The Gradients of Power: Evidence from Chinese Housing Market*

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Abstract

Using a large, unique dataset from Chinese housing market, we propose to measure corruption by 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 on average 1.05 percentage point lower than non-bureaucrat buyers, after controlling for a full set of characteristics of buyers, houses and mortgage loans. More interestingly, we find that the bureaucrat price discounts exhibit interesting gradients with respect to their hierarchical ranks, criticality of their government agencies to real estate developers, and geography. We argue that the bureaucrat price discounts and the gradients of these discounts are unlikely driven by alternative explanations, thus they are evidence of corruption and measures of the value of power.

Keywords: Government Power; Corruption; Housing Market

JEL Classification Codes: C93; O12; O16

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1 Introduction

The discretionary power of government officials often puts them in a position to seek rents and engage in other corruptive behavior, especially in developing and transition economies. Corruption may lead to inefficient resource allocations and impede growth (Murphy et al., 1993; Shleifer and Vishny, 1993; Mauro, 1995). There is a large literature in economics that attempts to measure corruption, investigate its causes and consequences, and study policies to reduce corruption. Olken and Pande (2011) provide an excellent survey on the recent advances in the literature on these questions.[1]

Due to its illicit and secretive nature, measuring corruption and its impact are often hindered by the lack of reliable data on corruption (Bardhan, 1997). As a result, most empirical studies on corruption were based either on self-reported bribery data or subjective cross-country corruption indices. For example, Svensson (2003) measures corruption using surveys that ask firms how much they pay in bribes to bureaucrats; and cross-country measures of corruption primarily rely on perception-based responses to the survey questions about incidence of corruption from a large number of subjects across countries and over time (see, e.g., Mauro, 1995; Knack and Keefer, 1995; La Porta et al., 1999; and Treisman, 2000). While this type of datasets is advantageous in that they are available for a large number of countries, their reliability has been challenged on the grounds that people's perception on corruption could be seriously biased and it is hard, if not possible, to make cross-country comparisons since people from different countries may have very different understanding of the subject of corruption (Rose-Ackerman, 1999; Olken, 2009).

Significant advances were achieved in the last decade on the measurement, determinants and consequences of corruption in the literature using a variety of micro-level and objective evidence (see Oklen and Pande, 2011, for a detailed review). One of the methods 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 payment in the context of truck drivers bribing police on their routes.

A second method to measure corruption is by *"subtraction"* or "*cross-checking.*" For example, Reinikka and Svensson (2004) use 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. They

[1] Olken and Pande (2011) provide an excellent survey on the recent advances in the literature on these questions. See also survey papers by Svensson (2005) and Banerjee, Hanna, and Mullainathan (2009) for recent development in the theoretical and empirical studies of corruption. Bardhan (1997) offers an earlier literature review on corruption and its impact on development.

find an initial rate of leakage of 87 percent, which fell to less than 20 percent after the release of the audit report. 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. They find that higher-taxed products are associated with a forty percent higher median evasion rate. Hsieh and Moretti (2006) try to detect the corruption under the Iraqi Oil for Food program administrated 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 the rural road projects by examining the officially claimed amount of money spent on the road with the cost estimates obtained from independent engineers. He finds that the difference accounts for about 24 percent of the total cost of the road.[2]

A third approach attempts to estimate the degree of corruption 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 Soeharto fell ill. The idea is that, if the efficient market hypothesis holds, then the change in the stock market value surrounding the event of Soeharto's illness captures the value of the political connection to the firm.[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 gaps in the reported earnings and expenditures between 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 percent 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 the public and private sector earnings are made up in bribes. Khwaja and Mian (2005) examine corruption by the politically connected in Pakistan by showing how political connectedness of a firm, as measured by whether its directors participate in elections, affect the amount of loan it is able to obtain from the banks and the associated default rates. They find that politically connected firms borrow 45 percent more and have 50 percent higher default rates; moreover, somewhat surprisingly such preferential treatment occurred exclusively in government banks, and private banks provided no such political favors.

In this paper we attempt to measure corruption 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. China's

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

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

housing market offers a unique setting for studying corruption since it is notorious for the prevalence of corruption and rent-seeking activities, as a result of heavy state regulations of the real estate market.[4] In every link of the real estate development, from the initial land taking and auction, to the approval of architectural design, and to sales license, real estate developers need support from bureaucrats from various goverment 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 corruption.[5]

Our empirical methodology is in the spirit of "market inference" approach described above, particularly that of Gorodnichenko and Peter (2007). Specifically, we measure the extent of corruption 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 income than other buyers in the housing market, they are more likely to buy apartments in relatively more expensive apartment complexes, and 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 1.05 percent 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 a result of receiving price discounts from real estate developers (second fact). We interpret the second fact as suggestive evidence the bureaucrat buyers receive price discounts as a form of bribery.

More interestingly, our data set contains information about bureaucrat ranks and theeir government agencies. This allows us to examine the *gradients* of the 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 higher ranks/levels receive larger price discounts in their housing purchases. For instance, we find that bureaucrats from critical agencies receive a 2.48 percent price discount while bureaucrats from other agencies only obtain 0.98 percent price discount. Bureaucrats working at provincial gov-

[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 percent of China's GDP in that year.

[5] For example, Cai, Henderson and Zhang (2013) present strong evidence on corruption in China's urban land auctions.

ernments enjoy an even higher, about 3.9 percent, price discount.[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 in low rank but in critical agencies may enjoy larger price discount than those in high ranks but not in critical agencies.

Compared with existing literature measuring corruption, our study has several distinctive features. First, our data contains information on mortgage loans in over 100 cities in China from 2004 to 2010 with more than a million transactions. This allows us to offer a nationwide coverage of corruption 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 geograpical gradients of the value of bureaucratic power; moreover, we make use of differences in the power gradient to interpret price discounts as a measure of corruption.

The most serious challenge to the cross-checking approach to measure corruption is the difficulty in attributing the observed differences to corruption. As emphasized in a review article by Banerjee et al. (2009), in many cases it is hard to tell whether the dissipated resources observed in the data are actually corruption or simply mismeasurement in 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 as much as possible to control for a full set of characteristics to capture the heterogeneity in house location and other attributes (up to floor level and window orientation) as well as buyers' and loan characteristics. More important, 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 scope of jurisdiction of power. We also find collaborative correlations between our measure of corruption (i.e. price discounts received by bureaucrats) and other variables, particularly, the Entertainment and Travel Costs (ETC) measure of corruption as proposed Cai, Fang and Xu (2011).

The remainder of the paper is organized as follows. In Section 2 we describe the institutional background on 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 the descriptive statistics; in Section 5 we present our main empirical results; in Section 6 we discuss several key alternative explanations for our empirical findings; and in section 7 we conclude.

[6] If we factor in the fact that bureaucrats at provincial governments typically live in provincial capital cities associated with relatively high housing prices, a 3.9 percent of price discount implies a even larger amount of money than it indicates by percentage points.

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 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 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, as an important impetus to the development of a private housing market, China's central bank, the People's Bank of China (PBC), also 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 mortgage loans in 2012, accounting for 16 percent 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 percent.[7]

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 record, and a down payment of no less than 20 or 30 percent of the purchase price of the house. To substantiate a stable income flow, applicants must provide a proof for their monthly income certified by their employers and also supported by their bank payment records. The minimum down-payment ratio varied substantially over time, which is subject to the regulation of the PBC and often used as a policy response to address the volatilities of housing prices. The maximum maturity of mortgage loans is 30 years. In 2004, China Banking Commission released guidelines for the risk management of mortgage loans for commercial banks which stipulate that monthly mortgage payment to income ratio of borrowers should be no higher than 50 percent. The interest rates of mortgage loans are set by the PBC and adjustable, and if the PBC changes the baseline interest rate, the 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 buyer) 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

[7] They are Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC), and Agricultural Bank of China (ABC).

loans from the commercial bank to construct houses. To avoid potential risks, commercial banks will do due diligence to check the real estate developer's qualification and construction conditions of houses before entering the collaboration with the real estate developer. Commercial banks make use of their strong bargaining power in lending to ask for a bundling of future mortgage loans with construction loans. Second, due to the heavy state regulation in the mortgage market, there is limited room for product differentiation and mortgage contracts offered by commercial banks are highly homogenous, so home buyers as borrowers lack incentives to look for better mortgage deals when there is one already available through the mediation of the real estate developer. Lack of free choice of commercial banks by housing purchasers 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. The rapidly rising housing prices in the first-tier cities attracted a lot of buyers from other areas of China in the past decade. However, this trend came to an abrupt halt in October 2010 when Chinese central government started to impose a house quota for each household with local residence (i.e., local *Hukou*) (up to 2 apartments), and prohibit residents without local household registration from buying local houses. Other first-tier cities, such as Shanghai, Guangzhou, and Shenzhen quickly followed suit to set similar regulations on housing purchases. Many second-tier cities, such as Hangzhou and Qingdao, have also made new policies to cool down speculative investment in the housing market since 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 to maximize the returns on investment. The strong economic growth and massive urbanization in the past decade have resulted in rapidly increasing housing prices which generates handsome returns to the housing investment. Encouraged by the booming prospect in the housing market, most Chinese bureaucrats regard real estate property as the most lucrative investment channel. The absolute majority of bureaucrats on corruption charges are reported to own multiple houses in big cities in China, sometimes even dozens of houses.[8] 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 sales of houses is subject to regulations by the state. During the process real estate developers have to go through numerous government agencies for approval and each government agency has a veto

[8] 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 Chinese news media.

power to delay or prevent the progress of the housing development project. Conversion from agricultural land into urban construction land is the first step for government approval and support, followed by a government review process of architectural design, land use planning, and housing construction. The value of power is reflected in not only the bribes bureaucrats may receive from real estate developers, but also the price discounts offered to bureaucrats when buying a house. One of the attractions of price discounts is their better ability to circumvent corruption charges than collecting money upfront from the real estate developers. As will be shown in Section 4, bureaucrats receive a significant amount of price discounts compared to other buyers in the housing market.

3 Hypotheses on the Price of Power in the Housing Market

State regulation naturally gives rise to rent-seeking activities. Real estate sector has been heavily regulated by the state in China. In order to get the approval, obtain lower land price or favorable floor area ratio, or to simply speed up the approval process, bribing bureaucrats or building good connections with bureaucrats is critical for real estate developers. More often than not real estate developers return favors from bureaucrats for significant price discounts in housing purchases. So we have our first testable hypothesis:

Hypothesis 1: **(Discounts for Bureaucrats)** *Other things 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 constraint on the discretionary use of power, the market value of power, or 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 see higher-ranked bureaucrats enjoy more rents from their positions than those in lower ranks. In China, an important dimension of power is the territory level of government the bureaucrat is affiliated with. Typically a higher level territory administration will be responsible for more important approval procedures. For example, land taking and conversion is usually subject to the approval by the higher-level territory government (e.g. provincial government). The territory level of government invoked in the approval of an investment project increases with the size of the investment. Some government agencies are more important than others from the viewpoint of real estate developers. For real estate developers, the relatively important agencies include development and reform committee, housing administration bureau, land administration bureau, and 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) *Other things being equal, bureaucrats with higher ranks will pay a lower price than bureaucrats with lower ranks.*

As a famous old saying in China 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 the 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 case in the housing market implies that some low-rank bureaucrats in critical agencies could hold control over key procedures or policy details, which makes them more powerful than his/her rank seems. In other words, hierarchical ranks are not the only determinant of the rents from power, and the importance of agencies matters a lot as well. Even though some bureaucrats have relatively low hierarchical ranks, but because they work in "critical" agencies they may be more valuable in the housing market than some others with relatively high rank but not in critical agencies. We argue that there will be an ordering of power rents for different combinations of ranks and agency importance, which is summarized in the following hypothesis:

Hypothesis 3: **(Critical Gradient)** *Other things being equal, bureaucrats from agencies critical to real estate developers will pay a lower price than bureaucrats in less critical agencies.*

It is possible that bureaucrats in low ranks but from critical agencies may receive more price discounts than bureaucrats in high ranks but from non-critical agencies.

Any power has its boundary of influence. A government bureau leader may seem powerful in the eyes of real estate developers in the jurisdiction over which the government leader has decision-making power, but for those developers who are doing business in other jurisdictions, this leader may be not that important. This means that the effect of power on rent-seeking depends critically upon geographical distance or jurisdictional scope. However, going out of the jurisdiction may not make bureaucrats lose their influence on businessmen completely since they may have some ties with bureaucrats in other jurisdictions. The indirect connections still yield some benefits to bureaucrats not in their power areas, but normally their indirect ties should not be so strong as direct influence. A natural implication derived from this discussion is the following hypothesis:

Hypothesis 4: (Geographical Gradient) *The price discount bureaucrats receive decreases when they leave their jurisdiction of authority, and 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 of China which accounts for about 16 percent of the mortgage loan market in China.[9] We restrict the sample to mortgages for new, residential properties and as a result have over 1 million mortgage loan contracts dating from the first quarter of 2004 to the fourth quarter of 2010. As mentioned above, the housing 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. A typical mortgage contract contains detailed information on the personal characteristics of housing buyers (e.g. age, gender, marital status, income, work unit, education, occupation, and region and address of residence), housing price and size, apartment-level characteristics (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 or job titles in the work units of the buyers. For our analytical purpose, we exclude mortgages in the following cases : (1) mansions; (2) the housing construction is financed by work-units; and (3) employees from work units (including government agencies) group together and enjoy price discounts from the real estate developers; and (4) the number of transactions in a complex is *less than 5*.[10] After deleting these observations, we end up with a sample of 1,005,960 observations.

[Table 1 About Here]

Table 1 presents the summary statistics of 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 percent are females, 69 percent are married, 20 percent have college degrees, and the average age is around 35. The monthly income is close to 6,000 RMB, but with a huge variation (the standard deviation is 10,179 RMB). In our sample, 85 percent of the purchases are made by buyers within their current city of residence, 13 percent are in other cities in the same province, and only 1.8 percent of the transactions are in cities outside of the home province. The average size of apartments purchased in our sample is 113.2 square meters, 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%.

[Figure 1 About Here]

[9] We do not release the name of the commercial bank for confidential reasons.

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

We define housing buyers whose work unit belongs to the administrative agencies of government as *bureaucrats*. This definition of bureaucrats does not include those employees who work in the so-called "public institutions" which may be affiliated with government agencies but do not perform administrative functions.[11] In our sample, bureaucrats account for 7.1 percent of buyers, which is much higher than the proportion of bureaucrats in the total population of China.[12] During 2004-2010, we see a clear trend of increasing presence of bureaucrats in the housing market, as shown in Figure 1. In 2004 only about 3 percent of the home buyers in our sample were bureaucrats, but this share rose to about 11% in the first quarter of 2009, and then steadied to about 8-9% since then. In addition, about 4 percent of the sample of bureaucrats have *Ke* or higher rank. *Ke* refers to a hierarchical rank which is equivalent to a bureau chief in a county-level government, or section chief of 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 include bureaus such as development and reform committee, housing administration, land administration, and construction planning are denoted as "critical agencies". As described in Section 2, bureaucrats in these agencies hold critical authority to decide whether to approve the applications of real estate developers and in what terms. In our sample, about 6 percent of bureaucrats come from these critical agencies. Table 1 also shows that about 1 percent 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.

[Figure 2 About Here]

We are interested in the price differences between bureaucrats and other buyers in the housing market. Figure 2 shows the time trend of the percentage differences in the average housing prices per square meter for bureaucrat and non-bureaucrat buyers from 2004 to 2010. Thus The average price differences between bureaucrat and non-bureaucrat buyers fluctuated between 3 percent and 9 percent over time, and averaged about 6 percent. To put 6 percent of price discounts in perspective, suppose a government official wants to buy an "average" apartment with a size of 113 square meters, and the market price is 3765 RMB per square meter. A 6 percent price discount saves a bureaucrat buyer about 25,536 RMB in purchase price. This is approximately equivalent

[11] Public institutions in China mainly engage in commercial businesses (e.g. product quality examination centers) and social services (e.g. university and research institutions). Employees in public institutions do not hold government power which is critical for private firms to operate business, and they are not regarded as "civil servants" in China's social welfare system.

[12] According to Zhou (2009), the bureaucrats in the administrative branch of government accounted for approximately 0.86 percent of the total population during 1989-2006.

to one year salary for government employees in most regions in China.[13] Of course, in Figure 2 the price differences are constructed only controlling for the year of the transaction. Thus they are likely confounded by potential differences in the characteristics of houses (such as, e.g., complex location) and other characteristics of the buyer and loans. In our analysis in Section 5 we will control for these differences.

[Table 2 About Here]

Table 2 presents the average housing prices per square meter by power status (hierarchy and rank) and by geography (city of residence, other cities in home province, and other provinces). The average housing prices calculated here do *not* adjust for any differences in housing characteristics. Among the housing purchased within a buyer's city of residence, bureaucrats pay 3659 RMB per square meter, in contrast to the average price of 3789 RMB per square meter for all buyers. The average price per square meter for bureaucrat buyers from critical government agencies is even lower at 3458 RMB. Without controlling for other characteristics of the housing and loans, we find that the bureaucrat with higher ranks pay about 3650 RMB per square meter, not so different from the average price for all bureaucrats; and bureaucrats from provincial government on average pays 5477 RMB per square meter, much higher than the average price for all buyers. Of course, this is due to the fact that bureaucrats with higher ranks or in provincial governments are more likely concentrated in provincial capitals which generally have a higher housing price than other cities in the same province. This observation highlights the necessity to control for the city fixed effect in our subsequent analysis in order to examine the effect of power rank and levels. Table 2 also shows that if bureaucrats purchase houses in cities outside of their residence, they still enjoy some amount of price discount especially when they go out to other provinces. In this case, bureaucrats coming from critical agencies also enjoy higher discounts than those from other agencies.

[Tables 3-4 About Here]

Table 3 summarizes the results from a series of regressions with the dependent variables being respectively, log area (Column 1), LTV (Column 2), log loan maturity (Column 3), log monthly income (Column 4) and relative complex price (Column 5), on bureaucrat dummy, or critical and non-critical agency dummies, high- or low-rank dummies, provincial- or lower level-government dummies, and other variables such as gender, marital status, age, age squared, complex location etc. (see notes of Table 3 for details). The omitted category is non-bureaucrat buyers. We report the coefficients of the respective dummies related to bureaucrat status. The coefficient estimates reveal two interesting correlations:

[13] Of course, the price discounts calculated from such a raw comparison between bureauract buyers and non-bureaucrat buyers may mask some other differences in the apartments. In analysis we report in Section 5, we aim to control for additional characteristics of the buyers, the apartments and the loans.

- Bureaucrat buyers tend to buy larger apartments, have a lower LTV ratio, a somewhat longer loan maturity, and buy into more expensive apartment complexes.
- Bureaucrats tend to have lower (about 14%) monthly income than other buyers in the market.

The same two correlations are also shown in Table 4 where we report the Probit regression results of the dummy variable of whether the buyer is a bureaucrat on a set of covariates. In Column 3 where we have the most of the controls, we find that bureaucrat dummy is positively correlated with more expensive apartment complex, larger apartment size, lower LTC, longer loan maturity, and lower monthly income.

There are two possibly complementary explanations for why bureaucrats can afford to buy houses in more expensive locations and with large areas with their relatively low income. The first one is that bureaucrats receive other sources of income in addition to their regular income (e.g., grey 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* effect from the power of being a bureaucrat, including potential in-kind benefits that bureaucrats receive than 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 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 power in the *particular* housing transaction. Our data does not permit us to examine the first effect.

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 territory level of government power affects price discounts bureaucrats enjoy, and how the effect of government power varies with geographical distance from the region of residence.

We will estimate the following model with OLS:

$$y_{ijt} = \alpha + \beta \textsc{Bureaucrat}_{ijt} + \mathbf{X}_{ijt}\boldsymbol{\gamma} + \sigma_j + u_t + \epsilon_{ijt} \tag{1}$$

where y_{ijt} denotes the logarithm of apartment price per square meter in transaction i in complex location j at time of purchase t; BUREAUCRAT_{ijt} is a dummy variable indicating whether the buyer of the transaction is a government official; $\mathbf{X}_{ijt}$ 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, orientation of windows, and time of construction, and prices respond to all these characteristics. In order to address the concerns about the effect of housing heterogeneity on prices, we control for a set of fixed effects including complex location (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 orientation of apartments, so housing prices vary across these attributes. In the following regressions, besides controlling for complex-level fixed effects, we also control for floor level and room number of the apartment.

We can reasonably assume that bureaucrats are price takers in the housing market, so we do not need to worry about the reverse causality from the decisions of bureaucrats to housing prices. However, bureaucrats may endogenously select apartments in certain complex locations to buy, due to some unobserved heterogeneity of apartment characteristics, which will bias our estimation. Therefore, a full set control of characteristics of buyers and apartments (up to purchase time, complex location, floor level, and room number) enables us to capture the effects of unobserved heterogeneity in apartments which may confound our estimation.

5.2 Baseline Results: Discount for Bureaucrats

Table 5 reports OLS regression results with the logarithm of apartment prices per square meter as the dependent variable. The number of observation 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. Notice that the difference between the 6% average bureaucrat discount we calculated in Figure 2 and the 3.72% discount reported in Column 1 is driven by the fact that complex location is controlled for in the calculation for Figure 2 and not in Column 1.

[Table 5 About Here]

In Columns 2-4, we add more controls on the characteristics of apartment and loans. In each of these specifications, we include controls for complex location, purchasing time (month), building number, floor level, last digit of room number and whether the property is in the residence province of the buyer. The three specifications differ in the other controls of the buyer, apartment

and loan characteristics. With such finer controls, the R^2 is above 90 percent for all remaining three specifications.

Column 2 reports estimated coefficient on bureaucrats only controlling for the common set of apartment controls listed above, but do not control for apartment area and its squared term, and characteristics of buyers and mortgage loans. We find that bureaucrats enjoy a 0.7 percent of price discount compared to other non-bureaucrat buyers, and this different is significant at 1 percent level. 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 percent and is still statistically significant at 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 increase further to 1.05 percent (see Column 4), and it remains statistically significant at 1% level. These results suggest that government power does convey significant rents to its holders, which strongly support 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 with group purchases, therefore the significant price discounts of 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 5 also reveals some interesting results on the 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 square meters, 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.[14] Age also has a U-shaped relation with apartment prices with the minimum at the age of 23.

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 information about the bureaucratic power and the location of the housing transaction to test for Hypotheses 2-4 in Section 3.

[14] We discuss the possibility of search costs in explaining the findings in Sectioin 6.

5.3.1 Hierarchical and Critical Gradients

Hypotheses 2 and 3 state that, everything else equal, bureaucrats with higher ranks or levels, and bureaucrats in critical agencies (for real estate developers), will enjoy a larger price discounts in the housing market, which we refer to as the hierarchical and critical gradients of power. Table 6 provides estimation results that supports 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 bureaucrats from these agencies would get more rents from real estate developers than those from non-critical government agencies. Second, we distinguish bureaucrats by their hierarchical ranks, whether they have *Ke* or above rank. Third, we differentiate the territory levels of the bureaucrats by whether they work in provincial governments or lower-level governments.

[Table 6 About Here]

Table 6 reports regression results showing the effects of differential power on housing prices. In each regression reported in Table 5, we have controlled for a full set of characteristics of buyers, apartments and mortgage loans as specified in Column 4 in Table 5. In Column 1, we find that bureaucrats from critical agencies enjoy a 2.48 percent of price discounts than non-bureaucrats while those from non-critical agencies only enjoy a 0.97 percent of price discounts. In Column 2, we find that the rank of the bureaucrats also makes a significant difference in the price discounts: bureaucrats with *Ke* or higher rank pay 1.38 percent less than non-bureaucrats, while bureaucrat buyers with lower rank receives a lower 1.03 percent price discounts.

In Column 3, we show that bureaucrats working in provincial governments receives a 3.90 percent price discounts relative to non-bureaucrat buyers, which is substantially higher than the 1 percent price discounts received by bureaucrats working in lower-level governments. These results lend strong support to the notion that the distribution of power rents critically hinges upon the rank/level of the power and the criticality of the government agency to the real estate sector.

The estimates in Columns 1 and 2 show that bureaucrats from critical agencies receive a much higher price discount in the housing market than those with higher ranks. One may argue that this result may be driven by the possibility that the bureaucrats in critical agencies may primarily have high ranks, so we don't know whether larger price discount associated with critical agencies is brought by the critical agencies or high ranks. In order to see more clearly the differential effects of agency criticality vs. ranks, we divide bureaucrats into four categories: (a) in critical agencies with high rank; (b) in critical agencies with low rank; (3) in non-critical agencies with high rank; and (4) in non-critical agencies with low rank.

Column (4) in Table 6 reports the results on price discounts for these four types of bureaucrats relative to non-bureaucrat buyers. We can see a very interesting result: while high ranks always convey larger price discounts for bureaucrats given the criticality of their agencies, low rank bureaucrats in critical agencies earn price discount which double that received by bureaucrats from non-critical agencies with high rank. This finding confirms Hypothesis 3 and provides a good testimony to the importance of the criticality of the government agency relative to hierarchical rank. Some bureaucrats who have relatively higher ranks but are not in the agencies which are critical to real estate developers may not seem as powerful as those with low ranks but are in the critical agencies.[15]

The significant difference in price discounts for different rank and level of power also helps address the previous concern that the effect of government power on housing price is actually driven by the self-selection of cheaper apartments or unfavorable complex location by bureaucrats. If the concern is correct, it is hard to explain that bureaucrats in critical agencies or with higher rank/level are more likely to buy cheaper apartments than those who are either in non-critical agencies or at the lower rank or level.

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 away from its jurisdiction. We refer to this as the *geographical gradient* of power. To introduce the measure of geographical distance, we rely on the information about the buyers' city of residence and the city of the housing transaction to judge whether buyers purchase houses outside their resident cities.[16]

[Table 7 About Here]

Table 7 provides regression results on the geographical gradient of power. For each regression, we have the same set of controls as in Column 4 of Table 5. Column 1 shows that if buyers pay 0.74 percent higher price for properties in other cities in the home province than in their resident cities. If they purchase outside of their home province, they face even higher prices (1.72% price premium) than buying at resident city. Bureaucrat buyers, however, receive 1.07 percent price discounts on average compared to non-bureaucrat buyers.

In Column 2, we add the interactions of Bureaucrat dummy and the indicators for whether the purchase is in other cities of home province; in Column 3, we add the interactions of Bureaucrat

[15] This finding is consistent with the idea idea that "real authority" is more important than "formal authority" (Aghion and Tirole, 1997).

[16] This rule is especially accurate for bureaucrats since they usually live in the city where their work units are located.

dummy and the indicators for whether the purchase is in other provinces; and in Column 4 we include both interactions. The results are provide strong evidence consistent with Hypothesis 4. For example, Column 2 shows that bureaucrat buyers receive 1.24 percent price discounts in their resident cities compared to non-bureaucrat buyers, but their price discount decreases to 0.36 percent ($0.0124 - 0.0088 = 0.0036$) if they purchase houses in other cities within their home province. Column 3 shows that bureaucrat buyers receive 1.08 percent price discount in their home province compared to non-bureaucrat buyers, but the price discount is reduced to 0.13 percent ($0.0108 - 0.093 = 0.015$) 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 percent in their resident cities, but it declines to 0.35 percent ($0.0126 - 0.0091 = 0.0035$) in other cities of the home province, and the price discount for bureaucrat further decreases to 0.15 percent ($0.0126 - 0.0111 = 0.0015$) 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 power has to be discounted, and the reduction in the influence of power is larger as they move farther away from their jurisdictions. This is exactly wheat Hypothesis 4 predicts, so we find strong evidence in support of Hypothesis 4. Interestingly, Table 7 also shows that even when bureaucrats move outside their own provinces, the market value of their power seems not to disappear completely. This result indicates that bureaucrats may make use of their nationwide networks in the government sector to expand 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 5, and we also established strong evidence of the hierarchical and critical gradients of power in Table 6 as well as geographical gradient of power in Table 7. In Tables 8 and 9, we investigate the interactions between hierarchical, critical and geographical dimensions of power and see how the effects of jurisdictional boundary on rents derived from the power differ by agencies and ranks of power.

[Table 8 About Here]

Table 8 focuses on the interactions of the geographical and critical dimensions of power. significance of power and its interaction with jurisdictional boundary. Column 1 shows that, even after controlling for whether the house purchase is in other cities in home province, or whether it is outside of the home province, bureaucrats in critical agencies receive 2.52 percent price discount while those from non-critical agencies receive 0.99 percent of price discount. This confirms the

finding in Table 6 where we did not control for whether the house purchase is 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 within their home province, the value of power decreases, but the magnitudes of the decrease in the price discount depend on the criticality of the bureaucrat's government agencies. 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 jurisdictions. In contrast, when bureaucrats in non-critical agencies make purchases outside their resident city (where their power jurisdiction lies), 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 out of 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, interesting finding highlights the differential value of power from one agency to another, not only along the critical dimension but also in its interaction with jurisdictional boundary.

[Table 9 About Here]

Table 9 examines the interaction between hierarchical and the geographical dimensions of power. Column 1 shows that bureaucrats with *Ke* or higher ranks receive a 1.42 percent discount, while those with lower ranks receive 1.05 percent discount, relative to non-bureaucrat buyers. However, Column 2 shows that both ranks of bureaucrats see their discount decline substantially when they purchase in other cities in their home province: bureaucrats in high ranks receive 1.99 percent discount in their resident cities, but the discount declines by 1.79 percentage points when they purchase in other cities in their home province; bureaucrats in lower ranks enjoy a smaller discount in their resident cities, but surprisingly, their discount declines less than the high-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 with the indicators for whether the transaction is in other cities in the home province, or other provinces. This empirical result again suggests the localized nature of the value of power, as highlighted by the results in Tables 7 and 8: even if high ranks pay off in the housing market in terms of receiving higher price discounts, these benefits decline quickly when moving out of the bureaucrats' jurisdiction of power.[17]

[17] A similar analysis can be done for bureaucrats at provincial governments buying houses elsewhere. However, the number of bureaucrats at the provincial governments buying houses in other cities either within or across

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 alternative thresholds 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 10A. These regressions have the same set of controls as in Column 4 of Table 5. The main results, report in Column 2, are quantitatively similar to our previous findings. Bureaucrats receive 1.29 percent price discounts relative to non-bureaucrat buyers in their resident city, but such discounts decrease by 0.93 percent when they purchase in other cities in the home province and by 1.05 percent when they buy in other provinces.[18]

[Tables 10A-10B About Here]

In order to facilitate 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 bo 647,649, and the results on this new subsample (Sub-sample II) are reported in Panel "Sub-sample II" Table 10A. The key results are the same as before.

We also restrict our sample to the 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 10B. 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 value of power and a measure of corruption. In this section, we discuss several alternative explanations.

provinces is too small (less than 100 in each case) to have enough statistical power to do the regression analysis.

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

6.1 Non-Representative Data

The dataset we use are from a large commercial bank, and we argued that it should be representative of all the mortgage loans in China. However, one may be concerned that the mortgage sample may not be representative of all the buyers in the housing market to the extent that it does not include all-cash buyers. First of all, in the new apartment market, majority of the buyers indeed use mortgages because the Chinese government offers discounted interest rates to mortgagors.[19] 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 super 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 a much larger price discounts than the typical bureaucrats we are studying in this paper. If the discounts are unusually large, the bureaucrat buyer may find it important to conceal the paper trail by paying for the transaction in cash. Typical non-bureaucrat buyers do not have such incentives. Thus to the extent that mortgage transactions are not representative of all housing transactions because they do not include all-cash transactions, we believe that it biased 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 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 phenomenon occurs in the housing market, our estimate of the value of power would again be downward biased 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 percent 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 happen in the new apartment sales. In new apartment sales, the seller is a real estate developer who is under an elevated level of scrutiny not to misreport the housing transaction prices to the bank. This is the reason that we are only using mortgage involving new apartment sales in our analysis.

[19] People's Bank of China issues a baseline inerest rate for borrowing from the banks, and mortgage interest rate is typically 80 percent of the baseline rate.

6.2 Selection on Unobservable Housing Characteristics

One may be concerned that the price discounts we found for bureaucrat buyers may arise 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 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 the possible characteristics of the house, or neighborhood that a buyer may value, we believe this concern is unlikely to be the driver for our main findings. In the regressions from which we measure the price and gradient of the power, we control the housing characteristics as listed in Column 4 of Table 5, which includes Area (log), Area Squared, Complex Location, Purchasing Time (month), Building, Floor Level, Last Digit of Room Number (which is often associated with whether the apartment faces the south or the north. After controlling for all 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 favorable treatment. Also, recall from Table 3 and 4, bureaucrats in general are more likely to purchase large apartments and in more expensive complexes. Their purchases are likely to be more desirable in 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 downward biased.

6.3 Information Advantage vs. Power Rents

A third alternative explanations for the price discounts we find that bureaucrat buyers receive relative to non-bureaucrat buyers in the housing market is a result of the bureaucrats possessing more information about the housing price distributions, instead as a result of the power rents.

We now present a series of regressions to assess whether the information advantage of the bureaucrats may be responsible for the price discounts they enjoy in the housing market. First, since the Chinese housing market has experienced tremendous price increases since 2003, and the year-to-year price growth could be over 20 per cent year in some cities. If bureaucrats' information advantage is driving the price discounts we documented earlier, we would expect that they would also be more likely among the early buyers in any apartment 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 fourth months on. We are left with 380,255 transactions related to the sample of apartment complexes using the above selection criterion.

For each of the transactions in the 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.

[Tables 11A-11D About Here]

In Tables 11A-11D, we report the linear probability regression results examining whether bureaucrat buyers are more likely to be among the early (first 3 months) buyers of apartment complexes. Table 11A 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 holds also 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 11B, we distinguish bureaucrats according to whether they work in critical agencies. If information advantage is the reason for price discounts the bureaucrats receive, we would expect that those working in critical government agencies to be more likely among the early buyers due to their proximate knowledge of when the complex would go on sales. 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 11C, we distinguish bureaucrats according to their rank. Again we do not find any evidence that the bureaucrats in high ranks are more likely to early buyers.

Another angle from which we can examine the information advantage mechanism is to examine whether the bureaucrats receive higher price discounts in cities with 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. Table 12 presents the results from these regressions. In Column 1, we find that for bureaucrats in general, they actually receive lower discounts in cities with larger price dispersion. The same holds in Column 2 when we distinguish bureaucrats by their criticality (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 bureaucrat price discounts.

[Tables 12 About Here]

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, but it is unlikely that this could be the only explanation for our findings. Recall that

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 in higher ranks and in critical agencies have lower search cost than other bureaucrats.

6.4 Relationship with Entertainment and Travel Cost (ETC) Measure of City-Level Corruption

So far we found that on average, bureaucrats receive about 0.7 to 1.05 percent price discounts for identical apartments than non-bureaucrat buyers (Table 5), and bureaucrat buyers in critical agencies receive 2.48 percent discount (Table 6). We interpret these price discounts received by bureaucrat buyers as evidence of the market value of power and a measure of corruption. Because transactions from all the cities are used in the regressions reported in Tables 5-9, 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 5-9 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 the city-level corruption. This provides us with an opportunity to collaborate our measure of corruption by bureaucrat price discount with an existing measure of city-level corruption by Entertainment and Travel Costs (ETC) as proposed in Cai, Fang and Xu (2011).

Chinese firms regularly report expenditures on entertainment, travel costs and conferences in their accounting books. As detailed in Cai, Fang, and Xu (2011), Chinese managers often use these expenditure category to reimburse money spent on bribing government officials and entertaining clients and suppliers, so these expenditures can be used as a measure of corruption in Chinese firms. The data on firms' expenditure 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 of all Chinese provinces except Tibet. It contained information on the firm-level expenditures on entertainment, travel costs and conferences as well as the city level GDP per capita and other characteristics, such as the fraction of employees in the financial sector.[20]

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 6. 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 13 About Here]

[20] See Cai, Fang, and Xu (2011) for more details about the survey data.

Table 13 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 13 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 expenditures 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 10% level. This provides yet another collaborative evidence for our interpretation of bureaucrat price discounts as a measure of corruption.

7 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 corruption has been a serious challenge to scholars due to its illicit and secretive nature. Using a large, unique dataset from China's housing market, we propose a novel approach to measure corruption by 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 on average 1.05 percentage point lower than non-bureaucrat buyers, after controlling for a full set of characteristics of buyers, houses and mortgage loans.

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

authority."

We argue that the bureaucrat price discounts and the gradients of these discounts are evidence of corruption and measures of the value of power in economies with weak institutions to prevent the abuse of power. Our study sheds new light on the corruption in the housing market as well as the functioning of power in the interplay between government and market when the rule of law is weak.

References

[1] Banerjee, A, R. Hanna and S. Mullainathan (2012). "Corruption." In *Handbook of Organizational Economics*, ed. R Gibbons, J Roberts. Princeton, NJ: Princeton University Press.

[2] Bardhan, P. (1997). "Corruption and Development: A Review of Issue." *Journal of Economic Literature*, 35, 1320-1346.

[3] Cai, H, H. Fang, and L.C. Xu (2011). "Eat, Drink, Firms, and Government: An Investigation of Corruption From Entertainment and Travel Costs of Chinese Firms." *Journal of Law and Economics,* 54, 55-78.

[4] Cai, Hongbin, J. Vernon Henderson and Qinghua Zhang (2013). "China's land market auctions: evidence of corruption?" *RAND Journal of Economics*, 44(3), 488-521.

[5] Di Tella, Rafael, and Ernesto Schargrodsky (2003). "The Role of Wages and Auditing During a Crackdown on Corruption in the City Buenos Aires." *Journal of Law and Economics,* 46, 269-300.

[6] Faccio, M. (2006). "Politically Connected Firms." *American Economic Review*, 96(1), 369-386.

[7] Fisman, R., and S.J. Wei (2004). "Tax Rates and Tax Evasion: Imports in China." *Journal of Political Economy,* 112, 471-96.

[8] Fisman, D., R. Fisman, J. Galef and R. Khurana (2006). "Estimating the Value of Connections to Vice-President Cheney." Working Paper, Columbia Business School.

[9] Gorodnichenko, Y, and Peter K.S. (2007). "Public Sector Pay and Corruption: Measuring Bribery from Micro Data." *Journal of Public Economics*, 91, 963-91.

[10] Hsieh, C., and E. Moretti (2006). "Did Iraq Cheat the United Nations? Underpricing, Bribes, and the Oil for Food Program." *Quarterly Journal of Economics,* 121, 1211-48.

[11] Knack, Stephen and Philip Keefer (1995). "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures." *Economics and Politics,* 7, 207-227.

[12] Khwaja, Asim and Atif Mian (2005). "Do Lenders Favor Politically Connected Firms? Rent provision in an Emerging Financial Market." *Quarterly Journal of Economics*, 120(4), 1371-1411.

[13] La Porta, Raphael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1999). "The Quality of Government." *Journal of Law, Economics, and Organizations*, 15, 222-279.

[14] Mauro, P. (1995). "Corruption and Growth." *Quarterly Journal of Economics,* 110, 681-712.

[15] McMillan, J. and P. Zoido (2004). "How to Subvert Democracy: Montesinos in Peru." *Journal of Economic Perspectives*, 18(4), 69-92.

[16] Olken, B.A. (2006). "Corruption and the Costs of Redistribution: Micro Evidence from Indonesia." *Journal of Public Economics,* 90, 853-70.

[17] Olken, B.A. (2007). "Monitoring Corruption: Evidence from a Field Experiment in Indonesia." *Journal of Political Economy,* 115, 200-49.

[18] Olken, B.A. (2009). "Corruption Perceptions vs. Corruption Reality." *Journal of Public Economics,* 93, 950-64.

[19] Olken, B.A. and P. Barron (2009). "The Simple Economics of Extortion: Evidence from Trucking in Aceh." *Journal of Political Economy,* 117, 417-52

[20] Olken, B.A. and R. Pande (2011). "Corruption in Developing Countries." *Annual Review of Economics,* 4, 479-505.

[21] Reinikka, R. and J. Svensson (2004). "Local Capture: Evidence from A Central Government Transfer Program in Uganda." *Quarterly Journal of Economics,* 119, 679-706.

[22] Svensson, J. (2003). "Who Must Pay Bribes and How Much? Evidence from A Cross Section of Firms." *Quarterly Journal of Economy,* 118, 207-30.

[23] Svensson J. (2005). "Eight Questions about Corruption." *Journal of Economic Perspectives,* 19(5),19-42.

[24] Treisman, Daniel (2000). "The Causes of Corruption: A Cross-National Study." *Journal of Public Economics,* 76(3), 399-457.

Table 1 Summary Statistics

	Obs.	Mean	Standard Deviation	Min	Max
Average housing price	1005960	3765.3	3195.5	1000	95700
Characteristics of Power					
Bureaucrats	1005960	.071	.258	0	1
in high rank	1005960	.003	.057	0	1
in critical agencies	1005960	.004	.060	0	1
in provincial government	1005960	.001	.035	0	1
Buyer's characteristics					
Gender (female=1)	1005960	.331	.471	0	1
Married	1005960	.694	.461	0	1
College education	1005960	.203	.402	0	1
Age	1005960	34.7	8.404	18	65
Monthly income (yuan)	1005960	5990	10179	700	249000
Housing purchases from					
City of residence	1005960	.851	.356	0	1
Other cities in home province	1005960	.131	.337	0	1
Other provinces	1005960	.018	.134	0	1
Apartment and loan characteristics					
Area (square meters)	1005960	113.2	46.571	21	797
Loan maturity (month)	1005960	188.5	73.622	12	360
Loan to value	1005960	.648	.121	.100	.800

Table 2 Average Purchase Price (per Square Meter) by Power Status and Location

Region of purchase	All buyers	Bureaucrats	Bureaucrats in critical agencies	Bureaucrats with higher rank	Bureaucrats in provincial government
City of residence	3789	3659	3458	3650	5477
Other cities in home province	3471	3454	3534	3848	4354
Other provinces	4830	3802	3551	4996	5372

Table 3 Correlations in Characteristics between Bureaucrats and Apartments/Mortgage Loans

	Dependent variable				
	(1)	(2)	(3)	(4)	(5)
	Size (log)	Loan to Value Ratio	Loan Maturity (log)	Monthly Income (log)	Relative Complex price
Bureaucrats	.0044***	-.0183***	.0480***	-.1414***	.0027
	(.0018)	(.0007)	(.0015)	(.0041)	(.0030)
Critical agencies	.0163***	-.0208***	.0481***	-.1465***	.0102
	(.0053)	(.0023)	(.0056)	(.0164)	(.0068)
Non-critical agencies	.0037***	-.0181***	.0480***	-.1411***	.0023
	(.0013)	(.0007)	(.0016)	(.0042)	(.0031)
High rank	.0100***	-.0067***	.0367***	-.0900***	.0073
	(.0044)	(.0024)	(.0075)	(.0099)	(.0130)
Low rank	.0054***	-.0190***	.0520***	-.1298***	-.0017
	(.0013)	(.0007)	(.0016)	(.0043)	(.0031)
Provincial gov't	.0332	-.0352***	.0191	-.0942***	.0430
	(.0246)	(.0061)	(.0118)	(.0308)	(.0782)
Lower-level gov't	.0039***	-.0180***	.0485***	-.1421***	.0020
	(.0013)	(.0007)	(.0016)	(.0041)	(.0027)

Note: We run size, loan to value ratio, maturity, and monthly income on bureaucrats or in critical and non-critical agencies or in high and low rank or in provincial government and lower-level government, female, marital status, age, age squared, complex location, building, floor level, last digit of room number, purchasing time, and residence province. We run relative complex price (i.e., average complex price relative to the city average price) on the same set of explanatory variables as the previous three regressions except that complex location dummies are replaced by city dummies. All standard errors are clustered at the level of complex locations.

Table 4 The Characteristics of Bureaucrats in the Housing Market: Probit Model

	Dependent variable: Bureaucrat=1		
	(1)	(2)	(3)
Relative complex price	.016***	.103***	.065***
	(.007)	(.012)	(.012)
Relative apartment size	.063***	.138***	.083***
	(.007)	(.009)	(.010)
Female		-.180***	-.166***
		(.005)	(.004)
Married		.018***	.023***
		(.005)	(.005)
College education		.560***	.545***
		(.009)	(.009)
Age		.016***	.004**
		(.002)	(.002)
Age squared		1.09E-5	1.80E-4***
		(2.34E-5)	(2.40E-5)
Monthly income (log)		-.068***	-.062***
		(.001)	(.001)
Loan maturity (log)			.178***
			(.008)
Loan to Value			-.916***
			(.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	1005960	1005960	1005960
Pseudo R-sq	.035	.085	.088

Note: Relative apartment size is defined as ratio of 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 *.

Table 5 The Bureaucrat Discount of Apartment Prices

	Dependent variable: log(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	-.0372***	-.0069***	-.0088***	-.0105***
	(.0057)	(.0013)	(.0014)	(.0014)
Apartment area (log)			-1.2432***	-1.1865***
			(.0538)	(.0526)
Apartment area squared			.1416***	.1338***
			(.0058)	(.0057)
Loan maturity (log)			.0361***	.0525***
			(.0018)	(.0022)
Loan to value			-.0223***	-.0392***
			(.0045)	(.0047)
Female				.0139***
				(.0007)
Married				.0020***
				(.0007)
College education				.0150***
				(.0013)
Age				-.0019***
				(.0002)
Age squared				4.25E-5***
				(3.44E-6)
Monthly income (log)				.0216***
				(.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	1005960	1005960	1005960	1005960
R-sq	.000	.908	.911	.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 *.

Table 6 The Hierarchical and Critical Gradients of Power on Apartment Prices

	Dependent variable: log(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in critical agencies	-.0248***			
	(.0049)			
Bureaucrats in non-critical	-.0097***			
agencies	(.0014)			
Bureaucrats in high rank		-.0138*		
		(.0071)		
Bureaucrats in low rank		-.0103***		
		(.0013)		
Bureaucrats in provincial			-.0390**	
government			(.0179)	
Bureaucrats in lower-level			-.0100***	
government			(.0014)	
Bureaucrats in critical				-.0371***
agencies*high rank				(.0195)
Bureaucrats in critical				-.0244***
agencies*low rank				(.0050)
Bureaucrats in non-critical				-.0123*
agencies*high rank				(.0072)
Bureaucrats in non-critical				-.0096***
agencies*low rank				(.0013)
Observations	1005960	1005960	1005960	1005960
R-sq	.913	.913	.913	0.913

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

Table 7 The Geographical Gradient of Power on Apartment Prices

	Dependent variable: log(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	-.0107***	-.0124***	-.0108***	-.0126***
	(.0014)	(.0017)	(.0014)	(.0017)
Bureaucrats* buying in other cities of home province		.0088***		.0091***
		(.0024)		(.0024)
Bureaucrats*buying in other provinces			.0093*	.0111**
			(.0053)	(.0053)
Buying in other cities of home province	.0074**	.0064*	.0074**	.0064*
	(.0037)	(.0037)	(.0037)	(.0037)
Buying in other provinces	.0172***	.0172***	.0166***	.0165***
	(.0037)	(.0037)	(.0037)	(.0037)
Observations	1005960	1005960	1005960	1005960
R-sq	.913	.913	.913	.913

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

Table 8 Interactions of Geographical and Critical Dimensions of Powers: Critical vs. Non-critical Agencies

	Dependent variable: log(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in critical agencies	-.0252***	-.0273***	-.0254***	-.0276***
	(.0049)	(.0059)	(.0049)	(.0060)
Bureaucrats in non-critical agencies	-.0099***	-.0116***	-.0101***	-.0118***
	(.0014)	(.0016)	(.0014)	(.0016)
Bureaucrats in critical agencies*buying in other cities in home province		.0101*		.0104*
		(.0059)		(.0060)
Bureaucrats in non-critical agencies*buying in other provinces			.0148	.0170
			(.0290)	(.0292)
Bureaucrats in non-critical agencies *buying in other cities in home province		.0089***		.0091***
		(.0024)		(.0024)
Bureaucrats in non-critical agencies *buying in other provinces			.0089*	.0106**
			(.0053)	(.0054)
Buying in other cities in home province	.0075**	.0064*	.0075**	.0064*
	(.0037)	(.0037)	(.0037)	(.0037)
Buying in other provinces	.0172***	.0172***	.0167***	.0165***
	(.0037)	(.0037)	(.0037)	(.0037)
Observations	1005960	1005960	1005960	1005960
R-sq	.913	.913	.913	.913

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

Table 9 Interactions of Geographical and Hierarchical Dimensions of Powers: High vs. Low Rank Bureaucrats

	Dependent Variable: log(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in low rank	-.0105***	-.0121***	-.0107***	-.0123***
	(.0013)	(.0016)	(.0013)	(.0016)
Bureaucrats in high rank	-.0142**	-.0199*	-.0148**	-.0210**
	(.0071)	(.0103)	(.0071)	(.0103)
Bureaucrats in low rank *buying in other cities of the same province		.0084***		.0086***
		(.0024)		(.0024)
Bureaucrats in low rank *buying in other provinces			.0088	.0104*
			(.0056)	(.0056)
Bureaucrats in high rank *buying in other cities of the same province		.0179*		.0189*
		(.0109)		(.0110)
Bureaucrats in high rank *buying in other provinces			.0174	.0235
			(.0287)	(.0288)
Buying in other cities of the same province	.0074**	.0064*	.0075**	.0064*
	(.0037)	(.0037)	(.0037)	(.0037)
Buying in other provinces	.0172***	.0172***	.0167***	.0165***
	(.0037)	(.0037)	(.0037)	(.0037)
Observations	1005960	1005960	1005960	1005960
R-sq	.913	.913	.913	.913

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

Table 10A: Robustness Checks

	Dependent variable: log(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	-.0109***	-.0129***	-.0135***	-.0176***
	(.0014)	(.0017)	(.0018)	(.0024)
Buying in other cities of the same province	.0077**	.0066*	.0076**	.0060*
	(.0038)	(.0038)	(.0036)	(.0037)
Buying in other provinces	.0174***	.0167***	.0168***	.0157***
	(.0038)	(.0038)	(.0036)	(.0036)
Bureaucrats* buying in other cities of the same province		.0093***		.0138***
		(.0025)		(.0030)
Bureaucrats*buying in other provinces		.0105*		.0160***
		(.0055)		(.0055)
Observations	964996	964996	647649	647649
R-sq	.911	.911	.901	.901

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

Table 10B: Robustness Checks

	Dependent variable: log(price)			
	Sub-sample III		Sub-sample IV	
	At least one buyer from other cities in the same province in each complex		Sub-sample II ∩ Sub-sample III	
	(1)	(2)	(3)	(4)
Bureaucrats	-.0108***	-.0127***	-.0137***	-.0177***
	(.0014)	(.0017)	(.0018)	(.0024)
Bureaucrats* buying in other	.0078*	.0066	.0080**	.0063
cities of the same province	(.0040)	(.0040)	(.0040)	(.0040)
Bureaucrats*buying in other	.0206***	.0198***	.0204***	.0193***
provinces	(.0041)	(.0041)	(.0040)	(.0028)
Buying in other cities of the		.0090***		.0137***
same province		(.0025)		(.0030)
Buying in other provinces		.0091**		.0138**
		(.0053)		(.0055)
Observations	805640	805640	587191	587191
R-sq	.906	.906	.896	.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 5. We report standard errors clustered at the complex level. The significance levels of 1%, 5%, and 10% are noted by ***, **, and *.

Table 11A The Information Advantage of Bureaucrats: General

	Dependent variable: Whether to buy in the first 3 months		
	(1)	(2)	(3)
Bureaucrats	.0029	.0018	-.0082
	(.0028)	(.0032)	(.0739)
Buying in other cities in the same province	-.0268***	-.0276***	-.0192**
	(.0069)	(.0069)	(.0085)
Buying in other provinces	-.0259***	-.0258***	-.0047
	(.0082)	(.0082)	(.0145)
Bureaucrats *buying in other cities in the same province		.0066	.0025
		(.0065)	(.0109)
Bureaucrats *buying in other provinces		-.0016	.0527
		(.0159)	(.0553)
Complex price growth			.0995***
			(.0347)
Bureaucrats *complex price growth			.0200
			(.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	380255	380255	380255
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 11B 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	-.0198***	-.0133	-.0683
	(.0095)	(.0107)	(.1229)
Bureaucrats in non-critical agencies	.0041	.0026	-.0049
	(.0028)	(.0032)	(.0760)
Buying in other cities in the same province	-.0268***	-.0276***	-.0192**
	(.0069)	(.0069)	(.0085)
Buying in other provinces	-.0259***	-.0258***	-.0047
	(.0082)	(.0083)	(.0145)
Bureaucrats in critical agencies *buying in other cities in the same province		-.0313	-.0252
		(.0251)	(.0280)
Bureaucrats in non-critical agencies *buying in other cities in the same province		-.0380	.0041
		(.0779)	(.0110)
Bureaucrats in critical agencies *buying in other provinces		.0088	.0280
		(.0066)	(.0856)
Bureaucrats in non-critical agencies *buying in other provinces		-.0005	.0531
		(.0164)	(.0569)
Complex price growth			.0995***
			(.0347)
Bureaucrats in critical agencies *complex price growth			.0608
			(.1170)
Bureaucrats in non-critical agencies *complex price growth			.0177
			(.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	380255	380255	380255
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 11C 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	-.0251	.0180	-.6770*
	(.0237)	(.0223)	(.3979)
Bureaucrats in low rank	.0027	.0016	-.0175
	(.0028)	(.0032)	(.0746)
Buying in other cities in the same province	-.0268***	-.0276***	-.0193**
	(.0069)	(.0069)	(.0085)
Buying in other provinces	-.0259***	-.0258***	-.0046
	(.0082)	(.0083)	(.0145)
Bureaucrats in high rank *buying in other cities in the same province		.1239	.1873
		(.1385)	(.1509)
Bureaucrats in low rank*buying in other cities in the same province		.0066	.0037
		(.0065)	(.0109)
Bureaucrats in high rank *buying in other provinces		.1047	.0238
		(.1402)	(.0158)
Bureaucrats in low rank*buying in other provinces		-.0004	.0461
		(.0016)	(.0568)
Complex price growth			.0995***
			(.0346)
Bureaucrats in high rank *complex price growth			.8891**
			(.3991)
Bureaucrats in low rank *complex price growth			.0272
			(.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	380255	380255	380255
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 11D 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.	-.0230	-.0135	-.1980
	(.0205)	(.0223)	(.2091)
Bureaucrats in low-level govt.	.0033	.0020	-.0062
	(.0028)	(.0032)	(.0740)
Buying in other cities in the same	-.0269***	-.0276***	-.0192**
province	(.0069)	(.0069)	(.0085)
Buying in other provinces	-.0259***	-.0258***	-.0048
	(.0082)	(.0083)	(.0145)
Bureaucrats in prov. govt. *buying in		-.0430	.0234
other cities in the same province		(.0600)	(.0587)
Bureaucrats in lower-level govt.*buying		.0069	.0020
in other cities in the same province		(.0065)	(.0109)
Bureaucrats in prov. govt. *buying in		-.0997	-.1073
other provinces		(.0811)	(.0638
Bureaucrats in lower-level govt.*buying		.0023	.0586
in other provinces		(.0016)	(.0564)
Complex price growth			.0995***
			(.0346)
Bureaucrats in prov. govt. *complex price			.1500
growth			(.1973)
Bureaucrats in lower-level govt.*complex			.0188
price growth			(.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	380255	380255	380255
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 12 The Information Advantage of Bureaucrats: Price Dispersion

	Dependent variable: log(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	-.0367***			
	(.0079)			
Bureaucrats in critical		-.0356*		
agencies		(.0192)		
Bureaucrats in non-critical		-.0365***		
agencies		(.0079)		
Bureaucrats in high rank			.0468	
			(.0534)	
Bureaucrats in low rank			-.0419***	
			(.0073)	
Bureaucrats in provincial				-.2599**
government				(.1033)
Bureaucrats in lower-level				-.0352***
government				(.0079)
Bureaucrats* city dispersion	.0129***			
	(.0037)			
Bureaucrats in critical		.0052		
agencies * city dispersion		(.0098)		
Bureaucrats in non-critical		.0131***		
agencies * city dispersion		(.0037)		
Bureaucrats in high rank *			-.0297	
city dispersion			(.0030)	
Bureaucrats in low rank *			.0154***	
city dispersion			(.0033)	
Bureaucrats in provincial				.0947***
government * city dispersion				(.0353)
Bureaucrats in lower-level				.0123***
government * city dispersion				(.0037)
Observations	1005960	1005960	1005960	1005960
R-sq	.913	.913	.913	0.913

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

Table 13 Price Discounts of Government Officials and Firms' Expenditure on ETC

	Dependent variable: Coefficient on "Bureaucrats in critical agencies"			
	(1)	(2)	(3)	(4)
Average Entertainment Expenditures (log)	-.038**	-.031*		
	(.018)	(.017)		
Average Meeting Expenditures (log)			-.042*	-.038*
			(.023)	(.023)
City GDP per capita (log)		-.022		-.018
		(.020)		(.019)
Observations	99	99	99	99
R-sq	.067	.074	.132	.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 6, 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 *.

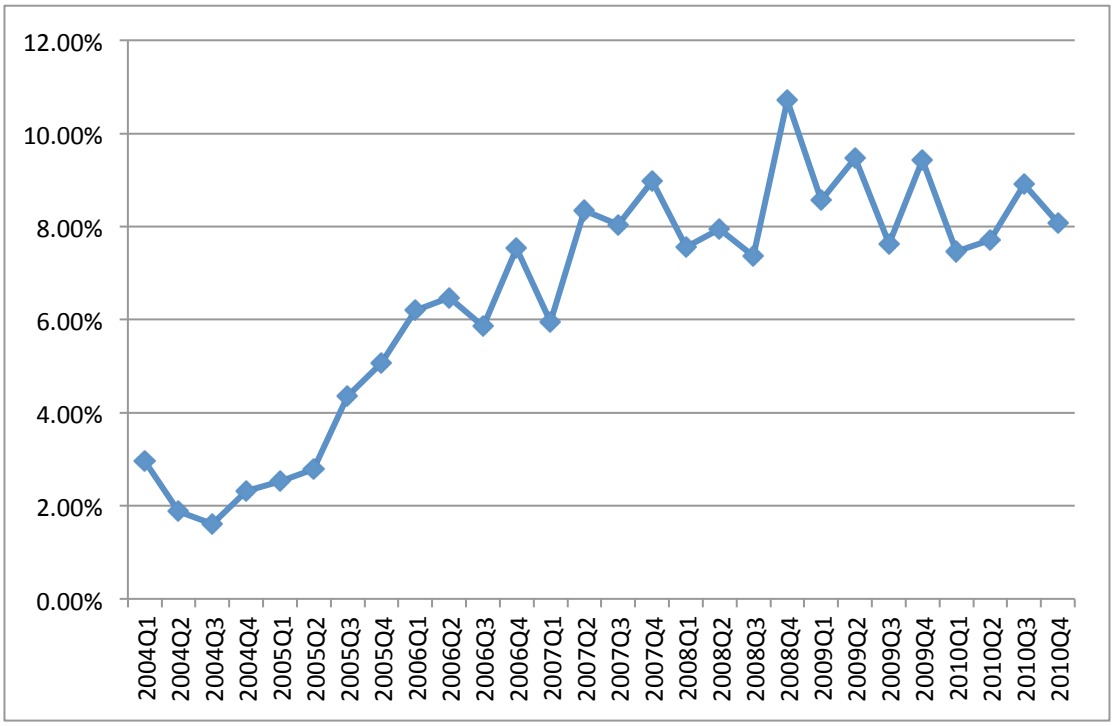


Figure 1: The Share of Bureaucrats in Housing Purchasers: 2004-2010

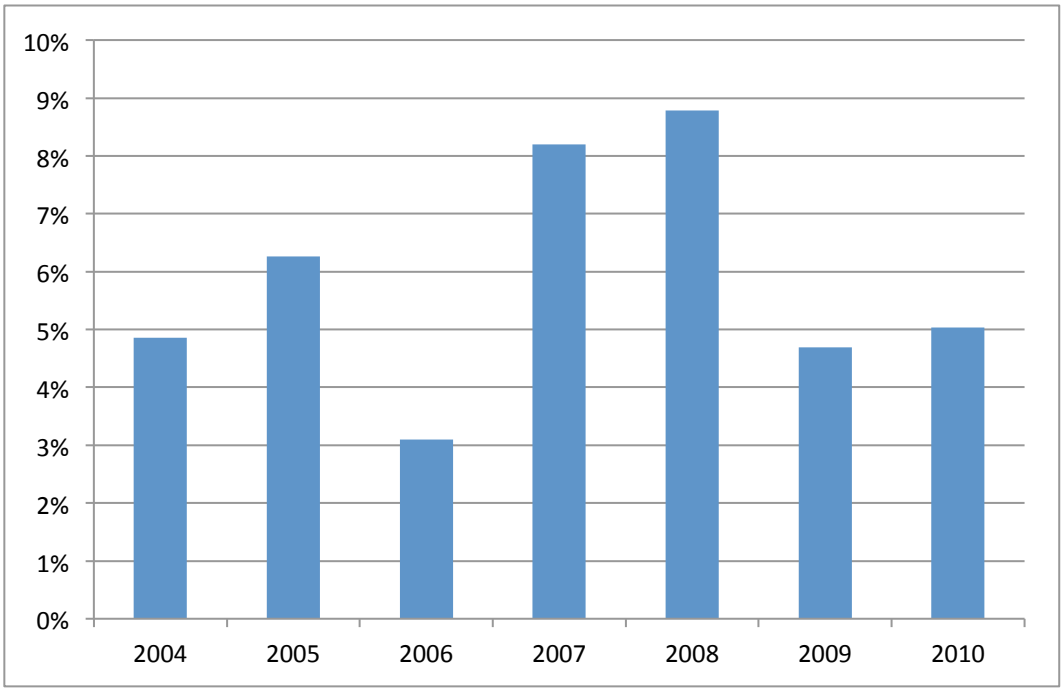


Figure 2: Average Percentage Difference in Per Square Meter Prices by Bureaucrat Buyers and Non-Bureaucrat Buyers, by Year.