of Economics, University of Pennsylvania, 133 S. 36th Street, Philadelphia, PA 19104, United States of America.

E-mail addresses: hanming.fang@econ.upenn.edu (H. Fang), linng@gsm.pku.edu.cn (Q. Gu), zhoula@gsm.pku.edu.cn (L.-A. Zhou).

¹ See also survey papers by Svensson (2005) and Banerjee et al. (2009) for recent development in the theoretical and empirical studies of rent-seeking and corruption. Bardhan (1997) offers an earlier literature review on corruption and its impact on development.

Hsieh and Moretti (2006) try to detect corruption under the Iraqi Oil for Food program administered by the United Nations. They use the difference between the price received by Iraq for its oil and the price of comparable oil in the world spot market to gauge the extent of underpricing and corruption. Olken (2007) presents an estimate of the “missing expenditure” on rural road projects in Indonesia by examining the officially claimed amount of money spent on the road with the cost estimates obtained from independent engineers.² Niehaus and Sukhtankar (2013) measure corruption by comparing official microrecords with original household survey data on the daily earnings in a government-sponsored employment program in India.

A third approach attempts to estimate the degree of corruption and rent-seeking using *market inference*. For example, Fisman (2001), in a seminal study, estimates the value of political connections to Indonesian President Soeharto by measuring how much the prices of the shares of the firms “connected” to Soeharto moved when he fell ill.³ Also belonging to this approach are papers that use the equilibrium conditions in labor markets or financial markets. For example, Gorodnichenko and Peter (2007) develop a measure of bribery by estimating the gaps in the reported earnings and expenditures between the public and private sectors. Using a household survey from Ukraine, they find that, controlling for education, hours of work, job security, fringe benefits and other job characteristics, public sector workers received 24–32% less income than their private sector counterparts, yet, they had the same level of consumption and assets. These findings suggest that a large part of the gap between public and private sector earnings is comprised of bribes. Khwaja and Mian (2005) examine the rent-seeking in Pakistan by showing how the political connectedness of a firm, as measured by whether its directors participate in elections, affects the amount of loans it is able to obtain from the banks and the associated default rates. They find that politically connected firms borrow 45% more and have 50% higher default rates.

In this paper, we attempt to measure the value of rents associated with government power in the Chinese housing market. Our paper draws on a large, unique dataset on housing mortgage loans from a leading commercial bank in China which has about 15% market share in Chinese residential mortgage loans market in 2012. China's housing market offers a unique setting for studying rent-seeking since it is notorious for the prevalence of corruption and rent-seeking activities, as a result of heavy state regulation of the real estate market.⁴ In every phase of the real estate development, from the initial land taking and auctions, to the approval of architectural designs, to sales licenses, real estate developers need support from bureaucrats in various government agencies in order to get favorable treatment. The discretionary power of the bureaucrats in these approval steps invites rent-seeking and corruption, making China's housing market an ideal context to quantify the rents of government power.⁵

Specifically, we measure the extent of rent-seeking by the difference in the unit price (per square meter) of the houses purchased by bureaucrat buyers relative to those by otherwise identical non-bureaucrat buyers. Our empirical analysis starts by documenting two interesting facts. First, despite the fact that bureaucrats on average earn lower incomes than other buyers in the housing market, they are more likely to buy apartments in relatively more expensive apartment complexes, and to buy larger apartments. Second, after controlling for a detailed set of characteristics of buyers, apartments (including controls as

detailed as the floor number, the apartment complex, and the orientation of the apartment unit) and mortgage loans, we find that bureaucrat buyers receive about a 1.05% discount in unit price relative to non-bureaucrat buyers in the same housing market.

We interpret the first fact as suggestive evidence that bureaucrats are either more likely to receive additional income sources apart from their wage earnings, which may or may not indicate corruption, or as a result of receiving price discounts from real estate developers (our second fact). We interpret the second fact as suggestive evidence that the bureaucrat buyers receive price discounts as a form of rent extraction.

We would like to emphasize that the bureaucrats' price discounts we measure in this paper can be regarded as a form of rent extraction, or a measure of the market value of power, but *not necessarily* bribery. By offering price discounts to government officials, the real estate developers may not necessarily ask for a direct, or explicit, or immediate favor in approving the housing projects, rather they may aim to establish good connections with the bureaucrats in the hope of future returns. Regardless of whether the trade of favors occurs immediately or in the future, the government officials do extract rents of power from the real estate developers.

More interestingly, our data set contains information about the hierarchical ranks of bureaucrats and the government agencies for which they work. This allows us to examine the *gradients* of the market value of power measured by *hierarchy*, by *criticality* and by *geography*. We measure hierarchy by the rank of the bureaucrat, criticality by the importance of the government agency to real estate development, and geography by whether the bureaucrat works in the city where the housing transaction takes place. We find that bureaucrats working in the agencies critical for real estate development or having a higher rank in the official hierarchy receive larger price discounts in their housing purchases. For instance, we find that bureaucrats from critical agencies receive a 2.48% price discount, while bureaucrats from other agencies only obtain a 0.98% price discount. Bureaucrats working for provincial governments enjoy an even higher price discount of approximately 3.9%.⁶ We find that the effect of government power on price discounts decreases substantially when bureaucrats leave their jurisdictions and buy houses in other jurisdictions. We also find evidence that bureaucrats with lower ranks but in critical agencies may enjoy larger price discounts than those with high ranks but not working in critical agencies.

Our results on the gradient of power shed new light on our thinking of private gains of a public position and the market value of power in a broader context. When economists think of the use of public office for private gains, we typically confined ourselves to corruption and bribery. In reality, there are many more nuanced ways, as shown in this study, to reap private benefits from holding public offices/power that do not explicitly violate laws. Though a bureaucrat in our context who receives price discounts from real estate developers may or may not “give back” in future, an implicit expectation from real estate developers of “giving back” whenever needed is certainly involved. Even in the case of “giving back,” the specific details of how to “give back” may be incomplete or even ambiguous for both favor-givers and favor-receivers. If corruption or rent-seeking is like spot transactions, the trade of implicit favors resembles long-term relational contracts.⁷ We believe that favor

² Other studies using the cross-checking approach include Di Tella and Schargrodsky (2003) who quantify corruption in hospital procurements, and Olken (2006) and Antonossava et al. (2008) who both estimate corruption in food distribution programs in developing countries.

³ Similar event studies using market inference include Faccio (2006) and Fisman et al. (2012).

⁴ According to China Statistical Yearbook (2013), the value-added of China's real estate sector was 2.9 trillion RMB (approximately 480 billion US dollars) in 2012, which accounted for 5.8% of China's GDP in that year.

⁵ For example, Cai et al. (2013) present strong evidence on corruption in China's urban land auctions.

⁶ If we factor in the fact that bureaucrats working for provincial governments typically live in provincial capital cities associated with relatively high housing prices, a 3.9% price discount implies an even larger amount of money than this percentage indicates.

⁷ This type of favor trading between government officials and the private sector is not restricted to China. Aoki (1988) considers the case in Japan where he showed that high-profile bureaucrats working in the central ministries (such as MITI or Ministry of Finance) would typically land at certain prestigious positions in the private sector after retirement, such as directorships of business associations. The expectation of such post-retirement arrangements motivates bureaucrats to work hard and stay clean in office and to maintain good relations with the private sector. Diermeier et al. (2005) showed that, in the US, congressional experience significantly increases post-congressional wages, both in the private and public sectors. Eggers and Hainmueller (2009) estimate the returns to serving in the British Parliament by comparing the estates of Members of Parliament (MPs) with parliamentary candidates who narrowly lost, and find that serving in office almost doubled the wealth of Conservative MPs, but had no discernible financial benefits for Labor MPs.

trading occurs not only in the public sector, but also in the private sector to individuals in powerful positions. The other interesting aspect of our results on the gradients of power is that the price of favors varies markedly with the identity of buyers/receivers, which suggests that the market of favors is not a standardized market with homogenous products and one prevailing price, rather this is a market of idiosyncratic favors with a large amount of heterogeneity and each favor trading strikes its own price, depending on whom trades with whom.

Our study also contributes to the literature measuring the degree of rent-seeking and corruption as previously reviewed. First, our data contains information on mortgage loans in over 100 cities in China from 2004 to 2010 and includes more than a million transactions. This allows us to assess rent-seeking on a nationwide scale in a highly important sector of the Chinese economy. Second, to the best of our knowledge, our paper is the *first* to show direct evidence of the hierarchical, critical and geographical gradients of the market value of bureaucratic power; moreover, we employ differences in these power gradients as additional evidence for interpreting the price discounts as a measure of rent-seeking. A closely related, and complementary, paper to our study is [Deng et al. \(2016\)](#).⁸ They estimate the unofficial income of government officials by exploiting the “Engel Curve” relationship between the home purchase price and the buyer’s latent, instead of the official, income, which they assume to be identical for bureaucrat and non-bureaucrat buyers. If non-bureaucrat’s official income is equal to their latent income (i.e., they do not have any unofficial income), then the relationship between house purchase price and income estimated off non-bureaucrat buyers can be used to infer about the unofficial income of the bureaucrats. Using this different approach, they also quantify the gradients of power by examining how the estimated unofficial incomes of the bureaucrats vary by their ranks. The difference in the approaches used in the two papers leads to an important difference in the interpretations of the measured value of powers: The “gray”, or “unofficial” incomes, of government officials estimated by [Deng et al. \(2016\)](#) reflect their *cumulative* rents of power, while the price discounts estimated in our paper measure the value of the bureaucratic power in the *particular* housing transactions.

The most serious challenge to measure the market value of government power is the difficulty in attributing the observed price differences to rent-seeking or corruption. As emphasized in a review article by [Banerjee et al. \(2012\)](#), in many cases it is difficult to tell whether the missing resources observed in the data are actually corruption or simply mismeasurement of the indicators or even just a sign of bureaucrat incompetence. Our rich dataset allows us to tackle this issue in a number of ways. We try to control for a full set of characteristics to capture the heterogeneity in house location and other attributes (as detailed as its floor level and orientation) as well as the detailed buyer and loan characteristics. More importantly, we differentiate the effects of power on price discounts by criticality of agencies, hierarchical ranks and geographical locations. Our empirical findings are consistent with our hypotheses on the differential values of power in the housing market, varying with rank, level, and jurisdiction of power. We also find collaborative correlations between our measure of bureaucratic rents of power (i.e. price discounts received by bureaucrats) and other variables, in particular the Entertainment and Travel Costs (ETC) measure of corruption proposed by [Cai et al. \(2011\)](#).

The remainder of the paper is organized as follows. In [Section 2](#) we describe the institutional background of China’s housing market and the potential involvement of bureaucrats; in [Section 3](#) we develop several testable hypotheses regarding the gradients of power as a measure of corruption in the housing market; in [Section 4](#) we provide details of our data set and descriptive statistics; in [Section 5](#) we present our main empirical results; in [Section 6](#) we discuss and cast doubt on several key alternative explanations for our empirical findings; in [Section 7](#) we present collaborative evidence in support of our interpretation of

bureaucrat price discounts as a measure of bureaucratic rents; and in [Section 8](#) we conclude.

2. Institutional background

2.1. China’s housing market

Until 1994, Chinese urban households lived in the apartments allocated by either the government or their work units (such as state-owned enterprises), and there was no commercial housing market. Housing reform was initiated in 1994 when employees in the state sector were allowed to purchase full or partial property rights to their current apartment units at subsidized prices. Nascent housing markets emerged in some large cities in the early 1990s, and they started to grow rapidly from 1998 when the central government completely abolished the traditional model of housing allocation as in-kind benefits and privatized the housing property of all urban residents. Also in 1998, in an important impetus to the development of a private housing market, China’s central bank, the People’s Bank of China (PBC), outlined the procedures for house purchasers to obtain residential mortgages at subsidized interest rates.

According to a report published by the People’s Bank of China in 2013, financial institutions made a total of 8.1 trillion RMB in mortgage loans in 2012, accounting for 16% of all bank loans in that year. In the residential housing mortgage market, China’s four state-owned commercial banks take a dominant position with a total market share of over 60%.⁹

In order to be eligible for mortgage loans, the applicants are required to meet a set of conditions, such as stable income flows, age ranging between 18 and 60, good credit records, and a down payment of no <20 or 30% of the purchase price of the house. To substantiate a stable income flow, applicants must provide proof for their monthly income certified by their employers and supported by their bank payment records. The minimum down-payment ratio has varied substantially over time, as it is subject to the PBC regulation and is often used as a policy instrument to address volatile housing prices. The maximum maturity of mortgage loans is 30 years. In 2004, the Chinese Banking Regulatory Commission released guidelines for the risk management of mortgage loans for commercial banks which stipulate that the monthly mortgage payment to income ratio of borrowers should be no higher than 50%. The interest rates of mortgage loans are set unilaterally by the PBC and *not subject to* any negotiations between the mortgage-lending banks and home buyers. At a given time, all borrowers face the same interest rate. But the interest rates are adjustable; if the PBC changes the baseline interest rate, the mortgage loan interest rate will be adjusted accordingly. Fixed interest rate mortgages are rarely seen in the market.

The contractual relationship between the mortgage borrowers (the home buyers) and the banks is typically mediated by real estate developers. When an individual decides to buy an apartment in a certain complex, he or she will sign mortgage contracts with a commercial bank designated by the real estate developer of the complex. It is very rare for buyers to choose a commercial bank different from the one designated by the developer for two reasons. First, real estate developers need sizable loans from a commercial bank to construct houses. To avoid potential risks, commercial banks will conduct due diligence to check the real estate developer’s qualifications and home construction plans before entering collaboration with them. Commercial banks make use of their strong bargaining power in lending to ask for a bundling of the construction loans to the developer with the future mortgage loans to the home buyers. Second, due to heavy state regulation in the mortgage market, there is limited room for product differentiation, and mortgage contracts offered by commercial banks are highly homogeneous (the same interest rate for instance). Therefore, home

⁸ To the best of our knowledge, the working paper version of our paper ([Fang et al., 2014](#)) predates [Deng et al. \(2016\)](#).

⁹ They are as follows: Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC), and Agricultural Bank of China (ABC).

buyers as borrowers lack incentives to look for better mortgage deals when there is one already offered through the mediation of the real estate developer. Home buyers' lack of free choice of commercial banks facilitates our empirical analysis because once the fixed effects of complexes are controlled for, we do not need to worry about the endogenous matching of commercial banks and housing buyers, which could lead to potential concerns about the endogeneity of observed mortgage loans.

Prior to October 2010, individuals from other regions of China were as eligible for mortgage loans as local residents. During the past decade, rapidly rising housing prices in China's first-tier cities have attracted many buyers from other areas in the country. However, this trend came to an abrupt halt in October 2010 when the Beijing municipal government started to impose a house purchase quota (up to two apartments) for each household with a local household registration (i.e., local *Hukou*), and prohibited residents without a local household registration from buying local houses. Other first-tier cities, such as Shanghai, Guangzhou, and Shenzhen quickly followed suit and established similar restrictions on housing purchases. Many second-tier cities, such as Hangzhou and Qingdao, have also formulated new policies to cool down speculation in the housing market around late 2010.

2.2. Bureaucrats in China's housing market

Chinese bureaucrats are important players in the housing market. On the one hand, bureaucrats like to use bribery income to invest in the housing market in order to maximize their returns on investment. China's strong economic growth and massive urbanization during the past decade have resulted in rapidly increasing housing prices, generating handsome returns on housing investments. Encouraged by the booming prospects in the housing market, most Chinese bureaucrats regard real estate property as the most lucrative investment channel (see Fang et al., 2015). The absolute majority of bureaucrats charged with corruption are reported to own multiple houses in big cities in China, sometimes even dozens of houses.¹⁰ On the other hand, the power held by bureaucrats is critical for real estate developers to get projects done. In China, the design, construction and sale of houses is subject to regulation by the state. During this process, real estate developers have to go through numerous government agencies for approval and each government agency has veto power to delay or prevent the progress of a housing development project. The formal conversion of agricultural land into urban construction land is the first step requiring government approval and support, followed by a government review process regarding the architectural design, the land use planning, and the housing construction. The market value of power is reflected not only in the bribes bureaucrats may receive from real estate developers, but also in the price discounts offered to bureaucrats when buying a house.

In the Chinese housing market, sales agents hold some discretion in price-setting while negotiating with home buyers, just like car dealers in the U.S. auto markets. This means that sales agents may practice certain degree of price discrimination based on the personal characteristics of home buyers. But if the transaction involves government officials who have a significant rank or are working in critical agencies related to real estate development, the higher-level managers or even the executives of the real estate companies may be directly brought in to set a final transaction price favorable to the government officials. One of the attractions of price discounts is their ability to better circumvent corruption charges, compared with taking bribes up-front from the real estate developers. As will be shown in Section 4, bureaucrats receive significant price discounts compared with other buyers in the housing market.

¹⁰ A recent well-known corruption case involved a bureaucrat in the housing administration bureau in Guangdong who owned over 49 houses around the country. He was dubbed as "Uncle House" by the Chinese news media.

3. Hypotheses on the gradients of power in the housing market

State regulation naturally gives rise to rent-seeking activities. The real estate sector in China has been heavily regulated by the state. In order to get the official approvals, obtain lower land prices or favorable floor area ratios, or simply to speed up the approval process, building good connections with bureaucrats and even bribing them is critical for real estate developers. More often than not, real estate developers either seek or return favors from bureaucrats by granting significant price discounts for their housing purchases. This leads to our first testable hypothesis as follows:

Hypothesis 1. (Discounts for bureaucrats) All else being equal, bureaucrat buyers will pay a lower price than non-bureaucrat buyers for the same house.

While government power conveys market value to its holders due to weak constraints on the discretionary use of power, the market value of power (i.e. the private gains the power can generate) hinges on the hierarchical ranks, territory levels, and criticality of the agencies the power is associated with. A higher hierarchical rank means more decision-making authority, so we would expect to see higher-ranked bureaucrats obtain more rents from their positions than those with lower ranks. In China, the territory level of government the bureaucrat is affiliated with is an important dimension of power. Typically the administration of a higher territorial level will be responsible for more important approval procedures. For example, land taking and conversion are usually subject to the approval by the higher-level territorial governments (e.g., provincial governments). The territory level of government required for the approval of an investment project increases with the size of the investment. In addition, some government agencies are more important than others from the viewpoint of real estate developers. For real estate developers, the relatively important agencies include the development and reform commission, the housing administration bureau, the land administration bureau, and the construction planning bureau. These government agencies regulate critical matters related to land conversion, architectural design, land use planning, and housing construction and sales. This observation leads to the following testable hypothesis:

Hypothesis 2. (Hierarchical gradient) All else being equal, bureaucrats with higher ranks will pay a lower price than bureaucrats with lower ranks.

As a famous traditional Chinese saying goes, it is not the person in authority, but the person directly in charge, who has real power. The idea behind this old saying is that due to asymmetric information, the person in authority may not be able to monitor the behavior of his or her subordinates such that the person directly in charge is able to enjoy a significant degree of discretion. Either discretion or command over local information enables the person directly in charge to capture his or her clients. Applying this logic to our analysis of the housing market implies that some low-rank bureaucrats in critical agencies could hold control over key procedures or policy details, making them more powerful in practice than his/her rank may imply. In other words, hierarchical ranks are not the only determinant of the rents from power; the relative importance of agencies matters a lot as well. Although some bureaucrats have relatively low hierarchical ranks, if they work in "critical" agencies they may be more valuable in the housing market than others with relatively higher ranks but not working in critical agencies.

Hypothesis 3. (Critical gradient) All else being equal, bureaucrats from agencies critical to real estate developers will pay a lower price than bureaucrats from less critical agencies.

Any power has its boundaries of influence. A government bureau leader may seem powerful in the eyes of real estate developers in the jurisdiction over which that bureaucrat exercises decision-making power, but for developers doing business in other jurisdictions, this individual

may not be that important. This suggests that the effect of power on rent-seeking depends greatly upon geographical distance or jurisdictional scope. However, going out of a given jurisdiction may not make bureaucrats lose their influence on business people completely, since they may have some ties with bureaucrats in other jurisdictions. However, while these indirect connections still yield some benefits to bureaucrats beyond their power areas, typically they are not as strong. The natural implication derived from this discussion yields the following hypothesis:

Hypothesis 4. (Geographical gradient) The price discount bureaucrats receive decreases outside their jurisdictions of authority; the farther away from their jurisdiction, the less the price discount they will receive, if any.

4. Data and descriptive statistics

The data used in this paper are compiled from mortgage contracts provided by a large commercial bank in China that accounts for about 15% of the mortgage loan market in China as of 2012.¹¹ Restricting the sample to mortgages for new residential properties yields over 1 million mortgage loan contracts dating from the first quarter of 2004 to the fourth quarter of 2010. As mentioned above, the house purchase rationing policy initiated in first and second tier cities in October 2010 stipulated that only households with local household registration are eligible to buy a maximum of two apartments. In order to avoid the confounding effect of quota-induced distortions, we end our data sample in the fourth quarter of 2010.¹² A typical mortgage contract contains detailed information on the personal characteristics of housing buyers (e.g., age, gender, marital status, income, employer, education, occupation, and region and address of residence), housing price and size, apartment-level characteristics (e.g., complex location, floor level, and room number), as well as loan-level characteristics (e.g., maturity, loan to value ratio, and down-payment). Our data also contain information on the hierarchical levels and job title of the buyers and their employers.¹³ For the purposes of our analysis, we exclude mortgages in the following cases from our data sample: employer-financed housing construction; and instances when employees from given employer (including government agencies) band together to obtain group price discounts from the real estate developers; and instances where the number of transactions in a complex is <5.¹⁴ After deleting these observations, we end up with a sample of 1,005,960 observations.

Panel A of Table 1 presents summary statistics for the key variables used in our analysis. The average housing price in our sample period is 3765.3 RMB per square meter with a large variation (the standard deviation is 3196 RMB). Table 1 also shows that among housing buyers, 33% are females, 69% are married, 20% have college degrees, and the average age is around 35. The monthly income of home buyers is close to 6000 RMB, but with a huge variation (the standard deviation is 10,179 RMB). In our sample, 85% of the purchases are made by buyers within their current city of residence, 13% are in other cities in the same province, and only 1.8% of transactions are in cities outside of the buyer's home province. The average size of apartments purchased in our sample is 113.2 m², which corresponds to a three-bedroom apartment. The average mortgage loan maturity is 188.5 months, and the loan to value (LTV) ratio averages 64.8%.

We define housing buyers whose employer belongs to an administrative agency of the government as *bureaucrats*. This definition of bureaucrats does not include individuals who work in the so-called “public institutions” which may be affiliated with government agencies but

which do not perform administrative functions.¹⁵ In our sample, bureaucrats account for 7.1% of buyers, which is much higher than the proportion of bureaucrats in the total population of China.¹⁶ During 2004–2010, we see a clear trend of the increasing presence of bureaucrats in the housing market, as shown in Fig. 1. In 2004, only about 3% of the home buyers in our sample were bureaucrats. This share rose to about 11% in the first quarter of 2009, and has since remained steady at about 8–9%. In addition, about 4% of the sample of bureaucrats have *Ke* (equivalent to section chief) or higher rank. *Ke* refers to a hierarchical rank which is equivalent to a bureau chief in a county-level government, or a section chief in a prefecture-city level bureau. We define this group of bureaucrats as “*bureaucrats in high rank*” in the subsequent analysis. In order to examine the differential effect of power, we distinguish some “critical” government agencies from others from the viewpoint of real estate developers. We denote bureaus such as the development and reform committee, housing administration, land administration, and construction planning as “critical agencies”. As described in Section 2, bureaucrats in these agencies hold critical authority to decide whether to approve the real estate developers' applications and under what terms. In our sample, about 6% of bureaucrats come from these critical agencies. Table 1 also shows that about 1% of bureaucrats work in the provincial government. Provincial bureaucrats show up in our data either because they purchase houses in provincial capitals where provincial governments are located or because they purchase houses elsewhere.

Panel B of Table 1 exhibits the difference in personal, housing and loan characteristics between bureaucrat buyers and non-bureaucrat buyers. Bureaucrat buyers pay lower housing prices, are more likely to be male, married, and educated with college degree, but earn less monthly income. Bureaucrat buyers also buy larger-sized apartments with lower loan to value ratio. The difference in loan maturity in these two groups is not statistically significant. In Table 2 we make a comparison of bureaucrat and non-bureaucrat buyers in the housing market in a more rigorous way. We run the Probit regressions of the dummy variable of whether the buyer is a bureaucrat on a set of covariates. All the regressions have controlled for the dummies of purchasing time, building number, floor level, last digit of room number and the buyer's residence province respectively. Column 1 shows that bureaucrat buyers are more likely to buy apartments in higher-priced complex locations and with larger apartment size. This result remains robust when we add more control of personal characteristics in Column 2. In Column 3 we find that bureaucrat buyers are also associated with lower loan to value ratio and longer loan maturity even though they have lower monthly income.

Table 2 reveals an interesting fact that despite their relatively lower incomes, bureaucrats can afford to buy homes in more expensive locations with larger sizes and lower loan to value ratio.¹⁷ There are two

¹⁵ Public institutions in China mainly engage in commercial business (e.g. product quality examination centers) and social services (e.g. university and research institutions). Employees in public institutions do not hold administrative power which is critical for private firms to conduct business, and they are not regarded as “civil servants” in China's social welfare system.

¹⁶ According to Zhou (2009), the bureaucrats in the administrative branch of government accounted for approximately 0.86% of the total population during 1989–2006.

¹⁷ There is a possibility that bureaucrats buy larger houses than non-bureaucrats simply because they tend to have larger families. To address this concern, we make a comparison of the family sizes between bureaucrats and non-bureaucrats in urban areas, using the 1% random sample of the 2000 Population Census of China, the latest microsample we have access to. We focus on the household heads with age 25–60 and then calculate their average family size respectively for bureaucrats and non-bureaucrats. It turns out that average household size for household heads who worked for state administration is 2.80, with a sample of 63,702 household heads, while the average household size for household heads who worked in non-government sector is 2.78, with a sample size of 608,883. China's One-Child Policy that started in 1980 made Chinese family size relatively small. Bureaucrats do have somewhat larger families than non-bureaucrats, and their difference is statistically significant, but the magnitude of the difference is fairly small (0.02). Panel B of Table 1 reveals that the apartment area for bureaucrat buyers is 4.8 percentage points larger than that for non-bureaucrat buyers and Columns 2 and 3 in Table 2 show that the relative apartment size for bureaucrats is 8.3–13.8 percentage points larger than that for non-bureaucrats. We believe that the difference in family size between bureaucrat and non-bureaucrat buyers is not enough to explain the observed difference in apartment sizes.

¹¹ We do not release the name of the commercial bank for reasons of confidentiality.

¹² Our key results are robust to inclusion of the sample of 2010–2012 after the rationing policy. We do not find evidence that the rationing policy affected differently bureaucrats and non-bureaucrats that can be linked to the market value of power.

¹³ The mortgage contract requires an entry of work unit and job title for any home buyer if applicable, and these pieces of information can easily reveal whether the home buyer works in the government sector and his or her hierarchical rank if working in the government.

¹⁴ We will do robustness checks in Section 5.4 by changing the threshold number of transactions in a complex.

Table 1
Summary statistics.

Panel A	Mean	Standard deviation	Min	Max
Average housing price (per square meter)	3765.3	3195.5	1000	95,700
Characteristics of power				
Bureaucrats	0.071	0.258	0	1
in high rank	0.003	0.057	0	1
in critical agencies	0.004	0.060	0	1
in provincial government	0.001	0.035	0	1
Buyer's characteristics				
Gender (female = 1)	0.331	0.471	0	1
Married	0.694	0.461	0	1
College education	0.203	0.402	0	1
Age	34.7	8.404	18	65
Monthly income (yuan)	5990	10,179	700	249,000
Housing purchases from				
City of residence	0.851	0.356	0	1
Other cities in home province	0.131	0.337	0	1
Other provinces	0.018	0.134	0	1
Apartment and loan characteristics				
Area (square meters)	113.2	46.571	21	797
Loan maturity (month)	188.5	73.622	12	360
Loan to value	0.648	0.121	0.100	0.800
Obs.	1,005,960			

Panel B	Bureaucrat buyers	Non-bureaucrat buyers	Difference ¹
Apartment price	3621.221	3776.955	155.7***
Gender (female = 1)	0.269	0.336	-0.067***
Married	0.751	0.690	0.061***
College degree	0.361	0.191	0.17***
Age	36.932	34.499	2.43***
Monthly income	4580.49	6094.18	-1514***
Apartment area	118.535	112.822	5.713***
Loan maturity	188.642	188.514	0.128
Loan to value ratio	0.623	0.650	-0.027***
Obs.	71,858	934,102	

*** Indicates that the difference is significant at the 1% level.

possibly complementary explanations for this fact. The first is that bureaucrats receive other sources of income in addition to their regular income (e.g., “gray income” from bribery or other activities). The second explanation, which we explore further below, is that bureaucrats actually pay lower prices than other buyers for the same apartment. Notice that the first explanation reflects the *cumulative* rents of power from being a bureaucrat, including potential in-kind benefits that bureaucrats

receive compared with non-bureaucrats, and potential bribes. This is consistent with the findings in [Gorodnichenko and Peter \(2007\)](#) who show that public sector employees receive 24–32% less wages than their counterparts in the private sector, but that they enjoy essentially identical level of consumption expenditures and asset holdings, indicating the presence of non-reported compensation in the public sector. In contrast, the second explanation is a measure of the value of the

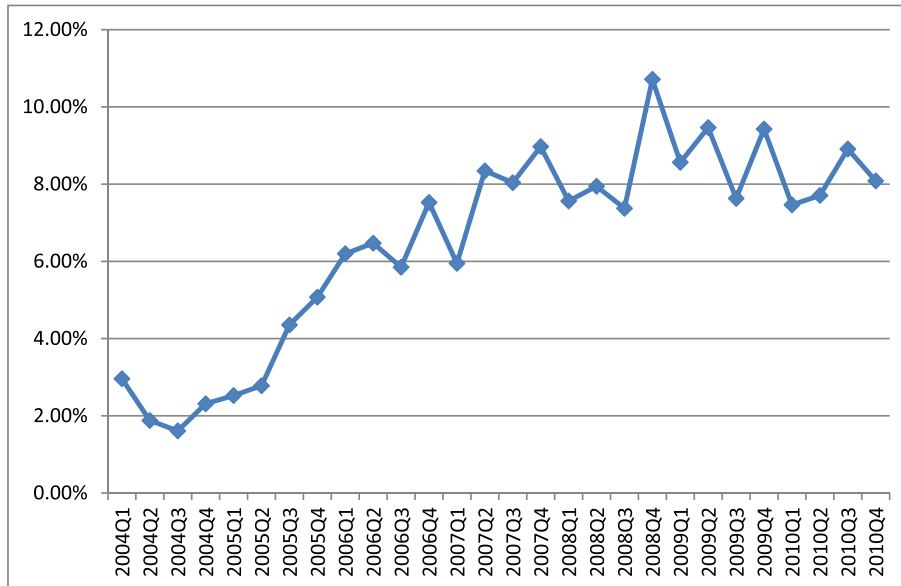


Fig. 1. The share of bureaucrats in housing purchasers: 2004–2010.

Table 2
The characteristics of bureaucrats in the housing market: Probit model.

	Dependent variable: Bureaucrat = 1		
	(1)	(2)	(3)
Relative complex price	0.016*** (0.007)	0.103*** (0.012)	0.065*** (0.012)
Relative apartment size	0.063*** (0.007)	0.138*** (0.009)	0.083*** (0.010)
Female		−0.180*** (0.005)	−0.166*** (0.004)
Married		0.018*** (0.005)	0.023*** (0.005)
College education		0.560*** (0.009)	0.545*** (0.009)
Age		0.016*** (0.002)	0.004** (0.002)
Age squared		1.09E−5 (2.34E−5)	1.80E−4*** (2.40E−5)
Monthly income (log)		−0.068*** (0.001)	−0.062*** (0.001)
Loan maturity (log)			0.178*** (0.008)
Loan to value			−0.916*** (0.016)
Purchasing time (month)	Y	Y	Y
Building	Y	Y	Y
Floor level dummy	Y	Y	Y
Room number dummy	Y	Y	Y
Residence province dummy	Y	Y	Y
Observations	1,005,960	1,005,960	1,005,960
Pseudo R-sq.	0.035	0.085	0.088

Note: Relative complex price is defined as average complex price relative to the city-wide average housing price. Relative apartment size is defined as a ratio of a buyer's apartment size to mean apartment size in the complex. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

power in the *particular* housing transaction. Our data do not permit us to examine the first effect, but we will discuss later how this data limitation affects our estimation of the market value of power.

5. Empirical analysis of the effect of power on housing prices

5.1. Econometric specification

In this section, we examine the effects of government power on the purchase price of apartments (per square meter). We will first look at the overall effect of being bureaucrats on housing prices, then we will investigate separately how the hierarchical rank and territorial level of government power affects the price discounts bureaucrats enjoy, and how the effect of government power varies with the geographical distance of the house purchase from the region of jurisdiction.

We will estimate the following model with OLS:

$$y_{ijt} = \alpha + \beta \times \text{Bureaucrat}_{ijt} + \mathbf{X}_{ijt}\boldsymbol{\gamma} + \sigma_j + u_t + \epsilon_{ijt} \quad (1)$$

where y_{ijt} denotes the logarithm of apartment price per square meter in transaction i in complex j at time of purchase t ; Bureaucrat_{ijt} is a dummy variable indicating whether the buyer of the transaction is a government official according to our definition, and \mathbf{X}_{ijt} denotes a vector of controls for the characteristics of buyers, apartments and mortgage loans involved in the transaction. One of the serious challenges in estimating the determinants of housing price is the considerable heterogeneity of apartments. Apartments differ in locations, floor level, window orientation, and time of construction, and prices respond to all of these characteristics. In order to address concerns about the effect of housing heterogeneity on prices, we control for a set of fixed effects including complex (σ_j) and transaction time in months (u_t), as well as city of residence of buyers. In China's housing market, buyers are not only sensitive to complex locations, but also floor levels and apartment orientation, so housing prices vary significantly across these attributes. In the following regressions, besides controlling for complex fixed

effects, we also control for floor level and room number of the apartment.¹⁸

Since bureaucrats only account for a small fraction of home buyers in the housing market (see Fig. 1), we are not concerned about the reverse causality from bureaucrats' decision to buy apartments on the housing prices. Still, bureaucrats may endogenously choose to purchase apartments in certain complex locations, due to some unobserved heterogeneity of apartment characteristics, which will bias our estimation. However, our rich data set allow us to control for a full set of characteristics of the apartments, such as purchase time, complex location, floor level, and room number, among others. We argue that these controls largely capture the effects of unobserved heterogeneity among apartments. In Section 6.3, we further discuss the concern regarding unobserved housing characteristics.

5.2. Baseline results: price discount for bureaucrats

Table 3 reports OLS regression results with the logarithm of apartment prices per square meter as the dependent variable. The number of observations is over 1 million. We report results from four specifications with different sets of controls. In Column 1, we only include a dummy for bureaucrat. We find that, without any additional controls, bureaucrat buyers pay about 3.72% less than non-bureaucrat buyers for their apartment purchases. In Columns 2–4, we add more controls for the characteristics of apartment and loans. In each of these specifications, we include controls for a set of dummies of complex locations, purchasing time (month), building number, floor level, last digit of room number, and whether the property is in the buyer's home province. The three specifications differ with regard to the other controls for the buyer, apartment and loan characteristics. With these finer controls, the R^2 is above 90% for all remaining three specifications.

¹⁸ The room number of the apartment is often associated with whether an apartment faces the south or the north, and thus how much sunshine the apartment can be exposed to.

Table 3
The bureaucrat discount of apartment prices.

	Dependent variable: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	−0.0372*** (0.0057)	−0.0069*** (0.0013)	−0.0088*** (0.0014)	−0.0105*** (0.0014)
Apartment area (log)			−1.2432*** (0.0538)	−1.1865*** (0.0526)
Apartment area squared			0.1416*** (0.0058)	0.1338*** (0.0057)
Loan maturity (log)			0.0361*** (0.0018)	0.0525*** (0.0022)
Loan to value			−0.0223*** (0.0045)	−0.0392*** (0.0047)
Female				0.0139*** (0.0007)
Married				0.0020*** (0.0007)
College education				0.0150*** (0.0013)
Age				−0.0019*** (0.0002)
Age squared				4.25E−5*** (3.44E−6)
Monthly income (log)				0.0216*** (0.0008)
Complex location	N	Y	Y	Y
Purchasing time (month)	N	Y	Y	Y
Building	N	Y	Y	Y
Floor level	N	Y	Y	Y
Last digit of room no.	N	Y	Y	Y
Residence province	N	Y	Y	Y
Observations	1,005,960	1,005,960	1,005,960	1,005,960
R-sq.	0.000	0.908	0.911	0.913

Note: Apartment price is defined as the price per square meter. We report standard errors clustered at the complex location level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Column 2 reports the estimated coefficient on bureaucrats only controlling for the common set of apartment controls listed above, but not controlling for apartment area and its squared term, and the characteristics of buyers and mortgage loans. We find that bureaucrats enjoy a 0.7% price discount compared to other non-bureaucrat buyers, and this difference is significant at the 1% level. For the specification in Column 3 we add apartment area and its squared term, loan maturity (log), and loan to value to the regression in Column 2. The price discount of bureaucrats increases to 0.88% and is still statistically significant at the 1% level. In Column 4, we additionally control for buyers' personal characteristics, including gender, marital status, college education, age, age squared and monthly income (log). The price discount subsequently increases further to 1.05%, and it remains statistically significant at the 1% level. These results suggest that government power does convey significant rents to its holders, which strongly supports Hypothesis 1. It is important to note that in each regression we have controlled for a full set of complex and apartment characteristics and exclude the observations involving group purchases.¹⁹ Therefore, the significant price discounts enjoyed by bureaucrats are unlikely driven by the alternative story that bureaucrats tend to choose apartments with undesirable complex locations or undesirable buildings within a complex.

Table 3 also reveals some interesting results regarding other determinants of housing prices in China's housing market. Apartment prices have a U-shaped relation with apartment area, with the minimum price hitting at an area of 81 and 84 m², based on the estimates in Column 3 and Column 4 respectively. Higher prices are associated with a longer loan maturity and a lower loan to value ratio. Married couples and

higher-educated buyers tend to pay more for their apartments, possibly because they face higher search costs.²⁰ Age also has a U-shaped relation with apartment prices with the minimum at the age of 23. Monthly income has a significantly positive effect on apartment prices.²¹

5.3. The gradients of power

So far we have established that bureaucrat buyers pay about 1% less than non-bureaucrat buyers for "identical apartments" (to the extent that we have sufficiently controlled for the characteristics of the apartments). This is consistent with Hypothesis 1 in Section 3. We now use the rich information about the hierarchical rank, criticality of the government agency and the geographical location of a bureaucrat's power and the housing transaction to test Hypotheses 2–4 in Section 3.

5.3.1. Hierarchical and critical gradients

Hypotheses 2 and 3 state that, all else being equal, bureaucrats with higher ranks or territorial levels, and who work in critical government agencies (for real estate developers), will enjoy larger price discounts in the housing market. We refer to this as the hierarchical and critical gradients of power. Table 4 provides estimation results that support the two hypotheses. Here we differentiate power rank and levels in three ways. First we compare bureaucrats in "critical" agencies with those in non-critical agencies. As mentioned before, connections with bureaucrats in critical agencies are vital for real estate developers. We expect that bureaucrats from these agencies would get more rents

²⁰ In Section 6, we discuss the possibility of search costs in explaining these findings.

²¹ As previously discussed, the monthly income of bureaucrats may not include the off-the-book benefits and/or bribes. Since the estimated coefficient of (legitimate) monthly income is significantly positive in our regressions, this means that, to the extent that we miss the bureaucrats' off-the-book incomes in our regressions, our estimates provide the lower bounds on the rent of bureaucrat power.

¹⁹ Our key results are robust to adding complex fixed effects interacted with floor level dummies, or complex fixed effects interacted with the building dummies, or complex specific time trend. These results are available upon request.

Table 4
The hierarchical and critical gradients of power on apartment prices.

	Dependent variable: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in critical agencies	−0.0248*** (0.0049)			
Bureaucrats in non-critical agencies	−0.0097*** (0.0014)			
Bureaucrats in high rank		−0.0138* (0.0071)		
Bureaucrats in low rank		−0.0103*** (0.0013)		
Bureaucrats in provincial government			−0.0390** (0.0179)	
Bureaucrats in lower-level government			−0.0100*** (0.0014)	
Bureaucrats in critical agencies * high rank				−0.0371*** (0.0195)
Bureaucrats in critical agencies * low rank				−0.0244*** (0.0050)
Bureaucrats in non-critical agencies * high rank				−0.0123* (0.0072)
Bureaucrats in non-critical agencies * low rank				−0.0096*** (0.0013)
Observations	1,005,960	1,005,960	1,005,960	1,005,960
R-sq.	0.913	0.913	0.913	0.913

Note: All regressions have same controls as in Column 4 of Table 3. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

from real estate developers than those from non-critical government agencies. Second, we distinguish bureaucrats by their hierarchical ranks, whether they have *Ke* (section chief) or above rank. Third, we differentiate the territorial levels of the bureaucrats by whether they work in provincial governments or lower-level governments.

Table 4 reports regression results showing the effects of differential government power on housing prices. In each regression reported in Table 4, we have controlled for a full set of characteristics of buyers, apartments and mortgage loans as specified in Column 4 in Table 3. In Column 1, we find that bureaucrats from critical agencies receive a 2.48% price discount compared with non-bureaucrats, while those from non-critical agencies only enjoy a 0.97% price discount.²²

In Column 2, we find that bureaucrats with *Ke* or higher rank pay 1.38% less than non-bureaucrats, while bureaucrat buyers with lower ranks receive a 1.03% price discount, although this difference between these two coefficients is not statistically significant. In Column 3, we show that bureaucrats working in provincial governments receives a 3.90% price discount relative to non-bureaucrat buyers, which is substantially higher than the 1% price discount received by bureaucrats working in lower-level governments. This finding seems somewhat odd since most powers on land supply, planning and construction permit issuance are controlled by the prefectural or county-level governments. Why do bureaucrats working in the provincial government enjoy such a large price discount in a location where they do not wield direct influence? We think it is possibly due to the fact that prefectural or county level bureaucrats need help from their counterparts in provincial government in many occasions (such as administrative approval, inspection, and grants allocation), given that China is a highly

regulatory state. Thus it is likely that real estate developers offer significant discounts to provincial bureaucrats at the request of those bureaucrats at city or county agencies. This finding indicates the transferability of favors between the connected people, a message that will show up again in our subsequent analysis of the geographical gradient of power.

As shown above, bureaucrats from critical agencies receive a much larger price discount in the housing market than those with higher ranks. This result may be driven by the possibility that the bureaucrats in critical agencies primarily have high ranks, so we do not know whether the larger price discount associated with critical agencies is caused by the agencies' criticality or higher rank. In order to see more clearly the differential effects of agency criticality vs. hierarchical rank, we divide bureaucrats into four categories: (a) those in critical agencies with high rank; (b) those in critical agencies with low rank; those in non-critical agencies with high rank; and those in non-critical agencies with low rank.

Column 4 in Table 4 reports the results for price discounts received by these four types of bureaucrats relative to non-bureaucrat buyers. We can see a very interesting result: while high rank always conveys larger price discounts for bureaucrats given the criticality of agencies for which they work, low rank bureaucrats in critical agencies enjoy a price discount that doubles that received by bureaucrats from non-critical agencies with high rank. This finding confirms Hypothesis 3 and provides solid evidence for the importance of the criticality of the government agency relative to hierarchical rank. Bureaucrats who have relatively higher ranks but are not from agencies critical to real estate developers may appear less powerful than those with low ranks but who are from critical agencies.

These empirical results on the gradients of power lend strong support to the notion that the ability of bureaucrats to collect rents or receive favors is closely associated with the hierarchical rank/level of the government agencies they work for and their criticality to the real estate sector. The significant difference in price discounts for different hierarchical level and agency criticality also helps address the previous concern that the effect of government power on housing prices is actually driven by bureaucrats' self-selection of cheaper apartments or unfavorable complex location. It is difficult for this explanation to account for why bureaucrats in critical agencies or in provincial governments are more likely to buy cheaper apartments than those who are either from non-critical agencies or non-provincial governments.

²² There is a potential concern about how these critical agencies are selected. In order to address this concern, we regroup bureaucrats in critical agencies into four subgroups: land resource administration, development and reform commission (DRC), housing administration, and urban construction and planning. Then we rerun the baseline regression as in Column 4 of Table 3. We find that bureaucrats from land resource, housing, and urban construction and planning enjoy significantly higher discounts than those from non-critical agencies. The magnitude of the estimate on DRC is quite large relative to the estimates of other three housing-related agencies, but it is insignificant, probably due to its small sample size. Our key results remain quantitatively and qualitatively similar after excluding DRC as a critical agency. We have also checked whether other government agencies, such as taxation bureau and fire department, are critical and found no evidence about it. All these results are available upon request.

Table 5
The geographical gradient of power on apartment prices.

	Dependent variable: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	−0.0107*** (0.0014)	−0.0124*** (0.0017)	−0.0108*** (0.0014)	−0.0126*** (0.0017)
Bureaucrats * buying in other cities of home province		0.0088*** (0.0024)		0.0091*** (0.0024)
Bureaucrats * buying in other provinces			0.0093* (0.0053)	0.0111** (0.0053)
Buying in other cities of home province	0.0074** (0.0037)	0.0064* (0.0037)	0.0074** (0.0037)	0.0064* (0.0037)
Buying in other provinces	0.0172*** (0.0037)	0.0172*** (0.0037)	0.0166*** (0.0037)	0.0165*** (0.0037)
Observations	1,005,960	1,005,960	1,005,960	1,005,960
R-sq	0.913	0.913	0.913	0.913

Note: All regressions have same controls as in Column 4 of Table 3. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

5.3.2. Geographical gradient

Hypothesis 4 predicts that the price discount bureaucrat buyers receive depends on the jurisdiction of their power, and it will decrease with the distance from its jurisdiction. We refer to this as the *geographical gradient* of power. To introduce the measure of geographical distance, we rely on reported information about the buyers' city of residence and the city of the housing transaction to judge whether buyers purchase houses outside their resident cities.²³

Table 5 presents the regression results for the geographical gradient of power. For each regression, we have the same set of controls as in Column 4 of Table 3. Column 1 shows that buyers pay 0.74% higher price for properties in cities elsewhere in their home province than in their resident cities. If they purchase outside of their home province, they face even higher prices (an approximately 1.72% price premium) than buying in their resident city. Bureaucrat buyers, however, still receive a 1.07% price discount on average compared to non-bureaucrat buyers.

In Column 2, we add the interactions of the bureaucrat dummy and the indicators for whether the purchase is in other cities of the home province; in Column 3, we add the interactions of the bureaucrat dummy and the indicators for whether the purchase is in other provinces; and in Column 4 we include both interactions. The results provide strong evidence consistent with **Hypothesis 4**. For example, Column 2 shows that bureaucrat buyers receive a 1.24% price discount in their resident cities compared to non-bureaucrat buyers, but their price discount decreases to 0.36% (0.0124 − 0.0088 = 0.0036) if they purchase houses in other cities within their home province. Column 3 shows that bureaucrat buyers receive a 1.08% price discount in their home province compared to non-bureaucrat buyers, but the price discount is reduced to 0.15% (0.0108 − 0.0093 = 0.0015) if they buy houses outside their home province. All these results are statistically significant at the conventional levels.

In Column 4 when we include both interaction terms, we find that the price discount for bureaucrat buyers is 1.26% in their resident cities, but it declines to 0.35% (0.0126 − 0.0091 = 0.0035) in other cities of the home province, and the price discount for bureaucrats further decreases to 0.15% (0.0126 − 0.0111 = 0.0015) when they purchase houses outside of their home province. This evidence strongly suggests that the influence of power has a very clear jurisdictional boundary: if bureaucrats move beyond their jurisdictions, the market value of their government power has to be discounted, and it continuously decreases as they move from their home city to home province to other provinces. This result accords exactly with the prediction of **Hypothesis 4**. Interestingly, Table 5 also shows that even when bureaucrats move outside their home provinces, the market value of their power does not disappear completely. This result indicates that bureaucrats may make use of

their nationwide networks to extend the influence of their power across jurisdictions.

5.3.3. Interactions of hierarchical, critical and geographical gradients

So far we have found strong evidence for the bureaucrat discount in Table 3, and we have also established strong evidence for the hierarchical and critical gradients of power in Table 4, as well as the geographical gradient of power in Table 5. In Tables 6 and 7, we investigate the interactions between the hierarchical, critical and geographical dimensions of power and see how the effects of jurisdictional boundaries on rents of government power differ by agencies and ranks.

Table 6 focuses on the interactions of the geographical and critical dimensions of bureaucrats' power. Column 1 shows that, even after controlling for whether the house purchase is in other cities in the home province, or whether it is outside of the home province, bureaucrats in critical agencies receive a 2.52% price discount while those from non-critical agencies receive a 0.99% price discount. This confirms the finding in Table 4 where we did not control for whether the house purchase was in other cities in the home province or outside of home province.

The more interesting finding emerges in Columns 2–4. It shows that if bureaucrats purchase houses outside of their resident city but still within their home province, the value of their power decreases, but the magnitude of the decrease in the price discount depends on the criticality of the bureaucrat's government agency. For bureaucrats from critical agencies, if they purchase houses outside their resident city in their home province, the decrease in the price discounts they receive (or the value of their power) is marginally statistically significant or insignificant. This suggests that they enjoy almost the same amount of price discounts even when they move out of their home jurisdictions. In contrast, when bureaucrats in non-critical agencies make purchases outside their resident city, either within or across provinces, the price discounts they receive are reduced significantly by 0.89–1.06 percentage points, and the declines are statistically significant. Although bureaucrats in non-critical agencies still receive some amount of price discounts even when they go beyond their own cities to buy houses, just as bureaucrats from critical agencies do, the difference between these two sets of bureaucrats is quite remarkable. Column 4 puts all the interactions terms together, and results remain quantitatively the same. This robust and interesting finding highlights the differential market value of power derived from different government agencies, not only along the critical dimension but also in its interaction with jurisdictional boundaries.

Table 7 examines the interaction between the hierarchical and geographical dimensions of power. Column 1 shows that bureaucrats with *Ke* (section chief) or higher ranks receive a 1.42% discount, while those with lower ranks receive a 1.05% discount, relative to non-bureaucrat buyers. However, Column 2 shows that both see their discounts decline substantially when they purchase in other cities in their home province.

²³ This rule is especially accurate for bureaucrats since they usually live in the city where their government agencies are located.

Table 6
Interactions of geographical and critical dimensions of powers: critical vs. non-critical agencies.

	Dependent variable: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in critical agencies	−0.0252*** (0.0049)	−0.0273*** (0.0059)	−0.0254*** (0.0049)	−0.0276*** (0.0060)
Bureaucrats in non-critical agencies	−0.0099*** (0.0014)	−0.0116*** (0.0016)	−0.0101*** (0.0014)	−0.0118*** (0.0016)
Bureaucrats in critical agencies * buying in other cities in home province		0.0101* (0.0059)		0.0104* (0.0060)
Bureaucrats in non-critical agencies * buying in other provinces			0.0148 (0.0290)	0.0170 (0.0292)
Bureaucrats in non-critical agencies * buying in other cities in home province		0.0089*** (0.0024)		0.0091*** (0.0024)
Bureaucrats in non-critical agencies * buying in other provinces			0.0089* (0.0053)	0.0106** (0.0054)
Buying in other cities in home province	0.0075** (0.0037)	0.0064* (0.0037)	0.0075** (0.0037)	0.0064* (0.0037)
Buying in other provinces	0.0172*** (0.0037)	0.0172*** (0.0037)	0.0167*** (0.0037)	0.0165*** (0.0037)
Observations	1,005,960	1,005,960	1,005,960	1,005,960
R-sq.	0.913	0.913	0.913	0.913

Note: All regressions have same controls as in Column 4 of Table 3. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 7
Interactions of geographical and hierarchical dimensions of powers: high vs. low rank bureaucrats.

	Dependent variable: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in low rank	−0.0105*** (0.0013)	−0.0121*** (0.0016)	−0.0107*** (0.0013)	−0.0123*** (0.0016)
Bureaucrats in high rank	−0.0142** (0.0071)	−0.0199* (0.0103)	−0.0148** (0.0071)	−0.0210** (0.0103)
Bureaucrats in low rank * buying in other cities of the same province		0.0084*** (0.0024)		0.0086*** (0.0024)
Bureaucrats in low rank * buying in other provinces			0.0088 (0.0056)	0.0104* (0.0056)
Bureaucrats in high rank * buying in other cities of the same province		0.0179* (0.0109)		0.0189* (0.0110)
Bureaucrats in high rank * buying in other provinces			0.0174 (0.0287)	0.0235 (0.0288)
Buying in other cities of the same province	0.0074** (0.0037)	0.0064* (0.0037)	0.0075** (0.0037)	0.0064* (0.0037)
Buying in other provinces	0.0172*** (0.0037)	0.0172*** (0.0037)	0.0167*** (0.0037)	0.0165*** (0.0037)
Observations	1,005,960	1,005,960	1,005,960	1,005,960
R-sq.	0.913	0.913	0.913	0.913

Note: All regressions have same controls as in Column 4 of Table 3. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Bureaucrats with high ranks receive a 1.99% discount in their resident cities, but the discount declines by 1.79 percentage points when they purchase in other cities in their home province. Conversely, bureaucrats with lower ranks enjoy a smaller discount in their resident cities, but surprisingly, their discount declines less than the higher-ranked bureaucrats when they purchase in other cities in their home province. Similar results hold in Column 4 when we introduce the interactions between the rank of the bureaucrats and the indicators for whether the transaction is in other cities in the home province, or in other provinces. This empirical result again suggests the localized nature of the market value of power, as highlighted by the results in Tables 5 and 6: even if high ranks pay off in the housing market in terms of receiving larger price discounts, these benefits decline quickly when moving outside of the bureaucrats' jurisdiction of power.²⁴

²⁴ A similar analysis can be done for bureaucrats from provincial governments buying houses elsewhere. However, the number of bureaucrats at the provincial governments buying houses in other cities either within or across provinces is too small (<100 in each case) to have enough statistical power to do the regression analysis.

5.4. Robustness checks: different sample section criterion

In the previous analysis, the analyses were conducted on a sample of housing transactions involving apartment complexes only if each complex has at least 5 transactions. We now show that our qualitative results are completely robust to an alternative threshold number of at least 10 transactions for the complex to be included in our analysis sample. Of course, the sample size is now slightly smaller (965,996 instead of 1,005,960). The regression results are reported in Panel "Sub-sample I" in Table 8A. These regressions have the same set of controls as in Column 4 of Table 3. The main results, reported in Column 2, are quantitatively similar to our previous findings. Bureaucrats receive a 1.29% price discount relative to non-bureaucrat buyers in their resident city, but such discounts decrease by 0.93 percentage points when they purchase in other cities in the home province and by 1.05 percentage points when they buy in other provinces.²⁵

²⁵ These results still hold if we increase the threshold number of transactions in each complex into 20. The details are available upon request.

Table 8A
Robustness checks.

	Dependent variable: ln(price)			
	Sub-sample I Number of transactions ≥ 10 for each complex		Sub-sample II At least one bureaucrat-buyer observed in each complex	
	(1)	(2)	(3)	(4)
Bureaucrats	−0.0109*** (0.0014)	−0.0129*** (0.0017)	−0.0135*** (0.0018)	−0.0176*** (0.0024)
Buying in other cities of the same province	0.0077** (0.0038)	0.0066* (0.0038)	0.0076** (0.0036)	0.0060* (0.0037)
Buying in other provinces	0.0174*** (0.0038)	0.0167*** (0.0038)	0.0168*** (0.0036)	0.0157*** (0.0036)
Bureaucrats * buying in other cities of the same province		0.0093*** (0.0025)		0.0138*** (0.0030)
Bureaucrats * buying in other provinces		0.0105* (0.0055)		0.0160*** (0.0055)
Observations	964,996	964,996	647,649	647,649
R-sq	0.911	0.911	0.901	0.901

Note: All regressions have same controls as in Column 4 of Table 3. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 8B
Robustness checks.

	Dependent variable: ln(price)			
	Sub-sample III At least one buyer from other cities in the same province in each complex		Sub-sample IV Sub-sample II ∩ Sub-sample III	
	(1)	(2)	(3)	(4)
Bureaucrats	−0.0108*** (0.0014)	−0.0127*** (0.0017)	−0.0137*** (0.0018)	−0.0177*** (0.0024)
Bureaucrats * buying in other cities of the same province	0.0078* (0.0040)	0.0066 (0.0040)	0.0080** (0.0040)	0.0063 (0.0040)
Bureaucrats * buying in other provinces	0.0206*** (0.0041)	0.0198*** (0.0041)	0.0204*** (0.0040)	0.0193*** (0.0028)
Buying in other cities of the same province		0.0090*** (0.0025)		0.0137*** (0.0030)
Buying in other provinces		0.0091** (0.0053)		0.0138** (0.0055)
Observations	805,640	805,640	587,191	587,191
R-sq	0.906	0.906	0.896	0.896

Note: Sub-sample IV include observations only if, in each complex, at least one buyer from other cities in the same province and at least one bureaucrat-buyer. All regressions have same controls as in Column 4 of Table 3. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

In order to facilitate the comparisons of prices paid by bureaucrat buyers and non-bureaucrat buyers in the same apartment complex, we can also limit our sample to include only transactions involving apartment complexes with at least one bureaucrat-buyer transaction. The size of this sub-sample is now reduced to 647,649, and the results on this new subsample (Sub-sample II) are reported in Panel “Sub-sample II” in Table 8A. The key results are the same as before.

We can also restrict our sample to two different cases: in Sub-sample III, we include only transactions in apartment complexes with at least one transaction involving a buyer from other cities in the same province; and in Sub-sample IV, we include transactions in apartment complexes with at least one transaction involving a buyer from other cities in the same province and at least one bureaucrat-buyer. The regression results for these two cases are reported in Panel “Sub-sample III” and Panel “Sub-sample IV” respectively in Table 8B. Again, our main results are robust to these restrictions on the data.

6. Alternative explanations

We interpret the price discounts received by bureaucrats as evidence of the market value of bureaucratic power. In this section, we discuss several alternative explanations.

6.1. Non-representative data

The dataset we use comes from a large commercial bank, and we argued that our data should be representative of all the mortgage loans in China. However, one may be concerned that it may not be representative of all buyers in the housing market because it does not include individuals who buy homes entirely using cash. First of all, in the new apartment market, the majority of buyers are likely to use mortgages because the Chinese government offers discounted mortgage interest rates to home buyers.²⁶ While we do not have data to evaluate the characteristics of cash buyers, it is reasonable to assume that they include two types: first, they are extremely wealthy, for example, some private entrepreneurs and top CEOs; and second, they would like to hide some aspects of the housing transaction. The first group is small, and they are likely buying mansions that we do not include in our analysis (see Section 4 for a description of our sample selection). The second group, however, would typically include government officials who probably have obtained much larger price discounts than the typical bureaucrats that we are studying in this paper. If the discounts are unusually large, the bureaucrat buyer may find it important to at least partially conceal

²⁶ The People’s Bank of China issues a baseline interest rate for borrowing from the banks, and the mortgage interest rate is typically 80% of the baseline rate.

the paper trail by paying for the transaction in cash. Typical non-bureaucrat buyers do not have such incentives. Thus, to the extent that the mortgage transactions in our dataset are not representative of all housing transactions because they do not include all-cash transactions, we believe that it would bias our estimate of the value of power downward.

The second concern is that a bureaucrat may use his/her spouse or adult child as the nominal borrower of the mortgage in an attempt to conceal transactions that may be suspected of corruption. This is indeed a possibility as many anti-corruption investigations have revealed that it is common for government officials to own properties in the names of their family members. To the extent that such a phenomenon occurs in the housing market, our estimate of the market value of power would again be biased downward because we would be categorizing some bureaucrat buyers who receive discounts as non-bureaucrat buyers in our analysis.

The third concern is that the housing prices recorded in the mortgage could be deflated so that the buyers and sellers can both reduce their property transaction tax bills (which is 1% of the sales price each for the buyer and the seller). Anecdotally this seems to be common among *secondary* market housing transactions; but this does not appear to be common in new apartment sales. In new apartment sales, the seller is a real estate developer who is under an elevated level of scrutiny not to mis-report the housing transaction prices to the bank. This is the reason that we are only using data for mortgages involving new apartment sales in our analysis.

6.2. Price discounts as price discrimination irrelevant to rent-seeking

Price discounts for some type of customers are very commonly observed in markets as a form of price discrimination. For instance, faculty members affiliated with a university typically enjoy some discount in a campus coffee shop. Can the price discounts for Chinese bureaucrats in the housing markets be justified by price-discrimination irrelevant to rent-seeking?

There are two scenarios where the price discounts for bureaucrats can be explained by price-discrimination irrelevant to rent-seeking. The first case is like the discount in the coffee shop granted to the university professors.²⁷ University professors receive price discounts in a coffee shop either because they are regular visitors and price discounts can build customer loyalty, or because they may bring more customers (e.g., their students or colleagues) in future. The first reason for faculty's price discounts in the coffee shop does not hold in our case since buying homes is not a frequently repeated activity even for most bureaucrats. The second reason points to an anchoring effect of university faculty. Government officials may also bring additional benefits to the housing complex (better roads or amenities near the complex for instance). As will be discussed in details in Section 6.5, our data do not support the anchoring effect hypothesis.

The second scenario is that bureaucrat's salaries may understate their true income for legitimate reasons (more in-kind benefits and greater job security), and these characteristics may justify favorable loan conditions (including price discounts) granted to bureaucrats. This alternative hypothesis is very unlikely to hold in China's context. In a typical housing transaction involving mortgage lending, the housing price-setting and mortgage lending decisions are two separate procedures. The buyer will first negotiate the price of the apartment with the real estate developer. After the price is set, the buyer will then approach the bank and apply for the mortgage loans. The bank certifies the buyer's qualification (e.g., monthly income) for mortgage lending and determines the loan conditions (e.g., the minimum down payment and loan maturity) offered to buyers. From the viewpoint of the real

estate developer, as long as the bank agrees to make mortgage loans to buyers, it will receive the *full upfront* payment from the bank regardless of the loan conditions. Therefore there is no reason for the real estate developer to offer the buyer price discounts just because he/she has a higher potential income or has a more stable income. Actually our baseline results in Table 3 show that a higher monthly income implies a higher housing price, other things being equal. Furthermore, if we follow the logic of this alternative hypothesis, then bureaucrats working in different agencies of the same city government but not engaged in rent seeking should have similar in-kind benefits or job security, and thus be treated equally by the real estate developers. But our results on the gradient of power in Table 4 reveal that the bureaucrats in critical agencies closely related to the housing regulations enjoy much higher price discounts than those in non-critical agencies, and that those bureaucrats with low rank but working in critical agencies receive more price discounts than those with high rank but in non-critical agencies. This evidence is more in line with a story of rent-seeking than with an alternative story of price discrimination irrelevant to rent-seeking.

6.3. Selection on unobservable housing characteristics

One may be concerned that the price discounts we found for bureaucrat buyers may occur because bureaucrats are buying houses that systematically have less desirable characteristics that are not captured by our controls. In other words, the concern is that the bureaucrat price discount is not reflecting the market value of power, rather it is a discount for undesirable housing characteristics unobserved to us but observed by the seller and buyers.

While no one can possibly control for all possible characteristics of the house or complex that a buyer may value, we believe this concern is unlikely to be the driver for our main findings. In the regressions in which we measure the price and gradient of government power, we control for the housing characteristics listed in Column 4 of Table 3, which includes area (log), area squared, and a set of fixed effects of complex, purchasing time (month), building number, floor level, and last digit of room number. It is important to emphasize that different apartment units in a given complex in China are often largely homogenous (see Fig. 3 in Fang et al. (2014) for a typical depiction of buildings and apartment units in a development complex in China). After controlling for all of these characteristics, what could still be potentially different among apartments is likely to be indoor structures, decorations, or floor plans. On these dimensions (unobserved to us), if anything we would expect that the bureaucrats are more likely to receive favorable treatment. Also, recall from Table 2 that bureaucrats in general are more likely to purchase large apartments and in more expensive complexes. Therefore, their purchases are likely to also be more desirable along such unobservable dimensions. Thus, to the extent that there are unobservable housing characteristics that are not controlled for in our analysis, our estimate of the value of power is likely to be biased downward.

6.4. Information advantage

A fourth alternative explanation for the price discounts bureaucrat buyers receive in the housing market is that it derives from the bureaucrats possessing more information about the housing price distributions, instead of rents from government power.

We now present a series of regressions to assess whether the information advantage of bureaucrats may be responsible for the price discounts they enjoy in the housing market. First, the Chinese housing market has experienced tremendous price increases since 2003, and the year-to-year price growth was over 20% year in some cities (see Fang et al., 2015). If bureaucrats' information advantage is driving the price discounts we documented earlier, we would expect that they would also more likely to be among the early buyers in any apartment

²⁷ University professors living in big and expensive cities, such as New York and San Francisco, also receive housing allowances from their employers. These are different from the housing price discounts received by the bureaucrat buyers from the developers, not their employers.

complex. To empirically assess this, we exploit the fact that in China, many of the apartment complexes have multiple buildings and they often go on the market sequentially. We thus select apartment complexes for which the sales period lasted at least 12 months in our sample, and contained at least 5 transactions in the first three months and at least 5 transactions from the fourth month on. We are left with 380,255 transactions using the above selection criterion. For each of the transactions in this selected sample, we can then define an indicator variable for whether the transaction occurred within the first 3 months after the apartment complex went on sale.

In Tables 9A–9D, we report the linear probability regression results examining whether bureaucrat buyers are more likely to be among the early buyers (first 3 months) of apartment complexes. Table 9A reports the results for bureaucrats as a whole. Column 1 shows that bureaucrats are not more likely to be early buyers than non-bureaucrats. This finding also holds when we distinguish transactions in the resident city from those in other cities of the home province and those in other provinces (Column 2); and it also holds when we add the price growth of the apartment complex (Column 3).

In Table 9B, we distinguish bureaucrats according to whether they work in critical government agencies. If information advantage is the reason for the observed price discounts that bureaucrats receive, we would expect that those working in critical government agencies should more likely to be among the early buyers due to their proximate knowledge of when the complex would go on sale. We do not find any such evidence; in fact, if anything, we find that bureaucrats in critical agencies are less likely to be among early buyers. In Table 9C, we distinguish bureaucrats according to their rank. Again we do not find any evidence that the bureaucrats with high ranks are more likely to be early buyers.

Another angle from which we can assess a posited information advantage mechanism is to examine whether bureaucrats receive higher “price discounts” in cities with a larger dispersion of housing prices. For this purpose, we create a variable “City Price Dispersion” measured by the ratio of the 80th percentile and 20th percentile of the per square meter prices in the housing prices each month, by city. If information advantage is driving the bureaucrat price discounts, we expect that they would enjoy higher discounts in cities with higher price

dispersion.²⁸ Table 10 presents the results from these regressions. In Column 1, we find that bureaucrats in general actually receive lower discounts in cities with larger price dispersion. The same holds when we distinguish bureaucrats by the criticality of their government agencies (in Column 2), by their rank (Column 3) and by whether they are provincial level or lower level bureaucrats (Column 4). These results suggest that information advantage is unlikely to be the driving force for the observed bureaucrat price discounts.

Yet another possible alternative explanation is that bureaucrats may have lower search costs, which allows them to obtain better deals by searching more. While we do not have direct evidence to rule out the possibility that bureaucrats as a whole have lower search costs than non-bureaucrat buyers, it is unlikely that this could be the only explanation for our findings. Recall that those bureaucrats with higher ranks, and in critical agencies are found to be receiving larger price discounts; common sense suggests that it is unlikely that the bureaucrats with higher ranks and in critical agencies have lower search costs than other bureaucrats. In addition, if lower search costs were driving the “price discounts” of the bureaucrats, then we would again expect the “price discounts” to be larger in cities with higher price dispersions. Results in Table 10 is inconsistent with this prediction.

6.5. Discounts to bureaucrats as “anchor” residents?

A fifth alternative explanation for the price discounts bureaucrat buyers receive is that they can play the role of “anchor” residents for developers and attract more buyers into a given apartment complex. If so, the developers may be willing to give bureaucrat buyers a price discount to compensate for their bringing additional buyers. The idea is akin to anchor stores receiving rent discounts from shopping mall developers (Pashigian and Gould, 1998; Gould et al., 2005). For example, maybe the developer can expect that amenities near the apartment complex are more likely improved by public infrastructure investments if there are more bureaucrat residents in the apartment complex (see, e.g., Zheng and Kahn, 2013). However, there is a crucial difference between anchor stores in shopping malls and bureaucrat residents. Anchor stores receive rent discounts from developers for their generating traffic to the shopping mall, which has important positive externalities on other tenants of the shopping mall. In contrast, there is no plausible channel through which bureaucrat residents could generate benefits to the developers or other residents other than those related to the power they may have as government officials.

We examine this hypothesis using several methods. First, if bureaucrat buyers receive price discounts because they serve as “anchor” residents for the developer to attract other buyers, we would expect that bureaucrat buyers are more likely to be among the earlier purchasers of the units in an apartment complex. However, as we have documented in Tables 9A–9D, this is not the case.

Second, if bureaucrat buyers are receiving price discounts because they are more likely to bring infrastructure investments to the neighborhood, which can increase the prices of future apartments in the same complex, then we would expect to see that the fraction of bureaucrat buyers in the first offering of a multi-offering apartment complex is positively related to the price appreciation of the later offerings. In Table 11, we examine this hypothesis. Focusing on the developments with multiple offering in our dataset leaves us with a total of 1230 multi-offering apartment complexes. For each offering, we construct the average per square meter price of the apartment units. The dependent variable in the regressions reported in Table 11 is the log of the price ratio between the average price of a latter offering (n -th offering, where $n \geq 2$) and the average price of the first offering, and the independent variables include the fraction of bureaucrat buyers in first offering

Table 9A
The information advantage of bureaucrats: general.

	Dependent variable: Whether to buy in the first 3 months		
	(1)	(2)	(3)
Bureaucrats	0.0029 (0.0028)	0.0018 (0.0032)	−0.0082 (0.0739)
Buying in other cities in the same province	−0.0268*** (0.0069)	−0.0276*** (0.0069)	−0.0192** (0.0085)
Buying in other provinces	−0.0259*** (0.0082)	−0.0258*** (0.0082)	−0.0047 (0.0145)
Bureaucrats * buying in other cities in the same province		0.0066 (0.0065)	0.0025 (0.0109)
Bureaucrats * buying in other provinces		−0.0016 (0.0159)	0.0527 (0.0553)
Complex price growth			0.0995*** (0.0347)
Bureaucrats * complex price growth			0.0200 (0.0346)
Complex location	Y	Y	N
Purchasing time (month)	Y	Y	Y
Building	Y	Y	Y
Floor level	Y	Y	Y
Last digit of room no.	Y	Y	Y
Residence province	Y	Y	Y
Observations	380,255	380,255	380,255
R-sq	0.416	0.416	0.137

Note: All regressions have controlled for female, marital status, income, education, age, age squared, size (log), size (log) squared, loan to value ratio, and maturity. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

²⁸ The argument is similar to Fang et al. (2008) in their assessment of whether individuals with higher cognitive skills are more likely to buy Medigap insurance because they have lower search costs.

Table 9B
The information advantage of bureaucrats: critical vs. non-critical agencies.

	Dependent variable: Whether to buy in the first 3 months		
	(1)	(2)	(3)
Bureaucrats in critical agencies	−0.0198*** (0.0095)	−0.0133 (0.0107)	−0.0683 (0.1229)
Bureaucrats in non-critical agencies	0.0041 (0.0028)	0.0026 (0.0032)	−0.0049 (0.0760)
Buying in other cities in the same province	−0.0268*** (0.0069)	−0.0276*** (0.0069)	−0.0192** (0.0085)
Buying in other provinces	−0.0259*** (0.0082)	−0.0258*** (0.0083)	−0.0047 (0.0145)
Bureaucrats in critical agencies * buying in other cities in the same province		−0.0313 (0.0251)	−0.0252 (0.0280)
Bureaucrats in non-critical agencies * buying in other cities in the same province		−0.0380 (0.0779)	0.0041 (0.1110)
Bureaucrats in critical agencies * buying in other provinces		0.0088 (0.0066)	0.0280 (0.0856)
Bureaucrats in non-critical agencies * buying in other provinces		−0.0005 (0.0164)	0.0531 (0.0569)
Complex price growth			0.0995*** (0.0347)
Bureaucrats in critical agencies * complex price growth			0.0608 (0.1170)
Bureaucrats in non-critical agencies * complex price growth			0.0177 (0.0748)
Complex location	Y	Y	N
Purchasing time (month)	Y	Y	Y
Building	Y	Y	Y
Floor level	Y	Y	Y
Last digit of room no.	Y	Y	Y
Residence province	Y	Y	Y
Observations	380,255	380,255	380,255
R-sq	0.416	0.416	0.137

Note: All regressions have controlled for female, marital status, income, education, age, age squared, size (log), size (log) squared, loan to value ratio, and maturity. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 9C
The information advantage of bureaucrats: high vs. low rank.

	Dependent variable: Whether to buy in the first 3 months		
	(1)	(2)	(3)
Bureaucrats in high rank	−0.0251 (0.0237)	0.0180 (0.0223)	−0.6770* (0.3979)
Bureaucrats in low rank	0.0027 (0.0028)	0.0016 (0.0032)	−0.0175 (0.0746)
Buying in other cities in the same province	−0.0268*** (0.0069)	−0.0276*** (0.0069)	−0.0193** (0.0085)
Buying in other provinces	−0.0259*** (0.0082)	−0.0258*** (0.0083)	−0.0046 (0.0145)
Bureaucrats in high rank * buying in other cities in the same province		0.1239 (0.1385)	0.1873 (0.1509)
Bureaucrats in low rank * buying in other cities in the same province		0.0066 (0.0065)	0.0037 (0.0109)
Bureaucrats in high rank * buying in other provinces		0.1047 (0.1402)	0.0238 (0.0158)
Bureaucrats in low rank * buying in other provinces		−0.0004 (0.0016)	0.0461 (0.0568)
Complex price growth			0.0995*** (0.0346)
Bureaucrats in high rank * complex price growth			0.8891** (0.3991)
Bureaucrats in low rank * complex price growth			0.0272 (0.0733)
Complex location	Y	Y	N
Purchasing time (month)	Y	Y	Y
Building	Y	Y	Y
Floor level	Y	Y	Y
Last digit of room no.	Y	Y	Y
Residence province	Y	Y	Y
Observations	380,255	380,255	380,255
R-sq	0.416	0.416	0.137

Note: All regressions have controlled for female, marital status, income, education, age, age squared, size (log), size (log) squared, loan to value ratio, and maturity. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 9D
The information advantage of bureaucrats: provincial vs. lower-level government.

	Dependent variable: Whether to buy in the first 3 months		
	(1)	(2)	(3)
Bureaucrats in provincial govt.	−0.0230 (0.0205)	−0.0135 (0.0223)	−0.1980 (0.2091)
Bureaucrats in low-level govt.	0.0033 (0.0028)	0.0020 (0.0032)	−0.0062 (0.0740)
Buying in other cities in the same province	−0.0269*** (0.0069)	−0.0276*** (0.0069)	−0.0192** (0.0085)
Buying in other provinces	−0.0259*** (0.0082)	−0.0258*** (0.0083)	−0.0048 (0.0145)
Bureaucrats in prov. govt. * buying in other cities in the same province		−0.0430 (0.0600)	0.0234 (0.0587)
Bureaucrats in lower-level govt. * buying in other cities in the same province		0.0069 (0.0065)	0.0020 (0.0109)
Bureaucrats in prov. govt. * buying in other provinces		−0.0997 (0.0811)	−0.1073 (0.0638)
Bureaucrats in lower-level govt. * buying in other provinces		0.0023 (0.0016)	0.0586 (0.0564)
Complex price growth			0.0995*** (0.0346)
Bureaucrats in prov. govt. * complex price growth			0.1500 (0.1973)
Bureaucrats in lower-level govt. * complex price growth			0.0188 (0.0728)
Complex location	Y	Y	N
Purchasing time (month)	Y	Y	Y
Building	Y	Y	Y
Floor level	Y	Y	Y
Last digit of room no.	Y	Y	Y
Residence province	Y	Y	Y
Observations	380,255	380,255	380,255
R-sq	0.416	0.416	0.137

Note: All regressions have controlled for female, marital status, income, education, age, age squared, size (log), size (log) squared, loan to value ratio, and maturity. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 10
The information advantage of bureaucrats: price dispersion.

	Dependent variable: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	−0.0367*** (0.0079)			
Bureaucrats in critical agencies		−0.0356* (0.0192)		
Bureaucrats in non-critical agencies		−0.0365*** (0.0079)		
Bureaucrats in high rank			0.0468 (0.0534)	
Bureaucrats in low rank			−0.0419*** (0.0073)	
Bureaucrats in provincial government				−0.2599** (0.1033)
Bureaucrats in lower-level government				−0.0352*** (0.0079)
Bureaucrats * city dispersion	0.0129*** (0.0037)			
Bureaucrats in critical agencies * city dispersion		0.0052 (0.0098)		
Bureaucrats in non-critical agencies * city dispersion		0.0131*** (0.0037)		
Bureaucrats in high rank * city dispersion			−0.0297 (0.0030)	
Bureaucrats in low rank * city dispersion			0.0154*** (0.0033)	
Bureaucrats in provincial government * city dispersion				0.0947*** (0.0353)
Bureaucrats in lower-level government * city dispersion				0.0123*** (0.0037)
Observations	1,005,960	1,005,960	1,005,960	1,005,960
R-sq.	0.913	0.913	0.913	0.913

Note: All regressions have same controls as in Column 4 of Table 3. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 11
Price appreciation of later units and the fraction of bureaucrat buyers in the initial offering.

	Dependent variable: Ln (Average Price in the Nth Offering/Average Price in the 1st Offering)			
	(1)	(2)	(3)	(4)
Fraction bureaucrats in 1st offering	−0.154 (0.127)			
Fraction bureaucrats from critical agencies in 1st offering		0.377 (0.442)		
Fraction bureaucrats with high ranks in 1st offering			0.001 (0.325)	
Fraction bureaucrats from provincial government in 1st offering				−0.952 (2.880)
Obs.	1230	1230	1230	1230
R-sq	0.357	0.355	0.355	0.355

Notes: An observation is a development project with multiple offerings. Regressions also include dummies for city, offering time and the numerical order of the offering. The Robust standard errors are clustered at the city level.

of the apartment complex (Column 1), the fraction of bureaucrat buyers from critical government agencies in the first offering (Column 2), the fraction of high-rank bureaucrat buyers in the first offering (Column 3) and the fraction of bureaucrat buyers from provincial government in the first offering (Column 4). All regressions include dummies for city, offering time, and the numerical order of the offering. Table 11 shows that none of coefficients for the fractions of bureaucrats are statistically significant. We should emphasize that this finding does not imply that bureaucrats do not provide any quid pro quo for the price discounts they receive in their purchase of the apartment units; rather, it suggests that such quid pro quo probably occurred before, not after, the bureaucrats received their price discounts.

6.6. Price discounts for group buyers

As previously mentioned, our sample excludes those purchases when the complex was purchased by certain work unit (including government bureaus) as a group, and as a result its employees obtain group price discounts from the real estate developers. But this sample still contains some group buyers who banded together privately but not in the name of their work units. They may still enjoy some group discounts, and if bureaucrats are somehow more likely to band together, our results on the market value of power may be driven simply by the group discounts received by bureaucrats. In order to tease out the effect of group discounts from the effect of government power, we define group buyers as those buyers from the same work unit in the same city who show up in the same complex when the number of the group buyers is no <10 (the cutoff of the group size can vary, as

shown below). Following this definition, we can identify a total of 327 buyer groups (with 8552 observations), including 63 groups of bureaucrat buyers (with 1957 observations).

To see how the presence of group buyers affects our estimation, we rerun the baseline regression in Table 3 with the inclusion of two dummy variables: group bureaucrat buyers and group non-bureaucrat buyers. We alternate the cutoff of the group size from 10, 15, to 20. The results are reported in Table 12. As we can see, group buyers, both for bureaucrats and non-bureaucrats, do enjoy significant discounts of around 5–8 percentage points depending on the group size, but including the group buyers does no change our estimated coefficient on bureaucrats in any noticeable way.

6.7. Access to the purchase of apartment units as bribes?

A common reaction to our finding that bureaucrat buyers on average receive about a 1.05% price discount relative to non-bureaucrat buyers for identical apartment units is that the bureaucrat price discount is surprisingly low. We would like to point out that our estimate of the bureaucrat price discount for apartment purchase is, to the best of our knowledge, the first systematic estimate based on a large data set. Anecdotal evidence from the widely-publicized anti-corruption cases tends to include only those outrageous price discounts received by government officials, if they did not obtain the apartments completely free of charge, but such cases are not representative. However, due to the issues we pointed out in Section 6.1, we do agree that our estimate of the market value of power tends to be downward biased.

Table 12
The impacts of group buyers on price discounts.

Group buyer size	Dependent variable: ln(price)		
	Cutoff = 10	Cutoff = 15	Cutoff = 20
	(1)	(2)	(3)
Bureaucrats (B)	−0.0105*** (0.0014)	−0.0103*** (0.0013)	−0.0104*** (0.0013)
Group bureaucrat buyers	−0.0591* (0.0316)	−0.0704* (0.0401)	−0.0630* (0.0371)
Group non-bureaucrat buyers	−0.0555*** (0.0117)	−0.0685*** (0.0166)	−0.0780*** (0.0204)
Other personal and loan characteristics	Y	Y	Y
Complex fixed effects	Y	Y	Y
Purchasing time (month)	Y	Y	Y
Floor dummy	Y	Y	Y
Room no. dummy	Y	Y	Y
Residence province	Y	Y	Y
Observations	1,005,960	1,005,960	1,005,960
R-sq.	0.913	0.913	0.913

Note: Other personal and loan characteristics include gender, marital status, college education, age, age squared, monthly income (log), loan maturity (log), and loan to value ratio. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 13A
Access to the purchase of apartment units as bribes?
Bureaucrats vs. non-bureaucrats.

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats	−0.0105*** (0.0015)	−0.0133 (0.0098)	−0.0105*** (0.0015)	−0.0149* (0.0087)	−0.0100*** (0.0015)	−0.0110 (0.0077)
Price growth in 6 months	−0.014* (0.008)	−0.014* (0.008)				
Price growth in 12 months			0.001 (0.007)	0.003*** (0.007)		
Price growth in 24 months					0.158*** (0.0108)	0.159*** (0.0118)
Bureaucrats * price growth in 6 months		0.0027 (0.0089)				
Bureaucrats * price growth in 12 months				0.0040 (0.0075)		
Bureaucrats * price growth in 24 months						0.0008 (0.0061)
Observations	794,271	794,271	794,271	794,271	794,271	794,271
R-sq	0.916	0.916	0.917	0.917	0.918	0.918

Note: All regressions have same controls as in Column 4 of Table 3. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 13B
Access to the purchase of apartment units as bribes?
Critical vs. non-critical agencies.

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats in critical agencies	−0.0239*** (0.0057)	−0.0405 (0.0321)	−0.0239*** (0.0057)	−0.0529 (0.0384)	−0.0238*** (0.0057)	−0.0512* (0.0280)
Bureaucrats in non-critical agencies	−0.0098*** (0.0015)	−0.0120 (0.0100)	−0.0098*** (0.0015)	−0.0130 (0.0086)	−0.0093*** (0.0015)	−0.0090 (0.0078)
Price growth in 6 months	−0.0137* (0.0080)	−0.0137*** (0.0080)				
Price growth in 12 months			0.0006 (0.0074)	0.0003 (0.0074)		
Price growth in 24 months					0.1579*** (0.0108)	0.1579*** (0.0108)
Bureaucrats in critical agencies * price growth in 6 months		0.0156 (0.0312)				
Bureaucrats in non-critical agencies * price growth in 6 months		0.0021 (0.0091)				
Bureaucrats in critical agencies * price growth in 12 months				0.0264 (0.0322)		
Bureaucrats in non-critical agencies * price growth in 12 months				0.0029 (0.0076)		
Bureaucrats in critical agencies * price growth in 24 months						0.0224 (0.0214)
Bureaucrats in non-critical agencies * price growth in 24 months						−0.0002 (0.0062)
Observations	794,271	794,271	794,271	794,271	794,271	794,271
R-sq	0.916	0.916	0.917	0.917	0.918	0.918

Note: All regressions have same controls as in Column 4 of Table 3. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

One may argue that in a booming housing market like China where apartment prices have increased up to ten-fold in some cities, a more important channel to bribe the government officials is not so much through the price discounts, but rather through granting the access to apartment units. According to this hypothesis, in cities with large housing price appreciations, access to apartment units is more valuable than that in cities with small price appreciations. As a result, we should expect that the outright price discounts to bureaucrat buyers will be smaller in cities with larger price appreciations. In Tables 13A–13D, we report regression results that aim to test this hypothesis. The specifications of these regressions are same as those reported in Tables 3–7, except that we now include the price appreciations at the city level in 6 months, 12 months

and 24 months following the transaction, and their interactions with the bureaucrat dummies of the buyer.²⁹ In Table 13A where we only distinguish bureaucrat buyers from non-bureaucrat buyers, we do find that the bureaucrat price discount is lower in cities with large subsequent price appreciation, but the effect is not statistically significant. The same is true in Table 13B where we distinguish bureaucrat buyers by whether they work in government agencies critical or non-critical to real estate

²⁹ The sample size in the regressions reported in Tables 13A–13D is somewhat smaller than those in Tables 3–7 because we can only include transactions in cities with sufficient number of transactions in each month that would allow us to construct reliable estimates of city-specific house price indices.

Table 13C

Access to the purchase of apartment units as bribes?
High vs. low rank.

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats in high rank	−0.0187 (0.0141)	0.0953* (0.0537)	−0.0188 (0.0141)	0.1776** (0.0849)	−0.0186 (0.0140)	−0.0981 (0.0834)
Bureaucrats in low rank	−0.0102*** (0.0014)	−0.0138 (0.0097)	−0.0102*** (0.0014)	−0.0163* (0.0088)	−0.0096*** (0.0014)	−0.0095 (0.0097)
Price growth in 6 months	−0.0135* (0.0079)	−0.0137* (0.0079)				
Price growth in 12 months			0.0006 (0.0074)	0.0003 (0.0073)		
Price growth in 24 months					0.1579*** (0.0108)	0.1579*** (0.0108)
Bureaucrats in high rank * price growth in 6 months		−0.1136* (0.0600)				
Bureaucrats in low rank * price growth in 6 months		0.0034 (0.0090)				
Bureaucrats in high rank * price growth in 12 months				−0.1852** (0.0890)		
Bureaucrats in low rank * price growth in 12 months				0.0056 (0.0076)		
Bureaucrats in high rank * price growth in 24 months						0.0610 (0.0549)
Bureaucrats in low rank * price growth in 24 months						−0.0001 (0.0062)
Observations	794,271	794,271	794,271	794,271	794,271	794,271
R-sq	0.916	0.916	0.917	0.917	0.918	0.918

Note: All regressions have same controls as in Column 4 of Table 3. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

development. In Table 13C, however, where we distinguish bureaucrat buyers by their rank, we find that higher rank bureaucrats tend to receive larger price discounts in cities with more subsequent price appreciation, contrary to the predictions from the hypothesis that access to purchase of apartment units can substitute for outright price discounts. In Table 13D where we distinguish bureaucrat buyers by whether they work in provincial governments, we do find some evidence consistent with the predictions from the hypothesis.

Table 13D

Access to the purchase of apartment units as bribes?
Provincial vs. lower-level government.

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats in provincial government	−0.0458* (0.0278)	−0.1079 (0.1355)	−0.0458* (0.0278)	−0.2380* (0.1378)	−0.0451 (0.0277)	−0.1411 (0.1038)
Bureaucrats in lower-level government	−0.0099*** (0.0014)	−0.0120 (0.0094)	−0.0099*** (0.0014)	−0.0100 (0.0079)	−0.0094*** (0.0014)	−0.0085 (0.0075)
Price growth in 6 months	−0.0135* (0.0079)	−0.0137* (0.0080)				
Price growth in 12 months			0.0006 (0.0074)	0.0004 (0.0074)		
Price growth in 24 months					0.1579*** (0.0108)	0.1578*** (0.0108)
Bureaucrats in provincial government * price growth in 6 months		0.0582 (0.0123)				
Bureaucrats in lower-level government * price growth in 6 months		0.0020 (0.0087)				
Bureaucrats in provincial government * price growth in 12 months				0.1757* (0.1066)		
Bureaucrats in lower-level government * price growth in 12 months				0.0001 (0.0069)		
Bureaucrats in provincial government * price growth in 24 months						0.0777 (0.0697)
Bureaucrats in lower-level government * price growth in 24 months						−0.0008 (0.0060)
Observations	794,271	794,271	794,271	794,271	794,271	794,271
R-sq	0.916	0.916	0.917	0.917	0.918	0.918

Note: All regressions have same controls as in Column 4 of Table 3. We report robust standard errors. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

7. Relationship with Entertainment and Travel Cost (ETC) measure of city-level corruption

So far we find that, on average, bureaucrats receive about 0.7 to 1.05% price discounts for identical apartments than non-bureaucrat buyers (Table 3), and bureaucrat buyers in critical agencies receive a 2.48% discount (Table 4). We interpret these price discounts received by bureaucrat buyers as evidence of the market value of power and a

Table 14
Price discounts of bureaucrats and firms' expenditure on ETC.

	Dependent variable: Coefficient on "Bureaucrats in critical agencies"			
	(1)	(2)	(3)	(4)
Average entertainment expenditures (log)	−0.038** (0.018)	−0.031* (0.017)		
Average meeting expenditures (log)			−0.042* (0.023)	−0.038* (0.023)
City GDP per capita (log)		−0.022 (0.020)		−0.018 (0.019)
Observations	99	99	99	99
R-sq	0.067	0.074	0.132	0.137

Note: The dependent variable is coefficient estimate for the dummy variable "Bureaucrats in critical agencies" in regression specification reported in Column 1 of Table 4, for each of the 99 cities in our sample. The results are robust to inclusion of additional city-level controls such as the fraction of city employment in financial sector, etc. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

measure of corruption. Because transactions from all the cities are used in the regressions reported in Tables 3–7, the bureaucrat price discounts estimated in these tables are bureaucrat discounts averaged over different cities. The large size of our sample actually permits us to estimate *city-specific bureaucrat price discounts* by running analogous regressions as in Tables 3–7 by city. To the extent that the price discounts received by bureaucrat buyers vary by city, they could be used as an alternative measure of city-level corruption and rent-seeking. This provides us with an opportunity to collaborate our measure of corruption and rent-seeking by bureaucrat price discount with an existing measure of city-level corruption by Entertainment and Travel Costs (ETC) as proposed in Cai et al. (2011).

Chinese firms regularly report expenditures on entertainment, travel costs and conferences in their accounting books. As detailed in Cai et al. (2011), Chinese managers often use these expenditure categories to reimburse money spent on bribing government officials and entertaining clients and suppliers, and so these expenditures can be used as a measure of corruption and rent-seeking in Chinese firms. The data on firms' expenditures on entertainment and conferences are drawn from the firm-level Investment Climate Survey conducted jointly by the World Bank and the Enterprises Survey Organization of the National Bureau of Statistics of China in 2005. This survey covered 12,400 firms located in 120 cities in all Chinese provinces except Tibet. It contains information on the firm-level expenditures on entertainment, travel costs, and conferences as well as the city level GDP per capita and other economic characteristics, such as the fraction of employees in the financial sector.³⁰

We calculate the average firm expenditures on entertainment, and on meetings for each city, and then merge these city-level average expenditures with the estimated coefficients for "bureaucrat in critical agencies" obtained from regressions run for each city with the same specification as in Column 1 of Table 4. Due to some missing values or small samples for certain cities in our housing data, we end up with a sample of 99 cities in the merged data.

Table 14 reports the cross-sectional OLS regression results on the correlation between city-specific price discounts of bureaucrats in critical agencies and log of the firms' average entertainment expenditures (Columns 1 and 2), and log of the firms' average meeting expenditures (Columns 3 and 4). Each regression in Table 14 is weighted by the variance of the estimated coefficient on the "bureaucrat in critical agency" dummy. The results reveal that indeed, the price discounts are deeper in cities where firms spend more on entertainment and meeting expenditures. The correlation between the price discounts to bureaucrats in critical agencies (negative) and the log of ETC expenditures range from −0.031 to −0.042 depending on specifications, and they are marginally significant at the 10% level. This provides further collaborative evidence for our interpretation of bureaucrat price discounts as a measure of corruption, rent-seeking, and favor trading.

8. Conclusion

The discretionary power of government often leads to rent-seeking and corruption, especially in developing and transition economies. How to quantify the magnitude of the rents from bureaucratic power has been a serious challenge for scholars due to the often secretive nature of rent-seeking and corruption. Using a large, unique dataset from China's housing market, we propose a novel approach to measure the rents of bureaucratic power using the difference in prices paid by bureaucrat buyers and non-bureaucrat buyers in the housing market. We find that the housing price paid by bureaucrat buyers is on average 1.05 percentage points lower than non-bureaucrat buyers, after controlling for a full set of characteristics of buyers, houses and mortgage loans.

More interestingly, we find that these price discounts exhibit interesting gradients with respect to bureaucrats' hierarchical rank, criticality of their government agencies to real estate developers, and geographical jurisdiction. Specifically, we find that bureaucrat buyers in critical agencies receive a 2.48% price discount, in contrast to a 0.97% price discount to bureaucrats in non-critical agencies; higher rank bureaucrats receive a 1.38% price discount in contrast to a 1.03% price discount for low rank bureaucrats; and bureaucrats from provincial governments receive a 3.9% price discount in contrast to a 1% price discount for bureaucrats from lower-level governments. Moreover, we find that the rent from the bureaucrats' power declines once they leave their resident city: if bureaucrats purchase apartments in other cities in their home province, the price discount is reduced by 0.9 percentage points relative to the price discounts they could obtain in their resident city (approximately 1.24%); and if they buy in other provinces, they essentially do not enjoy any price discounts. This suggests that the market value of government power is rather localized in China. Additionally, we find evidence that bureaucrats with low ranks but from agencies critical to real estate development may enjoy larger price discounts than those with high ranks but from non-critical agencies. This highlights the importance of distinguishing "real authority" from "formal authority" (Aghion and Tirole, 1997).

We argue that the bureaucrat price discounts and the gradients of these discounts are measures of the market value of government power in economies with weak institutions. To the best of our knowledge, this is one of the first to estimate the gradients of the power in the economics and political science literature (see also Deng et al., 2016, for a related study that evaluates the cumulative value of government power). We also evaluate and cast doubt on alternative mechanisms that may explain why bureaucrat buyers receive a lower price for identical housing units. Our study sheds new light on our understanding of rent-seeking activities and favor trading in the Chinese housing market as well as the functioning of power in the interplay between government and market when the rule of law is relatively weak.

Finally, our findings that bureaucrats receive rents from their power, and these rents exhibit interesting hierarchical, critical and geographical gradients, are applicable to bureaucracy in general, and are not

³⁰ See Cai et al. (2011) for more details about the survey data.

restricted to the China. Of course, the forms and the magnitudes in which bureaucrats extract their rents of power may differ across countries with different political systems and different legal institutions.

References

- Aghion, Philippe, Tirole, Jean, 1997. Formal and real authority in organizations. *J. Polit. Econ.* 105 (1), 1–29.
- Antonossava, Antonia, Bertrand, Marianne, Mullainathan, Sendhil, 2008. Misclassification in Targeted Programs: A Study of the Targeted Public Distribution System in Karnataka, India. mimeo. Harvard University.
- Aoki, Masahiko, 1988. Information, Incentives, and Bargaining in the Japanese Economy. Cambridge University Press, Cambridge.
- Banerjee, Abhijit, Hanna, Rema, Mullainathan, Sendhil, 2012. Corruption. In: Gibbons, R., Roberts, J. (Eds.), *Handbook of Organizational Economics*. Princeton University Press, Princeton, NJ.
- Bardhan, Pranab, 1997. Corruption and development: a review of issues. *J. Econ. Lit.* 35, 1320–1346.
- Cai, Hongbin, Fang, Hanming, Xu, Lixin C., 2011. Eat, drink, firms, and government: an investigation of corruption from entertainment and travel costs of Chinese firms. *J. Law Econ.* 54, 55–78.
- Cai, Hongbin, Vernon Henderson, J., Zhang, Qinghua, 2013. China's land market auctions: evidence of corruption? *RAND J. Econ.* 44 (3), 488–521.
- Deng, Yongheng, Wei, Shang-Jin, Wu, Jing, 2016. Estimating the Unofficial Income of Officials from Housing Purchases: The Case of China (Working Paper).
- Di Tella, Rafael, Schargrodsky, Ernesto, 2003. The role of wages and auditing during a crackdown on corruption in the City of Buenos Aires. *J. Law Econ.* 46, 269–300.
- Diermeier, Daniel, Keane, Michael, Merlo, Antonio, 2005. A political economy model of congressional careers. *Am. Econ. Rev.* 95 (1), 347–373.
- Eggers, Andrew C., Hainmueller, Jens, 2009. MPs for sale? Returns to office in postwar British politics. *Am. Polit. Sci. Rev.* 103 (4), 513–533.
- Faccio, Mara, 2006. Politically connected firms. *Am. Econ. Rev.* 96 (1), 369–386.
- Fang, Hanming, Keane, Michael P., Silverman, Dan, 2008. Sources of advantageous selection: evidence from the Medigap insurance market. *J. Polit. Econ.* 116 (2), 303–350.
- Fang, Hanming, Quanlin, Gu, Zhou, Li-An, 2014. The gradients of power: evidence from the Chinese housing market. NBER Work. Pap. Ser. 20317.
- Fang, Hanming, Gu, Quanlin, Xiong, Wei, Zhou, Li-An, 2015. Demystifying the Chinese housing boom. NBER Macro Annual 30, 105–166 (edited by Martin Eichenbaum and Jonathan Parker).
- Fisman, Raymond, 2001. Estimating the value of political connections. *Am. Econ. Rev.* 91, 1095–1102.
- Fisman, David, Fisman, Raymond, Galef, Julia, Khurana, Rakesh, Wang, Yongxiang, 2012. Estimating the value of connections to Vice-President Cheney. *B E J Econom. Anal. Policy* 13 (3), 1–20.
- Fisman, Raymond, Wei, Shang-Jin, 2004. Tax rates and tax evasion: imports in China. *J. Polit. Econ.* 112, 471–496.
- Gorodnichenko, Yuriy, Peter, Klara S., 2007. Public sector pay and corruption: measuring bribery from micro data. *J. Public Econ.* 91, 963–991.
- Gould, Eric D., Peter Pashigian, B., Prendergast, Canice, 2005. Contracts, externalities, and incentives in shopping malls. *Rev. Econ. Stat.* 87 (3), 411–422.
- Hsieh, Chang-Tai, Moretti, Enrico, 2006. Did Iraq cheat the United Nations? Underpricing, bribes, and the oil for food program. *Q. J. Econ.* 121, 1211–1248.
- Khwaja, Asim, Mian, Atif, 2005. Do lenders favor politically connected firms? Rent provision in an emerging financial market. *Q. J. Econ.* 120 (4), 1371–1411.
- Khwaja, Asim, Mian, Atif, 2011. Rent seeking and corruption in financial markets. *Annu. Rev. Econ.* 3 (1), 579–600.
- Krueger, Anne O., 1974. The political economy of the rent-seeking society. *Am. Econ. Rev.* 64 (3), 291–303.
- Mauro, Paolo, 1995. Corruption and growth. *Q. J. Econ.* 110, 681–712.
- McMillan, John, Zoido, Pablo, 2004. How to subvert democracy: Montesinos in Peru. *J. Econ. Perspect.* 18 (4), 69–92.
- Murphy, Kevin M., Shleifer, Andrei, Vishny, Robert W., 1993. Why is rent-seeking so costly to growth? *Am. Econ. Rev.* 83 (2), 409–414 Papers and Proceedings.
- Niehaus, Paul, Sukhtankar, Sandip, 2013. Corruption dynamics: the golden goose effect. *Am. Econ. J. Econ. Pol.* 5 (4), 230–269.
- Olken, Benjamin A., 2006. Corruption and the costs of redistribution: micro evidence from Indonesia. *J. Public Econ.* 90, 853–870.
- Olken, Benjamin A., 2007. Monitoring corruption: evidence from a field experiment in Indonesia. *J. Polit. Econ.* 115, 200–249.
- Olken, Benjamin A., Barron, Patrick, 2009. The simple economics of extortion: evidence from trucking in Aceh. *J. Polit. Econ.* 117, 417–452.
- Olken, Benjamin A., Pande, Rohini, 2012. Corruption in developing countries. *Ann. Rev. Econ.* 4, 479–509.
- Pashigian, B. Peter, Gould, Eric D., 1998. Internalizing externalities: the pricing of space in shopping malls. *J. Law Econ.* 41 (1), 115–142.
- Reinikka, Ritva, Svensson, Jakob, 2004. Local capture: evidence from a central government transfer program in Uganda. *Q. J. Econ.* 119, 679–706.
- Shleifer, Andrei, Vishny, Robert, 1993. Corruption. *Q. J. Econ.* 108 (3), 599–617.
- Svensson, Jakob, 2005. Eight questions about corruption. *J. Econ. Perspect.* 19 (5), 19–42.
- Tullock, Gordon, 1967. The welfare costs of tariffs, monopolies, and theft. *Econ. Inq.* 5 (3), 224–232.
- Zheng, Siqi, Kahn, Matthew E., 2013. Does government investment in local public goods spur gentrification? Evidence from Beijing. *Real Estate Econ.* 41 (1), 1–28.
- Zhou, Li-An, 2010. Incentives and governance: China's local governments. Cengage Learning, Singapore.