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THE GRADIENTS OF POWER:  
EVIDENCE FROM THE CHINESE HOUSING MARKET

Hanming Fang  
Quanlin Gu  
Li-An Zhou

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**ABSTRACT**

Using a large, unique dataset on the Chinese housing market, we propose to measure corruption using the price differences paid by bureaucrat buyers and non-bureaucrat buyers in the housing market. We find that the housing price paid by bureaucrat buyers is on average 1.05 percentage points lower than non-bureaucrat buyers, after controlling for a full set of characteristics of buyers, houses and mortgage loans. More interestingly, we find that the bureaucrat price discounts exhibit interesting *gradients* with respect to their hierarchical ranks, the 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 to be driven by alternative explanations, thus they are evidence of corruption and measures of the market value of government power.

Hanming Fang  
Department of Economics  
University of Pennsylvania  
3718 Locust Walk  
Philadelphia, PA 19104  
and NBER  
hanming.fang@econ.upenn.edu

Li-An Zhou  
Guanghua School of Management  
Peking University  
Beijing 100871  
CHINA  
zhoula@gsm.pku.edu.cn

Quanlin Gu  
Guanghua School of Management  
Peking University  
Beijing 100871  
CHINA  
linng@gsm.pku.edu.cn

# 1 Introduction

The discretionary power of government officials often puts them in a position to seek rents and engage in other corrupt 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 it. Olken and Pande (2011) provide an excellent survey on the recent advances in the literature regarding these questions.<sup>1</sup>

Due to its illicit and secretive nature, measuring corruption and its impact are often hindered by the lack of reliable data (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 survey questions about the 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 these types of datasets are advantageous in that they are available for a large number of countries, their reliability has been challenged on the grounds that people’s perceptions about corruption could be seriously biased and it is hard, if not impossible, to make cross-country comparisons since people from different countries may have very different understandings of the subject of corruption (Rose-Ackerman, 1999; Olken, 2009).

Significant advances in the literature were achieved during the last decade regarding the measurement, determinants and consequences of corruption using a variety of micro-level and objective evidence (see Oklen and Pande, 2011, for a detailed review). One method is to estimate corruption by *direct observation*. For example, McMillan and Zoido (2004) use records kept by a police chief in Peru on the bribes he paid to judges, politicians and the news media, which became public after the fall of the Fujimori regime, to estimate the cost of bribing various officials. Bertrand *et al.* (2007) and Olken and Barron (2009) measure corruption via direct observations in the field on bribery payments made by, respectively, drivers seeking driving licences to officials and truck drivers to local police on their routes.

A second method to measure corruption is by “*subtraction*” or “*cross-checking*.” For example, Reinikka and Svensson (2004) use the Public Expenditure Tracking Survey to estimate the leakage of government funds by comparing the amount of a special education block grant allocated from the central government in Uganda with the amount of the block grant received by schools. They find an initial rate of leakage of 87 percent, which fell to less than 20 percent after the release of an audit report. Fisman and Wei (2004)

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<sup>1</sup>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.

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 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 rural road projects in Indonesia by examining the officially claimed amount of money spent on the road with the cost estimates obtained from independent engineers. He finds that the difference accounts for about 24 percent of the total cost of the road.<sup>2</sup>

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 he 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 firms.<sup>3</sup> 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 the public and private sectors. Using a household survey from Ukraine, they find that, controlling for education, hours of work, job security, fringe benefits and other job characteristics, public sector workers received 24-32 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 public and private sector earnings is comprised of bribes. Khwaja and Mian (2005) examine corruption by the politically connected firms in Pakistan by showing how the political connectedness of a firm, as measured by whether its directors participate in elections, affects the amount of loans it is able to obtain from the banks and the associated default rates. They find that politically connected firms borrow 45 percent more and have 50 percent higher default rates; moreover, somewhat surprisingly, such preferential treatment exclusively involved 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 in 2012. China’s housing market offers a unique setting for studying corruption since it is notorious for the prevalence of corruption and

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

<sup>3</sup>Similar event studies using market inference include Faccio (2006) and Fisman *et al.* (2012).

rent-seeking activities, as a result of heavy state regulation of the real estate market.<sup>4</sup> In every phase of real estate development, from the initial land taking and auctions, to the approval of architectural designs, to sales licenses, real estate developers need support from bureaucrats in various government agencies in order to get favorable treatment. The discretionary power of the bureaucrats in these approval steps invites rent-seeking and corruption, making China’s housing market an ideal context to quantify corruption.<sup>5</sup>

Our empirical methodology is in the spirit of the “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 incomes than other buyers in the housing market, they are more likely to buy apartments in relatively more expensive apartment complexes, and to buy larger apartments. Second, after controlling for a detailed set of characteristics of buyers, apartments (including controls as detailed as the floor number, the apartment complex, and the orientation of the apartment unit) and mortgage loans, we find that bureaucrat buyers receive about a 1.05 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 as a result of receiving price discounts from real estate developers (second fact). We interpret the second fact as suggestive evidence that the bureaucrat buyers receive price discounts as a form of bribery.

More interestingly, our data set contains information about the hierarchical ranks of bureaucrats and the government agencies for which they work. This allows us to examine the *gradients* of the market value of power measured by *hierarchy*, by *criticality* and by *geography*. We measure hierarchy by the rank of the bureaucrat, criticality by the importance of the government agency to real estate development, and geography by whether the bureaucrat works in the city where the housing transaction takes place. We find that bureaucrats working in the agencies critical for real estate development or having a higher ranking in the official hierarchy receive larger price discounts in their housing purchases. For instance, we find that bureaucrats from critical agencies receive a 2.48 percent price discount, while bureaucrats from other agencies only obtain a 0.98 percent price discount. Bureaucrats working for provincial governments enjoy an even higher price discount of approximately 3.9 percent, price discount.<sup>6</sup> We find that the effect of

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<sup>4</sup>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.

<sup>5</sup>For example, Cai, Henderson and Zhang (2013) present strong evidence on corruption in China’s urban land auctions.

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

government power on price discounts decreases substantially when bureaucrats leave their jurisdictions and buy houses in other jurisdictions. We also find evidence that bureaucrats with lower rankings but in critical agencies may enjoy larger price discounts than those with high rankings but not working in critical agencies.

Compared with the 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 and includes more than a million transactions. This allows us to assess corruption on a nationwide scale in a highly important sector of the Chinese economy.

Second, to the best of our knowledge, our paper is the first to show direct evidence of the hierarchical, critical and geographical gradients of the market value of bureaucratic power; moreover, we employ differences in these power gradients to interpret price discounts as a measure of corruption.

The most serious challenge to the cross-checking approach to measuring 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 difficult to tell whether the missing resources observed in the data are actually corruption or simply mismeasurement of the indicators or even just a sign of bureaucrat incompetence. Our rich dataset allows us to tackle this issue in a number of ways. We try to control for a full set of characteristics to capture the heterogeneity in house location and other attributes (down to floor level and window orientation) as well as buyers' and loan characteristics. More importantly, we differentiate the effects of power on price discounts by criticality of agencies, hierarchical ranks and geographical locations. Our empirical findings are consistent with our hypotheses on the differential values of power in the housing market, varying with rank, level, and jurisdiction of power. We also find collaborative correlations between our measure of corruption (i.e. price discounts received by bureaucrats) and other variables, in particular the Entertainment and Travel Costs (ETC) measure of corruption proposed by Cai, Fang and Xu (2011).

The remainder of the paper is organized as follows. In Section 2 we describe the institutional background of China's housing market and the potential involvement of bureaucrats; in Section 3 we develop several testable hypotheses regarding the gradients of power as a measure of corruption in the housing market; in Section 4 we provide details of our data set and descriptive statistics; in Section 5 we present our main empirical results; in Section 6 we discuss and cast doubt on several key alternative explanations for our empirical findings; in Section 7 we present collaborative evidence in support of our interpretation of bureaucrat price discounts as a measure of corruption; and in section 8 we conclude.

## 2 Institutional Background

### 2.1 China's Housing Market

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

According to a report published by the People's Bank of China in 2013, financial institutions made a total of 8.1 trillion RMB in mortgage loans in 2012, accounting for 16 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.<sup>7</sup>

In order to be eligible for mortgage loans, the applicants are required to meet a set of conditions, such as stable income flows, age ranging between 18 and 60, good credit records, and a down payment of no less than 20 or 30 percent of the purchase price of the house. To substantiate a stable income flow, applicants must provide proof for their monthly income certified by their employers and supported by their bank payment records. The minimum down-payment ratio has varied substantially over time, as it is subject to the PBC regulation and is often used as a policy instrument to address volatile housing prices. The maximum maturity of mortgage loans is 30 years. In 2004, China Banking Commission released guidelines for the risk management of mortgage loans for commercial banks which stipulate that the monthly mortgage payment to income ratio of borrowers should be no higher than 50 percent. The interest rates of mortgage loans are set by the PBC and are adjustable; 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 buyers) and the banks is typically mediated by real estate developers. When an individual decides to buy an apartment in a certain complex, he or she will sign mortgage contracts with a commercial bank designated by the real estate developer of the complex. It is very rare for buyers to choose a commercial bank different from the one designated by the developer for two reasons. First, real estate developers need sizable loans from

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<sup>7</sup>They are: Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC), and Agricultural Bank of China (ABC).

a commercial bank to construct houses. To avoid potential risks, commercial banks will conduct due diligence to check the real estate developer's qualifications and home construction plans before entering collaboration with them. Commercial banks make use of their strong bargaining power in lending to ask for a bundling of future mortgage loans and construction loans. Second, due to heavy state regulation in the mortgage market, there is limited room for product differentiation, and mortgage contracts offered by commercial banks are highly homogenous. Therefore, home buyers as borrowers lack incentives to look for better mortgage deals when there is one already offered through the mediation of the real estate developer. Home buyers' lack of free choice of commercial banks facilitates our empirical analysis because once the fixed effects of complexes are controlled for, we do not need to worry about the endogenous matching of commercial banks and housing buyers, which could lead to potential concerns about the endogeneity of observed mortgage loans.

Prior to October 2010, individuals from other regions of China were as eligible for mortgage loans as local residents. During the past decade, rapidly rising housing prices in China's first-tier cities have attracted many buyers from other areas in the country. However, this trend came to an abrupt halt in October 2010 when the Chinese central government started to impose a house quota (up to 2 apartments) for each household with a local household registration (i.e., local *Hukou*), and prohibited residents without a local household registration from buying local houses. Other first-tier cities, such as Shanghai, Guangzhou, and Shenzhen quickly followed suit and established similar restrictions on housing purchases. Many second-tier cities, such as Hangzhou and Qingdao, have also formulated since late 2010 new policies to cool down speculative investment in the housing market.

## 2.2 Bureaucrats in China's Housing Market

Chinese bureaucrats are important players in the housing market. On the one hand, bureaucrats like to use bribery income to invest in the housing market in order to maximize their returns on investment. China's strong economic growth and massive urbanization during the past decade have resulted in rapidly increasing housing prices, generating handsome returns on housing investments. Encouraged by the booming prospects in the housing market, most Chinese bureaucrats regard real estate property as the most lucrative investment channel. The absolute majority of bureaucrats charged with corruption are reported to own multiple houses in big cities in China, sometimes even dozens of houses.<sup>8</sup> On the other hand, the power held by bureaucrats is critical for real estate developers to get projects done. In China, the design, construction and sale of houses is subject to regulation by the state. During this process, real estate developers have to go through numerous government agencies for approval and each government

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<sup>8</sup>A recent well-known corruption case involved a bureaucrat in the housing administration bureau in Guangdong who owned over 49 houses around the country. He was dubbed as "Uncle House" by the Chinese news media.



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

### 3 Hypotheses on the Gradients of Power in the Housing Market

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

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

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

**Hypothesis 2: (Hierarchical Gradient)** *All else being equal, bureaucrats with higher rankings will pay a lower price than bureaucrats with lower rankings.*

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

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

It is possible that bureaucrats with lower rankings but from critical agencies may receive greater price discounts than bureaucrats with higher rankings but who are from non-critical agencies.

Any power has its boundaries of influence. A government bureau leader may seem powerful in the eyes of real estate developers in the jurisdiction over which that bureaucrat exercises decision-making power, but for developers doing business in other jurisdictions, this individual may not be that important. This suggests that the effect of power on rent-seeking depends greatly upon geographical distance or jurisdictional scope. However, going out of a given jurisdiction may not make bureaucrats lose their influence on businesspeople completely, since they may have some ties with bureaucrats in other jurisdictions. However, while these indirect connections still yield some benefits to bureaucrats beyond their power areas, typically they are not as strong. The natural implication derived from this discussion yields the following hypothesis:

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

## 4 Data and Descriptive Statistics

The data used in this paper are compiled from mortgage contracts provided by a large commercial bank in China that accounts for about 15 percent of the mortgage loan market in China as of 2012.<sup>9</sup> Restricting

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<sup>9</sup>We do not release the name of the commercial bank for reasons of confidentiality.

the sample to mortgages for new, residential properties yields over 1 million mortgage loan contracts dating from the first quarter of 2004 to the fourth quarter of 2010. As mentioned above, the 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, employer, education, occupation, and region and address of residence), housing price and size, apartment-level characteristics (e.g. complex location, floor level, and room number), as well as loan-level characteristics (e.g. maturity, loan to value ratio, and down-payment). Our data also contain information on the hierarchical levels and job title of the buyers and their employers. For the purposes of our analysis, we exclude mortgages in the following cases from our data sample: (1) mansions; (2) employer-financed housing construction; and (3) instances when employees from given employer (including government agencies) band together to obtain group price discounts from the real estate developers; and (4) instances where the number of transactions in a complex is *less than 5*.<sup>10</sup> After deleting these observations, we end up with a sample of 1,005,960 observations.

[Table 1 About Here]

Table 1 presents summary statistics for the key variables used in our analysis. The average housing price in our sample period is 3,765.3 RMB per square meter with a large variation (the standard deviation is 3,196 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 of home buyers 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 transactions are in cities outside of the buyer’s 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 percent.

[Figure 1 About Here]

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

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<sup>10</sup>We will do robustness checks in Section 5.4 by changing the threshold number of transactions in a complex.

functions.<sup>11</sup> 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.<sup>12</sup> During 2004-2010, we see a clear trend of the 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. This share rose to about 11 percent in the first quarter of 2009, and has since remained steady at about 8-9 percent. In addition, about 4 percent of the sample of bureaucrats have *Ke* or higher rank. *Ke* refers to a hierarchical ranking which is equivalent to a bureau chief in a county-level government, or a section chief in a prefecture-city level bureau. We define this group of bureaucrats as “*bureaucrats in high rank*” in the subsequent analysis. In order to examine the differential effect of power, we distinguish some “*critical*” government agencies from others from the viewpoint of real estate developers. We denote bureaus such as the development and reform committee, housing administration, land administration, and construction planning as “critical agencies”. As described in Section 2, bureaucrats in these agencies hold critical authority to decide whether to approve the real estate developers’ applications and under what terms. In our sample, about 6 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 of the homes purchased by bureaucrats compared with 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. We find that 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 a 6 percent price discount in perspective, suppose a government official wants to buy an “average” apartment with a size of 113 square meters, and the market price is 3,765 RMB per square meter. A 6 percent price discount saves a bureaucrat buyer about 25,536 RMB in purchase price. This is approximately equivalent to one year of salary for government employees in most regions in China. 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 (e.g. complex location) and other characteristics of the buyer and loans. In our analysis in Section 5 we will control for these differences.

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<sup>11</sup>Public institutions in China mainly engage in commercial business (e.g. product quality examination centers) and social services (e.g. university and research institutions). Employees in public institutions do not hold administrative power which is critical for private firms to conduct business, and they are not regarded as “civil servants” in China’s social welfare system.

<sup>12</sup>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.

[Table 2 About Here]

Table 2 presents the average housing prices per square meter by power status (hierarchy and rank) and by geography (located in city of residence, in other cities in the home province, and in other provinces). The average housing prices calculated here do *not* adjust for any differences in housing characteristics. For the housing purchased within a buyer’s city of residence, bureaucrats paid 3,659 RMB per square meter, in contrast to the average price of 3,789 RMB per square meter for all buyers. The average price per square meter for bureaucrat buyers from critical government agencies is even lower at 3,458 RMB. Without controlling for other characteristics of the housing and loans, we find that bureaucrats with higher rankings pay about 3650 RMB per square meter, not so different from the average price for all bureaucrats; and bureaucrats from provincial governments 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 of controlling for city fixed effects in our subsequent analysis in order to examine the differential effect of hierarchical rankings and territorial levels. Table 2 also shows that if bureaucrats purchase houses in cities outside of their registered city of residence, they still enjoy some price discounts, including when they go out to other provinces. In this case, bureaucrats from critical agencies also enjoy higher discounts than those from other agencies not critical to real estate development.

[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 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 patterns:

- 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.

Similar patterns 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 list most

of the controls, we find that bureaucrat dummy is positively correlated with more expensive apartment complexes, 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 larger sizes despite their relatively lower incomes. The first 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 of the power of being a bureaucrat, including potential in-kind benefits that bureaucrats receive compared with non-bureaucrats, and potential bribes. This is consistent with the findings in Gorodnichenko and Peter (2007) who show that public sector employees receive 24-32 percent less wages than their counterparts in the private sector, but that they enjoy essentially identical level of consumption expenditures and asset holdings, indicating the presence of non-reported compensation in the public sector. In contrast, the second explanation is a measure of the value of the 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 the 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:

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

where  $y_{ijt}$  denotes the logarithm of apartment price per square meter in transaction  $i$  in complex location  $j$  at time of purchase  $t$ ;  $\text{Bureaucrat}_{ijt}$  is a dummy variable indicating whether the buyer of the transaction is a government official according to our definition, and  $\mathbf{X}_{ijt}$  denotes a vector of controls for the characteristics of buyers, apartments and mortgage loans involved in the transaction. One of the serious challenges in estimating the determinants of housing price is the considerable heterogeneity of apartments. Apartments differ in locations, floor level, window orientation, and time of construction, and prices respond to all of these characteristics. In order to address concerns about the effect of housing heterogeneity on prices, we control for a set of fixed effects including complex location ( $\sigma_j$ ) and transaction time in months ( $u_t$ ), as

well as city of residence of buyers. In China’s housing market, buyers are not only sensitive to complex locations, but also floor levels and apartment orientation, so housing prices vary significantly across these attributes. In the following regressions, besides controlling for complex-level fixed effects, we also control for floor level and room number of the apartment.<sup>13</sup>

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 choose to purchase apartments in certain complex locations, due to some unobserved heterogeneity of apartment characteristics, which will bias our estimation. Therefore, a full set of controls for the characteristics of buyers as well as apartments (e.g. 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: Price 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 observations is over 1 million. We report results from four specifications with different sets of controls. In Column 1, we only include a dummy for bureaucrat. We find that, without any additional controls, bureaucrat buyers pay about 3.72 percent less than non-bureaucrat buyers for their apartment purchases. Notice that the difference between the 6 percent average bureaucrat discount we calculated in Figure 2 and the 3.72 percent discount reported in Column 1 is driven by the fact that complex location and month of transactions are controlled for in the calculation for Figure 2 but not in Column 1.

[Table 5 About Here]

In Columns 2-4, we add more controls for 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 buyer’s home province. The three specifications differ with regard to the other controls for the buyer, apartment and loan characteristics. With these finer controls, the  $R^2$  is above 90 percent for all remaining three specifications.

Column 2 reports the estimated coefficient on bureaucrats only controlling for the common set of apartment controls listed above, but not controlling for apartment area and its squared term, and the characteristics of buyers and mortgage loans. We find that bureaucrats enjoy a 0.7 percent of price discount compared to other non-bureaucrat buyers, and this difference is significant at the 1 percent level.

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<sup>13</sup>The room number of the apartment is often associated with whether an apartment faces the south or the north and how much of sunshine the apartment can be exposed to the.

For the specification in column 3 we add apartment area and its squared term, loan maturity (log), and loan to value to the regression in Column 2. The price discount of bureaucrats increases to 0.88 percent and is still statistically significant at the 1 percent level. In Column 4, we additionally control for buyers’ personal characteristics, including gender, marital status, college education, age, age squared and monthly income (log). The price discount subsequently increases further to 1.05 percent (see Column 4), and it remains statistically significant at the 1 percent level. These results suggest that government power does convey significant rents to its holders, which strongly supports Hypothesis 1. It is important to note that in each regression we have controlled for a full set of complex and apartment characteristics and exclude the observations involving group purchases. Therefore, the significant price discounts enjoyed by bureaucrats are unlikely driven by the alternative story that bureaucrats tend to choose apartments with undesirable complex locations or undesirable buildings within a complex.

Table 5 also reveals some interesting results regarding other determinants of housing prices in China’s housing market. Apartment prices have a *U*-shaped relation with apartment area, with the minimum price hitting at an area of 81 and 84 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.<sup>14</sup> 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 percent less than non-bureaucrat buyers for “identical apartments” (to the extent that we have sufficiently controlled for the characteristics of the apartments). This is consistent with Hypothesis 1 in Section 3. We now use the rich information about the hierarchical rank, criticality of the government agency and the geographical location of a bureaucrat’s power and the housing transaction to test Hypotheses 2-4 in Section 3.

#### 5.3.1 Hierarchical and Critical Gradients

Hypotheses 2 and 3 state that, all else being equal, bureaucrats with higher rankings or territorial levels, and who work in critical government agencies (for real estate developers), will enjoy larger price discounts in the housing market. We refer to this as the hierarchical and critical gradients of power. Table 6 provides estimation results that support the two hypotheses. Here we differentiate power rank and levels in three ways. First we compare bureaucrats in “critical” agencies with those in non-critical agencies. As mentioned before, connections with bureaucrats in critical agencies are vital for real estate developers. We

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<sup>14</sup>We discuss the possibility of search costs in explaining the findings in Section 6.



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 government 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 receive a 2.48 percent price discount compared with non-bureaucrats, while those from non-critical agencies only enjoy a 0.97 percent price discount. In Column 2, we find that the ranking of the bureaucrats also makes a significant difference in the price discounts they receive: bureaucrats with *Ke* or higher ranking pay 1.38 percent less than non-bureaucrats, while bureaucrat buyers with lower ranking receive a 1.03 lower percent price discount.

In Column 3, we show that bureaucrats working in provincial governments receives a 3.90 percent price discount relative to non-bureaucrat buyers, which is substantially higher than the 1 percent price discount received by bureaucrats working in lower-level governments. These results lend strong support to the notion that the distribution of power to collect rents largely hinges upon the hierarchical ranking/level of the associated government agency and its criticality 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 rankings. One may argue that this result may be driven by the possibility that the bureaucrats in critical agencies may primarily have high rankings, so we do not know whether the larger price discount associated with critical agencies is caused by the agencies' criticality or higher rankings. In order to see more clearly the differential effects of agency criticality vs. hierarchical rankings, we divide bureaucrats into four categories: (a) those in critical agencies with high ranking; (b) those in critical agencies with low ranking; (3) those in non-critical agencies with high ranking; and (4) those in non-critical agencies with low ranking.

Column (4) in Table 6 reports the results for price discounts received by these four types of bureaucrats relative to non-bureaucrat buyers. We can see a very interesting result: while high ranking always conveys larger price discounts for bureaucrats given the criticality of agencies for which they work, low ranking bureaucrats in critical agencies enjoy a price discount doubles that received by bureaucrats from non-critical agencies with high ranking. This finding confirms Hypothesis 3 and provides solid evidence for the importance of the criticality of the government agency relative to hierarchical rank. Bureaucrats who have relatively higher rankings but are not from agencies critical to real estate developers may appear less

powerful than those with low rankings but who are from critical agencies.

The significant difference in price discounts for different hierarchical rank and agency criticality also helps address the previous concern that the effect of government power on housing prices is actually driven by bureaucrats' self-selection of cheaper apartments or unfavorable complex location. It is difficult for this explanation to account for why bureaucrats in critical agencies or with higher ranking are more likely to buy cheaper apartments than those who are either from non-critical agencies or lower ranking.

### 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 reported information about the buyers' city of residence and the city of the housing transaction to judge whether buyers purchase houses outside of their resident cities.<sup>15</sup>

[Table 7 About Here]

Table 7 provides regression results for 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 buyers pay 0.74 percent higher price for properties in cities elsewhere in their home province than in their resident cities. If they purchase outside of their home province, they face even higher prices (an approximately 1.72 percent price premium) than buying in their resident city. Bureaucrat buyers, however, still receive a 1.07 percent price discount on average compared to non-bureaucrat buyers.

In Column 2, we add the interactions of the bureaucrat dummy and the indicators for whether the purchase is in other cities of the home province; in Column 3, we add the interactions of the bureaucrat dummy and the indicators for whether the purchase is in other provinces; and in Column 4 we include both interactions. The results provide strong evidence consistent with Hypothesis 4. For example, Column 2 shows that bureaucrat buyers receive a 1.24 percent price discount 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 a 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.

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<sup>15</sup>This rule is especially accurate for bureaucrats since they usually live in the city where their government agencies are located.

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 bureaucrats 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 government power has to be discounted, and it continuously decreases as they move from their home city to home province to other provinces. This result accords exactly with the prediction of Hypothesis 4, offering strong supporting evidence. Interestingly, Table 7 also shows that even when bureaucrats move outside their home provinces, the market value of their power does not disappear completely. This result indicates that bureaucrats may make use of their nationwide networks to extend the influence of their power across jurisdictions.

### 5.3.3 Interactions of Hierarchical, Critical and Geographical Gradients

So far we have found strong evidence for the bureaucrat discount in Table 5, and we have also established strong evidence for the hierarchical and critical gradients of power in Table 6, as well as the geographical gradient of power in Table 7. In Tables 8 and 9, we investigate the interactions between the hierarchical, critical and geographical dimensions of power and see how the effects of jurisdictional boundaries on rents derived from the government power differ by agencies and ranking.

[Table 8 About Here]

Table 8 focuses on the interactions of the geographical and critical dimensions of bureaucrats' power. Column 1 shows that, even after controlling for whether the house purchase is in other cities in the home province, or whether it is outside of the home province, bureaucrats in critical agencies receive a 2.52 percent price discount while those from non-critical agencies receive a 0.99 percent price discount. This confirms the finding in Table 6 where we did not control for whether the house purchase was in other cities in the home province or outside of home province.

The more interesting finding emerges in Columns 2-4. It shows that if bureaucrats purchase houses outside of their resident city but still within their home province, the value of their power decreases, but the magnitude of the decrease in the price discount depends on the criticality of the bureaucrat's government agency. For bureaucrats from critical agencies, if they purchase houses outside their resident city in their home province, the decrease in the price discounts they receive (or the value of their power) is marginally statistically significant or insignificant. This suggests that they enjoy almost the same amount of price discounts even when they move out of their home jurisdictions. In contrast, when bureaucrats in non-critical agencies make purchases outside their resident city, either within or across provinces, the

price discounts they receive are reduced significantly by 0.89-1.06 percentage points, and the declines are statistically significant. Although bureaucrats in non-critical agencies still receive some amount of price discounts even when they go beyond their own cities to buy houses, just as bureaucrats from critical agencies do, the difference between these two sets of bureaucrats is quite remarkable. Column (4) puts all the interactions terms together, and results remain quantitatively the same. This robust, interesting finding highlights the differential market value of power derived from different government agencies, not only along the critical dimension but also in its interaction with jurisdictional boundaries.

[Table 9 About Here]

Table 9 examines the interaction between the hierarchical and geographical dimensions of power. Column 1 shows that bureaucrats with *Ke* or higher rankings receive a 1.42 percent discount, while those with lower rankings receive a 1.05 percent discount, relative to non-bureaucrat buyers. However, Column 2 shows that both see their discounts decline substantially when they purchase in other cities in their home province. Bureaucrats with high rankings receive a 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. Conversely bureaucrats with lower rankings enjoy a smaller discount in their resident cities, but surprisingly, their discount declines less than the higher-ranked bureaucrats when they purchase in other cities in their home province. Similar results hold in Column 4 when we introduce the interactions between the ranking of the bureaucrats and the indicators for whether the transaction is in other cities in the home province, or in other provinces. This empirical result again suggests the localized nature of the market value of power, as highlighted by the results in Tables 7 and 8: even if high rankings pay off in the housing market in terms of receiving higher price discounts, these benefits decline quickly when moving outside of the bureaucrats’ jurisdiction of power.<sup>16</sup>

#### 5.4 Robustness Checks: Different Sample Section Criterion

In the previous analysis, the analyses were conducted on a sample of housing transactions involving apartment complexes only if each complex has *at least 5* transactions. We now show that our qualitative results are completely robust to an alternative threshold number of *at least 10* transactions for the complex to be included in our analysis sample. Of course, the sample size is now slightly smaller (965,996 instead of 1,005,960). The regression results are reported in Panel “Sub-sample I” in Table 10A. These regressions have the same set of controls as in Column 4 of Table 5. The main results, reported in Column 2, are

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<sup>16</sup>A similar analysis can be done for bureaucrats from provincial governments buying houses elsewhere. However, the number of bureaucrats at the provincial governments buying houses in other cities either within or across provinces is too small (less than 100 in each case) to have enough statistical power to do the regression analysis.

quantitatively similar to our previous findings. Bureaucrats receive a 1.29 percent price discount 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.<sup>17</sup>

[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 to 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 can also restrict our sample to two different cases: in Sub-sample III, we include only transactions in apartment complexes with at least one transaction involving a buyer from other cities in the same province; and in Sub-sample IV, we include transactions in apartment complexes with at least one transaction involving a buyer from other cities in the same province *and* at least one bureaucrat-buyer. The regression results for these two cases are reported in Panel “Sub-sample III” and Panel “Sub-sample IV” respectively in Table 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 market value of government power and a measure of corruption. In this section, we discuss several alternative explanations.

### 6.1 Non-Representative Data

The dataset we use comes from a large commercial bank, and we argued that the data it includes should be representative of all the *mortgage loans* in China. However, one may be concerned that it may not be representative of *all buyers* in the housing market because it does not include individuals who buy homes entirely using cash. First of all, in the new apartment market, the majority of buyers are likely to use mortgages because the Chinese government offers discounted mortgage interest rates to.<sup>18</sup> While we do not have data to evaluate the characteristics of cash buyers, it is reasonable to assume that they include two types: first, they are extremely wealthy, for example, some private entrepreneurs and top CEOs; and second, they would like to hide some aspects of the housing transaction. The first group is small, and they

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<sup>17</sup>These results still hold if we increase the threshold number of transactions in each complex into 20. The details are available upon request.

<sup>18</sup>The People’s Bank of China issues a baseline interest rate for borrowing from the banks, and the mortgage interest rate is typically 80 percent of the baseline rate.

are likely buying mansions that we do not include in our analysis (see Section 4 for a description of our sample selection). The second group, however, would typically include government officials who probably have obtained much larger price discounts than the typical bureaucrats we are studying in this paper. If the discounts are unusually large, the bureaucrat buyer may find it important to at least *partially* 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 the mortgage transactions in our dataset are not representative of all housing transactions because they do not include all-cash transactions, we believe that it would bias our estimate of the value of power downward.

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

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

## 6.2 Selection on Unobservable Housing Characteristics

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

While no one can possibly control for all possible characteristics of the house or complex that a buyer may value, we believe this concern is unlikely to be the driver for our main findings. In the regressions in which we measure the price and gradient of government power, we control for the housing characteristics listed in Column 4 of Table 5, which includes area (log), area squared, complex location, purchasing Time (month), building, floor level, last digit of room number. It is important to emphasize that different

apartment units in a given complex in China are often largely homogenous (see Figure 3 for a typical depiction of buildings and apartment units in a development complex in China). After controlling for all of these characteristics, what could still be potentially different among apartments is likely to be indoor structures, decorations, or floor plans. On these dimensions (unobserved to us), if anything we would expect that the bureaucrats are more likely to receive favorable treatment. Also, recall from Table 3 and 4 that bureaucrats in general are more likely to purchase large apartments and in more expensive complexes. Therefore, their purchases are likely to also be more desirable along such unobservable dimensions. Thus, to the extent that there are unobservable housing characteristics that are not controlled for in our analysis, our estimate of the value of power is likely to be biased downward.

[Figure 3 About Here]

### 6.3 Information Advantage

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

We now present a series of regressions to assess whether the information advantage of bureaucrats may be responsible for the price discounts they enjoy in the housing market. First, the Chinese housing market has experienced tremendous price increases since 2003, and the year-to-year price growth was over 20 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 more likely to be 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 the fourth month on. We are left with 380,255 transactions using the above selection criterion. For each of the transactions in this selected sample, we can then define an indicator variable for whether the transaction occurred within the first 3 months after the apartment complex went on sale.

[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 buyers (first 3 months) 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 also holds when we distinguish transactions in the

resident city from those in other cities of the home province and those in other provinces (Column 2); and it also holds when we add the price growth of the apartment complex (Column 3).

In Table 11B, we distinguish bureaucrats according to whether they work in critical government agencies. If information advantage is the reason for the observed price discounts that bureaucrats receive, we would expect that those working in critical government agencies should more likely to be among the early buyers due to their proximate knowledge of when the complex would go on sale. We do not find any such evidence; in fact, if anything, we find that bureaucrats in critical agencies are less likely to be among early buyers. In Table 11C, we distinguish bureaucrats according to their rank. Again we do not find any evidence that the bureaucrats with high rankings are more likely to early buyers.

Another angle from which we can assess a posited information advantage mechanism is to examine whether bureaucrats receive higher price discounts in cities with a larger dispersion of housing prices. For this purpose, we create a variable “City Price Dispersion” measured by the ratio of the 80th percentile and 20th percentile of the per square meter prices in the housing prices each month, by city. If information advantage is driving the bureaucrat price discounts, we expect that they would enjoy higher discounts in cities with higher price dispersion. Table 12 presents the results from these regressions. In Column 1, we find that bureaucrats in general actually receive lower discounts in cities with larger price dispersion. The same holds in Column 2 when we distinguish bureaucrats by the criticality of their government agencies (in Column 2), by their ranking (Column 3) and by whether they are provincial level or lower level bureaucrats (Column 4). These results suggest that information advantage is unlikely to be the driving force for the observed bureaucrat price discounts.

[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, it is unlikely that this could be the only explanation for our findings. Recall that those bureaucrats with higher rankings, and in critical agencies are found to be receiving larger price discounts; common sense suggests that it is unlikely that the bureaucrats with higher rankings and in critical agencies have lower search costs than other bureaucrats.

#### **6.4 Discounts to Bureaucrats as “Anchor” Residents?**

A fourth alternative explanation for the price discounts bureaucrat buyers receive is that they can play the role of “anchor” residents for developers and attract more buyers into a given apartment complex. If so, the developers may be willing to give bureaucrat buyers a price discount to compensate for their



bringing additional buyers. The idea is akin to anchor stores receiving rent discounts from shopping mall developers (Pashigian and Gould, 1998; and Gould, Pashigian and Prendergast, 2005). For example, maybe the developer can expect that amenities near the apartment complex are more likely improved by public infrastructure investments if there are more bureaucrat residents in the apartment complex (see, e.g., Zheng and Kahn, 2013). However, there is a crucial difference between anchor stores in shopping malls and bureaucrat residents. Anchor stores receive rent discounts from developers for their generating traffic to the shopping mall, which has important positive externalities on other tenants of the shopping mall. In contrast, there is no plausible channel through which bureaucrat residents could generate benefits to the developers or other residents that are not related to the power they may have as government officials.

We examine this hypothesis using several methods. First, if bureaucrat buyers receive price discounts because they serve as “anchor” residents for the developer to attract other buyers, we would expect that bureaucrat buyers are more likely to be among the earlier purchasers of the units in an apartment complex. However, as we have documented in Tables 11A-11D, this is not the case.

[Table 13 About Here]

Second, if bureaucrat buyers are receiving price discounts because they are more likely to bring infrastructure investments to the neighborhood, which can increase the prices of future apartments in the same complex, then we would expect to see that the fraction of bureaucrat buyers in the first offering of a multi-offering apartment complex is positively related to the price appreciation of the later offerings. In Table 13, we examine this hypothesis. Focusing on the developments with multiple offering in our dataset leaves us with a total of 1,230 multi-offering apartment complexes. For each offering, we construct the average per square meter price of the apartment units. The dependent variable in the regressions reported in Table 13 is the log of the price ratio between the average price of a latter offering ( $n$ -th offering, where  $n \geq 2$ ) and the average price of the first offering, and the independent variables include the fraction of bureaucrat buyers in first offering of the apartment complex (Column 1), the fraction of bureaucrat buyers from critical government agencies in the first offering (Column 2), the fraction of high-ranking bureaucrat buyers in the first offering (Column 3) and the fraction of bureaucrat buyers from provincial government in the first offering (Column 4). All regressions include dummies for city, offering time, and the numerical order of the offering. Table 13 shows that none of coefficients for the fractions of bureaucrats are statistically significant. We should emphasize that this finding does not imply that bureaucrats do not provide any *quid pro quo* for the price discounts they receive in their purchase of the apartment units; rather, it suggests that such *quid pro quo* probably occurred before, not after, the bureaucrats received their price discounts.

## 6.5 Access to the Purchase of Apartment Units as Bribes?

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

One may argue that in a booming housing market like China where apartment prices have increased up to ten-fold in some cities, a more important channel to bribe the government officials is not so much through the price discounts, but rather through granting the access to apartment units. According to this hypothesis, in cities with large housing price appreciations, access to apartment units is more valuable than that in cities with small price appreciations. As a result, we should expect that the outright price discounts to bureaucrat buyers will be smaller in cities with larger price appreciations. In Tables 14A-14D, we report regression results that aim to test this hypothesis. The specifications of these regressions are same as those reported in Tables 5-9, except that we now include the price appreciations at the city level in 6 months, 12 months and 24 months following the transaction, and their interactions with the bureaucrat dummies of the buyer.<sup>19</sup> In Table 14A where we only distinguish bureaucrat buyers from non-bureaucrat buyers, we do find that the bureaucrat price discount is lower in cities with large subsequent price appreciation, but the effect is not statistically significant. The same is true in Table 14B where we distinguish bureaucrat buyers by whether they work in government agencies critical or non-critical to real estate development. In Table 14C, however, where we distinguish bureaucrat buyers by their rank, we find that higher ranking bureaucrats tend to receive larger price discounts in cities with more subsequent price appreciation, contrary to the predictions from the hypothesis that access to purchase of apartment units can substitute for outright price discounts. In Table 14D where we distinguish bureaucrat buyers by whether they work in provincial governments, we do find some evidence consistent with the predictions from the hypothesis.

[Tables 14A-14D About Here]

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<sup>19</sup>The sample size in the regressions reported in Table 14A-14D is somewhat smaller than those in Tables 5-9 because we can only include transactions in cities with sufficient number of transactions in each month that would allow us to construct reliable estimates of city-specific house price indices.

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

So far we find that on average, bureaucrats receive about 0.7 to 1.05 percent price discounts for identical apartments than non-bureaucrat buyers (Table 5), and bureaucrat buyers in critical agencies receive a 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 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 categories to reimburse money spent on bribing government officials and entertaining clients and suppliers, and so these expenditures can be used as a measure of corruption in Chinese firms. The data on firms' expenditures on entertainment and conferences are drawn from the firm-level Investment Climate Survey conducted jointly by the World Bank and the Enterprises Survey Organization of the National Bureau of Statistics of China in 2005. This survey covered 12,400 firms located in 120 cities in all Chinese provinces except Tibet. It contained information on the firm-level expenditures on entertainment, travel costs, and conferences as well as the city level GDP per capita and other economic characteristics, such as the fraction of employees in the financial sector.<sup>20</sup>

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 15 About Here]

Table 15 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

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<sup>20</sup>See Cai, Fang, and Xu (2011) for more details about the survey data.

(Columns 1 and 2), and log of the firms’ average meeting expenditures (Columns 3 and 4). Each regression in Table 15 is weighted by the variance of the estimated coefficient on the “bureaucrat in critical agency” dummy. The results reveal that indeed, the price discounts are deeper in cities where firms spend more on entertainment and meeting expenditures. The correlation between the price discounts to bureaucrats in critical agencies (negative) and the log of ETC expenditures range from -0.031 to -0.042 depending on specifications, and they are marginally significant at the 10 percent level. This provides further collaborative evidence for our interpretation of bureaucrat price discounts as a measure of corruption.

## 8 Conclusion

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

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

We argue that the bureaucrat price discounts and the gradients of these discounts are evidence of corruption and measures of the market value of government power in economies with weak institutions

to prevent its abuse. We also evaluate and cast doubt on alternative mechanisms that may explain why bureaucrat buyers receive a lower price for identical housing units. Our study sheds new light on corruption in the Chinese housing market as well as the functioning of power in the interplay between government and market when the rule of law is weak.

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**Table 1: Summary Statistics**

	Obs.	Mean	Standard Deviation	Min	Max
<b>Average housing price</b>	1005960	3765.3	3195.5	1000	95700
<b>Characteristics of Power</b>					
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
<b>Buyer's characteristics</b>					
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
<b>Housing purchases from</b>					
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
<b>Apartment and loan characteristics</b>					
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*** (.0018)	-.0183*** (.0007)	.0480*** (.0015)	-.1414*** (.0041)	.0027 (.0030)
Critical agencies	.0163*** (.0053)	-.0208*** (.0023)	.0481*** (.0056)	-.1465*** (.0164)	.0102 (.0068)
Non-critical agencies	.0037*** (.0013)	-.0181*** (.0007)	.0480*** (.0016)	-.1411*** (.0042)	.0023 (.0031)
High rank	.0100*** (.0044)	-.0067*** (.0024)	.0367*** (.0075)	-.0900*** (.0099)	.0073 (.0130)
Low rank	.0054*** (.0013)	-.0190*** (.0007)	.0520*** (.0016)	-.1298*** (.0043)	-.0017 (.0031)
Provincial gov't	.0332 (.0246)	-.0352*** (.0061)	.0191 (.0118)	-.0942*** (.0308)	.0430 (.0782)
Lower-level gov't	.0039*** (.0013)	-.0180*** (.0007)	.0485*** (.0016)	-.1421*** (.0041)	.0020 (.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*** (.007)	.103*** (.012)	.065*** (.012)
Relative apartment size	.063*** (.007)	.138*** (.009)	.083*** (.010)
Female		-.180*** (.005)	-.166*** (.004)
Married		.018*** (.005)	.023*** (.005)
College education		.560*** (.009)	.545*** (.009)
Age		.016*** (.002)	.004** (.002)
Age squared		1.09E-5 (2.34E-5)	1.80E-4*** (2.40E-5)
Monthly income (log)		-.068*** (.001)	-.062*** (.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: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	-.0372*** (.0057)	-.0069*** (.0013)	-.0088*** (.0014)	-.0105*** (.0014)
Apartment area (log)			-1.2432*** (.0538)	-1.1865*** (.0526)
Apartment area squared			.1416*** (.0058)	.1338*** (.0057)
Loan maturity (log)			.0361*** (.0018)	.0525*** (.0022)
Loan to value			-.0223*** (.0045)	-.0392*** (.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: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in critical agencies	-.0248*** (.0049)			
Bureaucrats in non-critical agencies	-.0097*** (.0014)			
Bureaucrats in high rank		-.0138* (.0071)		
Bureaucrats in low rank		-.0103*** (.0013)		
Bureaucrats in provincial government			-.0390** (.0179)	
Bureaucrats in lower-level government			-.0100*** (.0014)	
Bureaucrats in critical agencies*high rank				-.0371*** (.0195)
Bureaucrats in critical agencies*low rank				-.0244*** (.0050)
Bureaucrats in non-critical agencies*high rank				-.0123* (.0072)
Bureaucrats in non-critical agencies*low rank				-.0096*** (.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: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	-.0107*** (.0014)	-.0124*** (.0017)	-.0108*** (.0014)	-.0126*** (.0017)
Bureaucrats* buying in other cities of home province		.0088*** (.0024)		.0091*** (.0024)
Bureaucrats*buying in other provinces			.0093* (.0053)	.0111** (.0053)
Buying in other cities of home province	.0074** (.0037)	.0064* (.0037)	.0074** (.0037)	.0064* (.0037)
Buying in other provinces	.0172*** (.0037)	.0172*** (.0037)	.0166*** (.0037)	.0165*** (.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: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in critical agencies	-.0252*** (.0049)	-.0273*** (.0059)	-.0254*** (.0049)	-.0276*** (.0060)
Bureaucrats in non-critical agencies	-.0099*** (.0014)	-.0116*** (.0016)	-.0101*** (.0014)	-.0118*** (.0016)
Bureaucrats in critical agencies*buying in other cities in home province		.0101* (.0059)		.0104* (.0060)
Bureaucrats in non-critical agencies*buying in other provinces			.0148 (.0290)	.0170 (.0292)
Bureaucrats in non-critical agencies*buying in other cities in home province		.0089*** (.0024)		.0091*** (.0024)
Bureaucrats in non-critical agencies*buying in other provinces			.0089* (.0053)	.0106** (.0054)
Buying in other cities in home province	.0075** (.0037)	.0064* (.0037)	.0075** (.0037)	.0064* (.0037)
Buying in other provinces	.0172*** (.0037)	.0172*** (.0037)	.0167*** (.0037)	.0165*** (.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: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats in low rank	-.0105*** (.0013)	-.0121*** (.0016)	-.0107*** (.0013)	-.0123*** (.0016)
Bureaucrats in high rank	-.0142** (.0071)	-.0199* (.0103)	-.0148** (.0071)	-.0210** (.0103)
Bureaucrats in low rank *buying in other cities of the same province		.0084*** (.0024)		.0086*** (.0024)
Bureaucrats in low rank *buying in other provinces			.0088 (.0056)	.0104* (.0056)
Bureaucrats in high rank *buying in other cities of the same province		.0179* (.0109)		.0189* (.0110)
Bureaucrats in high rank *buying in other provinces			.0174 (.0287)	.0235 (.0288)
Buying in other cities of the same province	.0074** (.0037)	.0064* (.0037)	.0075** (.0037)	.0064* (.0037)
Buying in other provinces	.0172*** (.0037)	.0172*** (.0037)	.0167*** (.0037)	.0165*** (.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: ln(price)			
	Sub-sample I		Sub-sample II	
	Number of transactions $\geq$ 10 for each complex		At least one bureaucrat-buyer observed in each complex	
	(1)	(2)	(3)	(4)
Bureaucrats	-.0109*** (.0014)	-.0129*** (.0017)	-.0135*** (.0018)	-.0176*** (.0024)
Buying in other cities of the same province	.0077** (.0038)	.0066* (.0038)	.0076** (.0036)	.0060* (.0037)
Buying in other provinces	.0174*** (.0038)	.0167*** (.0038)	.0168*** (.0036)	.0157*** (.0036)
Bureaucrats* buying in other cities of the same province		.0093*** (.0025)		.0138*** (.0030)
Bureaucrats*buying in other provinces		.0105* (.0055)		.0160*** (.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: ln(price)			
	Sub-sample III		Sub-sample IV	
	At least one buyer from other cities in the same province in each complex		Sub-sample II	$\cap$ Sub-sample III
	(1)	(2)	(3)	(4)
Bureaucrats	-.0108*** (.0014)	-.0127*** (.0017)	-.0137*** (.0018)	-.0177*** (.0024)
Bureaucrats* buying in other cities of the same province	.0078* (.0040)	.0066 (.0040)	.0080** (.0040)	.0063 (.0040)
Bureaucrats*buying in other provinces	.0206*** (.0041)	.0198*** (.0041)	.0204*** (.0040)	.0193*** (.0028)
Buying in other cities of the same province		.0090*** (.0025)		.0137*** (.0030)
Buying in other provinces		.0091** (.0053)		.0138** (.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 (.0028)	.0018 (.0032)	-.0082 (.0739)
Buying in other cities in the same province	-.0268*** (.0069)	-.0276*** (.0069)	-.0192** (.0085)
Buying in other provinces	-.0259*** (.0082)	-.0258*** (.0082)	-.0047 (.0145)
Bureaucrats *buying in other cities in the same province		.0066 (.0065)	.0025 (.0109)
Bureaucrats *buying in other provinces		-.0016 (.0159)	.0527 (.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*** (.0095)	-.0133 (.0107)	-.0683 (.1229)
Bureaucrats in non-critical agencies	.0041 (.0028)	.0026 (.0032)	-.0049 (.0760)
Buying in other cities in the same province	-.0268*** (.0069)	-.0276*** (.0069)	-.0192** (.0085)
Buying in other provinces	-.0259*** (.0082)	-.0258*** (.0083)	-.0047 (.0145)
Bureaucrats in critical agencies *buying in other cities in the same province		-.0313 (.0251)	-.0252 (.0280)
Bureaucrats in non-critical agencies *buying in other cities in the same province		-.0380 (.0779)	.0041 (.0110)
Bureaucrats in critical agencies *buying in other provinces		.0088 (.0066)	.0280 (.0856)
Bureaucrats in non-critical agencies *buying in other provinces		-.0005 (.0164)	.0531 (.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 (.0237)	.0180 (.0223)	-.6770* (.3979)
Bureaucrats in low rank	.0027 (.0028)	.0016 (.0032)	-.0175 (.0746)
Buying in other cities in the same province	-.0268*** (.0069)	-.0276*** (.0069)	-.0193** (.0085)
Buying in other provinces	-.0259*** (.0082)	-.0258*** (.0083)	-.0046 (.0145)
Bureaucrats in high rank *buying in other cities in the same province		.1239 (.1385)	.1873 (.1509)
Bureaucrats in low rank*buying in other cities in the same province		.0066 (.0065)	.0037 (.0109)
Bureaucrats in high rank *buying in other provinces		.1047 (.1402)	.0238 (.0158)
Bureaucrats in low rank*buying in other provinces		-.0004 (.0016)	.0461 (.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 (.0205)	-.0135 (.0223)	-.1980 (.2091)
Bureaucrats in low-level govt.	.0033 (.0028)	.0020 (.0032)	-.0062 (.0740)
Buying in other cities in the same province	-.0269*** (.0069)	-.0276*** (.0069)	-.0192** (.0085)
Buying in other provinces	-.0259*** (.0082)	-.0258*** (.0083)	-.0048 (.0145)
Bureaucrats in prov. govt. *buying in other cities in the same province		-.0430 (.0600)	.0234 (.0587)
Bureaucrats in lower-level govt.*buying in other cities in the same province		.0069 (.0065)	.0020 (.0109)
Bureaucrats in prov. govt. *buying in other provinces		-.0997 (.0811)	-.1073 (.0638)
Bureaucrats in lower-level govt.*buying in other provinces		.0023 (.0016)	.0586 (.0564)
Complex price growth			.0995*** (.0346)
Bureaucrats in prov. govt. *complex price growth			.1500 (.1973)
Bureaucrats in lower-level govt.*complex price growth			.0188 (.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: ln(price)			
	(1)	(2)	(3)	(4)
Bureaucrats	-.0367*** (.0079)			
Bureaucrats in critical agencies		-.0356* (.0192)		
Bureaucrats in non-critical agencies		-.0365*** (.0079)		
Bureaucrats in high rank			.0468 (.0534)	
Bureaucrats in low rank			-.0419*** (.0073)	
Bureaucrats in provincial government				-.2599** (.1033)
Bureaucrats in lower-level government				-.0352*** (.0079)
Bureaucrats* city dispersion	.0129*** (.0037)			
Bureaucrats in critical agencies * city dispersion		.0052 (.0098)		
Bureaucrats in non-critical agencies * city dispersion		.0131*** (.0037)		
Bureaucrats in high rank * city dispersion			-.0297 (.0030)	
Bureaucrats in low rank * city dispersion			.0154*** (.0033)	
Bureaucrats in provincial government * city dispersion				.0947*** (.0353)
Bureaucrats in lower-level government * city dispersion				.0123*** (.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 Appreciation of Later Units and the Fraction of Bureaucrat Buyers in the Initial Offering**

		Dependent Variable: Ln (Average price in the Nth Offering/Average Price in the 1 <sup>st</sup> Offering)			
		(1)	(2)	(3)	(4)
Fraction Bureaucrats in 1 <sup>st</sup> Offering		-.154 (.127)			
Fraction Bureaucrats from Critical Agencies in 1 <sup>st</sup> Offering			.377 (.442)		
Fraction Bureaucrats with High Ranks in 1 <sup>st</sup> Offering				.001 (.325)	
Fraction Bureaucrats from Provincial Government in 1 <sup>st</sup> Offering					-.952 (2.880)
Obs.		1230	1230	1230	1230
R-sq		.357	.355	.355	.355

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



**Table 14A: Access to the Purchase of Apartment Units as Bribes?  
Bureaucrats vs. Non-Bureaucrats**

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats	-.0105*** (.0015)	-.0133 (.0098)	-.0105*** (.0015)	-.0149* (.0087)	-.0100*** (.0015)	-.0110 (.0077)
Price growth in 6 months	-.014* (.008)	-.014* (.008)				
Price growth in 12 months			.001 (.007)	.003*** (.007)		
Price growth in 24 months					.158*** (.0108)	.159*** (.0118)
Bureaucrats * Price growth in 6 months		.0027 (.0089)				
Bureaucrats * Price growth in 12 months				.0040 (.0075)		
Bureaucrats * Price growth in 24 months						.0008 (.0061)
Observations	794271	794271	794271	794271	794271	794271
R-sq	.916	.916	.917	.917	.918	.918

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 14B: Access to the Purchase of Apartment Units as Bribes?  
Critical vs. Non-Critical Agencies**

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats in critical agencies	-.0239*** (.0057)	-.0405 (.0321)	-.0239*** (.0057)	-.0529 (.0384)	-.0238*** (.0057)	-.0512* (.0280)
Bureaucrats in non-critical agencies	-.0098*** (.0015)	-.0120 (.0100)	-.0098*** (.0015)	-.0130 (.0086)	-.0093*** (.0015)	-.0090 (.0078)
Price growth in 6 months	-.0137* (.0080)	-.0137*** (.0080)				
Price growth in 12 months			.0006 (.0074)	.0003 (.0074)		
Price growth in 24 months					.1579*** (.0108)	.1579*** (.0108)
Bureaucrats in critical agencies *		.0156				
Price growth in 6 months		(.0312)				
Bureaucrats in non-critical agencies * Price growth in 6 months		.0021 (.0091)				
Bureaucrats in critical agencies *				.0264		
Price growth in 12 months				(.0322)		
Bureaucrats in non-critical agencies * Price growth in 12 months				.0029 (.0076)		
Bureaucrats in critical agencies *						.0224
Price growth in 24 months						(.0214)
Bureaucrats in non-critical agencies * Price growth in 24 months						-.0002 (.0062)
Observations	794271	794271	794271	794271	794271	794271
R-sq	.916	.916	.917	.917	.918	.918

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 14C: Access to the Purchase of Apartment Units as Bribes?  
High vs. Low Rank**

	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats in high rank	-.0187 (.0141)	.0953* (.0537)	-.0188 (.0141)	.1776** (.0849)	-.0186 (.0140)	-.0981 (.0834)
Bureaucrats in low rank	-.0102*** (.0014)	-.0138 (.0097)	-.0102*** (.0014)	-.0163* (.0088)	-.0096*** (.0014)	-.0095 (.0097)
Price growth in 6 months	-.0135* (.0079)	-.0137* (.0079)				
Price growth in 12 months			.0006 (.0074)	.0003 (.0073)		
Price growth in 24 months					.1579*** (.0108)	.1579*** (.0108)
Bureaucrats in high rank * Price growth in 6 months		-.1136* (.0600)				
Bureaucrats in low rank * Price growth in 6 months		.0034 (.0090)				
Bureaucrats in high rank * Price growth in 12 months				-.1852** (.0890)		
Bureaucrats in low rank * Price growth in 12 months				.0056 (.0076)		
Bureaucrats in high rank * Price growth in 24 months						.0610 (.0549)
Bureaucrats in low rank * Price growth in 24 months						-.0001 (.0062)
Observations	794271	794271	794271	794271	794271	794271
R-sq	.916	.916	.917	.917	.918	.918

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 14D: Access to the Purchase of Apartment Units as Bribes?  
Provincial vs. Lower-Level Government**

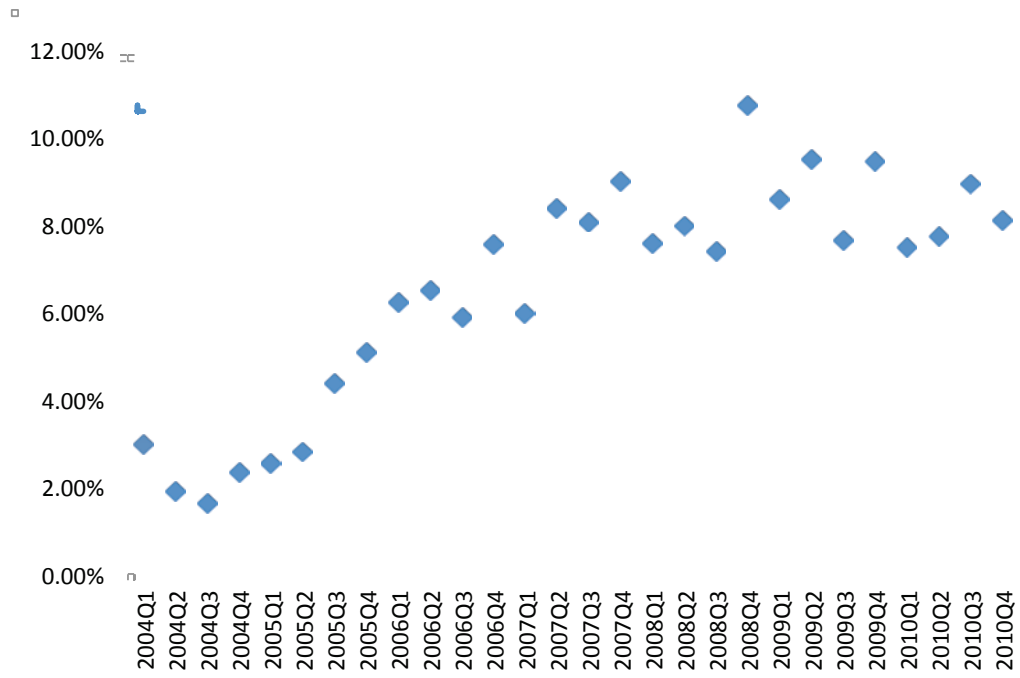
	Dependent variable: ln(price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Bureaucrats in provincial government	-.0458* (.0278)	-.1079 (.1355)	-.0458* (.0278)	-.2380* (.1378)	-.0451 (.0277)	-.1411 (.1038)
Bureaucrats in lower-level government	-.0099*** (.0014)	-.0120 (.0094)	-.0099*** (.0014)	-.0100 (.0079)	-.0094*** (.0014)	-.0085 (.0075)
Price growth in 6 months	-.0135* (.0079)	-.0137* (.0080)				
Price growth in 12 months			.0006 (.0074)	.0004 (.0074)		
Price growth in 24 months					.1579*** (.0108)	.1578*** (.0108)
Bureaucrats in provincial government * Price growth in 6 months		.0582 (.0123)				
Bureaucrats in lower-level government * Price growth in 6 months		.0020 (.0087)				
Bureaucrats in provincial government * Price growth in 12 months				.1757* (.1066)		
Bureaucrats in lower-level government * Price growth in 12 months				.0001 (.0069)		
Bureaucrats in provincial government * Price growth in 24 months						.0777 (.0697)
Bureaucrats in lower-level government * Price growth in 24 months						-.0008 (.0060)
Observations	794271	794271	794271	794271	794271	794271
R-sq	.916	.916	.917	.917	.918	.918

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 \*.

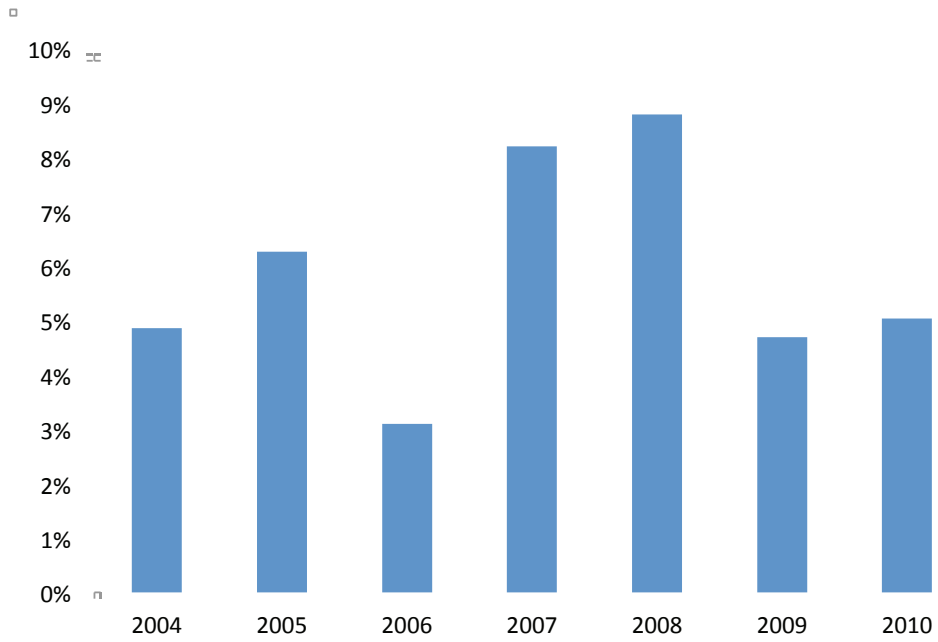
**Table 15: Price Discounts of Bureaucrats and Firms' Expenditure on ETC**

	Dependent variable: Coefficient on "Bureaucrats in critical agencies"			
	(1)	(2)	(3)	(4)
Average Entertainment Expenditures (log)	-.038** (.018)	-.031* (.017)		
Average Meeting Expenditures (log)			-.042* (.023)	-.038* (.023)
City GDP per capita (log)		-.022 (.020)		-.018 (.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.**



Figure 3: Chinese Housing Complexes: A Photo