

Exclusive Seller-Platform Contracts in Two-Sided Markets: An Empirical Study of the Real Estate Market

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Abstract

Platform firms operating in two-sided markets often adopt exclusive seller-platform contracts to mitigate competition, leading to substantial implications for equilibrium outcomes and social welfare. In this paper, we examine the impacts of exclusive seller-platform contracts on the market outcomes of real estate listings using comprehensive listing-level data from a large city in China. Our findings reveal that exclusive listings receive significantly more buyer views due to agents allocating their selling efforts toward exclusive listings at the expense of non-exclusive ones. Moreover, exclusivity leads to an average increase of 4.53% in listing prices and 2.78% in transaction prices. Through an investigation of potential explanations for the positive price effect, we attribute it to agents persuading exclusive sellers to set higher prices. Furthermore, exclusive listings have a greater probability of transaction and spend fewer days on the market.

Keywords: platform, exclusive contract, effort-steering effect, listing price

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1 Introduction

In many two-sided markets, platform firms offer exclusive contracts to sellers to reduce competition and attract buyers. For example, an e-commerce platform may prevent sellers from selling products on competing platforms through exclusive contracts. Television networks and video streaming platforms can sign exclusive contracts with content makers. Video game console manufacturers can sign exclusive contracts with game developers. Real estate agencies may require home owners to sign exclusive selling contracts.¹ Such exclusive contracts can have substantial impacts on the equilibrium outcome and social welfare.

As the platform-based business model plays a more important role in many industries worldwide (e.g., e-commerce, travel, education, and housing), many countries are paying increasing attention to evaluate the welfare implications of such exclusive contracts and establishing legislation to regulate competition among platform firms. For example, in 2021, the State Administration for Market Regulation of China fined two large platform firms, Alibaba and Meituan, for using such anticompetitive exclusive contracts.²

The literature on exclusive contracts in two-sided markets has primarily focused on theoretical analysis. This literature has mixed findings regarding the welfare implications of exclusive contracts in such markets. Armstrong and Wright (2007) demonstrate that exclusive contracts improve the surplus of agents on the multihoming side but diminish it on the single-homing side. Doganoglu and Wright (2010) prove that exclusive contracts between platforms and consumers are both anticompetitive and inefficient. On the other hand, Carroni, Madio, and Shekhar (2019) and Saruta (2021) find that

¹While such exclusive contracts in the housing market are legal or even mandatory in some countries (e.g., the U.S. and Canada), they are not common or even illegal in other countries (e.g., China).

²See <https://www.nytimes.com/2021/04/09/technology/china-alibaba-monopoly-fine.html> and <https://www.nytimes.com/2021/10/08/technology/china-meituan-antitrust-fine.html> for more information.

exclusivity can enhance welfare when there is a strong indirect network effect between sellers and buyers.

However, empirical studies examining the impacts of exclusive contracts in two-sided markets are relatively scarce. Lee (2013) finds that vertical integration by platforms into one side of the market, along with the use of exclusive contracts with game developers, can facilitate the entry of new platforms in the video game industry. In this paper, we aim to empirically study the impacts of exclusive contracts on the platform's selling efforts and transaction outcomes.

Our dataset includes listing-level information of apartments listed by the largest real estate agency in China in 2016. In 2015, this company began offering exclusive selling contracts to sellers. However, due to the soaring home prices in Beijing and Shanghai, the public criticized this agency for using exclusive contracts to increase its market power, resulting in higher prices borne by home buyers and greater commission fees for the agency. As a response, the Shanghai government banned such exclusive contracts in 2016, followed by a similar ban in Beijing in 2017.

Theoretically, exclusive seller-platform contracts can have both positive and negative impacts. These contracts can positively influence the platform's efforts in selling exclusive products while potentially negatively affecting non-exclusive products. Under exclusive contracts, platforms are obliged to prioritize the sale of exclusive sellers' products and allocate greater advertising and promotional efforts towards these exclusive products. However, if platforms reduce their efforts in selling non-exclusive products, exclusive contracts can have an effort-steering effect. This effect leads to an increase in the exclusive sellers' surplus but a decrease in the non-exclusive sellers' surplus.

Exclusive contracts can impact sellers' prices through various channels. Firstly, platforms may directly influence the pricing decisions of exclusive sellers by providing pricing suggestions. For instance, in the real estate industry, seller agents play a crucial role as they possess better market information, which can influence sellers' listing price

choices. Secondly, sellers may raise prices after signing exclusive contracts, anticipating greater selling efforts from the platform. It's important to consider the presence of a confounding factor in seller selection if the sellers who opt for exclusive contracts exhibit more patience. In such cases, these exclusive sellers might set higher prices and wait for buyers with a higher willingness to pay. It's worth noting that when exclusive sellers increase prices, non-exclusive sellers may also follow suit, resulting in a market-wide impact on prices.

Exclusive contracts have significant impacts on the transaction outcomes through platforms' selling efforts and prices. On the one hand, the platforms' increased effort leads to higher transaction probabilities and faster transactions for exclusive products. On the other hand, if exclusivity results in higher listing and transaction prices, it can reduce transaction probabilities and speed. Additionally, the effort-steering effect of exclusive contracts negatively affects non-exclusive products.

To empirically study these impacts, we utilize two datasets. The first dataset contains listing-level information for all listings from the largest real estate agency in Beijing for three months in 2016. It includes data on listing prices, dates of first buyer views, numbers of buyer views within different timeframes, apartment characteristics, and agent characteristics. The second dataset consists of listing-level transaction data for all sold listings in 2016, providing information on transaction dates and prices.

We first analyze the impacts of exclusive contracts on agents' selling efforts, measured by the number of buyer views for a listing. However, an endogeneity issue arises because sellers with apartments in poor conditions were more likely to sign exclusive contracts, and we do not observe all the characteristics that capture these conditions (e.g., the interior design and apartment maintenance). To address this issue, we employ the instrumental variable (IV) approach. The results show that, on average, an exclusive listing receives 5.74 more buyer views within a two-week timeframe compared to a non-exclusive listing.

Furthermore, we investigate the existence of the effort-steering effect. We construct four measures of buyer views at the agent-week level: views arranged by each agent for any listing, views for their own exclusive listings, views for their own non-exclusive listings, and views for other agents' listings. By regressing each of these measures on the share of exclusive listings among all the agent's listings, we find that the share of exclusive listings does not affect the total number of views arranged by an agent but negatively impacts the number of views for non-exclusive listings. Thus, exclusive contracts exhibit an effort-steering effect without an effort-increasing effect. Moreover, we find that the agents primarily steer effort from their own non-exclusive listings to their own exclusive listings. This is consistent with Hagiu and Jullien (2011) who find that diverting users' search is an essential strategic instrument for intermediaries.

Next, we analyze the impact of exclusivity on the listing prices using the full sample and a subsample of the sold listings. In the full sample, we find that exclusive listings' prices per square meter were 4.52% (RMB 1900) higher than non-exclusive listings. In the subsample of sold listings, the exclusive listings' listing prices per square meter were 2.86% (RMB 1200) higher. The smaller impact in the subsample is due to the fact that less expensive listings were more likely to sell. More importantly, we analyze a subsample of listings that switched between exclusive and non-exclusive contracts to explore three possible explanations for the positive price effect. This analysis allows us to rule out seller selection and sellers increasing prices, leading us to attribute the positive price effect to agents suggesting higher prices.

Lastly, we examine the impacts of exclusivity on transaction outcomes, including the probability of transaction, number of days on the market, and transaction prices. After addressing endogeneity concerns related to contract exclusivity, we find that exclusivity increases the probability of a transaction within 90 days from the first buyer view by 0.17, reduces the number of days on the market by 2.69 days, and increases the transaction price per square meter by 2.78% (RMB 1,100).

The findings above indicate that exclusive contracts improve the welfare of the agents of the platform and exclusive sellers, but they have negative implications for all buyers and non-exclusive sellers. The increased selling effort by agents for exclusive listings improves the likelihood and speed of transactions for those listings. The higher transaction prices benefit agents in terms of earning higher commission fees, and exclusive sellers receive higher prices for their apartments. However, the effort-steering effect leads to reduced buyer views and lower transaction probabilities for non-exclusive listings. Buyers of the exclusive listings will pay higher prices, and so are the buyers of the non-exclusive listings due to the strategic complementarity between the two types of listings' prices.

This paper is closely related to the literature on the impacts of real estate agents on housing transactions. Levitt and Syverson (2008) find that agents may have distorted incentives when selling their own houses, resulting in higher selling prices and longer time on the market. Hendel, Nevo, and Ortalo-Magné (2009) find that the use of professional agents increases the probability of sales and reduces the number of days on the market, but has no significant effect on the transaction prices. Jia and Pathak (2010) find that listings with high commission fees are more likely to sell and sell faster, but transaction prices are not significantly different. Han and Hong (2016) find that agents have an incentive to promote their own company's listings for a higher financial reward. This paper builds upon this literature by analyzing the impacts of exclusive seller-platform contracts on agents' effort, listing prices, and transaction outcomes.

Another notable difference from the literature is that the previous studies use data from the U.S., where sellers are legally required to be on exclusive contracts with agents. In our dataset, sellers have the choice to sign exclusive contracts, which introduces to the endogeneity problem in the contract exclusivity.

Several papers examine the impacts of real estate agents' entry on the number of houses sold per agent. Hsieh and Moretti (2003) demonstrate that in cities with high

housing prices, the entry of real estate agents can be socially inefficient if barriers to entry are low. Barwick and Pathak (2015) use a dynamic empirical model to study the consequences of agent entry in Greater Boston. They find that excessive competition leads to lower average agent quality and market inefficiency. In this paper, we take the agent entry as given and focus on analyzing the impact of exclusive seller-platform contracts on market outcomes.

Another strand of literature focuses on housing prices. Merlo and Ortalo-Magne (2004) and Merlo, Ortalo-Magné, and Rust (2015) analyze listing price changes using detailed data on all offers made on each property. Albrecht, Gautier, and Vroman (2006) explain the price difference between listing and transaction prices using a searching and negotiation model framework. Piazzesi and Schneider (2009) use survey data to show a small fraction of optimistic buyers can have a large effect on housing prices. Tucker, Zhang, and Zhu (2013) show that “days on market” information has a substantial impact on the home sale prices. Ngai and Tenreyro (2014) document and explain seasonality in the U.K. and U.S. housing markets using a searching and matching model. Glaeser, Huang, Ma, and Shleifer (2016) explain the skyrocketing housing prices in China from both the demand and supply sides. This paper contributes to the literature by examining the impact of exclusive seller-platform contracts on housing prices.

The remaining sections of the paper are organized as follows. Section 2 provides background information on the industry and describes the dataset used in the analysis. Section 3 presents the empirical model and discusses the endogeneity issue in exclusivity. Section 4 analyzes the impacts of exclusivity on agent effort, while Section 5 focuses on the effects of exclusivity on listing prices. The impact of exclusivity on transaction outcomes is discussed in Section 6. Finally, Section 7 concludes the paper, summarizing the findings and their implications.

2 Industry Background and Data

2.1 Background

Market concentration. Our study focuses on the resale market of apartments sold by owners through real estate agencies, specifically in the city of Beijing. It's important to note that the sale of new apartments is typically conducted directly by construction companies, while the resale market involves transactions facilitated by real estate agencies.³ The market of real estate agencies is highly concentrated in Beijing. In 2016, the largest agency accounted for approximately 50% of total transactions, while the combined market share of the next two largest agencies was 16%.⁴ The largest agency has actively expanded its market share by acquiring competitors and expanding its presence in various cities across China, particularly in big cities.

The agency's strategy includes the establishment of a large number of offline stores to serve customers. In Beijing, the number of offline stores increased from 720 in 2011 to 1400 in 2016, and in Shanghai, it grew from 250 in 2011 to 1300 in 2016. By March 2016, the agency had a total of 6300 offline stores throughout the country.⁵ The expansion of offline stores has had significant implications for both the number of listings available and the number of potential buyers, ultimately contributing to the agency's market dominance.

Agents. In the real estate firm, there are three types of agents who work together to facilitate the sale of each apartment: the representing agent, buyer agents, and assistant agents. Each agent has specific responsibilities and incentives within the selling process.

First, the representing agent is responsible for communication with the seller. When listing the apartment, this agent contacts the seller to arrange visits to take photos and review the seller's property certificate. The representing agent then offers an exclusive

³In 2016, 85% of all transactions in Beijing are from the resale market.

⁴Data source: <http://beijing.fangdd.com/news>.

⁵Data sources: <http://money.163.com/16/0406>, and <http://business.sohu.com/20160419/>.

contract to the seller and negotiates the terms of the contract with the seller to reach an agreement. Throughout the selling process, the representing agent maintains communication with the seller and buyer agents to arrange buyer views and address any concerns or questions of the seller. They also make suggestions on the initial listing prices and price adjustments, since they have better information on recent transactions in the market. Thus, the representing agents play a very important role in setting the listing prices.

Second, buyer agents help buyers to schedule apartment views and negotiate prices before the transaction. These agents are responsible for communicating with the representing agent and potential buyers to arrange views and help them to negotiate a possible transaction. When a transaction occurs, they prepare the transaction contract and help the buyer to apply for a mortgage. Note that buyer agents and the representing agents are all in the same real estate company. That is, buyer agents from other agencies cannot contact the representing agent to schedule views.

In addition to the representing agent and buyer agents, there are assistant agents who support both the buyer agent and representing agent in various tasks. Their responsibilities include arranging property viewings, preparing transaction documents, and assisting with mortgage applications.

Note that all agents in the company can work as buyer agents, including the representing agents. A buyer agent can show any listing available in the company's system to their buyers, regardless of the representing agent. Hence, a buyer agent can show buyers not only the listings represented by themselves but also the listings represented by other agents. Nonetheless, they have the incentive to show their own representing listings first, so that when a transaction occurs, they can earn a greater proportion of the commission fee.

When a transaction occurs, the firm receives a commission fee, which is 2.7% of the transaction price of the apartment. Out of this commission, the firm retains approxi-

mately 15% as its revenue, while the remaining 85% is distributed as performance credit among the agents involved in the sale. The buyer agent who represents the buyer in the transaction receives the highest commission share, followed by the representing agent. The specific percentage share of the commission varies between 5% and 50% depending on the agents' roles and performance. It's important to note that the commission share received by an agent represents their performance credit and is not their direct income. The agent's income is a fraction of this credit, with the specific percentage determined by their level of work experience. An agent then can receive up to 50% of this performance credit as income.⁶

Sellers and buyers. Sellers typically choose to list their apartments with real estate agencies to attract more buyers and receive assistance in the legal transaction process. If the apartment is unoccupied, the seller may provide a key to the agents for convenient arrangement of buyer views. Since the agency promises greater selling effort for exclusive listings, sellers with less attractive apartments in terms of factors such as floor plan, interior design, and cleanness are more likely to sign exclusive contracts.

Buyers have two sources to obtain information on listings. First, a buyer can visit the offline stores of real estate agencies. The agents will suggest listings based on the buyers' needs and budgets. If buyers are interested in the suggested options, the agents proceed to arrange viewings. Second, a buyer can browse the agencies' websites to find listings and contact the representing agent whose phone number is provided in the listing information. Once a buyer finds an agent, the agent will recommend available listings and facilitate the arrangement of viewings for the buyer. Thus, buyers rely on agents' recommendations in deciding which listings to view, and they are willing to viewing more apartments to find better options.⁷

⁶For example, for a commission fee of 200,000 RMB, a very experienced representing agent can receive a performance credit of up to 85,000 RMB ($200,000 \times 85\% \times 50\%$) and an income of up to 42,500 RMB ($85,000 \times 50\%$).

⁷Occasionally, agents possess information on newly listed ones that may not be published on the agency's website yet. Without the agents' recommendations, buyers would not be able to discover

Exclusive contracts. In 2015, real estate agencies introduced exclusive selling contracts. Representing agents offer exclusive contracts to sellers who then decide whether to accept them. If a seller signs an exclusive contract, the agency becomes responsible for selling his apartment within 90 days, at a price no lower than a pre-negotiated price, and the seller is prohibited from listing the apartment to other real estate agencies. If the agency fails to sell the apartment within the specified period, it is obligated to pay the seller a compensation fee of RMB1,000 to 3,000. On the other hand, if the seller breaches the exclusive contract and sells the apartment through other channels, they must pay the agency the commission fee based on the transaction price.

If the seller opts not to sign the exclusive contract, they have the option to list the property with multiple real estate agencies. Only the agency that successfully sells the apartment receives the commission fee, while other agencies do not receive compensation for their selling effort.

Given these circumstances, representing agents have a strong incentive to persuade sellers to sign exclusive contracts. By securing an exclusive contract, the agent eliminates competition from other listing agencies. Without an exclusive contract, there is a risk that the agent invests effort into selling the apartment, only to have a competing agency successfully close the sale.

The use of exclusive contracts has sparked intense debates regarding their impact on housing prices, particularly in Beijing and Shanghai. The primary argument against exclusive contracts is that the agency has monopolistic power in selling exclusive listings. This enables the agency to persuade sellers to increase the listing prices and earn greater commission fees. However, elevated housing prices significantly reduce buyer welfare. Between 2014 and 2015, the average price per square meter increased from RMB 27,200 to just below RMB 40,000. In February 2016, the Shanghai government implemented a ban on exclusive contracts as a measure to control the rapid growth in apartment

these listings online.

prices. Similarly, Beijing banned the use of exclusive contracts by real estate agencies in 2017.

Tax. The property value-added tax is a significant tax related to real estate transactions, and it is typically paid by the buyer. The exemption from value-added tax depends on the seller’s ownership and the duration of ownership of the property. If the seller owns only one apartment and has held it for more than five years, then the transaction of that specific apartment is exempted from value-added tax. However, if the seller owns multiple apartments or has owned the apartment for less than five years, the value-added tax is applicable. In such cases, the value-added tax is calculated as 20% of the increase in the registered price from the previous transaction to the current transaction of the apartment.

2.2 Data

We collected listing-level data in Beijing from the largest agency’s website in March, May, and June of 2016 and the transaction data in December 2016. The transaction data includes all transactions that occurred up to September 2016. For each listing, we observe the identification number, whether it was under an exclusive contract, the total price, price per square meter, apartment size, location, year of construction, number of bedrooms, number of living rooms, access to subway stations, whether it is in a good school district, the representing agent’s identification number, the agent’s work experience, and the history of buyer views. An apartment can appear in multiple months if it was not sold.

After removing apartment listings that fell below the 1% quantile (43.44 square meters) or exceeded the 99% quantile (249.00 square meters) in terms of apartment size, we are left with 22,114 exclusive and 101,725 non-exclusive listings within the sample period. The fraction of exclusive listings among all listings is 17.86%. Table 1 shows the comparison of apartment characteristics for the two types of listings. On

average, exclusive listings are smaller in size, with an average size of 89.34 square meters for exclusives and 98.35 square meters for non-exclusives. Exclusive listings also tend to have slightly fewer living rooms and bedrooms, with averages of 2.14 and 1.23 respectively, compared to 2.19 and 1.25 for non-exclusive listings.

Exclusive listings tend to be more commonly found on lower or higher floors, which are typically less preferred by buyers. Additionally, exclusive listings have an older average age, with 28% of them being constructed before 1995, compared to only 17% for non-exclusive listings. In contrast, only 6% of exclusive listings were built after 2010, while this figure rises to 11% for non-exclusive listings. Exclusive listings are also more likely to be situated in good school districts, accounting for an average of 24% compared to 15% for non-exclusive listings.

Regarding proximity to metro stations, exclusive listings have a higher likelihood of being located nearby, with 76% of exclusive listings and 64% of non-exclusive listings having convenient access to a metro station. Moreover, the proportion of tax-free listings is greater among the exclusive listings, standing at 51% compared to 40% for the non-exclusive listings. Additionally, agents possess the keys for 23% of exclusive listings, whereas this figure drops to 10% for non-exclusive listings. Lastly, the representing agents of exclusive listings boast longer average work experience compared to their counterparts in non-exclusive listings.

Table 1: Apartment Summary Characteristics and Exclusiveness in Beijing, 2016

	Exclusive		Non-exclusive	
	mean	st.d	mean	st.d
Price per m^2 (10^4)	4.97	2.15	4.20	2.10
Total price (10^4)	430.55	250.22	412.07	298.31
Size in m^2	89.34	37.17	98.35	42.93
Living rooms	2.14	0.78	2.19	0.88
Bedrooms	1.23	0.53	1.25	0.58
School dummy	0.24	0.43	0.15	0.36
Metro dummy	0.76	0.43	0.64	0.48
High floor	0.35	0.48	0.34	0.47
Middle floor	0.34	0.48	0.34	0.47
Low floor	0.31	0.46	0.32	0.46
Const.: before 1995	0.28	0.45	0.17	0.38
Const.: after 2010	0.06	0.24	0.11	0.31
Tax free	0.51	0.50	0.40	0.49
Key	0.23	0.42	0.10	0.30
Manager dummy	0.31	0.46	0.31	0.46
Agent exp: 5+ years	0.22	0.42	0.19	0.39
Observations	22114		101725	

The last two columns are the mean difference and t-value of the t-statistics (in parentheses). *** stands for p-value being less than .01.

The presence of smaller, less desirable floor locations, and older apartments among the exclusive listings suggests a deliberate choice by sellers to opt for exclusivity. Sellers of apartments with these characteristics are motivated to sign exclusive contracts due to the assurance of heightened selling efforts from the agents. Without such dedicated effort, these listings would face greater challenges in finding potential buyers. Additionally, sellers of apartments with unfavorable floor plans, poor maintenance conditions, or lacking elevators would also be more inclined to choose exclusive contracts, even though these specific characteristics are not captured in our dataset.

Table 2 presents a comparison of listing prices, buyer views, and transaction outcomes for the two types of listings. Exclusive listings have higher prices per square

meter, averaging approximately 20% higher than the non-exclusive listings. Moreover, exclusive listings attract a significantly larger number of views than non-exclusive listings. Within a two-week window, the average number of buyer views is 12.82 per exclusive listing, while the average is only 3.04 per non-exclusive listing. Over a four-week period, these figures rise to 19.81 and 4.84 views, respectively.

The lower section of the table shows the transaction outcome of the two listing types. The average transaction prices per square meter are 44,500 RMB for the exclusive listings and 39,600 RMB for the non-exclusive ones. Thus, the exclusive listings' transaction prices are 11.84% higher on average. The probability of a transaction occurring within 90 days from the first buyer view is 26% for the exclusive listings but only 8% for the non-exclusive listings. On average, it takes 51 days to sell an exclusive listing and 67 days to sell a non-exclusive listing.

Table 2: Transaction Outcome Summary Statistics and Exclusiveness, 2016

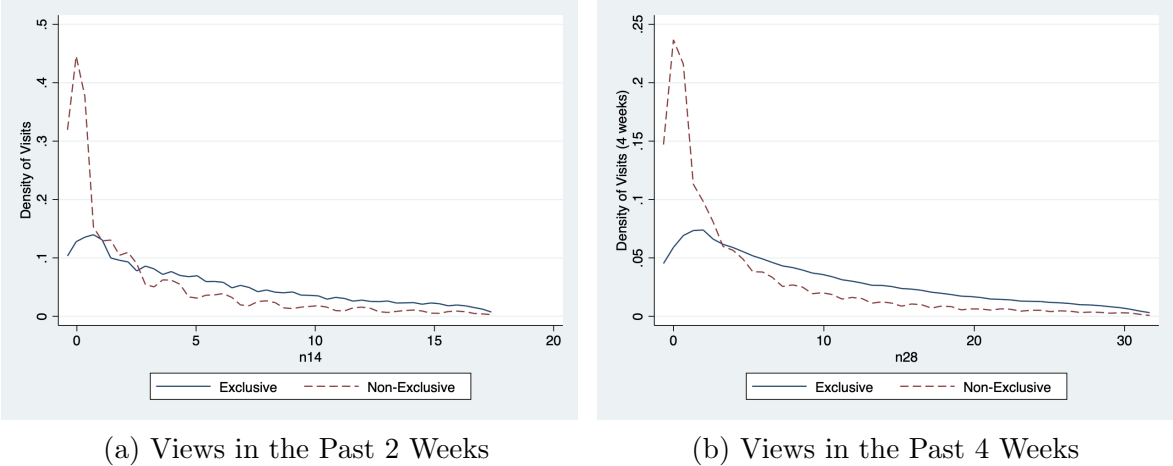
	(1)	(2)	(3)	(4)
	Exclusive		Non-exclusive	
	mean	sd	mean	sd
Listing price (10^4 RMB/ m^2)	4.97	2.15	4.20	2.10
Total listing price (10^4 RMB)	430.55	250.22	412.07	298.31
Sold within 90 days	0.26	0.44	0.08	0.27
Views in past 2 weeks	12.82	26.38	3.04	10.76
Views in past 4 weeks	19.81	40.01	4.84	16.72
Observations	22114		101725	
Days to sold	50.65	56.79	66.81	77.89
Transaction price (10^4 RMB/ m^2)	4.45	1.85	3.96	1.75
Total transaction price (10^4 RMB)	369.37	202.90	350.97	223.20
Observations	7027		11585	

Columns (1) to (4) provide mean and standard deviation (in parentheses) of variables for exclusive and non-exclusive properties. Columns (5) and (6) provides the mean difference and t-value of the t-test (in parentheses). *** stands for $p < .01$.

Figures 1a and 1b plot the probability distributions of buyer views for exclusive

and non-exclusive listings during the two- and four-week periods preceding the data collection date, respectively. In Figure 1a, the probability density of the number of views for non-exclusive listings peaks at one, whereas the density for exclusive listings appears relatively flat. This pattern aligns with the average number of views observed for each listing type, as shown in Table 2. We observe similar patterns in Figure 1a for the density of buyer views in the four-week period.

Figure 1: Kernel Density of Buyer Views to Exclusive and Non-Exclusive Listings



3 Empirical Model and Endogeneity in Exclusivity

3.1 Empirical Model

Given the differences between the two types of listings, our analysis focuses on understanding the impact of exclusive contracts on the agents’ selling effort and the overall market outcome of the listings. We begin by examining how exclusivity influences the agents’ effort, which we measure using the number of buyer views. We then investigate how exclusivity affects the listing price. A positive price effect would provide support for the ban of the exclusive seller-platform contracts implemented by the Shanghai and Beijing governments. Lastly, we analyze the impacts of exclusivity on the market per-

formances of the two types of listings, including the transaction probability, days on the market, and transaction prices.

Our main regression equation for these analyses is:

$$y_{it} = \beta_0 + \beta_e e_{it} + \beta_x \mathbf{x}_i + \beta_z \mathbf{z}_{it} + \alpha_t + \epsilon_{it}, \quad (1)$$

where y_{it} is the dependent variable (e.g., number of buyer views and listing price) for apartment i in month t . The dummy variable e_{it} indicates whether the apartment is under an exclusive contract. If the listing is under an exclusive contract, then $e_{it} = 1$. Otherwise, then $e_{it} = 0$. The observable apartment characteristics are denoted by \mathbf{x}_i , which is a vector that includes the size in square meters, number of bedrooms, number of living rooms, a dummy variable for being in a good school district, a dummy variable for being near a subway station, fixed effect of the neighborhood, year being built, floor number, and so on.

The characteristics of the representing agent are in vector \mathbf{z}_{it} , which includes a dummy variable indicating managerial position and a dummy variable indicating five or more years of work experience. We also control for the month fixed effects, α_t . The error term ϵ_{it} captures the unobserved characteristics of the apartment, like the floor plan and the maintenance condition. In the regression analyses, unless otherwise specified, we only consider the last appearance of apartments that appeared in multiple months in the sample.

3.2 Endogeneity and IV

The identification of β_e is subject to an endogeneity issue because sellers can choose whether to sign the exclusive contracts, and this decision is correlated with the unobserved characteristics captured by ϵ_{it} . For the apartments with less desirable unobserved characteristics, the sellers are more likely to sign exclusive contracts. These

apartments are more difficult to sell without the guaranteed selling effort by the agents under exclusive contracts. Thus, a negative correlation exists between ϵ_{it} and e_{it} .

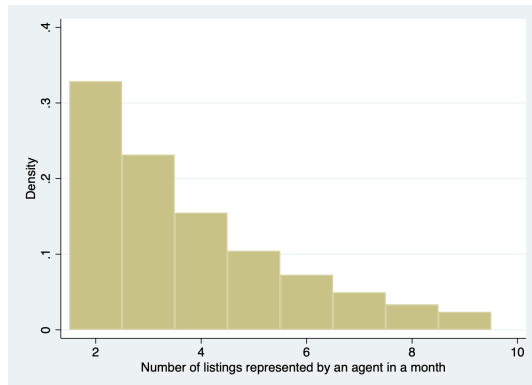
We employ an instrumental variable (IV) approach to address the endogeneity issue of e_{it} . The IV is the fraction of exclusive listings among the apartments represented by the same agent in the same month. This fraction serves as a proxy for the representing agent's ability to convince sellers to sign exclusive contracts. As discussed in Section 2, representing agents have a strong incentive to persuade sellers to sign exclusive contracts, and more experienced agents tend to be more successful in this regard. Therefore, this IV is positively correlated with e_{it} because the representing agent's ability affects whether listing i is under an exclusive contract. It is uncorrelated with ϵ_{it} because the agent's ability is independent of the unobserved characteristics of listing i . To avoid collinearity between e_{it} and the IV, we only include the listings where the representing agent represents at least two listings in the regressions.⁸

Figure 2 plots the probability density of the number of listings represented by an agent in a given month, conditional on the agents representing at least two listings.⁹ Among these agents, the distribution reveals that 32% represent two listings, 24% represent three listings, 16% represent four listings, and 10% represent five listings. The correlation coefficients between the IV and e_{it} are 0.63 in the full sample and 0.58 in the subsample of agents representing at least two listings.

⁸For robustness, we further restrict our sample to agents representing more than two listings (e.g. at least three, four, or five listings) in the regressions.

⁹In the full sample, the share of listings for which the representing agent only represents one listing in a month is 8.35%.

Figure 2: Density of the Number of Listings Represented by an Agent



In each of the regression analyses in the next section, we perform the weak-IV test by regressing e_{it} on the IV and the set of other explanatory variables. The results of these first-stage regressions show that the F-statistics for all models are greater than 10, indicating that the IV passes the weak-IV tests.

4 Impacts of Exclusivity on Agent Effort

In this section, we analyze the impacts of exclusive seller-platform contracts on the agents' effort to sell listings. We first examine the listing-level data to determine whether exclusivity has a positive impact on the number of views for a listing. Next, to investigate whether exclusivity redirects agents' efforts from non-exclusive listings to exclusive listings, we construct agent-week-level effort measures and regress them on the number of listings represented by the agent and the fraction of exclusive listings represented by the agent.

4.1 Exclusivity and Agents' Effort at the Listing Level

The impact of the exclusivity on the agents' effort can be both positive or negative. On the one hand, a positive impact exists for two reasons. Firstly, given the agency's obligation to sell exclusive listings within a 90-day timeframe, agents are instructed

to prioritize the sale of these listings. Secondly, unlike non-exclusive listings, exclusive listings do not face the issue of buyer free-riding. Free-riding occurs when buyers engage the agency to arrange property viewings but ultimately conduct transactions through other agencies. This is likely to occur because the agency under study offers highly professional services but also charges the highest commission fee among all agencies.¹⁰ On the other hand, exclusivity may also have a negative impact on the agents' efforts. This is because the agents may reduce their effort in selling the exclusive listings since the agency faces no competition in selling exclusive listings.

We use regression model in equation (1) to estimate the net impact of exclusivity on the agents' effort. Our measure of agent effort in selling each listing is its number of buyer views. As discussed in Section 2.1, buyers heavily rely on agents' recommendations to identify suitable listings that align with their preferences and financial constraints because the agents have more information.¹¹ Buyers rarely decline the agents' recommendations to view listings because buying an apartment is a very important family decision so they would like to have more options. Thus, the agents can choose to show more exclusive listings to buyers if they have the incentive to do so.

It is worth noting that since all agents in the agency can show their buyers any available listing, regardless of the representing agent, the number of views for a listing includes the views of buyers from all agents. Therefore, a positive impact of exclusivity on the agents' effort means that the agency, or all agents collectively, exert more effort to selling the exclusive listings, rather than solely the representing agent.

We construct two measures of buyer views to each listing, the views in the two weeks and four weeks prior to our data collection date, respectively. We regress each measure

¹⁰The regulated commission fee is 2% of the sale price, but the agency under study also imposes an additional 0.6% service fee. In contrast, other agencies may be more flexible in negotiating the commission fee. Consequently, the total fees charged by the agency under study can be significantly higher than those of other agencies.

¹¹When a buyer contacts an agent for the first time, the buyer may find listings on the agency's website and request views. After they establish connection with each other, the agent will recommend more listings to the buyer.

on the exclusivity dummy, apartment characteristics, agent characteristics, month fixed effects, and the number of days it has been on the market. The number of days on the market can capture possible decreasing trends in the buyer views for an apartment. In this regression, we restrict the sample to listings that have been on the market for at least two weeks.¹² The sample size reduces from 123,839 to 49,430.

Table 3 presents the regression results. Columns (1) and (3) are the OLS results, indicating that exclusivity has a positive and significant impact on the number of views. Specifically, an exclusive listing has 4.99 more views in the two-week period and 7.91 more views in the four-week period. Columns (2) and (4) are the results when utilizing the IV for exclusivity.¹³ After addressing the endogeneity, an exclusive listing has 5.74 more views in the two-week period and 9.31 more views in the four-week period. The IV estimates demonstrate stronger impacts of the exclusivity on views compared to the OLS estimates. This is because exclusivity and ϵ_{it} have a negative correlation, as explained in section 3. Therefore, the exclusive listings have more buyer views than the non-exclusive listings, indicating that agents exert greater effort in selling exclusive listings.

¹²When we regress the number of views in the four weeks prior to the data collection date, the sample only includes listings which have been on the market for four weeks.

¹³In the weak-IV test, the F-statistic is 5186.04 for the first-stage regression. Thus, the IV passes the weak-IV test in this regression.

Table 3: Exclusivity and Buyer Views

	(1)	(2)	(3)	(4)
	Two-week buyer views OLS	Two-week buyer views OLS-IV	Four-week buyer views OLS	Four-week buyer views OLS-IV
Exclusivity	4.99 (0.14) ^{***}	5.74 (0.26) ^{***}	7.91 (0.27) ^{***}	9.31 (0.49) ^{***}
Living rooms	0.29 (0.07) ^{***}	0.28 (0.07) ^{***}	0.76 (0.14) ^{***}	0.75 (0.14) ^{***}
Bedrooms	1.04 (0.10) ^{***}	1.01 (0.10) ^{***}	1.77 (0.19) ^{***}	1.73 (0.19) ^{***}
Size in m^2	-0.02 (0.00) ^{***}	-0.02 (0.00) ^{***}	-0.03 (0.00) ^{***}	-0.03 (0.00) ^{***}
School dummy	0.16 (0.18)	0.14 (0.18)	0.58 (0.34) [*]	0.54 (0.34)
Metro dummy	0.28 (0.17) [*]	0.28 (0.17) [*]	0.57 (0.30) [*]	0.57 (0.30) [*]
Tax free	2.85 (0.10) ^{***}	2.83 (0.10) ^{***}	4.71 (0.19) ^{***}	4.68 (0.19) ^{***}
Key	10.87 (0.18) ^{***}	10.77 (0.18) ^{***}	18.62 (0.34) ^{***}	18.44 (0.34) ^{***}
R^2	0.27	0.22	0.29	0.23
Agent Num	15480	15480	13803	13803
N	49430	49430	37253	37253

Henceforth, the symbols *, **, and *** indicate significance at the 0.1, 0.05 and 0.01 levels using a two-tailed t-test, respectively.

One might argue that the buyer views for non-exclusive listings are spread across multiple agencies, with each agency only receiving a fraction of the total views. However, this scenario assumes two conditions, both of which are inconsistent with the actual viewing process. First, it assumes that buyers first find non-exclusive listings on multiple agencies' websites and then choose which agency to arrange a tour with. However, this contradicts how buyers typically request views. For the buyers who visit the agency's offline stores, they first find the store and then view the apartments recommended by the agents. For the buyers who view listings online, there is no incentive to search for the same apartment on different agencies' websites because it is time-consuming and the information provided by different agencies is identical.

The second assumption is that non-exclusive listings must to be listed by multiple agencies. However, this is not the case in reality. Even though many non-exclusive sellers do not sign exclusive contracts, they still list the apartment only with one agency. This is because the agency in this paper is the largest agency, which can attract the most buyers for the seller. Additionally, listing with multiple agencies would require the seller to spend more time on communicating with the agencies. Therefore, the idea that buyers are spread across multiple agencies should not be the reason for the non-exclusive listings receiving fewer buyer views compared to exclusive listings.

Another alternative explanation for the positive impact of the exclusivity on buyer views is that sellers who sign exclusive contracts may be more motivated to sell, and thus more willing to accept more views, even at inconvenient times (e.g., late evenings or weekdays). In other words, sellers of exclusive listings are more likely to accommodate view requests. To address this alternative explanation, we conduct a regression analysis using a subsample of listings for which the agents have the keys. In these cases, the sellers do not reside in the apartments, so the agents do not need to coordinate viewings with the sellers. Thus, the sellers do not influence the number of buyer views for the listings in this subsample. We find that that the positive impact of exclusivity on the number of view remains.¹⁴ By ruling out these potential confounding factors, we attribute the positive effect of exclusivity on the number of views to the agents' effort.

4.2 Effort-Steering Effect of the Exclusive Contracts

The agents' greater effort to sell exclusive listings may have a negative impact on their effort to sell the non-exclusive listings. As an agent represents a greater fraction of exclusive listings, they may exert more effort to sell their own exclusive listings and reduce their effort to sell non-exclusive listings. When this occurs, we say that

¹⁴When regressing the buyer views in the two-week period using this subsample, we find that the OLS and IV regression coefficients for exclusivity are 5.73 and 7.06, respectively. Both are significant at the 1% confidence level.

the exclusive contracts have *an effort-steering effect*. Conversely, as the fraction of exclusive listings increases, an agent may exert more effort to sell exclusive listings without diminishing their effort for non-exclusive listings. When this occurs, we say that the exclusive contracts have *an effort-increasing effect*.

We analyze our data further to investigate whether exclusivity has an effort-increasing effect or an effort-steering effect. We first construct four agent-week-level effort measures: the number of views to all listings, exclusive listings represented by the agent, non-exclusive listings represented by the agent, and listings represented by other agents. Our dataset contains 48,885 agent-week-level observations. The agent-week-level number of buyer views ranges from one to 69, with a mean of 5.95.¹⁵ Most of the buyer views are for non-exclusive listings, which account for 82% of the listings in our data.

We regress each of the four agent-week-level effort measures on the fraction of exclusive listings among the agent’s representing listings, the total number of listings represented by the agent, square term of this number, agent fixed effects, and week fixed effects. The agent fixed effects control for the heterogeneity in agents’ abilities. The week fixed effects control for possible demand shocks in the market. The regression results are in Table 4. Column (1) shows that the fraction of exclusive listings does not have a significant impact on the total number of views, conditional on the number of listings represented by the agent. The number of listings has a positive effect on the weekly total number of views. These results indicate that an agent’s weekly effort increases with the number of listings he represents. However, increasing the fraction of exclusive listings does not have a significant effect on the agent’s total weekly effort. Thus, the exclusive contracts do not have the effort-increasing effect.

In columns (2)-(4), the dependent variables are the weekly numbers of buyer views that an agent arranges to the exclusive listings he represents, the non-exclusive listings he represents, and all listings represented by other agents, respectively. We find that, as

¹⁵Table A.1 in the appendix shows the summary statistics of the four measures.

the fraction of exclusive listings goes up, agents arrange more buyer views to their own exclusive listings but fewer buyer views to their own non-exclusive listings and other listings represented by other agents. The estimated effects for these three variables are 1.22, -1.04 , and -0.30 , respectively. The net effect of them is close to zero, which aligns with the result in column (1) that the exclusive fraction does not increase agents' total effort. However, the negative effects in columns (3) and (4) suggest that the exclusive contracts have the effort-steering effect. Specifically, given the number of listings represented by an agent, an increase in the fraction of exclusive listings leads to an increase in effort devoted to selling these exclusive listings, while reducing effort allocated to selling other listings.

Table 4: Agents' Weekly Visits and Effort Steering

	(1) Total views	(2) Exclusive own	(3) Non-exclusive own	(4) Other
Exclusive fraction	-0.14 (0.19)	1.22 (0.04)***	-1.04 (0.05)***	-0.30 (0.17)*
# listings	0.70 (0.05)***	0.16 (0.01)***	0.37 (0.03)***	0.17 (0.04)***
# listings square	-0.00 (0.00)	-0.00 (0.00)***	-0.00 (0.00)	-0.00 (0.00)
Y				
R^2	0.03	0.09	0.08	0.01
N	48885	48885	48885	48885

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4 uses total views for different types of listings. We now examine views per listing to provide further evidence of the effort-steering effect. Specifically, we compute three additional agent-week-level variables: the average number of weekly buyer views per listing arranged by an agent for all the listings he represents, for the exclusive listings he represents, and for the non-exclusive listings that he represents. The averages

of these three numbers of views per listing are 0.30, 0.47, and 0.24, respectively.¹⁶

We regress each of the three views per listing on the exclusive fraction of an agent. The results are in Table 5. In column (1), the dependent variable is the average number of weekly views per listing over all the listings represented by the agent. This average is weighted by the fractions of exclusive and non-exclusive listings. Our finding indicates that the number of views per listing increases with the exclusive fraction. This is because exclusive listings receive more views than non-exclusive listings on average, as Table 2 shows. Thus, as the exclusive fraction goes up, the weighted average weekly views per listing also increases.

Table 5: Weekly Buyer Views per Listing and the Exclusive Fraction

	(1)	(2)	(3)
	All own	Exclusive own	Non-exclusive own
Exclusive fraction	0.07 (0.03)**	-0.03 (0.08)	-0.09 (0.03)**
# listings	0.05 (0.00)***	0.05 (0.01)***	0.04 (0.00)***
# listings square	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***
Agent fixed effect	Y	Y	Y
Weekly dummy	Y	Y	Y
R^2	0.02	0.02	0.02
N	48885	20061	45715

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

In columns (2) and (3), the dependent variables are the weekly views per listing arranged by the agent for his exclusive and non-exclusive listings, respectively. The results show that a higher exclusive fraction does not have a positive impact on the number of views per exclusive listing, but it has a negative impact on the views per non-exclusive listing. These results suggest that as the exclusive fraction increases, agents allocate their effort from non-exclusive listings to exclusive listings. Therefore,

¹⁶Table A.2 in the appendix shows the summary statistics of these variables.

exclusive contracts have an effort-steering effect.

5 Exclusivity and Listing Prices

In this section, we analyze the impact of exclusive contracts on listing prices. We began by comparing the distributions of the listing prices for the two listing types. We then conduct a regression analysis, regressing listing prices on exclusivity, and find that exclusive listings have higher listing prices on average. Several possible mechanisms can explain this positive effect. To investigate each mechanism, we examine the variation in the exclusivity status of listings over time. Our results indicate that the higher listing prices of exclusive listings can be attributed to the agents' incentive to advise sellers to set higher listing prices.

5.1 Fair Listing Prices

Following Jia and Pathak (2010), we construct the “fair prices” of the listings using a hedonic pricing model. This model assumes that the listing price is a linear function of the apartment characteristics and month-fixed effects. The fair listing price of an apartment is the fitted value from the hedonic price function regression.¹⁷ We then compute the ratio of an apartment's listing price to its fair price, which indicates the deviation from the fair market price.

In Figure 3, the top graphs plot the histogram of the list-fair price ratios for the two listing types.¹⁸ We find that the ratio is more dispersed for the non-exclusive listings compared to the exclusive listings. Specifically, for the exclusive listings, the mean and standard deviation of this ratio are 1.01 and .18, respectively. For the non-exclusive listings, the mean value is slightly lower at 1.00, but the standard deviation is .22. The

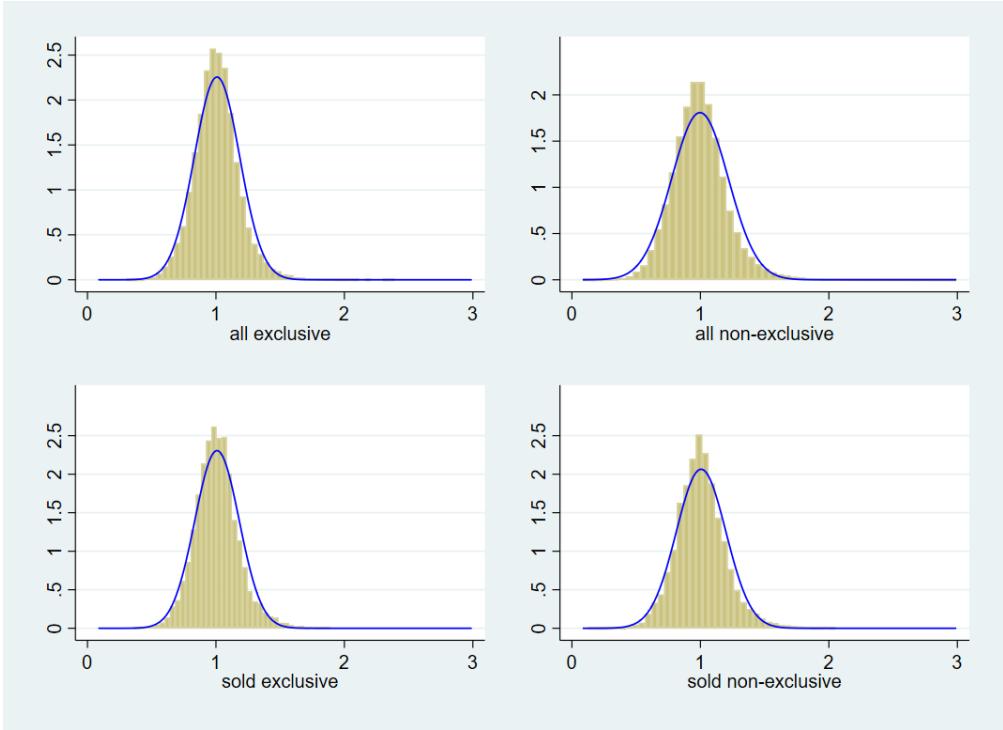
¹⁷We use the full sample in this regression. Restricting to non-exclusive listings only does not change the results.

¹⁸We truncate the ratio at 3.

two bottom graphs in Figure 3 display the distributions of this ratio for the listings in the transaction data. These distributions show similar patterns.

The smaller dispersion in the price ratio for the exclusive listings, as compared to the non-exclusive listings, is due to the following reason. The agents have strong incentives to recommend the exclusive sellers to set the listing price close to the fair market prices, given the constraints of selling the exclusive listings within 90 days. The agents will suggest appropriate listing prices that are higher than the minimum prices set in the contracts but still within a range that can attract sufficient buyer views. As a result, the listing prices for exclusive listings exhibit less dispersion.

Figure 3: Distribution of the List-Fair Price Ratio



5.2 Impact of Exclusivity on Listing Prices

We now regress the listing price per square meter on the apartment characteristics, agent characteristics, and month fixed effects, using equation (1). Table 6 presents the regression results with and without the IV for exclusivity. In columns (1) and (2),

we use the full sample of all listings. The OLS results in column (1) show that the listing price per square meter for the exclusive listings is 800 RMB higher than that for the non-exclusive listings, which is approximately 1.90% of the average unit price of non-exclusive listings. The IV estimates in column (2) demonstrate that this difference increases to 1,900 RMB, equivalent to around 4.52% of the average unit price of non-exclusive listings. The IV estimate is greater than the OLS estimate due to the negative correlation between the unobserved quality and exclusivity, as explained in section 3.

Table 6: Exclusivity and Listing Prices (in 10^4 RMB/ m^2)

	(1)	(2)	(3)	(4)
	All apartments		Sold apartments	
	OLS	OLS-IV	OLS	OLS-IV
Exclusivity	0.08 (0.01) ^{***}	0.19 (0.02) ^{***}	0.06 (0.01) ^{***}	0.12 (0.03) ^{***}
Living rooms	0.17 (0.01) ^{***}	0.16 (0.01) ^{***}	0.15 (0.02) ^{***}	0.14 (0.02) ^{***}
Bedrooms	0.35 (0.01) ^{***}	0.35 (0.01) ^{***}	0.36 (0.02) ^{***}	0.36 (0.02) ^{***}
Size in m^2	-0.01 (0.00) ^{***}	-0.01 (0.00) ^{***}	-0.01 (0.00) ^{***}	-0.01 (0.00) ^{***}
School dummy	0.86 (0.03) ^{***}	0.86 (0.03) ^{***}	0.69 (0.04) ^{***}	0.69 (0.04) ^{***}
Metro dummy	0.12 (0.01) ^{***}	0.12 (0.01) ^{***}	0.10 (0.02) ^{***}	0.10 (0.02) ^{***}
Tax free	0.13 (0.01) ^{***}	0.13 (0.01) ^{***}	0.15 (0.01) ^{***}	0.15 (0.01) ^{***}
Key	-0.10 (0.01) ^{***}	-0.12 (0.01) ^{***}	-0.12 (0.02) ^{***}	-0.13 (0.02) ^{***}
R^2	0.80	0.18	0.82	0.18
Agent Num	18931	18931	8357	8357
N	111945	111945	13184	13184

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

In columns (3) and (4), we use the subsample of the apartments sold within 90 days. The OLS estimation reveals that exclusivity increases the listing price per square meter by 600 RMB, while after addressing the endogeneity in exclusivity, the increase

amounts to 1,200 RMB. Since apartments with lower listing prices are more likely to sell, the impact of exclusivity on listing prices is smaller in this subsample than when using the full sample.

Several possible reasons can cause the positive impact of exclusivity on listing prices. First, representing agents are inclined to suggest higher listing prices for exclusive listings. Since they do not face competition from other agencies, the agents can wait for buyers with a high willingness to pay. With a higher price, the representing agents can earn a greater commission fee upon a successful transaction. Second, if the sellers who sign the exclusive contracts are more patient in selling the apartments and therefore wish to set higher listing prices, we would observe see higher listing prices for exclusive listings. Third, the sellers may increase the listing prices once they sign exclusive contracts because they anticipate agents to exert more effort in selling exclusive listings.

To examine whether each of these reasons is consistent with our data, we leverage the variation in listing prices when a listing changes its exclusivity status. We utilize a subsample of listings that appeared multiple times in the data and calculate the change in the listing price between two consecutive months. This sample comprises 75,536 changes for 55,472 listings. Among them, 79.21% remained non-exclusive, 3.40% changed from non-exclusive to exclusive, 2.69% changed from exclusive to non-exclusive, and 15.70% remained exclusive. The average changes in the price per square meter in these categories are 376.39, 22.07, 645.46, and 2.54, respectively.¹⁹ On average, the listing prices of all types of changes increased over time, which is consistent with the rapid price increase of apartments in 2016.

For each apartment, we create dummy variables representing the four types of contract status changes and regress the change in the apartment's listing price on these dummy variables. Other control variables include apartment characteristics, agent characteristics, and month dummies. The results are in Table 7.

¹⁹See Table A.3 for the summary statistics of the four types of status changes.

In columns (1) and (2), the dependent variable is the listing price per square meter. In columns (3) and (4), the dependent variable is the total listing price. We use the listings that remained non-exclusive as the benchmark. The results are as follows. Compared with listings that remained non-exclusive, when a listing changed from non-exclusive to exclusive, the price per square meter decreased by 558 RMB, and the total price dropped by 51.6 thousand RMB. When a listing changed from exclusive to non-exclusive, the listing price increased by 116 RMB, and the total price increased by 9.7 thousand RMB. For listings that remained exclusive, the price per square meter dropped by 301 RMB, and the total price dropped by 27 thousand.

Table 7: Changes in the Listing Prices and the Exclusivity Status

	(1) Price/ m^2 (RMB)	(2)	(3) Total price (10^4 RMB)	(4)
<i>non_exc</i>	-560.06 (48.93) ^{***}	-558.03 (48.94) ^{***}	-5.16 (0.53) ^{***}	-5.13 (0.53) ^{***}
<i>exc_non</i>	115.48 (70.40)	115.88 (70.54)	0.97 (0.66)	0.97 (0.66)
<i>exc_exc</i>	-301.37 (18.78) ^{***}	-300.68 (18.78) ^{***}	-2.72 (0.19) ^{***}	-2.71 (0.19) ^{***}
Month FE	Yes	Yes	Yes	Yes
Apartment characteristics	Yes	Yes	Yes	Yes
Agent characteristics	No	Yes	No	Yes
R^2	0.06	0.06	0.06	0.06
N	75,536	75,490	75,536	75,490

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

The variables *non_exc*, *exc_non*, and *exc_exc* are dummy variables for changing from non-exclusive to exclusive, changing from exclusive to non-exclusive, and being always exclusive during the sample period, respectively.

The results in Table 7 suggest that the second and third possible reasons for the positive impact of exclusivity on listing prices are not supported. Regarding the second reason, if the higher listing prices of the exclusive listings were a results of greater seller patience, we would expect a positive coefficient for the variable *non_exc*. This means that when a seller switched from a non-exclusive contract to an exclusive contract, they

would increase the listing price if they became more patient in selling the apartment. However, Table 7 shows the opposite result, where the listing price actually decreased in such cases. Therefore, it can be concluded that the higher prices of exclusive listings are not due to greater seller patience.

Similarly, the third reason is inconsistent with the results in Table 7. If the sellers strategically raised listing prices after signing exclusive contracts, we should also expect a positive coefficient for the variable *non_exc*. However, the estimation results indicate the opposite. Thus, while agents may exert more effort in selling exclusive apartments, the evidence does not support the notion that exclusive sellers intentionally increase listing prices after signing the contracts.

Meanwhile, we cannot exclude the first reason, which aligns with the negative coefficient for *exc_exc* in Table 7. When exclusive apartments are initially listed, agents are incentivized to encourage sellers to set relatively high listing prices. If an apartment remains unsold after one month, the agent and seller will gradually reduce the listing prices. The negative coefficient for *exc_exc* indicates that exclusive apartments experienced larger decreases in listing prices over time compared to apartments that remained non-exclusive.

In summary, we find that exclusive listings have higher and less dispersed listing prices compared to non-exclusive listings. Furthermore, we investigate the potential explanations for the higher listing prices of exclusive apartments. Through analysis of a subsample of apartments that changed contract exclusivity during the sample period, we conclude that the higher listing prices of exclusive apartments are not a result of greater seller patience or sellers increasing prices after signing exclusive contracts. Instead, we attribute this positive effect to representing agents persuading exclusive sellers to set higher prices, which aligns with the agents' incentive to earn greater commission fees.

6 Exclusivity and Transaction Outcomes

We now analyze the impacts of exclusivity on the transaction outcomes of the listings. As shown above, exclusive listings have more buyer views and higher listing prices, which have opposite effects on the transaction outcomes. On the one hand, more buyer views help an apartment to sell faster and potentially result in a higher transaction price. On the other hand, the higher listing price may slow down the selling process, although it can lead to a higher transaction price. To evaluate the overall impact of exclusive contracts, we will utilize the transaction data and examine the effects of exclusivity on transaction probability, duration (number of days on the market), and transaction prices, following the approach of Jia and Pathak (2010).

The transaction probability is a dummy variable indicating whether the listing is sold within 90 days from the first buyer view. In the full sample, 10.90% of the listings are sold within 90 days. The average transaction probabilities are 0.26 for exclusive listings and 0.08 for non-exclusive listings. While only 17.86% of the apartments were exclusive in the listing data, 42.53% of the apartments were exclusive in the transaction data. These figures indicate that exclusive listings are more likely to be successfully sold.

We apply the model in equation (1) and regress each of the three outcome variables on apartment characteristics, agent characteristics, and month-fixed effects. We utilize the subsample of listings with agents representing at least two listings to ensure a well-defined IV for exclusivity.²⁰ Table 8 presents the estimation results for the three outcome variables.

In columns (1) and (2), the dependent variable is the transaction dummy. Column (1) displays the OLS regression results, while column (2) employs the IV for exclusivity. We find that exclusivity has a significant and positive impact on the transaction

²⁰For robustness, we further restrict the sample to agents representing five or more listings and obtain similar results.

probability, emerging as the most influential factor among all explanatory variables. Exclusivity alone increases the transaction probability by 17%. Among the other explanatory variables, agents having the key also plays a crucial role, increasing the transaction probably by 7%. If the apartment is exempt from property value-added tax, its transaction probability rises by 4%. Additionally, the number of bedrooms has a positive and significant impact, whereas apartment size exhibits a negative impact on the transaction probability.

Table 8: Impact of Exclusivity on Transaction Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Transaction		Days on the market		Trans. price (10^4 RMB)	
	OLS	OLS-IV	OLS	OLS-IV	OLS	OLS-IV
Exclusivity	0.17 (0.00)***	0.17 (0.01)***	-2.44 (0.45)***	-2.69 (0.81)***	0.05 (0.01)***	0.11 (0.03)***
Living rooms	-0.00 (0.00)	-0.00 (0.00)	0.53 (0.48)	0.54 (0.48)	0.14 (0.02)***	0.14 (0.02)***
Bedrooms	0.01 (0.00)***	0.01 (0.00)***	-0.99 (0.55)*	-0.98 (0.55)*	0.36 (0.02)***	0.35 (0.02)***
Size in m^2	-0.00 (0.00)***	-0.00 (0.00)***	0.04 (0.01)***	0.04 (0.01)***	-0.01 (0.00)***	-0.01 (0.00)***
School dummy	0.01 (0.00)	0.01 (0.00)	-0.05 (0.84)	-0.04 (0.84)	0.66 (0.04)***	0.66 (0.04)***
Metro dummy	0.00 (0.00)	0.00 (0.00)	-0.87 (0.71)	-0.87 (0.71)	0.10 (0.02)***	0.10 (0.02)***
Tax free	0.04 (0.00)***	0.04 (0.00)***	-2.43 (0.47)***	-2.42 (0.47)***	0.15 (0.01)***	0.15 (0.01)***
Key	0.07 (0.00)***	0.07 (0.00)***	3.28 (0.55)***	3.32 (0.55)***	-0.12 (0.02)***	-0.13 (0.02)***
R^2	0.11	0.09	0.04	0.02	0.82	0.17
Agent Num	18931	18931	7921	7921	8357	8357
N	111945	111945	12094	12094	13184	13184

In columns (1) and (2), the dependent variable is the transaction dummy. In columns (3) and (4), the dependent variable is the duration (number of days on market). In columns (5) and (6), the dependent variable is the transaction price per square meter. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Columns (3) and (4) show the impact of exclusivity on the number of days on the

market for a listing.²¹ We truncate this number at 90 because the agents are obligated to sell the exclusive listings within 90 days. Column (3) presents the OLS regression results, showing a negative impact of exclusivity on the number of days on the market. After dealing with the endogeneity in exclusivity in column (4), we find that exclusivity reduces the number of days on the market by an average of 2.69 days, which corresponds to approximately a 4.01% reduction compared to the average number of days on the market for non-exclusive listings. Faster sales allow sellers to accrue more interest by receiving the transaction payment sooner. For instance, for an apartment with a total price of the mean of all exclusive listings ($430.55 * 10^4$ RMB), selling 2.69 days faster can help the seller to earn 1,588 RMB in interest at an interest rate of 5%.

Columns (5) and (6) in Table 8 present the estimates when regressing the transaction price per square meter on exclusivity. The OLS results in column (5) indicate that the per square meter price of exclusive listings is 500 RMB greater than that of non-exclusive listings. The IV estimation results in column (6) suggest a stronger impact of exclusivity on the transaction price, with a coefficient of 1,100 RMB. This larger coefficient is due to the negative correlation between the unobserved apartment characteristics and exclusivity. With the average transaction price per square meter of non-exclusive listings being 39,600 RMB, this coefficient implies that the transaction price of exclusive listings is 2.78% higher than that of non-exclusive listings. For an apartment with the average size (approximately 90 square meters), the coefficient of 1,100 RMB in column (6) indicates that its total price would be 99,000 RMB higher when under an exclusive contract compared to a non-exclusive contract.

In addition to the exclusivity, the number of living rooms, bedrooms, dummies for good school districts, proximity to a metro station, and the dummy for value-added tax exemption also have positive impacts on the transaction price. This means that buyers are willing to pay more for apartments with more rooms, located in good school

²¹We do not observe the date of listing, so we count the days from the first buyer view date.

districts, close to subway stations, and exempt from value-added tax. Apartment size has a negative impact on the transaction price per square meter due to lower demand for larger apartments compared to smaller ones, primarily because of the high total prices.

Compared to columns (3) and (4) in Table 6, the impact of exclusivity on transaction prices is smaller than its impact on listing prices. This discrepancy arises because transaction prices are generally lower than listing prices due to negotiations between buyers and sellers.

From the regressions above, we find that exclusive listings have better transaction outcomes. They exhibit a higher probability of transaction within 90 days, fewer days on the market, and higher transaction prices. Therefore, despite having higher listing prices, exclusive apartments are more likely to sell and sell faster, at higher prices. These better market outcomes for exclusive listings align with the greater selling effort by the agents on these listings. Agents choose to arrange more buyer views for exclusive listings, and having more buyer views is the key to selling apartments faster and at higher prices.

7 Conclusion

Many countries have taken actions to regulate or even ban exclusive contracts between platforms and sellers in various industries. While the theoretical studies have yielded mixed results regarding the welfare effects of such exclusive contracts, empirical analyses are lacking. In this paper, we quantitatively examine the impacts of exclusive contracts on the platform's effort and transaction outcomes between the two sides.

Our data comprises listing-level information of apartments from the largest real estate company in Beijing in 2016. During our sample period, this company offered exclusive contracts to sellers, which were later prohibited by the local governments.

We leverage the variation in exclusivity and employ regression analyses to quantify the impacts of exclusive seller-platform contracts on the platform's effort, listing prices, and transaction outcomes. After dealing with the endogeneity of exclusivity, we obtain the following results.

First, agents exert greater effort in selling exclusive listings compared to non-exclusive listings. On average, exclusivity increases the number of buyer views in a two-week period by 5.74, which is approximately double the average number of buyer views for non-exclusive listings. Furthermore, an effort-steering effect exists, meaning that agents reduce their efforts in selling non-exclusive listings when representing more exclusive listings.

Analyses of the listing prices reveal that exclusivity raises the listing price per square meter by 1,900 RMB (4.52%). Additionally, by examining the changes in the exclusivity of listings over time, we find that this positive price effect is not attributable to sellers' selection of exclusivity or sellers increasing prices after signing exclusive contracts. Instead, we attribute this positive price effect to agents persuading sellers to set higher listing prices in order to earn greater commission fees. Despite having higher listing prices, exclusive apartments still have a greater probability to sell and sell faster, at higher transaction prices. Thus, the positive impact of increased selling effort on transaction outcomes outweighs the negative impact of higher listing prices.

The effort steering effect and positive price effect indicate that exclusive contracts between agents and sellers have positive welfare impacts on exclusive sellers and agents but have negative welfare impacts on non-exclusive sellers and buyers. Thus, government regulations banning such exclusive contracts would improve the welfare of consumers and non-exclusive sellers. As more industries rely on platforms to facilitate transactions (e.g., e-commerce, restaurants, travel, and education), it becomes increasingly important for governments to appropriately regulate competition among platforms, which often employ exclusive contracts to reduce competition and increase

market power.

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Appendix

A Tables

Table A.1: Summary Statistics of Agent-Week-Level Total Number of Buyer Views

	Mean	St.d.	Minimum	Maximum
Total buyer views	5.95	4.86	1	69
Exclusive own	0.27	0.81	0	18
Non-exclusive own	0.58	1.27	0	26
Other	5.14	4.18	0	56

Table A.2: Summary Statistics of Agent-Week-Level Number of Buyer Views per Listing

	Mean	St.d.	Minimum	Maximum	Observations
Buyer views per listing for all his own listings	0.30	0.56	0	14	48,885
Buyer views per listing for his exclusive listings	0.47	0.86	0	18	20,061
Buyer views per listing for his non-exclusive listings	0.24	0.51	0	13	45,715

Table A.3: Summary Statistics of Listings that Appeared Multiple Times in the Data

	<i>non_non</i>	<i>non_exc</i>	<i>exc_non</i>	<i>exc_exc</i>
Number of observations	59,833	2,568	1,276	11,859
Fraction of observations	79.21	3.40	1.69	15.70
Mean price change ($/m^2$)	376.39	22.07	645.46	2.54

The variables *non_non*, *non_exc*, *exc_non*, and *exc_exc* denote four types of contract status changes: non-exclusive to non-exclusive, non-exclusive to exclusive, exclusive to non-exclusive, and exclusive to exclusive, respectively.