

## Online Appendices

### Do Real Estate Agents Have Information Advantages in Housing Markets?

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#### A. Data Matching Processes

In this appendix, we discuss the two main matching processes used in this study, where we first match the housing transaction data to the personal and the agent registry datasets and then merge the housing transaction data with the listing data.

We identify the agent-buyers by matching more than 30,000 registered agents (salespersons) to the housing transactions. We are able to match a large number of agents who have bought houses during the sample periods. After dropping transactions with missing key variables, 6,791 buyers are identified as the agent-buyers. In the matching process, cases with more than one match based on the buyer names in the transaction dataset and the agent names in the agent list are separated and denoted as “*agents with multiple matching names*”. There are 5,775 one to one matches and 1,016 one to many matches. The main results (Table 2) are estimated using only agents with “one-to-one matching names”; and agents with multiple matched names are dropped from the sample.

The matching by the “name” may not be precise and could cause exclusion bias in the results if errors exist in the matching process. We run various robustness checks to ensure that our results are not subject to distortion when agents with multiple matched names are randomly dropped from our samples. We adopt the two-step strategies in our robustness tests. First, we keep all agents with multiple matching by the names in the sample (left-hand Panel of Table A1); second, we randomly select one matched agent by name from the list of agents with multiple matching names (right-hand Panel of Table A1). We estimate the models using the full housing samples and then repeat the estimations using the balanced samples of agent-buyers and the non-agent buyers that are derived using PSM technique.

The results are summarized in Table A1. When all the agents with multiple matched names are included, the results are significant and consistent, but the estimates are biased downward, which could be caused by possible “false” inclusions of some non-agents into the agent group. The agent discounts are estimated at 1.78% in the full sample and 1.53% in the balanced sample compared to the estimated 2.45% and 2.32%, respectively, in the main results (Table 2). When we use only the randomly chosen agent, one each from the multiple matched names, the results remain strong and consistent. We estimate the price discounts at 2.03% and 1.59% for the full sample and the balanced sample, respectively, and the results are closer to the main results in Table 2. These results are consistent with the information advantage story that agents pay lower prices for their own houses than comparable houses bought by other non-agent buyers.<sup>1</sup>

We obtain the listing data from a proprietary source that systematically collates house listing information from several major electronic listing portals in Singapore; the listing data contain information on the address of the list house, listing price, housing size, posting date and agent posting the listing. We run the matching process that merge the listing data into the resale transaction data for the period from 2010 to 2012. The matching procedure is described as follows. First, given that the listing data do not have the actual unit number for houses, we merge the two datasets using the 6-digit postal code (each postal code represents one building) and the housing size. The 6-digit postal code identifies the building in which the houses are located, and the size helps to further refine the accuracy of the matching. Second, we delete those listings where the date of the listing is later than the transaction date. In this process, a house could still be matched to multiple listing records; in this case, we use the latest listing date before the transaction date as the reference time. Based on the above procedures, we are able to merge 2175 transactions to listing data, which cover is approximately 40% of the resale

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<sup>1</sup> In the sample of agents with “one-to-one matching names”, it is still possible that buyers with the exact same names are different persons. Thus, some non-agent buyers are classified as agent-buyers. In this case, our estimation of agent discounts is likely to have a lower bound.

transactions for the period from 2010 to 2012.<sup>2</sup>

## **B. Supplementary Empirical Analyses**

### *B.1. New Sales versus Resales*

We test the heterogeneity of the housing sale type: new sale (pre-completion) versus resale (completed). In Singapore and many Asian markets, it is common for developers to start selling houses before the physical completion of a project; this practice is known as “pre-completion sales”. Developers usually outsource the marketing and brokerage of new residential projects to third-party real estate agencies. Real estate agencies are appointed based on trained real estate salespersons/agents and established sale networks of the firms. Real estate agents from the appointed agency firms will have first-hand knowledge of the listing prices for units available for sales in the projects. Agents are able to have better knowledge and information about discounts and other marketing perks offered by developers to attract buyers to the projects. Therefore, real estate agents have information advantages over other buyers in new sales of houses in the market. Unlike the study by Hendel, Nevo and Ortalo-Magne (2009) and other US studies that exclude developers’ new sales from the samples, we split our housing transactions into two groups: new sales versus resale sales<sup>3</sup> and test the significance of agents’ information advantages in the two distinct submarkets.

Figure A1 plots the unit housing prices for the agent-buyers and the non-agent buyers in the resale market and the new sale market. The distributions of unit housing prices for both the resale and the new sale houses are skewed to the right, and houses with unit prices below

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<sup>2</sup> For those can be matched with multiple listing records, we have also tested whether our results will be distorted by the random elimination of housing with multiple matched listing records in our sample; the results are consistent.

<sup>3</sup> Resale market transactions include the sales of completed properties, where prices are negotiated at arms-length by willing buyers and willing sellers who are represented by their respective agents. The agents will be paid a 1% commission when closing a transaction deal. We also run a robustness check where we combine the resale and sub-sale sample. The results are unchanged.

\$10,000 per square meters (psm) constitute a large fraction of the transactions in the two markets. Houses in this price range appeal to a large proportion of buyers in the private housing market, whereas houses in the luxury segment that are usually priced above S\$20,000 psm are purchased by wealthy individuals and investors. High-end private condominiums are usually bought by the investor-buyers for long-term investment purposes. The high-end market segment is less liquid, and transaction volumes are smaller relative to the mass-market segment. Next, we run the agents' information advantage models (Equation 1) separately using the resale sample and the new sale sample. The results in Table A2 show significant discounts for houses sold to the agent-buyers in both the resale and the new sale markets. In the resale market, agent-buyers pay 2.56% (Column 1) lower prices than other buyers purchasing comparable houses, and the price discount is 2.48% (Column 2) after controlling for the buyers' characteristics in the model. The estimated price discounts are higher than the discounts of 2.54% (Table 2, Column 1) and 2.45% (Table 2, Column 2) estimated using the full samples. However, in the new sale market, the discounts for agent-buyers are still significant, but the magnitude is smaller at 2.57% (Column 3), and 2.41% (Column 4) after controlling for the buyers' socioeconomic characteristics. The results again do not rule out the information advantages of agents when buying houses for their own use relative to other buyers in both the new sales and the resale markets. However, we expect agent-buyers to obtain larger price discounts in the resale market than in the new sale market.

### *B.2. Size Effects of Real Estate Agencies*

We expect agents in large agency firms to have a higher probability of exploiting information advantages to buy houses at lower prices for their own use. Agents in large agency firms are also more heterogeneous relative to agents in smaller agency firms. We divide agents

by the “firm size” dummy into two groups and test for the firm size effects. The first cut-off by the “agency firm” has a total number of 100 or less real estate agents (salespersons) and 0 otherwise (Table A3, Columns 1 and 2). The second “firm size” dummy identifies the medium and smaller agency firms, which has a value of 1 if a firm is not one of the 5 largest real estate agency firms by the number of real estate agents hired and 0 otherwise for the top 5 firms by size (Table A3, Columns 3 and 4). We rerun the OLS regressions with log-unit housing prices as the dependent variable and include the “Agent×firm size” interactive term in the model. The empirical results are reported in Table A3.

The results show that agents’ discounts are significant at approximately 2.21%, and at 2.14% when the two firms size dummies (firms with less than 100 agents and the top 5 firms by the agent size) are added to the models while controlling for socioeconomic characteristics of the buyers, district and year fixed effects. However, the interactive variables, “Agent x Firm Size”, are not significant in all the models, implying that there are no differential effects of firm size on agents’ information advantages in agents’ own housing purchases compared to other non-agents’ housing purchases.

### *B.3. District-level Variations*

As background, Singapore is a city-state with one of the highest population densities in the world, and it is divided into 28 districts, where a district<sup>4</sup> in Singapore is larger than a county in the US in terms of population but has a much smaller geographical area relative to a US county. We will test whether agents could find more bargains in large districts than in small

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<sup>4</sup> Singapore is one of the most densely populated countries in the world with a population density of 7640 per square kilometer. Singapore has a land area of about 716 square kilometers and a population size of 5.47 million divided into 28 districts. The average area and population in a district is about 25.6 square kilometers and 195 thousand, respectively. By comparison, the US has a land area of 9.5 million square kilometers and a population size of 323 million over 3142 counties. The average area and population in a county is 2910 square kilometers and 103 thousand, respectively. Thus, a district in Singapore is larger than a county in the US by the population, but it is much smaller by land area.

districts in Singapore. We compute the differences in average total prices for houses bought by agents and the non-agents as a percentage of the average house prices at the district level and plot them in Figure A2. The figure shows agent discounts across different districts, which are arranged by the population in the district in a descending order from the largest district from the left to the smallest one to the right. The vertical bars below (above) the zero line indicate price discounts (premiums) for houses bought by agent-buyers relative to comparable houses bought by other non-agent buyers. The price differences are bounded within a range between -8% and 6%, and the variations show significant heterogeneity in information advantage across the districts. Agents pay the highest price premiums for houses in District 1, which include areas in downtown, such as Raffles Place, Marina, and Cecil, and District 14, which includes areas in Geylang, Paya Lebar, and Sims. By contrast, agents bought houses with the largest discounts in District 2 (Tanjong Pagar and Chinatown), District 7 (Bugis, Beach Road, and Golden Mile) and District 21 (Upper Bukit Timah, Ulu Pandan, and Clementi Park). However, we do not see any clear correlations between agent discounts and the size of the districts.

#### *B.4. Market Timing Strategies*

We explore the month effects on the agent discounts by interacting the agent dummy with various time-related indicators, which include the month of the year, the quarter of the year, the 3-month SIBOR, and the housing price index. In the results in Column 1, Table A5, we analyze the heterogeneity of agent discounts by month and find that agent discounts are smaller in the months of June, November and December. However, the coefficients on the interaction terms are not significant. Since there is no bunching of agent transactions in different months, we could not support the story that agents choose a good month in a year to buy houses. In Column

2, we analyze the heterogeneity effects of agent discounts by interacting the agent dummy with 3-month SIBOR, which is a proxy of borrowing costs. We also interact agent discounts with the housing price index in Singapore, and the results in Column 3 show that the coefficients on the interaction terms are not statistically significant. In summary, there is no evidence that agents choose a good time to buy houses based on various market timing strategies, either by a month in a year, by mortgage costs, or by housing price.

### *B.5. Law Events*

In the main model, we aggregate all the lawsuits using a dummy variable “Lawsuits” in the log-pricing models on the assumption that there is no heterogeneity in different types of law events. In this section, we sort the type of law events into five different categories including car accident, sale of good, credit card, tenancy and bankruptcy, and we identify the law events by using five different binary indicators denoted by  $(\varphi_i)$ . We define the two time dummies, “Before Lawsuits $|\varphi_i$ ” and “After Lawsuits $|\varphi_i$ ”, which indicate the timing of housing transactions either before or after a seller has been sued in a law event,  $\varphi_i$ . We run the log-unit housing price model using only the resale housing transactions for the full sample period, and the results are summarized in Table A7. We run the regressions using only the six years sample period truncated in a 3-year window before and after the occurrence of the law events. The results are largely robust and consistent, but the results estimated using the truncated sample period are not included in the paper.

**Table A1: Selection of Agents from Samples of Agents-Buyers with Multiple Matched Names**

Agent dummy selection	Include all agents with multiple matching names				Randomly select one out of agents with multiple matching names			
Sample	Full Sample		PSM Sample		Full Sample		PSM Sample	
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Agent	-0.0180*** (0.0026)	-0.0178*** (0.0026)	-0.0159*** (0.0033)	-0.0153*** (0.0033)	-0.0211*** (0.0029)	-0.0203*** (0.0030)	-0.0166*** (0.0039)	-0.0159*** (0.0039)
Size (square meters)	0.0055*** (0.0000)	0.0055*** (0.0000)	0.0060*** (0.0000)	0.0060*** (0.0000)	0.0055*** (0.0000)	0.0055*** (0.0000)	0.0057*** (0.0000)	0.0057*** (0.0000)
Condominium	0.1546*** (0.0019)	0.1548*** (0.0019)	0.1545*** (0.0045)	0.1540*** (0.0045)	0.1546*** (0.0019)	0.1548*** (0.0019)	0.1535*** (0.0052)	0.1525*** (0.0052)
High Floor	0.0404*** (0.0015)	0.0403*** (0.0015)	0.0384*** (0.0035)	0.0380*** (0.0035)	0.0404*** (0.0015)	0.0403*** (0.0015)	0.0394*** (0.0041)	0.0389*** (0.0041)
Freehold	0.1218*** (0.0018)	0.1216*** (0.0019)	0.1247*** (0.0044)	0.1245*** (0.0044)	0.1217*** (0.0018)	0.1215*** (0.0019)	0.1154*** (0.0052)	0.1153*** (0.0052)
Newsale	0.0129*** (0.0029)	0.0123*** (0.0028)	0.0138** (0.0065)	0.0136** (0.0065)	0.0129*** (0.0028)	0.0123*** (0.0028)	0.0094 (0.0076)	0.0096 (0.0075)
Resale	-0.1786*** (0.0029)	-0.1788*** (0.0029)	-0.1741*** (0.0067)	-0.1738*** (0.0067)	-0.1785*** (0.0029)	-0.1787*** (0.0029)	-0.1713*** (0.0077)	-0.1706*** (0.0077)
Intercept	13.0899*** (0.0129)	13.0753*** (0.0133)	13.0117*** (0.0306)	132.9958*** (0.0323)	13.0898*** (0.0129)	13.0754*** (0.0133)	13.0728*** (0.0371)	13.0444*** (0.0389)
Socioeconomic Variables	No	Yes	No	Yes	No	Yes	No	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108,534	107,399	17,062	17,062	108,534	107,399	13,426	13,426
R-Squared	0.7743	0.7746	0.7798	0.7803	0.7743	0.7746	0.7658	0.7664

Note: The dependent variable is log-total price of houses. “Agent” is dummy variable that has a value of 1, if a buyer is also an agent; and 0 otherwise. In the left-hand Panel (Columns 1 to 4), we include all agents with multiple matched names in our samples; whereas in the right-hand Panel (Columns 5-8), we randomly select only one agent from the sample of agents with multiple matched names. Standard errors are reported in parenthesis. The matched samples in Columns 3, 4, 7 and 8 are generated using the Propensity Score Matching approach. \*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.



**Table A2: Heterogeneity Tests by Housing Type**

Sub-market Model	Resale Market		Newsale Market	
	(1)	(2)	(3)	(4)
Agent	-0.0256*** (0.0052)	-0.0248*** (0.0052)	-0.0257*** (0.0039)	-0.0241*** (0.0039)
Size (square meters)	0.0042*** (0.0000)	0.0042*** (0.0000)	0.0069*** (0.0000)	0.0069*** (0.0000)
Condominium	0.2128*** (0.0031)	0.2127*** (0.0031)	0.0933*** (0.0024)	0.0935*** (0.0024)
High Floor	0.0390*** (0.0026)	0.0389*** (0.0026)	0.0394*** (0.0018)	0.0396*** (0.0018)
Freehold	0.1453*** (0.0029)	0.1451*** (0.0030)	0.1089*** (0.0024)	0.1088*** (0.0024)
Intercept	13.1288*** (0.0173)	13.1190*** (0.0180)	13.0159*** (0.0221)	12.9954*** (0.0226)
Socioeconomic Variables	No	Yes	No	Yes
Spatial Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	41,141	40,737	58,687	58,071
R-Squared	0.7569	0.7572	0.8142	0.8148

Note: This table shows results of OLS regression analysis. The dependent variable is log-total price of houses. “Agent” is dummy variable that has a value of 1, if a buyer is also an agent; and 0 otherwise. The control variables in the model include housing variables using the house characteristics and social-economic variations using the buyer characteristics. Regression results in Columns 1 and 2 are estimated using resale samples; whereas Columns 3 and 4 are estimated using new sale samples. Standard errors are reported in parenthesis.

\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

**Table A3: Heterogeneity Tests by Firm Size**

Firm Size Dummy:	(i) Agency firms with 100 or less agents		(i) The Top 5 largest agency firms by employee number	
	(1)	(2)	(3)	(4)
Agent	-0.0230*** (0.0067)	-0.0221*** (0.0047)	-0.0227*** (0.0067)	-0.0214*** (0.0048)
Firm Size	-0.0014 (0.0051)	-0.0007 (0.0058)	-0.0033 (0.0051)	-0.0031 (0.0058)
Agent×Firm Size	-0.0018 (0.0090)	-0.0051 (0.0085)	0.0009 (0.0091)	-0.0025 (0.0085)
Size (square meters)	0.0055*** (0.0000)	0.0055*** (0.0000)	0.0055*** (0.0000)	0.0055*** (0.0000)
Condominium	0.1546*** (0.0019)	0.1546*** (0.0019)	0.1548*** (0.0019)	0.1548*** (0.0019)
High Floor	0.0404*** (0.0015)	0.0404*** (0.0015)	0.0403*** (0.0015)	0.0403*** (0.0015)
Freehold	0.1217*** (0.0018)	0.1217*** (0.0018)	0.1215*** (0.0019)	0.1215*** (0.0019)
Newsale	0.0129*** (0.0029)	0.0129*** (0.0028)	0.0123*** (0.0028)	0.0123*** (0.0028)
Resale	-0.1785*** (0.0029)	-0.1785*** (0.0029)	-0.1787*** (0.0029)	-0.1787*** (0.0029)
Intercept	13.0900*** (0.0129)	13.0900*** (0.0129)	13.0755*** (0.0133)	13.0755*** (0.0133)
Socioeconomic Variables	No	Yes	No	Yes
District Fixed Effect	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Observations	108,534	107,399	108,534	107,399
R-Squared	0.7743	0.7743	0.7746	0.7746

Note: This table shows results of OLS regressions that control for large agency firm effects. The dependent variable is logarithm of total price. We use two definition of “Firm Size” dummies in the regressions. Columns 1 and 2 represent agency firms with 100 or less agents; and Columns 3 and 4 exclude the 5 largest agency firms by the number of agents hired. “Agent” is dummy variable that has a value of 1, if a buyer is also an agent; and 0 otherwise. The control variables in the model include housing variables using the house characteristics and social-economic variations using the buyer characteristics. The district fixed effect, which is represented by the 28 planning districts, and the transaction year fixed effects are included in the regression. Standard errors are reported in parenthesis.

\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

**Table A4: Placebo Tests**

<b>Placebo cutoff year</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Model</b>	(1)	(2)	(3)	(4)	(5)	(6)
Agent×Placebo cutoff year	-0.0247*** (0.0089)	-0.0223** (0.0131)	-0.0012 (0.0107)	0.0120 (0.0099)	0.0124 (0.0091)	0.0013 (0.0092)
Socioeconomic Variables	Yes	Yes	Yes	Yes	Yes	Yes
Spatial Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50,159	53,423	46,975	54,280	57,941	54,776
R-Squared	0.7217	0.7491	0.7584	0.7631	0.7712	0.7706

Note: Placebo cutoff year is used to falsify the policy shock in 2010 is specific to the CEA establishment in Singapore. The placebo cutoff year dummy divide the sample into the before (control) group and the after (treatment) group, and we use the same sample period of six years in each placebo tests. For instance, if the Placebo cutoff year is set at 2004, the two 3-year samples: 2001-2003 and 2004-2006 will be used as the “before” and “after” effects. The coefficients on housing attributes, buyers’ socioeconomic characteristics and transaction types as in Table 3 are not reported. All columns include year and region fixed effects.

\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

**Table A5: Agent Discounts and Transaction Time**

Sample Model	All Sample		
	(1)	(2)	(3)
Agent	-0.0084 (0.0117)	-0.0212*** (0.0052)	-0.0198 (0.0162)
Agent*month1	-0.0169 (0.0167)		
Agent*month2	-0.0283* (0.0164)		
Agent*month3	-0.0252 (0.0161)		
Agent*month4	-0.0159 (0.0155)		
Agent*month5	-0.0167 (0.0157)		
Agent*month6	-0.0039 (0.0157)		
Agent*month7	-0.0153 (0.0150)		
Agent*month8	-0.0281* (0.0152)		
Agent*month9	-0.0240 (0.0162)		
Agent*month10	-0.0057 (0.0169)		
Agent*month11	-0.0070 (0.0172)		
Agent*3 month SIBOR		-0.0011 (0.0015)	
Agent*House Price Index			-0.0000 (0.0002)
Intercept	13.1023*** (0.0135)	13.0646*** (0.0133)	11.6320*** (0.0244)
Housing Characteristics	Yes	Yes	Yes
Socioeconomic Variables	Yes	Yes	Yes
District Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Observations	107,399	107,399	107,399
R-Squared	0.7781	0.7749	0.7844

Note: This table shows results of OLS regression analysis about agent discounts and transaction time. The dependent variable is log-total price of houses. 3 month Singapore Interbank Overnight Rate (SIBOR) is usually the index rate for home mortgage in Singapore. We use price index of non-landed properties from Urban Redevelopment Authority (URA) as our housing price index.

\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

**Table A7: Agent Discounts and Transaction Time**

lawsuits type ( $\varphi_i$ )	Bankruptcy	Car Accident	Sale of good	Credit Card	Tenancy
Model	(1)	(2)	(3)	(4)	(5)
Agent	-0.0241*** (0.0053)	-0.0244*** (0.0053)	-0.0248*** (0.0052)	-0.0244*** (0.0052)	-0.0249*** (0.0052)
Before Lawsuits $ \varphi_i$	-0.0580*** (0.0145)	-0.0126 (0.0175)	0.0695 (0.0624)	-0.0239 (0.0271)	0.0223 (0.0474)
After Lawsuits $ \varphi_i$	-0.0327* (0.0171)	-0.0073 (0.0152)	-0.1045* (0.0559)	-0.1005*** (0.0178)	-0.1312*** (0.0381)
Agent× (Before Lawsuits $ \varphi_i$ )	0.0977 (0.0614)	-0.0174 (0.0612)	0.0079 (0.1829)	0.0793 (0.1363)	-0.0219 (0.1705)
Agent× (After Lawsuits $ \varphi_i$ )	-0.1326** (0.0595)	-0.0165 (0.0552)		-0.0952 (0.0763)	0.1220 (0.1326)
Size (square meters)	0.0042*** (0.0000)	0.0042*** (0.0000)	0.0042*** (0.0000)	0.0042*** (0.0000)	0.0042*** (0.0000)
Condominium	0.2126*** (0.0031)	0.2127*** (0.0031)	0.2127*** (0.0031)	0.2124*** (0.0031)	0.2126*** (0.0031)
High Floor	0.0389*** (0.0026)	0.0389*** (0.0026)	0.0389*** (0.0026)	0.0389*** (0.0026)	0.0388*** (0.0026)
Freehold	0.1450*** (0.0030)	0.1451*** (0.0030)	0.1451*** (0.0030)	0.1450*** (0.0030)	0.1451*** (0.0030)
Intercept	13.1200*** (0.0180)	13.1195*** (0.0180)	13.1190*** (0.0180)	13.1201*** (0.0180)	13.1191*** (0.0180)
Socioeconomic Variables	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	40,737	40,737	40,737	40,737	40,737
R-Squared	0.7574	0.7572	0.7572	0.7575	0.7573

Notes: This table shows the OLS regressions with the log-total price of houses as the dependent variable. “Agent” is dummy variable that has a value of 1, if a buyer is also an agent; and 0 otherwise. “Before” and “After” are time dummies that represent transactions that occur before or after the law events convicted by sellers. We condition the timing of transactions on different law events, [i = car accident, sale of good, credit card, tenancy and bankruptcy]. The control variables in the model include unit size (sqm), a dummy on condominium, a dummy on high floor that identifies unit located at level 9 and above, a dummy on new sale and a dummy on resale. Social-economic variations are controlled in the model using the buyer characteristics, such as dummies on “Male”, “Chinese”, and “Marriage”. For age, we use a dummy on “Old Age” that takes a value of 1, if a buyer is 60 year and older; and zero otherwise. The district fixed effect, which is represented by the 28 planning districts, and the transaction year fixed effects are included in the regression. Standard errors are reported in parenthesis.

\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

**Table A8: Agent Discounts for Investor Buyers**

Model	Resale Samples		Newsale Samples	
	(1)	(2)	(3)	(4)
Agent	-0.0250*** (0.0058)	-0.0239*** (0.0059)	-0.0262*** (0.0045)	-0.0249*** (0.0046)
Investor buyer	-0.0140*** (0.0032)	-0.0136*** (0.0032)	-0.0194*** (0.0021)	-0.0193*** (0.0021)
Agent×Investor buyer	-0.0018 (0.0125)	-0.0030 (0.0126)	0.0024 (0.0089)	0.0033 (0.0089)
Size (square meters)	0.0042*** (0.0000)	0.0041*** (0.0000)	0.0069*** (0.0000)	0.0069*** (0.0000)
Condominium	0.2126*** (0.0031)	0.2125*** (0.0031)	0.0933*** (0.0024)	0.0935*** (0.0024)
High Floor	0.0397*** (0.0026)	0.0396*** (0.0026)	0.0407*** (0.0018)	0.0409*** (0.0018)
Freehold	0.1454*** (0.0029)	0.1453*** (0.0030)	0.1087*** (0.0024)	0.1086*** (0.0024)
Intercept	13.1355*** (0.0174)	13.1258*** (0.0181)	13.0248*** (0.0221)	13.0048*** (0.0227)
Socioeconomic Variables	No	Yes	No	Yes
District Fixed Effect	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Observations	41,141	40,737	58,687	58,071
R-Squared	0.7570	0.7573	0.8145	0.8151

Note: This table shows results of OLS regression analysis about agent discounts for investor buyers. The dependent variable is log-total price of houses. “Agent” is dummy variable that has a value of 1, if a buyer is also an agent; and 0 otherwise. The control variables in the model include unit size (sqm), a dummy on condominium, a dummy on high floor that identifies unit located at level 9 and above, a dummy on new sale and a dummy on resale. Standard errors are reported in parenthesis. Regression results in Columns 1 and 2 are estimated using resale samples; whereas Columns 3 and 4 are estimated using new sale samples. Standard errors are reported in parenthesis.

\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level

**Table A9: Information Advantages of Real Estate Agents: Cluster standard error**

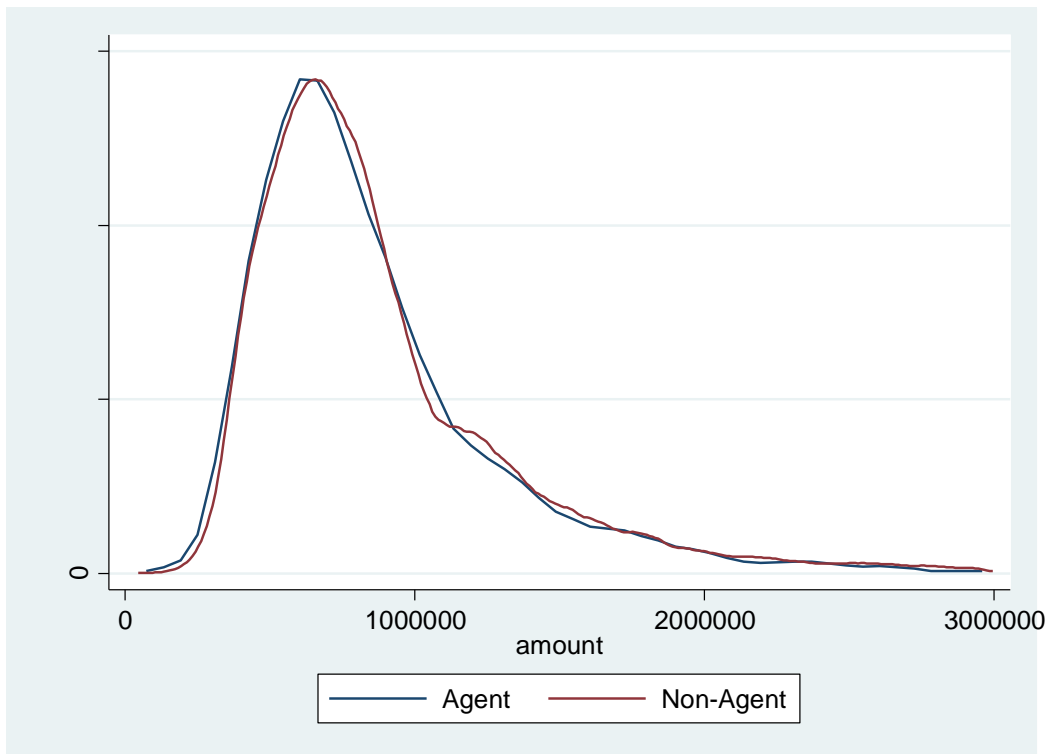
Sample: Model	All Samples		Repeat sale		Matched Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Agent	-0.0254*** (0.0036)	-0.0245*** (0.0035)	-0.0152** (0.0073)	-0.0148** (0.0077)	-0.0238*** (0.0038)	-0.0232*** (0.0038)
Size (square meters)	0.0055*** (0.0003)	0.0055*** (0.0003)			0.0061*** (0.0002)	0.0061*** (0.0002)
Condominium	0.1546*** (0.0207)	0.1548*** (0.0205)			0.1550*** (0.0218)	0.1541*** (0.0218)
High Floor	0.0404*** (0.0076)	0.0403*** (0.0076)			0.0421*** (0.0081)	0.0420*** (0.0082)
Freehold	0.1217*** (0.0166)	0.1215*** (0.0166)			0.1113*** (0.0167)	0.1107*** (0.0166)
Newsale	0.0129 (0.0118)	0.0123 (0.0117)	-0.0264 (0.0178)	-0.0272 (0.0178)	0.0057 (0.0134)	0.0054 (0.0134)
Resale	-0.1785*** (0.0164)	-0.1787*** (0.0164)	-0.0529** (0.0205)	-0.0560*** (0.0209)	-0.1733*** (0.0170)	-0.1729*** (0.0169)
Intercept	13.0899*** (0.0452)	13.0755*** (0.0451)	14.5393*** (0.0590)	14.5600*** (0.0638)	13.0082*** (0.0435)	12.9805*** (0.0456)
Socioeconomic $V_i$	No	Yes	No	No	No	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effe	Yes	Yes	Yes	Yes	Yes	Yes
House Fixed Effects	No	No	Yes	Yes	No	No
Observations	108534	107399	2874	2831	11402	11402
R-Squared	0.7743	0.7746	0.9535	0.9541	0.7732	0.7739

Note: This table re-run the main results in Table 2 by clustering the standard error at the postal sector level

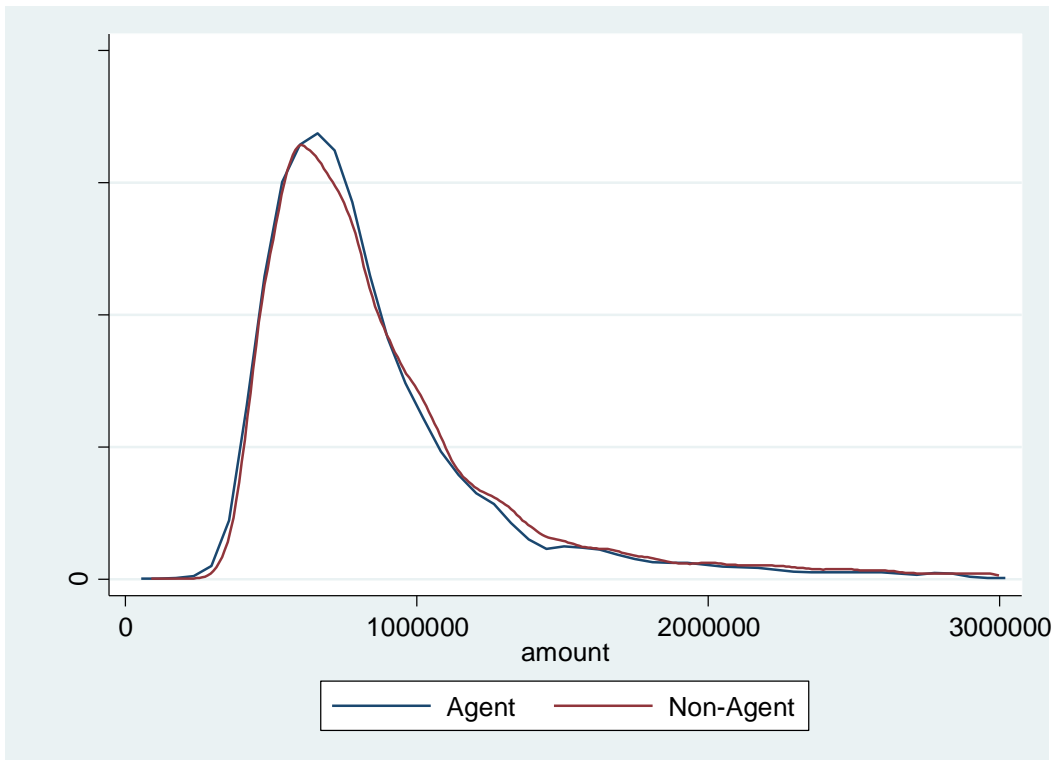
\*Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level.

**Figure A1: Kernel Density Plot of Unit Price Per Square Meter**

Panel A. Resale Market

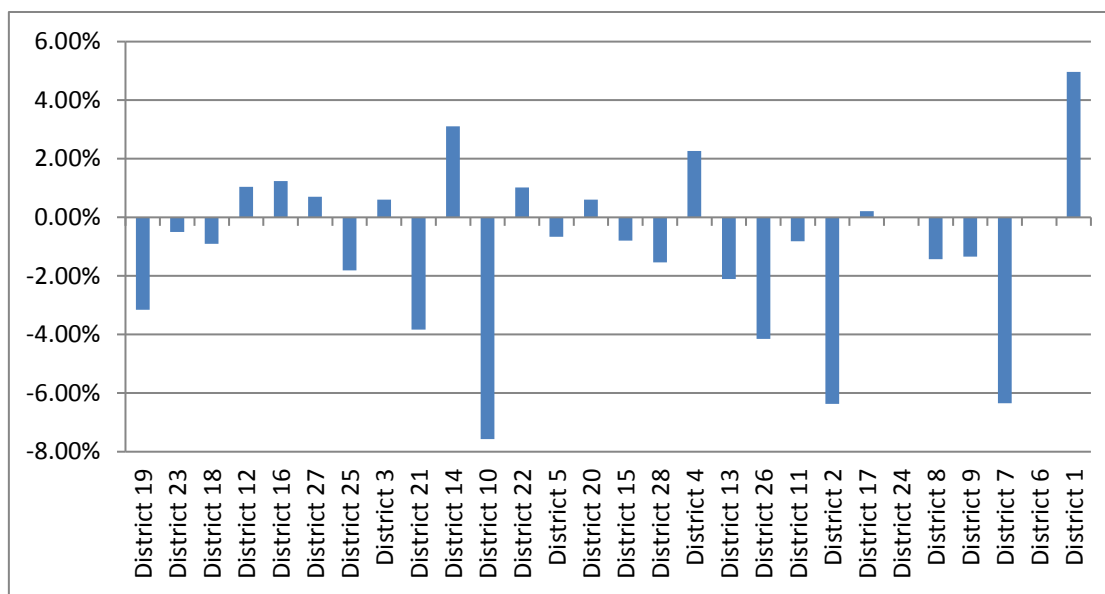


Panel B. Newsale Market





**Figure A2: Price Differences between Agent and Non-Agent Housing Transactions by District**



**Legend on Districts and Areas Covered:**

District	Name of Areas Covered	District	Name of Areas Covered
1	Raffles Place, Marina, Cecil	15	Joo Chiat, Marina Parade, Katong
2	Tanjong Pagar, Chinatown	16	Bedok, Upper East Coast, Siglap
3	Tiong Bahru, Alexandra, Queenstown	17	Changi, Flora, Loyang
4	Mount Faber, Telok Blangah, Harbourfront	18	Tampines, Pasir Ris
5	Buona Vista, Pasir Panjang, Clementi	19	Punggol, Sengkang, Serangoon Gardens
6	Clarke Quay, City Hall	20	Ang Mo Kio, Bishan, Thomson
7	Bugis, Beach Road, Golden Mile	21	Upper Bukit Timah, Ulu Pandan, Clementi Park
8	Little India, Farrer Park	22	Boon Lay, Jurong, Tuas
9	Orchard Road, River Valley	23	Choa Chu Kang, Dairy Farm, Hillview, Bukit Panjang, Bukit Batok
10	Bukit Timah, Holland, Balmoral	24	Kranji, Lim Chu Kang, Tengah
11	Novena, Newton, Thomson	25	Woodlands, Admiralty
12	Toa Payoh, Serangoon, Balestier	26	Upper Thomson, Mandai
13	Macpherson, Braddell	27	Sembawang, Yishun, Admiralty
14	Geylang, Paya Lebar, Sims	28	Yio Chu Kang, Seletar

Note: This figure shows % differences in average total transaction price between houses bought by agents and non-agents across different districts ordered by the population of the district. The largest district is on the left. A negative number indicates a discount in the transaction prices, which mean that an agent buys a comparable house for his/her own use at lower prices than other a non-agent buyer; whereas, a positive number indicates that an agent pay a higher price for a comparable house than non-agent buyer. There are 28 planning districts in Singapore, and detailed descriptions of areas bounded under each district are shown in the appended table.