

Who Is Misleading Whom in Real Estate Transactions?

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Abstract

The current commission system in real estate brokerage misaligns agent and house seller interests, so real estate agents have strong incentives to mislead their clients by convincing them to sell their houses too cheaply and too quickly. This paper studies, being motivated by the commission system, which types of agents are misleading which types of clients, so they need to renegotiate a better contract. We find that agents mainly mislead corporate, bank, and government clients, but not individual clients. Moreover, corporate clients are mainly misled by moderately experienced agents, while bank and government clients are mainly misled by less experienced agents. Highly experienced agents, on the other hand, mislead to the least extent on all types of clients. Greater information asymmetry leads to larger distortion on all types of clients, while greater motivation heterogeneity causes larger distortion on corporate and bank clients. We do not find evidence of agent shirking on effort.

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WHO'S CHEATIN' WHO

...

But still you wonder

Who's cheatin' who

Who's being true

And who don't even care anymore

...

— Alan Jackson

1 Introduction

The agency problem between real estate agents and their seller clients under the current commission structure (or contract) has been identified and quantified by Rutherford et al. (2005, 2007) and Levitt and Syverson (2008). By comparing house sales in which agents sell their own houses versus when they sell their clients' houses, these studies find that agent-owned houses sell for more (for about 3.7 to 4.8% in Levitt and Syverson, 2008, and 3.0 to 7.0% in Rutherford et al., 2005, 2007) and stay on the market longer (for about 10 days in Levitt and Syverson, 2008, and 3.5 days in Rutherford et al., 2007) than comparable client-owned houses.

These well-publicized statistics have been interpreted by academia as evidence of a non-trivial agency problem – originated from real estate agents' information advantage – that under the current commission structure, agents have strong incentives to mislead their clients by convincing them to sell their houses too cheap and too quickly. (Levitt and Syverson, 2008; Rutherford, et al, 2007; Jia and Pathak, 2010)

The media, however, somehow distorted this interpretation. They imputed the estimated house sales gaps solely to agents, and blamed agents for “cheating” their clients. Ever since, real estate agents have become the target of increased criticism on their abuse of informa-

tion.¹ It is even suggested that agents be avoided altogether in real estate transactions.² Alternative channels for house sales, such as For-Sale-By-Owner (FSBO) and auctions, are instead proposed and increasingly studied.³

Should real estate agents be avoided altogether? Not necessarily. Indeed, a good agent knows far better than her clients about the true value of the house, the condition of the housing market, the whole process of a real estate transaction, and even the buyer's thought. The seller depends on the agent for this information, and in fact, that is why a seller hires an agent. So avoiding real estate agents altogether is avoiding valuable information, which is not wise, especially for those extremely uninformed sellers.

Agents perhaps should not even be blamed for "cheating" their clients. As Levitt and Dubner (2009) noted, "[c]heating may or may not be human nature, but it is certainly a prominent feature in just about every human endeavor. Cheating is a primordial economic act ... [J]ust about anyone [cheats], if the stakes[, or equivalently if the incentives] are right." Agents, after all, are human beings who respond to incentives. How a given agent treats his clients will depend on how that agent's incentives are set up by the contract. Therefore, these well-promoted statistics actually provide evidence of an inefficient contract which fails to provide the first best incentives. (Levitt and Syverson, 2008; Rutherford, et al, 2005, Jia and Pathak, 2010.) In a theorist's words, the current contract is not incentive compatible. (See Crawford and Sobel, 1982; Fong, 2005.) Indeed, it has been broadly argued that the standard contract is inefficient in aligning the interests of the agent and seller, as real estate agents bear a substantial fraction of the marketing costs involved with a house

¹See for instance Weintraub (2008), Wright (2008), and SmartMoney (2010), among many other media coverages.

²See for instance Gehrman (2010), Mullins (2008), and Brenner (2008).

³Bernheim and Meer (2010) look at sales of faculty and staff homes on the Standard University campus with and without an agent. They find that "a seller's use of broker reduces the selling price of the typical home by 5.9 to 7.7 percent ... [and] accelerates the sale." By analyzing home-sales data in Madison, Wisconsin, which has a thriving FSBO market, Hendel et al. (2009) find that the FSBO homes sold for the same average price as those sold by real estate agents, but took twenty days longer to sell. Considering the 6% agent commission-that is \$18,000 for a \$300,000 house-most people would probably consider it worth \$18,000 to live in their old home for an extra twenty days. See also Hagerty (2009), Schwartz (2008), Blanchfield (2008), Wollam (2005), Tyson (2011) and Heather (2011).

sale,⁴ but receive only a small fraction, typically 1.5%,⁵ of any increase in the price.⁶ While getting 3.3% more on a \$300,000 house—\$10,000—may be important to the client, the agent’s commission on the margin is \$150 for an extra 10 days of work. Therefore, the agent is motivated towards convincing the client to accept suboptimal prices in order to facilitate faster sales.

Given that the current form of contract fails to solve the agency problem so real estate agents still have strong incentives to mislead their clients, three important questions arise naturally: (1) being motivated by the contract, which types of agents are misleading which types of house sellers? (2) why does such an inefficient contract become so prevalent and persistent? and (3) what cause the agency problem in the first place?

The major goal of this paper is to find answers to the above questions by exploring a data set of over 35,000 houses for sale in Indiana in 2000-2010. The current paper offers the first empirical answers to the first and second questions. The third question is not new; it was firstly studied by Levitt and Syverson (2008), who by using data from Illinois successfully identified a major cause of the agency problem – information asymmetry. In this paper we find additional evidence in support of their results, and more importantly we provide other evidence in favor of a second explanation – motivation heterogeneity. Answers to these questions have important practice implications. By answering the first question, we know on which types of sellers and agents the current commission system fails,⁷ so these participants need to renegotiate a better contract, while for the other participants the current form of contract is already optimal. As we will see, the answer to the first question also suggests a compelling reason to the second question. By answering the third question, we know for those sellers and agents who need to redesign the contract, where the root of the problem lies and what the right direction is to find the solutions.

We find the answers to the first and second problems by analyzing how the house sales

⁴The costs include but not limited to advertising, accompanying potential buyers on visits to the house, conducting open houses, and negotiating offers.

⁵A total commission of 6% of the sale price is split evenly between the buyer’s and seller’s agents, each of whom then gives part to the agency he or she works for, pocketing an average of 1.5%.

⁶See Levitt and Syverson (2008), Rutherford et al. (2007), and Beattie (2009).

⁷A contract fails when it misaligns the interests of the seller and agent.

differences are distributed across clients in different ownership categories and across agents with different experience levels. First, agents sell properties owned by different types of clients. While most of their clients are owner occupants and individual investors, nowadays more and more properties listed for sale are owned by relocation companies, financial institutes, and government departments, especially after the burst of the subprime mortgage crisis in middle 2007. These owners are likely to differ systematically in several important respects (for instance, familiarity with local real estate market and motivation to sell), which affect the agent's incentives to mislead.⁸ Second, different agents may respond differently to the incentives present in the brokerage. It is therefore of interest to determine whether the effects of brokerage are reasonably uniform, or if they differ across agents with different levels of experience.

We find that agent-owned houses sell for 4.6% on average more than their clients' houses and stay on the market an extra 8.5 days.⁹ These house sales differences mainly come from houses owned by corporate, bank, and government clients, but are either negligible or insignificant on individually-owned houses. More specifically, corporate-owned houses sell for 8.9% less than agent-owned houses and 32 days sooner, bank-owned houses 8.5% less and 40 days sooner, and government-owned houses 5.3% less and 45 days sooner. These results imply that the current commission system works pretty well for individual house sellers but fails mainly on corporate, bank, and government house sellers, who may need to renegotiate a better contract. Of course, here we did not consider any contracting costs.¹⁰ After factoring in the contracting costs, the current contract will probably become efficient (in net) for corporate, bank, and government clients.

We also find that the differences on bank-owned and government-owned properties are mainly due to *less experienced* agents, while the differences on corporate-owned houses are

⁸In a theoretical work, Fong (2005) predicts that experts "cheat" selectively on clients, based on the client's certain characteristics.

⁹This result is comparable to those in Levitt and Syverson (2008) and Rutherford et al. (2005, 2007): The price premium ranges from 3.7 to 4.8% in Levitt and Syverson (2008) and from 3.0 to 7.0% in Rutherford et al. (2005, 2007). While agent-owned properties stay on the market about 9.5 days longer in Levitt and Syverson (2008) and 3.5 days longer in Rutherford et al. (2007), the difference in Rutherford et al. (2005) is insignificant.

¹⁰Contracting costs are the transaction costs involved with designing and negotiating a contract.

mainly attributable to *moderately experienced* agents. *Highly experienced* agents, on the other hand, are among those who mislead to the least extent on all types of clients. What is more, compared to less experienced agents, moderately experienced agents often sell for premiums at the cost of more days on the market, and highly experienced agents are able to sell more quickly without sacrificing the sale prices. These results are robust to different measures of the agent's experience, and suggest that the standard contract disciplines highly experienced agents more effectively than the other agents. This finding makes sense. A highly experienced is probably more concerned with protecting his/her reputation.

The above results also suggest a prime reason why the current contract arose and persists despite its inefficiency on average: it is nevertheless efficient for the vast majority of the sellers (i.e., individual sellers) and the most prolific agents (i.e., highly experienced agents).

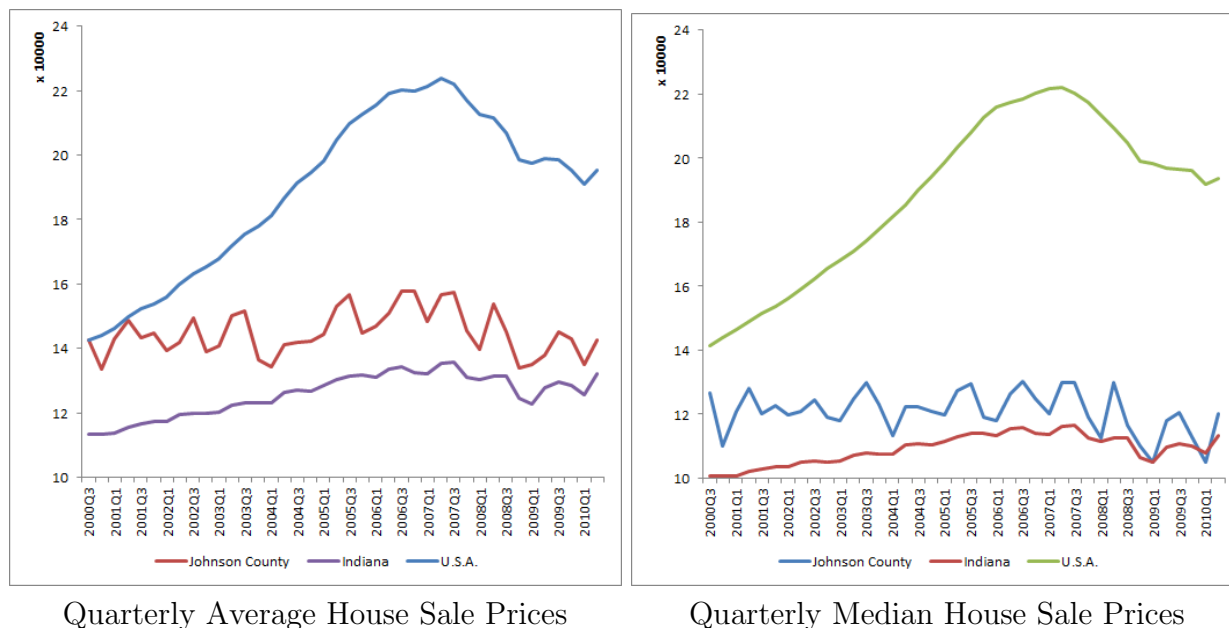
A number of different theories can produce the basic pattern of results we observe in the data. To fulfil the goal of this paper, we attempt to distinguish between these competing hypothesis. We examine three potential theoretical explanations: (1) information asymmetry, (2) motivation heterogeneity, and (3) effort shirking by agent. Similar to Levitt and Syverson (2008), we find abundant evidence that greater information asymmetry leads to larger house sales differences between agent-owned houses and those of their clients. Different from Levitt and Syverson (2008), we also find evidence that the gaps between agent-owned and corporate/bank-owned houses vary systematically with the seller motivation heterogeneity, suggesting that relocation company and financial institute themselves are very motivated to sell even at substantially lower prices. We, however, find no evidence of effort shirking on part of the agent.

The rest of the paper is organized as follows. Section 2 introduces the data used. Section 3 presents the empirical specifications. Section 4 discusses the results, and Section 5 concludes.

2 Data

The data contain all residential properties listed for sale in Johnson County, Indiana, during the period June 2000-June 2010. Johnson County is one of the largest counties in Indiana

Figure 1: Quarterly Average and Median House Sale Prices of Johnson County, Indiana, and U.S.A. (2000-2010)



(population 139,654 in 2010) and is essentially a suburb of Indianapolis in the adjacent Marion County. The largest city in Johnson County is Greenwood (population 49,791 in 2010), which is about 12 miles south of Indianapolis. The original data set contains 37,564 observations. After discarding those with missing values we obtain 36,721 listings including 19,077 houses, 2,907 listing agents, and 3,178 selling agents. About 3.9% of the observations –1436 listings– involve a real estate agent selling his or her own house.

Our data set is unique in several respects. First, the data set is comparable to that in Levitt and Syverson (2008) in that both focus on suburbs of the primary city in the corresponding state. Moreover, Johnson County is representative of the state of Indiana in the sense that the quarterly average and median home sale prices tend to move in the same direction over time, especially after the burst of the subprime mortgage crisis in 2007. (See Figure 1.)

Second, the data contain detailed information about each listing, including property physical characteristics, geographic location (zip code, city, school district, and subdivision), calendar information (listing, sale, expiration, and withdrawal dates), contractual terms (ex-

clusive right to sell, buyer agent commission rate, and other terms), and marketing activities (the number of images of the property, the frequency of open houses, and whether a virtual tour is available). Furthermore, each agent is tagged with a unique identification number. Physical characteristics include the number of bedrooms and square footage, as well as descriptions such as “defects” and “fixer-upper.” We can also use the data to define the number of comparable properties for a given property. In particular, we say that one property is comparable to another if both are for sale at the same time within the same zip code and the list price of the former is within 30% deviation of the latter.¹¹ Prior studies of agency problems do not control for such detailed information as we include. As will be seen in the following analysis, including these controls is important to properly compare house sales outcomes between agent-owned and client-owned houses. The full list of variables can be found in Appendix Table 1.

Third, unlike the data in Levitt and Syverson (2008) and Rutherford et al. (2005, 2007), our data report the ownership for each property, which falls into one of five mutually exclusive and exhaustive categories: real estate agents (agent-owned houses), owner occupants and individual investors (individually-owned houses), relocation companies¹² (corporate-owned houses), financial institutions and for-profit loan insurers, like Fannie Mae and Freddie Mac (bank-owned houses), and government agencies and government loan insurers such as the Department of Veteran Affairs and Department of Housing and Urban Development (government-owned houses). These ownership categories are likely to differ in several important respects, which as predicted by theory may affect the agent’s misleading behaviors (See Fong, 2005). For example, it may be that financial institutes and government agencies are less concerned about the sale price than individual owners (agent or non-agent) and have less information about local market conditions.

The key dependent variables include the sale price and days-on-market, as well as the

¹¹Our results are robust to alternative definitions of comparables with 20% and 10% price deviations

¹²Relocation companies work with corporate clients (employees) to provide home sale assistance to their relocating employers. Usually the employer is offered a “buy-out” option, by which if his or her house is not sold in a certain period, usually 2 to 3 months, he or she can turn the house over to the relocation company for a pre-determined price. The relocation company will then hire a real estate agent to re-sell this property as a corporate-owned property.

list price. For expired and withdrawn listings, days-on-market is computed as the number of days between the listing date and the expiration/withdrawal date. For those properties that are eventually sold, days-on-market is measured as the number of days between the listing date and the closing date.

Table 1 provides descriptive statistics for each ownership category. Consistent with Levitt and Syverson (2008) and Rutherford et al. (2005, 2007), agent-owned properties tend to have the highest list and sale prices and the longest days-on-market. With respect to the new categories of owners, we find that individually-owned properties have the second-highest list and sale prices followed by corporate-owned, bank-owned, and government-owned houses in descending order. Days-on-market follows the same order: individually-owned properties stay on the market for the second-longest time followed by corporate-owned, bank-owned, and government-owned houses. Government-owned houses are the most likely to be sold (98.5%), followed by bank-owned (88.2%), corporate-owned (76.7%), agent-owned (49.4%), and individually-owned (47.1%) houses.

It is clear from the remainder of the table that house characteristics vary systematically across houses with different owner types. Bank-owned houses are more likely to be sold as-is. Agent-owned (as well as individually-owned) houses tend to be larger, more likely to be located in good school districts, more likely to be equipped with security systems, et al. Moreover, agents tend to put more images for their own houses and their individual clients' houses, and agent-owned and individually-owned houses have more comparables. These systematic differences in the observables highlight the importance of controls in the following analysis we conduct.

3 Empirical Specification

The empirical specification takes the following form:

$$y = \alpha + \beta' * ownership + \gamma' * X + AGENT + IMR + \epsilon, \quad (1)$$

where the dependent variable y is either a house's logged sale price, days-on-market, or logged list price. $ownership = (individually-owned, corporate-owned, bank-owned, government-owned)$ is a vector of the ownership indicators, with the agent ownership being the omitted category.

X is the vector of house physical characteristics, geographic location, calendar information, contractual terms, and marketing activities of the agent. The calendar variables in the sale price model relate to the sale date, while in the days-on-market and list price models relate to the listing date.

In the sale price and days-on-market models, X includes an additional variable, DOP , which is the residual of the list price model. More specifically, DOP is the percentage deviation from the expected list price for a listing characterized by $ownership$, X , and $AGENT$, calculated as $\log(list\ price) - E[\log(list\ price)|ownership, X, AGENT]$. DOP is used to estimate the degree of overprice, which influences both the sale price (Knight, 2002) and the days-on-market (Knight, 2002; Rutheford et al., 2007).

$AGENT$ corresponds to listing agent fixed effects. Though X already includes a rich set of observed listing characteristics, it remains a possibility that the house sales outcomes are affected by listing agent characteristics and preferences which we do not observe, such as network, experience, bargaining power, and preferences in choices of dcor. (Levitt and Syverson, 2008.) To the extent that the unobservable characteristics of an agent are correlated with the ownership and house sales outcomes, this will cause biases due to unobserved agent heterogeneity. A way to remove such biases is to include listing agent fixed effects so that estimation of the parameters comes from a comparison of homes listed by the same agent, rather than homes listed by different agents.

In the sale price model, we take additional control for selling agent fixed effects, because there is anecdote evidence that the sale price is affected by unobserved selling agent characteristics and preferences. For the days-on-market and list price models, however, we do not allow for selling agent fixed effects for two main reasons; first, days-on-market and list price have little to do with the selling agent. Days-on-market is a function of the entire history of the house's listing experience which is not affected by the selling agent, and the list price is

determined before a selling agent is involved. Secondly, only sold properties involve selling agents, so controlling for selling agent fixed effects greatly reduces the effective size of the sample.¹³

IMR stands for the inverse Mills ratio, and is included in the sale price and days-on-market models in order to control for the sample selection bias due to the fact that the sales price and date are unobservable for those expired or withdrawn listings. This is well explained by Rutherford et al (2005) as follows:

“For housing studies and many other applications, the Heckman model (Heckman, 1978) is an appropriate method when one suspects sample selection bias. The Heckman selection model corrects for selectivity bias by adjusting the conditional error terms using the inverse Mills ratio so that the conditional error terms will have zero means. In general, sample selection bias refers to the case in which a dependent variable is only observed for a restricted, non-random sample. In this study, we only observe a selling price if the house is actually sold.”

A similar sample selection bias also exists in the days-on-market model, as we only observe the sales date for those houses that eventually sell.¹⁴ The Heckman model, sometimes called the Heckman’s two-step procedure, takes two stages. In the first stage a probit model is used to predict the probability of a house being sold and in the second stage the *IMR*, estimated from the first stage, is included as a regressor in the sale price model and in the days-on-market model. The dependent variable in the first stage probit regression is the indicator of being sold, and the independent variables include house physical characteristics, geographic location, calendar information related to listing date, contractual terms, advertising activities, and listing agent fixed effects.

¹³It is worth noting that our empirical results from the days-on-market and list price models are not sensitive to controlling for selling agent fixed effects.

¹⁴We also estimate a hazard model on the probability of a house being sold as a function of the covariates. This allows us to account for the fact that some listings are expired or withdrawn before a sale occurs. The hazard regression results, reported in Appendix Table 4, are very close to the Heckman two-step regression results. The list price model does not have the sample selection bias problem because the list price is observable for all listings.

4 Results – Who is Misleading Whom?

As an initial step, we test the existence of the agency problem under the current contractual structure. We estimate the house sales differences between agent-owned houses and those of their clients, using similar specifications as in Levitt and Syverson (2008). The regression results, presented in Appendix Table 2, show that agent-owned houses sell for 4.6 percent more than other houses and stay on the market 8.5 days longer, providing evidence of an agency problem—under the current contractual structure, the agent has strong incentives to convince their clients to sell too cheap and too quickly. The results are comparable to those in Levitt and Syverson (2008) and Rutherford et al. (2005, 2007): The price premium ranges from 3.7 to 4.8% in Levitt and Syverson (2008) and from 3.0 to 7.0% in Rutherford et al. (2005, 2007). While agent-owned properties stay on the market about 9.5 days longer in Levitt and Syverson (2008) and 3.5 days longer in Rutherford et al. (2007), the difference in Rutherford et al. (2005) is insignificant.

We then proceed to explore how the house sales differences are distributed across clients in different ownership categories and across agents with different experience levels.

4.1 Agents Mislead Corporate, Bank, and Government Clients, but not Individual Clients

Table 2 presents a series of regression results in which the set of control variables expands as we move from Column (1) to (6). The sale price coefficients are presented in Panel I, and those for days-on-market in Panel II. Heckman standard errors are in parenthesis.¹⁵ Specification (1) controls for the ownership only. The coefficients imply that individually-owned houses sell for 4.4% less than agent-owned houses on average and 11 days faster, corporate-owned properties 29.9% less and 13 days faster, bank-owned properties 55.6% less and 28 days faster, and government-owned properties 58.7% less and 24 days faster.

¹⁵Both the usual OLS standard errors and heteroskedasticity-robust standard errors are incorrect in Heckman’s two step estimation. Correct formulas for the standard errors take account of the complication that the inverse Mills ratio in the second step is an estimate from the first step. Formulas for the correct standard errors are given in Heckman (1979) and Greene (1981). Implementation is not simple so I use the *heckman* package in STATA that automatically handles this complication.

Moreover, ownership by itself has little explanatory power on the outcomes; only 7% (0.5%) of the variability in the logged sale price (days-on-market) is accounted for by the ownership.

The ownership coefficients in Specification (1) tell us nothing about the causal effects of ownerships on a house's sale price and days-on-market. As a first step toward measuring that effect, we control for house physical characteristics in Specification (2). Controlling for house physical characteristics greatly reduces the estimated impacts of corporate, bank, and government ownerships on the sale price. For instance, the sale price difference between agent-owned and bank-owned houses is 10.2%, less than one fifth of the difference in Specification (1). Thus the observation that agent-owned houses tend to be "better" than other houses on the market, as seen in Table 1, is mainly responsible for the low sale prices on corporate-owned, bank-owned, and government-owned houses. Adding house characteristics, however, does not substantially change the estimated ownership impacts on days-on-market, except that the coefficient of government ownership drops (in magnitude) to -12, almost half of the corresponding coefficient in Specification (1). On the other hand, almost 80% of the variation in the logged sale price is explained by house physical characteristics. House characteristics, however, explain little (1.7%) of the variation in days-on-market.

In Specification (3) we further immunize our estimates against geographic and calendar influence by including subdivision, year, and season fixed effects.¹⁶ By controlling for subdivision fixed effects, Specification (3) also removes possible biases due to *unobservable* house characteristics which are homogeneous within subdivisions, like location, views, crime, architectural style, and so forth.¹⁷ The estimated sale price and days-on-market impacts of ownerships see only economically negligible and statistically insignificant changes with the control of geographic and calendar fixed effects with two exceptions: first, the days-on-market difference between agent-owned and individually-owned houses drops (in magnitude) from -10 days to -7 days, and becomes insignificant at 1 percent level. Second, the days-on-market

¹⁶The year and season fixed effects in the sale price regression relate to the time of *sale*, while in the days-on-market regression relate to the time of *listing*.

¹⁷Theoretically, a more efficient strategy to remove biases due to unobservable house characteristics is to include house fixed effects. This strategy, however, is infeasible because our sample of 36721 listings involves more than 19,000 houses. After controlling for house fixed effects, too few degrees of freedom remain to measure the impact of ownership with useful precision.

coefficient of government ownership raises (in magnitude) to 22, almost double of the coefficient in Specification (2). The R-squared of the days-on-market regression increases from 2% to almost 15%, implying the presence of important subdivision differences and calendar trends in days-on-market.

In Specification (4), controls of contractual terms are added, including length of the contractual period, whether allow direct contact from potential buyers, whether short sale or pre-foreclosure, whether exclusive right to sell, and buyer agent commission rate (or dollar amount for a flat-fee contract). Adding these controls substantially changes both the sale price and days-on-market coefficients. The impact of individual ownership on logged sale price reduces by half in magnitude to -2.9%, but the sale price impacts of corporate, bank, and government ownerships increase in size by 64%, 64%, and 140% respectively from Specification (3). On the other hand, the days-on-market impacts of corporate, bank, and government ownerships increase (in size) substantially after controlling for contractual terms, but the impact of individual ownership becomes economically negligible (-1.8 days) and statistically insignificant at even 10% level. Moreover, the R-squared of the days-on-market regression jumps from 15% to almost 35%, suggesting the presence of important differences in contractual terms.

One issue the previous specifications fail to address is the agent heterogeneity, one aspect of which is the agent's effort level. Given that real estate agents may be more motivated and expend more effort in selling their own houses, we attempt to obtain information that relates to the agent's effort. In Specification (5), we proxy agents' effort by measures of their marketing activities, including the number of images of the properties posted, the frequency of open houses, and whether a virtual tour is available. The estimated sale price and days-on-market impacts of the ownerships see only economically negligible and statistically insignificant changes with the control of effort measures. Moreover, marketing activities explain little of the variation in the logged sale price and days-on-market. The results suggest that either these marketing activities are not representative of the agent's effort level, or agents' effort has little impact on house sales outcomes.

Though we have controlled for measures of agent's marketing activities, it remains the

possibility that the sale price and days-on-market are affected by unobservable agent characteristics, such as network, experience, bargaining power, and preferences in choices of decor (Levit and Syverson, 2008), and this will cause a bias due to unobserved listing agent heterogeneity. In Specification (6) we remove this possible bias by including listing agent fixed effects so that identification of the parameters comes from a comparison of houses listed by the same listing agent, rather than from homes listed by different agents. In addition, we control for buyer agent fixed effects in the sale price regression, since there is anecdotal evidence that the sale price is also affected by buyer agent characteristics and preferences.¹⁸ Controlling for agent fixed effects reduces the sizes of the sale price coefficients on all non-agent ownerships. Compared to comparable agent-owned houses, individually-owned houses sell for 1.7% less, the corporate-owned houses 8.9% less, the bank-owned houses 8.5% less, and the government-owned houses 5.3% less. All sale price coefficients are statistically significant at 1% level. Moreover, corporate-owned houses sell for 32 days faster than agent-owned houses, bank-owned houses 39 days faster, and government-owned houses 45 days faster. All these days-on-market differences are significant at 1% level. The days-on-market difference between individually-owned and agent-owned houses, however, is economically negligible (-1.5 days) and statistically indistinguishable from zero at 1% level. After controlling for listing agent fixed effects, the R-squared of the days-on-market regression jumps from 36% to 48%, implying the presence of important unobservable listing agent heterogeneity.

The results of Table 2 reveal at least three noteworthy facts. First, the house sales differences between agent-owned and client-owned houses vary systematically across clients in different ownership categories. The differences mainly come from houses owned by corporate, bank, and government clients, but are either economically negligible or statistically insignificant on individually-owned houses. These results imply that the standard contract works pretty well for individual clients, but fails mainly on corporate, bank, and government clients, who may need to renegotiate a better contract.

¹⁸In the days-on-market regression, we do not control for buyer agent fixed effects because days-on-market is “a function of the entire history of the house’s listing experience” (Levitt and Syverson, 2008), and is not affected by the buyer agent. The empirical results, however, are not sensitive to the inclusion of buyer agent fixed effects.

Second, the primary dimensions along which agent-owned houses differ from those of their clients are in terms of house physical characteristics, geographic and calendar information, contractual terms, and unobservable agent heterogeneity; controlling for these factors substantially changes the gaps between agent-owned and other houses. Agents marketing activities, on the other hand, have negligible and insignificant effects on the estimated impacts of ownerships on house sale outcomes.

Finally, house physical characteristics account for majority (80%) of the residual variance in the sale price. On the other hand, geographic and calendar information, contractual terms, and unobserved agent heterogeneity explain much (44%) of the residual variance in the days-on-market.

Appendix Table 3 reports the estimated coefficients of a subset of the control variables included in Specification (6) of Table 2.¹⁹ Other things equal, condominiums sell for 6% less and stay on the market 19 days longer than single family houses. Houses located in the best school district sell for a 3.5% premium, while those in the worst school district sell for 2.3% less. Pre-foreclosure (short sale) houses sell for 7.8% (9.4%) less and stay on the market 34 (51) days longer than otherwise identical houses. All else constant, houses with 10 more pictures posted stay on the market 3 days longer. This superficial positive correlation between *image* and days-on-market might be a result of the fact that agents' marketing activities are determined endogenously; agents intent to market more intensively (i.e., put more pictures) as the time houses have been on the market increases. To remove possible biases due to the endogeneity of *image*, we apply the instrument variables (IV) method to the days-on-market model, and use the total number of rooms as an instrument for the number of images.²⁰ Our empirical results, however, are robust to the IV estimation, except that the days-on-market impact of image becomes statistically insignificant at 1% significance level.²¹

¹⁹Only a subset of coefficients is reported to conserve space. Full results are available from the author upon request.

²⁰The total number of rooms is likely to be a valid instrument for the number of images in the days-on-market regression. First, after controlling for the numbers of bedrooms, full bathrooms, and half bathrooms, and square footage, the total number of rooms is not likely to affect days-on-market. Secondly, the total number of rooms is positively correlated with the number of images, with a correlation coefficient of 25% in the current data.

²¹To conserve space we do not report the IV estimation results. The results are available from the author upon request.

4.2 Highly Experienced Agents Mislead Less Than Other Agents

Different agents respond differently to the incentives present in the brokerage. It is therefore of interest to determine whether the effects of brokerage are reasonably uniform, or if they differ across agents with different levels of experience. We examine this issue by using three separate proxies of the listing agent's experience. According to each proxy, we classify listing agents into three equally-sized levels – *less experienced*, *moderately experienced*, and *highly experienced*. We then rerun our regressions, but add to the specifications indicator variables of the agent's experience, and their interactions with the ownership indicators. The results are reported in Table 3.

First, we proxy an agent's experience by the number of houses he or she sells in the sample period, and show the results in Columns (1) to (3) of Table 3. Results reported in each column are from a separate regression, with the omitted category of the agent's experience increases from Column (1) to (3). Compared to agent-owned houses, individually-owned houses sell for 1.8% less on average and stay on the market 5 days longer if sold by less experienced agents, 4.1% less and 15 days shorter if sold by moderately experienced agents, and 1.2% less and 7 days longer if sold by highly experienced agents. The differences caused by highly experienced agents, however, are statistically insignificant. Similarly, the corporate-owned gaps are biggest among moderately experienced agents, -11.9% in sales price and -41 days in days-in-market, in comparison to -6.4% and -22 days among less experienced agents and -8.1% and -24 days among highly experienced agents. On the other hand, the bank-owned gaps and government-owned gaps tend to decrease (in size) with the agent's experience levels. For instance, the government-owned gap in sale price is -12.4% among less experienced agents, smaller (-10.7%) among moderately experienced agents, and smallest (-8.7%) among highly experienced agents.

Second, we proxy an agent's experience by the total number of months in which s/he has a successful transaction. The results, reported in Columns (4) to (6), show similar patterns as those in Columns (1) to (3). The estimated individually-owned and corporate-owned gaps are largest among moderately experienced agents: the sale price differences are -4.1% and

-12.4%, and the days-on-market differences are -12 days and -40 days respectively. On the other hand, the bank-owned and government-owned gaps are largest among less experienced agents. Again, highly experienced agents are among those who “cheat” to the least extent on all types of clients.

The previous two proxies for an agent experience are constant over time. In respect to the fact that an agent’s knowledge of local market may vary over time, we proxy a listing agent’s experience at each point of time when he or she sells a house, by the number of houses the agent sells in the previous year and in the same city as the current house. The value of this proxy changes over time and more accurately reflects the familiarity of a listing agent with the rapidly changing local real estate market. The results, reported in Columns (7) to (9) of Table 3, are qualitatively robust to this time-varying proxy of agent experience. Individually-owned houses are sold by moderately experienced agents for 2.8% less than the agent-owned houses and around 5 days faster, the gaps are smaller among less experienced agents (-2.4% in the sale prices and -2 days in days-on-market), and smallest among highly experienced agents (-1.8% and 6 days). The corporate-owned gaps show similar patterns; they are largest among moderately experienced agents and smallest among highly experienced agents, with less experienced agents in the middle. The estimated bank-owned and government-owned gaps, on the other hand, tend to decrease (in size) with listing agent experience; for instance, bank-owned (corporate-owned) houses are sold for 14.2% (12.3%) less than agent-owned houses by less experienced agents, 13.2% (7.3%) less by moderately experienced agents, and 6.5% (7.7%) less by highly experienced agents.

The results from Table 3 suggest that the house sales gaps vary systematically across agents at different experience levels. While the individually-owned and corporate-owned gaps are mainly due to moderately experienced agents, the bank-owned and government-owned gaps are mainly attributable to less experienced agents. Highly experienced agents, on the other hand, are among those who make minimum house sales differences on all types of clients. These results suggest that the standard contract disciplines highly experienced agents more effectively than the other agents. This finding makes sense. A highly experienced agent is probably more concern about protecting his/her reputation.

When it comes to selling their owned houses, agents' experience also makes differences on the outcomes.²² By proxying an agent's experience by the number of houses he or she sells in the sample period, we find that compared to a less experienced agent, a typical moderately experienced agent is associated with a 2.3% higher price and 16 more days on the market when selling their own houses. A highly experienced agent can not sell for a premium, but can sell 16 days faster than a less experienced agent.

If one measures agent experience by the number of months in which the agent has a successful transaction, then a moderately experienced agent is able to sell his or her own house for 2.0% more than a less experienced agent does, at the cost of 14 extra days. There are no significant outcome differences between less and highly experienced agents when selling their own houses.

If agent experience is proxied by the number of houses the agent sells in the previous year and in the same city as the current house, then the gaps between less and moderately experienced agents are negligible and insignificant when selling their own houses. A typical highly experienced agent, however, can sell 15 days faster than other agents without selling cheaply.

All these results, pertaining to agents selling their own houses, suggest that compared to less experienced agents, moderately experienced agents often sell for premiums at the cost of more days on the market, and highly experienced agents can sell faster without sacrificing the sale prices.

4.3 List Price

In this subsection we examine the possibility that real estate agents influence the sale prices in part by encouraging sellers to set lower initial list prices. We estimate similar sale price specifications as in Column (6) of Table 2 and Table 3, but with a different dependent variable—the logged list price. The results, reported in Appendix Tables 5 and 6, are roughly comparable to the sale price results. Appendix Table 5 shows that the list price difference between the

²²The estimated impacts of agent experience on the house sales outcomes of agent-owned houses are not reported in the table. The results are available from the author upon request.

individually-owned and agent-owned houses is negligible (0.3%) and insignificant at 10% significance level. On the other hand, the list price gaps on the corporate-owned, bank-owned, and government-owned houses are -7.8%, -9.8%, and -9.4% respectively, and are all significant at 1% level. Appendix Table 6 shows that the list price gaps on individually-owned and corporate-owned houses are evenly distributed across less and moderately experienced agents, while the gaps on bank-owned and government-owned houses are mainly attributable to moderately experienced agents. Highly experienced agents, on the other hand, are among those who make minimum differences on the list prices. In sum, the results suggest that much of the effect of the ownership on the sale price reflects its influence on the list price.

4.4 Competing Theoretical Explanations

A number of different theories can in principle produce the basic pattern of results we observe in the data. In this section, we attempt to distinguish between these competing hypothesis. There are three potential reasons why agent-owned houses might sell for more and stay on the market longer than their clients' houses: (1) information asymmetry, (2) motivation heterogeneity, and (3) effort shirking. We consider these three explanations in turn.

4.4.1 Strong Evidence of Information Asymmetry

There has been some evidence in the current literature (Levitt and Syverson, 2008) that the gap between agent-owned and client-owned houses systematically varies with the agent's informational advantage. In this subsection we examine this issue along six dimensions, providing additional evidence of information asymmetry. The first three dimensions relate to the agent's informational advantage over the *seller*, and the next three dimensions the *buyer*. We report the results in Tables 4 and 5.

Evidence of the Agent's Informational Advantage over the Seller

The first dimension we analyze relates to the availability of information, which is expected to be different between small and big cities. Information about house values and local market

conditions is more readily available in big cities than in small cities, because more houses are listed and sold in big cities than in small cities. Therefore sellers in big cities can easily learn much about their own houses' values as well as local market conditions simply by observing nearby house sales. We classify the sample into two equally-sized categories according to the sizes of the cities, and report the results in Columns (1) and (2) of Table 4.

As can be seen from the table, the house sales differences are indeed larger in small cities where the agent enjoys bigger informational advantages. The sale price gap between bank-owned and agent-owned properties is -10.7% in small cities and -9.0% in big cities. For corporate-owned houses, the sale price gap is -10.4% and -8.0% in small and big cities respectively. All these results are in accordance with the notion that big cities present smaller information asymmetry. The government-owned gap in sale price, however, is economically and statistically indistinguishable between big and small cities. The days-on-market differences reflect similar patterns. Compared to similar agent-owned houses, bank-owned houses sell 45 days sooner in small cities and 28 days sooner in big cities, while for government-owned houses the difference is -52 days in small cities and -30 days in big cities. For each type of owners, we can reject at 1% significance level that the days-on-market coefficients from the big city subsample equal those from the small city subsample.

The second dimension we analyze is with respect to the degree of market heterogeneity which is expected to be different between the single-family housing market and condominium market. Compared to the single-family housing market, the condominium market tends to be more homogeneous, involve less uncertainty, and therefore reduce the informational advantage enjoyed by the agents. If the agency problem is caused (in part) by information asymmetry, then one would expect the agency problem to be more severe in the single-family housing market than in the condominium market. We report in Columns (3) and (4) of Table 4 the results from the estimations using the single-family house and condominium subsamples.

As expected, the house sales differences mainly exist in the single-family housing market. The coefficients estimated in the single-family housing subsample are close to those estimated in the full sample. For instance, the estimated sale price coefficient of bank ownership is

-8.4% in the single-family house subsample and -8.5% in the full sample. Similarly, the estimated days-on-market impact of bank ownership is -38 days in the single-family house subsample and -40 days in the full sample. On the contrary, the house sales differences are negligible in the condominium market, providing no evidence of agency problems in the condominium market. The relatively small size of the condominium market (less than 600 listings are related to condominiums in our sample period) reduces the accuracy of our estimates, and may contribute to the estimated differences between the single-family housing and condominium markets. Nevertheless, the differences are at least consistent with our predication regarding information asymmetry.

The third dimension along which we expect to observe systematic differences in the agent's informational advantage over the seller relates to the number of *comparables*. By definition, one property is a comparable to another if both are for sale at the same time within the same zip code and the list price of the former is within 30% deviation of the latter. For a house with many comparables, the seller can learn much about his or her house's true market value and local market conditions simply by observing sales of comparable houses. With few comparables, however, such information is not easily and cheaply available. We divide the full sample into two equally-sized mutually exclusive and exhaustive subsamples according to the number of comparables. The results, reported in Columns (5) and (6) of Table 4, fit nicely with the theoretical prediction. Among the houses with only a few comparables, corporate-owned, bank-owned, and government-owned houses are sold for 9.1%, 7.1%, and 9.8% less than agent-owned houses respectively, while the differences decrease in size to -5.8%, -4.5%, and -5.0% for corresponding houses with many comparables. The estimated sale price difference on the individually-owned houses with only a few comparables is -1.6% and significant at 10 % significance level, and becomes negligible and insignificant if there are many comparables. The days-on-market differences show a similar pattern. The days-on-market differences on corporate-owned, bank-owned, and government-owned houses are economically and statistically more significant among houses with only a few comparables than among houses with many comparables. We are able to distinguish the estimated days-on-market coefficients across the two subsamples at 1% significant level.

The estimated days-on-market impact of the individual ownership is insignificant in both subsamples, but the magnitude of this coefficient is still larger in the few-comparable subsample than in the many-comparable subsample.

Evidence of the Agent's Informational Advantage over the Buyer

The next three dimensions we analyze relate to the agent's informational advantage over the buyer. The first relates to the presence of an investor buyer. There are two main types of buyers in the residential real estate market: owner-occupants and investors. Real estate agents enjoy a bigger informational advantage over owner-occupants than over investors, because owner-occupants are further less informed than investors. Moreover, there is some anecdote evidence that the majority of houses with defects are purchased by investors, and houses in the move-in condition are often bought by owner-occupants.²³ Therefore, if the house sales differences can be explained (in part) by information asymmetry between agents and buyers, these differences should be larger among houses in move-in conditions than the houses with defects.

To test these hypotheses, we classify the houses into two mutually exclusive and exhaustive categories: houses with defects and in move-in conditions. We then rerun our full specifications using the two subsamples separately. The results, reported in Columns (7) and (8) of Table 4, are consistent with these hypotheses: the house sales differences distribute mainly on move-in ready houses. For houses with defects, ownerships have negligible and insignificant impacts on the sale price, except for bank-owned and corporate-owned house, for which the sale price impacts are -3% and -4% respectively, almost one third and half of the corresponding impacts on houses in the move-in condition. The results on days-on-market show the same pattern, and we can reject equality of the coefficients across the two subsamples at the 10% level.

²³Most owner-occupant buyers don't even consider houses with defects for two main reasons. First, Most owner occupants, especially those first-time homebuyers, are going to get loans for their purchase. In order for a house to qualify for a loan, it needs to pass inspection and to be move-in ready. So most owner-occupants will have to pass on houses with defects which can not pass the inspection for loan. Secondly, because of comparative (dis)advantage, house repair and renovation are expensive and time-consuming for most owner-occupants.

The second dimension along which the agent's informational advantage (over the buyer) may vary relates to the presence of a dual agent. In a typical real estate transaction, the seller is represented by a listing agent, and the buyer is represented by a buyer agent. In most transactions, the listing and buyer agents are different persons. In this case, we call them *independent listing agent* and *independent buyer agent* respectively. In some other cases, the same agent represents both the seller and buyer, and in this case we call him/her the *dual agent*. As well explained by Levitt and Syverson (2008), there are two channels through which a dual agent can better exploit his or her informational advantage than an independent listing agent can. First, a dual agent can directly communicate with the potential buyer and therefore affect the outcome to a large extent, while an independent listing agent can only communicate with the buyer's agent. Second, when selling a client's house, the listing agent has a strong incentive to sell to a buyer who hires him/her as the buyer agent, because his/her commission doubles in the dual agent case. This incentive, however, is much weaker when the agent sells his or her own house, as the agent is the residual claimant and commission is only a small portion of the sale price. (See Levitt and Syverson, 2008.)

To test these hypotheses, we rerun our sale price regression, but add to the specification an indicator variable of dual agent and its interactions with the non-agent ownership indicators. The results are presented in Column 1 of Table 5. When an agent sells his or her own houses, the presence of a dual agent is associated with a 6.0% price premium. The price premium decreases to 1.2% for individually-owned houses and 2.7% for corporate-owned houses, and becomes negligible for bank-owned and government-owned houses. One interpretation of these results is that a dual agent, though represents both parties in a real estate transaction, tends to lean towards the seller and not provide the buyer with reliable information and full protection. Therefore a buyer with a dual agent is likely to be uninformed and susceptible to pay higher prices if the dual agent wishes to extract the surplus. When agents sell their own houses, buyers with dual agents are exploited to the full extent possible since the agents are the residual claimant. When selling houses for individual and corporate clients, however, the agents will not extract the full surplus at the risk of the deal failing to go through. For the same reason but with a larger risk of losing the deal, listing agents do not even attempt

to extract any surplus for their bank and government clients.

The third dimension is a combination of the previous two. If the dual agent impacts can be interpreted as a consequence of information asymmetry between the agent and buyer, then we can expect the impacts to be larger among houses in the move-in condition than among those with defects. This is because many of the houses with defects are purchased by investors. Investor buyers are well informed by themselves, so there is little surplus to be extracted from them no matter whether a dual agent is used or not. On the other hand, the impacts of a dual agent should be more prominent among the houses in the move-in condition, as the majority of these houses are bought by owner-occupants who get information mainly from the buyer agents.

To test this hypothesis, we rerun the sale price specification (which includes the dual agent indicator and its interactions with the ownership indicators) using the subsamples of houses in move-in conditions and those with defects separately. The results, reported in Columns (2) and (3) of Table 5, fit very well with the theoretical predication. The estimated dual agent impacts are significant among houses in the move-in conditions, but are mainly negligible and insignificant among houses with defects, with the only exception on government-owned houses with defects, on which there is a significant negative impact – -20% – of the dual agent. One interpretation is that government-owned properties with defects are disproportionately purposed by investors who are aggressive and fussy. When dealing with these investor buyers, the fear of losing the deal is so deep that the dual agent tends to further the interest of the buyer at the expense of the seller's, and lean on the seller to accept a suboptimal price.

4.4.2 Some Evidence of Motivation Heterogeneity

The real estate literature has provided some evidence that sellers are heterogenous in their motivation to sell, which influences both the sale price and days-on-market (See Glower, Haurin, and Hendershott, 1998; Springer, 1996). Therefore, it is possible that the gaps between agent-owned houses and those of their clients systematically vary with the sellers' motivation. We examine this issue along three different dimensions, reporting the results in

Table 6.

The first dimension along which we expect to see systematic differences in the seller's motivation relates to the season in which the house is listed. It is broadly known that spring and summer are the hottest seasons for residential real estate, while winter is the worst.²⁴ Those sellers listing in winter are very motivated to sell, while the others are a mix of motivated and non-motivated sellers. In other words, the sellers who list in winter have more homogenous motivation than those who list in other seasons do. If the house sales differences between agent-owned and other houses are caused in part by heterogeneity in the seller's motivation, then we expect to see smaller differences among houses listed in winter months (from November to February) than houses listed in non-winter months (from March to October). We classify houses into two mutually exclusive and exhaustive subsamples according to the month of listing, and report the results in Columns (1) and (2) of Table 6. Our results on the sale price are in accordance with the theoretical predications. The sale price difference between agent-owned and individually-owned (government-owned) houses is negligible and insignificant if they are listed in winter months, and increases in magnitude to -2.7% (-7.9%) if listed in non-winter months. Similarly, the bank-owned (corporate-owned) gap in sale price is -6.2% (-5.4%) if they are listed in winter months, and increases in size to -9.0% (-8.3%) if listed in non-winter months. We can reject equality of the coefficients between the two subsamples at the 1% significance level. The days-on-market results on government-owned and corporate-owned houses show similar patterns. Government-owned (corporate-owned) houses are sold 44 (30) days faster than agent-owned houses if listed in winter months, and 45 (36) days faster if listed in non-winter months. However, the days-on-market gap on individually-owned houses decreases (in size) from -12 days to negligible when one moves from Column (2) to (1), and similarly for government-owned houses. As a collection, the results provide evidence that motivation heterogeneity between agents and their bank and corporate clients can explain portion of the house sales differences on bank-

²⁴Sales peak in April and May and stay strong in June and July. It's a good time for families to move, between school terms and while the weather is warm. People have just received their tax refunds, which they can use to help finance a down payment. And the nice weather in spring and summer makes it a great time for sellers to show their houses.

owned and corporate-owned houses.

The second dimension we study relates to the subprime mortgage crises. The number of foreclosed houses expands rapidly since the burst of the crises in 2007.²⁵ Foreclosed houses become banks' inventory and are treated as bad assets; owning a foreclosed house is equivalent to throwing away the dividend on a financial asset. As the number of foreclosures increases rapidly, banks become more and more motivated to sell. At the same time the impact of the crises on the motivation of the agent when he sells his own houses is much less, if there is any. Since the motivation heterogeneity between banks and agents (both as sellers) widens rapidly after the burst of the subprime mortgage crises, we expect that the house sales differences between bank-owned and agent-owned houses increase after 2007. We report in Columns (3) and (4) of Table 6 the results from estimating our full specifications on two subsamples of the data stratified by time (2000-2007 and 2008-2010).

As expected, compared to similar agent-owned houses, bank-owned houses sell for 7.8% less and 10 days faster before 2007, and the days-on-market difference is insignificant at 10% level. After the burst of crises, bank-owned houses sell for 9.8% less and stay on the market 36 days shorter, and both results are significant at 1% level. Interestingly, the results on corporate-owned houses show similar patterns. The corporate-owned gaps are -8.2% in sale price and -11 days in days-on-market before 2007, and the gaps increase in size to -8.24% and -28 days after 2007. Individually-owned houses are indistinguishable from agent-owned houses both before and after 2007. For government-owned houses, though the sale price gap increases in size from -3.5% before 2007 to -8.7% after 2007, the days-on-market difference decreases in size from -43 days to -39 days. Again, the results provide evidence that the bank-owned and corporate-owned gaps can be explained in part by motivation heterogeneity between real estate agents and bank and corporate house sellers.

The conclusion from the results presented in this subsection is that the estimated house sales differences on bank-owned and corporate-owned houses can be explained in part by the notion that a typical financial institute or relocation company is more motivated to sell

²⁵In our data, the percentage of bank-owned houses increases from 3.15% before crises to 6.87% after crises. The percentage of government-owned houses increases from 1.48% to 4.92%.

than a real estate agent even at substantially lower prices, when both are selling their own houses.

4.4.3 No Evidence of Effort Shirking

Borrowing the results from the job search literature, Levitt and Syverson (2008) argues from a theoretical perspective that “[effort] shirking is unlikely to lead clients to pull their houses off the market more quickly”. In this paper, we explicitly test the assumption that the house sales differences we observe in the data can be explained by effort shirking, and we do not find any evidence in favor of this assumption. The results are reported in Table 7.

First, the current data contain information about each agent’s effort on marketing activities, including (1) the number of images of the property posted, (2) the frequency of open houses, and (3) whether a virtual tour is available. To see whether agents exert efforts to different extents when selling their own houses and other houses, we regress each of the three effort measures on a set of covariates including ownership indicators, house physical characteristics, geographic location, calendar information related to listing, contractual terms, and listing agent fixed effects. The results, report in Panel A of Table 7, show that the impacts of the ownership of the house on the agent’s marketing effort are mostly negligible and insignificant, except that bank-owned houses have 1 less picture on average than agent-owned houses, and similarly for the government-owned houses. Combined with the previous results (reported in Appendix Table 3) that the estimated impacts of image on house sales outcomes are negligible – 0.0072 on sale price and 3.2635 on days-on-market – this result provides no evidence that the house sales differences can be explained by effort shirking.

Second, much of the agent’s effort is still unobservable, for instance, their communication and negotiation with other real estate agents and potential buyers. Given this fact, it remains the possibility that the agent’s unobserved effort differs systematically across houses of different ownerships, contributing to the house sales differences that we observe in the data. To solve this potential problem, we proxy an agent’s effort by the type of listing contract. There are two common types of listing contracts: *exclusive-right-to-sell* and *exclusive-agency*. Exclusive-right-to-sell means that the seller will pay the listing agent a commission, no matter

who buys the property. Exclusive-agency means that the seller pays the listing agent only if the listing agent brings the buyer. The listing agent will not be paid if the seller sells the house him/herself.²⁶ There is an intelligent reason why the listing agent will exert more effort under the exclusive-right-to-sell contract: under the exclusive-agency contract, the listing agent is not so enthusiastic about spending that much effort, because there is a chance that the prospective buyer can go straight to the seller and the agent will not be paid for his or her efforts. Therefore, exclusive-agency will definitely create some doubt in the agent's mind, and less willingness to exert the same amount of effort.

To test these hypotheses, we rerun our full specifications of the sale price and days-on-market models, but add to the specifications the interactions of the exclusive-right-to-sell indicator with the ownership indicators.²⁷ The results, reported in Panel B of Table 7, show that all else constant, houses listed under the exclusive-right-to-sell contract sell for 2.5% more and 7 days faster than houses listed under the exclusive-agency contract. However, these coefficients, as well as those of the interaction terms, are indistinguishable from zero at the 10% level, providing no evidence that the house sales differences can be explained by effort shirking on part of the agent.

5 Conclusion

As a result of their information advantage, real estate agents may mislead their clients by convincing them to sell their houses too cheaply and too quickly. The commission system is thereby designed to regulate agents' behaviors. As it turns out, however, the current commission system fails in general to solve the agency problem – given the contract, agents still have strong incentives to mislead their clients.

This raises a few important questions. First, the current commission system needs to be renegotiated, but who truly need to do that? To answer this question, we need to know

²⁶Any buyer is presumed to have been procured through the listing agent's marketing efforts. Nonetheless, exclusive-agency does allow for random buyers to knock on the seller's door and buy the property direct from the seller – despite the fact that the listing agent's efforts are what alert them to the existence of the property.

²⁷The indicator variable of *exclusive-right-to-sell* is already included in the full specifications.

which types of agents are misleading which types of clients, so these participants are in need of a better contract. Second, why does a contract that so badly misaligns agent and seller incentives become so prevalent and persistent? Last but not least important, what cause the agency problem in the first place?

Our empirical estimates show that after controlling for observables, corporate-owned houses sell for 8.9% less than agent-owned houses and 32 days sooner, bank-owned houses 8.5% less and 40 days sooner, and government-owned houses 5.3% less and 45 days sooner. The individually-owned gaps are either negligible or insignificant. These results imply that the current commission system works pretty well for individual house sellers, but fails mainly on corporate, bank, and government house sellers, who may need to renegotiate the contract.

We also find that the corporate-owned gaps are mainly due to moderately experienced agents, while the bank-owned and government-owned gaps are mainly attributable to less experienced agents. Highly experienced agents, on the other hand, make the minimum house sales gaps for all clients. This result suggests that the standard contract disciplines highly experienced agents more effectively than the other agents. A possible explanation of this result is that highly experienced agents are more concerned with protecting their reputation.

The above results also suggest a prime reason why the current contract arose and persists despite its inefficiency on average: it is nevertheless efficient for the vast majority of the sellers (i.e., individual sellers) and the most prolific agents (i.e., highly experienced agents).

A number of different theories can produce the basic pattern of results we observe in the data. To fulfil the goal of this paper, we attempt to distinguish between these competing hypothesis. We examine three potential theoretical explanations: (1) information asymmetry, (2) motivation heterogeneity, and (3) effort shirking by agent. Similar to Levitt and Syverson (2008), we find abundant evidence that greater information asymmetry leads to larger house sales gaps for all types of clients. Different from Levitt and Syverson (2008), we also find evidence that the corporate-owned and bank-owned gaps vary systematically with seller motivation heterogeneity, suggesting that relocation company and financial institute themselves are very motivated to sell even at substantially lower prices. We, however, find no evidence of effort shirking on part of the agent.

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TABLE 1. DESCRIPTIVE STATISTICS

	(1)		(2)		(3)		(4)		(5)	
	agent-owned		individually-owned		corporate-owned		bank-owned		government-owned	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
I. Dependent Variables and other Key Variables										
sold	0.494	0.500	0.471	0.499	0.767	0.423	0.882	0.323	0.985	0.121
expired	0.506	0.500	0.526	0.499	0.233	0.423	0.118	0.323	0.015	0.121
withdraw	0.000	0.000	0.003	0.052	0.000	0.000	0.000	0.000	0.000	0.000
list price (×10 ⁴)	22.938	143.050	18.469	41.027	13.909	10.284	10.594	7.214	8.945	2.653
list price, given sold (×10 ⁴)	18.182	15.270	16.438	11.190	13.638	10.098	10.525	7.349	8.945	2.662
sale price (×10 ⁴)	17.117	13.661	15.564	9.685	12.717	9.756	9.388	6.411	7.963	2.485
dom	161.702	134.555	139.711	102.988	106.785	102.332	80.103	74.624	54.368	69.592
dom, given sold	96.897	109.415	84.059	84.568	84.019	84.475	71.439	68.176	50.427	60.328
II. Independent Variables										
Physical Characteristics										
asis	0.024	0.154	0.031	0.172	0.195	0.397	0.580	0.494	0.036	0.187
upper fixer	0.005	0.070	0.006	0.079	0.047	0.212	0.040	0.196	0.001	0.031
defects	0.128	0.334	0.200	0.400	0.064	0.246	0.009	0.093	0.000	0.000
cosmetics	0.012	0.108	0.017	0.130	0.063	0.244	0.058	0.235	0.001	0.031
bedroom	3.332	0.821	3.237	0.752	3.263	0.810	3.098	0.752	3.058	0.553
full bath	1.998	0.786	1.982	0.683	1.882	0.690	1.768	0.694	1.799	0.449
half bath	0.478	0.615	0.471	0.550	0.488	0.534	0.407	0.608	0.416	0.506
fireplace	0.682	0.725	0.684	0.634	0.566	0.583	0.464	0.585	0.200	0.405
rooms	8.023	2.720	7.842	2.375	7.564	2.263	6.916	1.980	6.264	1.303
levels	1.517	0.664	1.483	0.635	1.543	0.593	1.465	0.622	1.434	0.537
garage	1.911	0.972	1.964	0.887	1.786	0.881	1.672	0.845	1.799	0.576
sqft	2223.263	1354.852	2156.425	1173.483	2057.101	1092.422	1810.550	910.910	1594.372	641.069
acre	0.660	2.059	0.725	2.627	0.460	1.581	0.476	1.298	0.146	0.185
condominium	0.049	0.215	0.032	0.176	0.035	0.183	0.047	0.213	0.004	0.061
basement	0.279	0.449	0.267	0.442	0.233	0.423	0.202	0.401	0.055	0.228
appliances	3.795	2.089	4.023	2.014	2.109	2.117	0.743	1.339	0.074	0.493
style_ranch	0.403	0.491	0.414	0.493	0.333	0.472	0.440	0.497	0.185	0.389
style_tradt	0.266	0.442	0.335	0.472	0.322	0.468	0.241	0.428	0.714	0.452
cool_pad fan	0.352	0.478	0.407	0.491	0.174	0.379	0.079	0.269	0.018	0.132
equip_smoke	0.767	0.423	0.790	0.407	0.573	0.495	0.398	0.490	0.232	0.422
equip_water	0.159	0.366	0.205	0.404	0.048	0.214	0.012	0.107	0.000	0.000
equip_security	0.164	0.371	0.189	0.392	0.083	0.276	0.021	0.145	0.002	0.043
ext_brick	0.507	0.500	0.541	0.498	0.402	0.491	0.272	0.445	0.163	0.369
ext_vinyl	0.333	0.471	0.372	0.483	0.395	0.489	0.385	0.487	0.663	0.473
foundation_slab	0.369	0.483	0.378	0.485	0.463	0.499	0.496	0.500	0.812	0.391
life_detached	0.706	0.456	0.679	0.467	0.653	0.476	0.918	0.275	0.985	0.121
construction_new	0.100	0.300	0.090	0.287	0.193	0.395	0.008	0.090	0.000	0.000
utility_cable	0.655	0.475	0.672	0.469	0.496	0.500	0.252	0.434	0.019	0.135
utility_gas	0.414	0.493	0.461	0.498	0.308	0.462	0.143	0.351	0.013	0.113
utility_internet	0.223	0.416	0.178	0.382	0.082	0.274	0.042	0.201	0.007	0.086
age	27.623	37.994	23.291	31.625	25.303	35.709	34.407	39.663	17.728	26.641
Geographic Location										
school_best	0.325	0.468	0.351	0.477	0.278	0.448	0.219	0.414	0.089	0.285
school_worst	0.007	0.083	0.008	0.086	0.018	0.134	0.036	0.186	0.007	0.081
Calendar Information										
		0.281		0.293		0.266		0.211		0.279
spring_list	0.281	0.450	0.293	0.455	0.266	0.442	0.211	0.408	0.279	0.449
summer_list	0.258	0.438	0.282	0.450	0.233	0.423	0.274	0.446	0.197	0.398
fall_list	0.232	0.422	0.212	0.409	0.259	0.438	0.259	0.438	0.262	0.440
winter_list	0.228	0.420	0.212	0.409	0.242	0.429	0.257	0.437	0.262	0.440
Contractual Terms										
duration	236.806	131.359	209.174	2103.828	167.186	110.913	130.069	68.172	332.631	384.144
pre-foreclosure	0.003	0.053	0.008	0.091	0.000	0.000	0.000	0.000	0.000	0.000
short sale	0.003	0.053	0.005	0.072	0.000	0.000	0.000	0.000	0.000	0.000
bac_per, given percentage commission	3.370	0.341	3.372	0.391	3.193	0.408	2.960	0.347	3.264	1.931
bac_num, given flat-fee commission	568.333	376.840	1410.240	1659.602	1127.385	211.016	1075.667	274.121	1250.000	.
Marketing Activities										
image	4.706	4.163	5.182	4.146	3.148	3.463	2.612	2.886	1.218	1.139
open house	0.017	0.164	0.022	0.178	0.012	0.119	0.001	0.024	0.000	0.000
virtual tour	0.050	0.217	0.080	0.272	0.027	0.161	0.008	0.090	0.003	0.053
Comparables	1228.129	1058.843	1272.903	1249.768	860.462	1012.338	787.199	800.633	916.595	728.126
N.	1436		31504		978		1729		1074	

Note: Columns (1) to (5) report the summary statistics on houses owned by real estate agents, individuals, relocation companies, financial institutes, and government agencies respectively. Summary statistics reflect our sample of 36,721 listings on MLS over the period 2001-2010 in Johnson County, Indiana. Listings with missing values are excluded from the sample. The variables listed represent a subset of the control variables used in the analysis; see Appendix Table 1 for a full list, as well as the explanation of each variable.

TABLE 2. THE IMPACTS OF NON-AGENT OWNERSHIPS ON SALE PRICE AND DAYS-ON-MARKET

	(1)	(2)	(3)	(4)	(5)	(6)
I. Dependent Variable: log(sale price)						
individually-owned	-0.044 ** (0.020)	-0.062 *** (0.009)	-0.059 *** (0.008)	-0.029 *** (0.006)	-0.032 *** (0.006)	-0.017 *** (0.006)
corporate-owned	-0.299 *** (0.027)	-0.074 *** (0.013)	-0.063 *** (0.012)	-0.104 *** (0.008)	-0.105 *** (0.008)	-0.089 *** (0.009)
bank-owned	-0.556 *** (0.023)	-0.102 *** (0.013)	-0.086 *** (0.011)	-0.141 *** (0.008)	-0.135 *** (0.008)	-0.085 *** (0.009)
government-owned	-0.587 *** (0.025)	-0.072 *** (0.014)	-0.063 *** (0.013)	-0.151 *** (0.009)	-0.134 *** (0.009)	-0.053 *** (0.014)
R-squared	0.070	0.870	0.874	0.913	0.915	0.951
II. Dependent Variable: days-on-market						
individually-owned	-11.094 *** (3.229)	-10.742 *** (3.228)	-7.225 ** (3.177)	-1.840 (3.257)	-3.136 (3.242)	-1.550 (3.701)
corporate-owned	-12.874 *** (4.404)	-12.151 *** (4.512)	-16.278 *** (4.523)	-31.356 *** (4.745)	-31.685 *** (4.727)	-32.039 *** (5.354)
bank-owned	-27.704 *** (3.850)	-24.952 *** (4.317)	-29.944 *** (4.429)	-46.396 *** (4.724)	-43.562 *** (4.712)	-39.651 *** (5.500)
government-owned	-24.248 *** (4.140)	-12.380 *** (4.712)	-22.383 *** (4.982)	-45.871 *** (5.420)	-38.756 *** (5.438)	-45.158 *** (8.508)
R-squared	0.005	0.022	0.147	0.348	0.360	0.484
Controls included						
sample selection bias	Y	Y	Y	Y	Y	Y
house characteristics	N	Y	Y	Y	Y	Y
geographic and calendar information	N	N	Y	Y	Y	Y
contract terms	N	N	N	Y	Y	Y
observed measures of agent effort	N	N	N	N	Y	Y
agent fixed effects	N	N	N	N	N	Y

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010. The dependent variable in the top section is the natural log of the sale price; the dependent variable in the bottom section is the number of days on the market. Coefficients reported in each column is from a separate regression. The other variables included in each specification are noted in the table, but the coefficients on these other variables are not reported here (Appendix Table presents a subset of coefficient estimates in Specification (6)).

TABLE 3. THE IMPACT OF LISTING AGENTS' EXPERIENCE
(VALUES IN TABLE ARE COEFFICIENTS ON OWNERSHIP INDICATOR VARIABLES)

	A. Experience = the number of houses sold in the sample period			B. Experience = the number of months in which one or more listed houses are sold			C. Experience = the number of houses sold in the last month in the same city											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)									
	omitted category: less experienced	omitted category: moderately experienced	omitted category: highly experienced	omitted category: less experienced	omitted category: moderately experienced	omitted category: highly experienced	omitted category: less experienced	omitted category: moderately experienced	omitted category: highly experienced									
I. Dependent variable: log(sale price)																		
individually-owned	-0.018 (0.007)	** (0.010)	-0.041 (0.017)	*** (0.019)	-0.012 (0.017)	-0.019 (0.007)	*** (0.011)	-0.041 (0.016)	*** (0.018)	-0.013 (0.008)	-0.024 (0.009)	*** (0.009)	-0.028 (0.014)	*** (0.014)	-0.018 (0.014)			
corporate-owned	-0.064 (0.013)	*** (0.014)	-0.119 (0.019)	*** (0.019)	-0.081 (0.019)	*** (0.012)	-0.056 (0.012)	-0.124 (0.014)	*** (0.018)	-0.085 (0.018)	*** (0.037)	-0.088 (0.020)	** (0.020)	-0.180 (0.016)	*** (0.016)	-0.086 (0.016)	*** (0.016)	
bank-owned	-0.158 (0.012)	*** (0.013)	-0.142 (0.018)	*** (0.018)	-0.063 (0.018)	*** (0.012)	-0.179 (0.012)	-0.126 (0.013)	*** (0.017)	-0.065 (0.017)	*** (0.012)	-0.142 (0.012)	*** (0.012)	-0.132 (0.012)	*** (0.012)	-0.065 (0.016)	*** (0.016)	
government-owned	-0.124 (0.077)	* (0.025)	-0.107 (0.018)	*** (0.018)	-0.087 (0.018)	*** (0.034)	-0.151 (0.031)	-0.058 (0.031)	* (0.017)	-0.088 (0.017)	*** (0.013)	-0.123 (0.013)	*** (0.013)	-0.073 (0.013)	*** (0.013)	-0.077 (0.017)	*** (0.017)	
R-square	0.931			0.931			0.931			0.931								
II. Dependent variable: days-on-market																		
individually-owned	5.193 (3.976)	-15.680 (5.777)	*** (9.694)	7.732 (9.694)	4.462 (3.971)	-12.317 (5.907)	** (9.086)	1.061 (9.086)	-2.570 (4.430)	-4.642 (5.094)	6.652 (7.645)							
corporate-owned	-22.293 (6.948)	*** (7.881)	-41.258 (10.906)	*** (10.906)	-24.445 (10.906)	** (6.806)	-20.546 (6.806)	*** (7.850)	-40.209 (10.502)	*** (10.502)	-33.218 (6.973)	*** (7.236)	-33.567 (6.709)	*** (6.709)	-16.014 (8.855)	* (8.855)		
bank-owned	-40.229 (6.495)	*** (7.261)	-50.158 (10.618)	*** (10.618)	-35.925 (10.618)	*** (6.395)	-41.485 (6.395)	*** (7.423)	-48.380 (10.064)	*** (10.064)	-41.784 (6.507)	*** (6.507)	-44.358 (6.709)	*** (6.709)	-44.960 (8.855)	*** (8.855)		
government-owned	-112.344 (49.466)	** (14.929)	-75.565 (10.682)	*** (10.682)	-21.409 (10.682)	** (21.583)	-57.766 (17.847)	*** (17.847)	-82.379 (10.129)	*** (10.129)	-27.318 (21.519)	*** (21.519)	-40.961 (11.719)	* (11.719)	-37.548 (8.831)	*** (8.831)	-27.250 (8.831)	*** (8.831)
R-square	0.374			0.374			0.376			0.368								

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010. The dependent variable in the top section is the natural log of the sale price; the dependent variable in the bottom section is the number of days on the market. All coefficients in the table correspond to variations of the specification reported in Column (6) of Table 2, by adding indicator variables of the agent's experience and their interactions with the ownership indicators. In Panel A, the agent's experience is proxied by the number of houses he or she sells in the sample period, in Panel B by the number of months in which the agent sells a house, and in Panel C by the number of houses sold by the agent in the last year and in the same city. Coefficients reported in each column are from a separate regression with different omitted category of the agent's experience. Coefficients reported in Columns 1, 4, 7 are from regressions in which the omitted category is less experienced agents, Columns 2, 5, 8 moderately experienced agents, and Columns 3, 6, 9 highly experienced agents.

TABLE 4. THE IMPACTS OF NON-AGENT OWNERSHIPS BY SUBSAMPLES

Subsamples	A		B		C		D	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Small Cities	Big Cities	SFH	Condo	Few Comparables	Many Comparables	Move-in Condition	With Defects
Manitude of Predicted Information Asymmetry	High	Low	High	Low	High	Low	High	Low
I. Dependent Variable: log(sale price)								
individually-owned	-0.014 (0.012)	-0.012 * (0.007)	-0.018 *** (0.007)	-0.204 (0.140)	-0.016 * (0.009)	0.005 (0.007)	-0.020 ** (0.008)	-0.017 (0.012)
corporate-owned	-0.104 *** (0.016)	-0.080 *** (0.009)	-0.094 *** (0.009)	-0.053 (0.167)	-0.098 *** (0.013)	-0.050 *** (0.010)	-0.080 *** (0.011)	-0.043 *** (0.017)
bank-owned	-0.107 *** (0.016)	-0.090 *** (0.010)	-0.084 *** (0.010)	-0.022 (0.229)	-0.091 *** (0.013)	-0.058 *** (0.010)	-0.094 *** (0.013)	-0.033 ** (0.016)
government-owned	-0.057 *** (0.022)	-0.057 *** (0.015)	-0.046 *** (0.014)	0.846 (0.830)	-0.071 *** (0.018)	-0.045 *** (0.016)	-0.043 *** (0.016)	0.024 (0.033)
R-square	0.953	0.967	0.948	0.959	0.968	0.962	0.931	1.000
II. Dependent Variable: days-on-market								
individually-owned	7.344 (6.454)	-5.230 (4.619)	-0.703 (3.775)	0.735 (19.539)	-7.836 (5.167)	-5.407 (5.175)	2.637 (4.936)	2.187 (6.602)
corporate-owned	-31.208 *** (8.907)	-25.821 *** (6.740)	-29.593 *** (5.476)	-17.644 (26.978)	-15.966 ** (6.904)	-13.845 * (7.693)	-52.300 *** (7.585)	-3.699 (8.985)
bank-owned	-45.448 *** (8.932)	-28.155 *** (6.971)	-38.320 *** (5.609)	2.388 (29.626)	-23.238 *** (7.134)	-18.459 ** (7.443)	-66.906 *** (8.958)	-12.419 (8.815)
government-owned	-52.308 *** (13.029)	-29.700 *** (11.031)	-41.684 *** (8.565)	111.012 (74.405)	-23.013 ** (10.033)	-16.380 (12.014)	-54.279 *** (12.132)	-28.570 (17.458)
R-square	0.622	0.432	0.481	0.683	0.419	0.425	0.742	0.420

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. The dependent variable in the top section is the natural log of the sale price; the dependent variable in the bottom section is the number of days on the market. All coefficients in the table correspond to the specification reported in Column (6) of Table 2. Each panel divides the sample into mutually exclusive and exhaustive subsamples. Panel A divides the sample according to the size of the cities. Panel B divides the sample into single family housing market and condominium market. Panel C divides the sample according to the number of comparables. One property is comparable to another if both are for sale at the same time within the same zip code and the list price of the former is within 30% deviation of the latter. Panel D divides the sample according to the physical condition of the house.

**TABLE 5. THE IMPACT OF DUAL AGENT ON HOUSE SALES PRICE
(VALUES IN TABLE ARE COEFFICIENTS ON DUAL AGENT INDICATOR VARIABLE)**

	(1)		(2)		(3)
	Full Sample		Subsample of houses in move-in condition		Subsample of houses with defects
	I. Dependent Variable: log(sale price)				
Omitted Ownership Category					
agent-owned	0.060 *** (0.013)		0.075 *** (0.015)		0.030 (0.022)
individually-owned	0.012 *** (0.003)		0.022 *** (0.005)		0.001 (0.005)
corporate-owned	0.027 * (0.016)		0.064 *** (0.020)		-0.037 (0.024)
bank-owned	-0.020 (0.014)		-0.029 (0.020)		-0.002 (0.019)
government-owned	0.002 (0.044)		0.023 (0.053)		-0.202 *** (0.078)
R-squared	0.915		0.899		0.988

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. All coefficients in the table correspond to a variation on the specification reported in Column (6) of Table 2, by adding an indicator variable of the presence of a dual agent and its interaction with the ownership indicators. Values in table are coefficients on dual agent indicator variable. Column (1) reports the coefficients estimated using the full sample. Column (2) reports the results from the subsample of houses in move-in conditions. Column (3) reports the results from the subsample of houses with defects. Within each column, the coefficient reported in each row is from a separate regression with different omitted ownership category. The coefficients in first row are from regressions in which the omitted ownership category is agent-owned properties, the second row individually-owned, the third row corporate-owned, the fourth row bank-owned, and the fifth row government-owned.

TABLE 6. THE IMPACTS OF NON-AGENT OWNERSHIPS BY SUBSAMPLES (CONTINUED)

Subsamples	A				B			
	(1)		(2)		(3)		(4)	
	Listed in non-winter months	Listed in winter months			After Crises	Before Crises		
Magnitude of Predicted Motivation Distortion	High		Low		High		Low	
I. Dependent Variable: log(sale price)								
individually-owned	-0.027	***	0.006		-0.013		0.001	
	(0.008)		(0.011)		(0.010)		(0.008)	
corporate-owned	-0.083	***	-0.054	***	-0.082	***	-0.082	***
	(0.011)		(0.015)		(0.014)		(0.011)	
bank-owned	-0.090	***	-0.062	***	-0.098	***	-0.078	***
	(0.011)		(0.015)		(0.013)		(0.012)	
government-owned	-0.079	***	-0.007		-0.086	***	-0.035	**
	(0.016)		(0.024)		(0.021)		(0.016)	
R-square	0.951		0.977		0.971		0.966	
II. Dependent Variable: days-on-market								
individually-owned	2.930		-11.991	*	-4.601		-6.213	
	(4.641)		(6.688)		(5.886)		(4.373)	
corporate-owned	-36.675	***	-30.023	***	-28.377	***	-11.053	*
	(6.790)		(9.004)		(8.504)		(6.011)	
bank-owned	-45.049	***	-44.085	***	-36.188	***	-10.361	
	(7.018)		(9.387)		(7.899)		(6.742)	
government-owned	-47.915	***	-72.022	***	-38.949	***	-43.007	***
	(10.534)		(14.784)		(12.708)		(8.812)	
R-square	0.696		0.770		0.692		0.592	

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. The dependent variable in the top section is the natural log of the sale price; the dependent variable in the bottom section is the number of days on the market. All coefficients in the table correspond to the specification reported in Column (6) of Table 2. Each panel divides the sample into mutually exclusive and exhaustive subsamples. Panel A divides the sample according to whether the house is listed in winter months (November, December, January, and February). Panel B divides the sample according to whether the house is listed before or after the burst of the subprime mortgage crises in 2007.

TABLE 7. THE IMPACTS OF THE AGENT'S EFFORT

	A. results on agent's observable effort			B. results on agent's unobservable effort	
	(1) image	(2) open house	(3) virtual tour	(4) log(sale price)	(5) dom
individually-owned	0.181 (0.165)	-0.008 (0.011)	0.004 (0.012)	-0.019 (0.038)	-11.751 (22.517)
corporate-owned	-0.046 (0.212)	-0.009 (0.012)	-0.013 (0.013)	-0.093 (0.053)	* -109.509 *** (32.141)
bank-owned	-0.912 *** (0.212)	-0.020 * (0.012)	-0.028 ** (0.006)	-0.069 (0.046)	-41.220 (27.685)
government-owned	-0.918 *** (0.297)	-0.018 (0.011)	-0.026 (0.019)	-0.031 (0.040)	-57.167 ** (24.102)
individually-owned × exclusive right to sell				0.003 (0.038)	10.413 (22.578)
corporate-owned × exclusive right to sell				0.004 (0.053)	78.960 ** (32.283)
bank-owned × exclusive right to sell				-0.016 (0.046)	2.001 (27.575)
government-owned × exclusive right to sell				-0.024 (0.039)	12.498 (23.063)
exclusive right to sell				0.025 (0.037)	-7.089 (22.225)
R-squared	0.681	0.288	0.497	0.951	0.485

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010. Coefficients reported in each column correspond to a separate regression. The dependent variable in Column (1) is the number of images of the house posted on MLS, in Column (2) the frequency of open house, and in Column (3) the indicator variable of the virtual tour. Columns (1) to (3) control for the same set of covariates including house physical characteristics, geographic location, calendar information related to listing, contractual terms, and listing agent fixed effects. Panel B adds interactions between an indicator variable of the exclusive-right-to-sell and the ownership indicators to the full specification reported in Column (6) of Table 2.

APPENDIX 1. DEFINITION OF VARIABLES

Variable	Description
	Dependent Variables
list price	List price on MLS, expressed as log(list price) in the regressions
sale price	Selling price of the property, expressed as log(sale price) in the regressions
days-on-market	The number of days the property has been on the market until it is sold, expired, or withdrawn
	Independent Variables
Ownership Categories	
agent-owned	Dummy variable indicating agent-owned property
individually-owned	Dummy variable indicating individual-client-owned property
corporate-owned	Dummy variable indicating relocation-company-owned property
bank-owned	Dummy variable indicating financial-institute-owned property
government-owned	Dummy variable indicating government-department-owned property
House Physical Characteristics	
asis	Dummy variable indicating the property sold as-is
upper fixer	Dummy variable indicating upper-fixer
defects	Dummy variable indicating the property having some defects
cosmetics	Dummy variable indicating the property needing cosmetics.
bedroom	Number of bedrooms
full bath	Number of full bathrooms
half bath	Number of half bathrooms
fireplace	Number of fireplaces
rooms	Total number of rooms
levels	Number of levels
garage	Number of garages
sqft	Number of square feet
acre	Size of the lot measured in acre
condominium	Dummy variable indicating condominium in contrast to single family house
basement	Dummy variable indicating the presence of a basement
appliances	Number of appliances coming with the property
style_ranch	Dummy variable indicating property of ranch style
style-tradit	Dummy variable indicating property of traditional style
cool_central electric	Dummy variable indicating the presence of central electric cooling
cool_pad fan	Dummy variable indicating the presence of ceiling paddle fan cooling
equip_smoke	Dummy variable indicating the presence of smoke alarm
equip_water	Dummy variable indicating the presence of water purifying system
equip_security	Dummy variable indicating the presence of security system
exterior_brick	Dummy variable indicating the exterior is brick
exterior_vinyl	Dummy variable indicating the exterior is vinyl
exterior_stone	Dummy variable indicating the exterior is stone
foundation_crawl	Dummy variable indicating crawl foundation
foundation_slab	Dummy variable indicating slab foundation
life_detached	Dummy variable indicating detached house
life_attached	Dummy variable indicating attached house
heat_force	Dummy variable indicating the presence of forced air heating
construction_new	Dummy variable indicating new construction
utility_cable	Dummy variable indicating the presence of TV cable
utility_gas	Dummy variable indicating the presence of gas heating
utility_internet	Dummy variable indicating the presence of internet
age	Number of years the property had been built when the listing went off the market
Geographic Location	
school_best	Dummy variable indicating property located in the best school district in Johnson County, IN
school_worst	Dummy variable indicating property located in the worst school district in Johnson County, IN
Calendar Information	
spring_list	Dummy variable indicating the property listed in spring
summer_list	Dummy variable indicating the property listed in summer
fall_list	Dummy variable indicating the property listed in fall
winter_list	Dummy variable indicating the property listed in winter
spring_sold	Dummy variable indicating the property sold in spring
summer_sold	Dummy variable indicating the property sold in summer
fall_sold	Dummy variable indicating the property sold in fall
winter_sold	Dummy variable indicating the property sold in winter
Contractual Terms	
duration	The number of days during which the listing contract is valid
pre-foreclosure	Dummy variable indicating the listing was a pre-foreclosure sale
shortsale	Dummy variable indicating the listing was a short sale
direct contact	Dummy variable indicating whether allow direct contact from potential buyers
exclusive right to sell	Dummy variable indicating exclusive right to sell
bac_per	Percentage of the buyer agent commission in listing with fixed-percentage commission
bac_num	Dollar amount of the buyer agent commission in listing with flat-fee commission
Marketing Activities	
image	Number of images of the house posted on MLS
open house	Frequency of open house
virtual tour	Dummy variable indicating virtual tour
comparables	Number of similar houses for sale at the same time in the same city
Degree of overpricing (DOP)	Residual from the list price equation. The percentage deviation of the list price from the expected list price

**APPENDIX 2. THE IMPACT OF AGENT-OWNERSHIP ON SALE PRICE AND
DAYS-ON-MARKET**

	log(sale price)		days-on-market	
agent-owned	0.046	***	8.508	***
	(0.006)		(3.101)	
R-squared	0.898		0.205	
Controls included				
sample selection bias	Y		Y	
house characteristics	Y		Y	
geographic and calendar information	Y		Y	
contract terms	Y		Y	
observed measures of agent effort	N		N	
agent fixed effects	N		N	

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010. All coefficients in the table correspond to variations of the specification reported in Column (6) of Table 2, by replacing the indicators of the non-agent ownerships with the indicator of agent ownership.

APPENDIX 3. SAMPLE OF COEFFICIENT ESTIMATES ON CONTROL VARIABLES

Dependent Variable:	Log(sale price)			days-on-market		
	Coeff.	s.e.		Coeff.	s.e.	
Physical Characteristics						
fixer-upper	-0.198	0.011	***	-0.475	6.889	
cosmetics	-0.046	0.008	***	-4.412	4.677	
bedroom	0.036	0.002	***	0.046	1.345	
full bath	0.058	0.003	***	2.054	1.611	
half bath	0.032	0.002	***	2.491	1.501	*
fireplace	0.050	0.002	***	-2.127	1.402	
levels	-0.011	0.002	***	-0.873	1.480	
garage	0.059	0.002	***	-3.566	1.119	***
sqft	0.000	0.000	***	0.008	0.001	***
acre	0.022	0.001	***	2.795	0.673	***
condominium	-0.062	0.011	***	19.209	6.559	***
appliances	0.008	0.001	***	0.576	0.406	
style_ranch	0.005	0.003	*	-3.048	1.794	*
cool_central electric	0.082	0.004	***	-1.484	2.572	
equip_water	0.018	0.003	***	-5.473	1.806	***
equip_security	0.034	0.003	***	7.006	1.910	***
exterior_alumn	-0.090	0.005	***	-0.220	2.996	
exterior_brick	0.042	0.003	***	-0.035	1.880	
exterior_vinyl	-0.072	0.004	***	0.042	2.153	
exterior_stone	0.026	0.006	***	0.683	3.395	
exterior_wood	-0.035	0.004	***	0.251	2.639	
foundation_slab	-0.037	0.004	***	4.035	2.374	*
fuel_gas	-0.017	0.005	***	2.301	2.808	
heat_force	-0.003	0.005		11.246	2.810	***
life_detached	0.017	0.008	**	43.048	4.166	***
construction_new	0.120	0.006	***	1.310	3.328	
utility_gas	0.010	0.003	***	1.689	1.564	
utility_internet	0.010	0.004	***	-0.648	2.128	
age	-0.001	0.000	***	0.201	0.047	***
Geographic Location						
sch_centrgrove	0.035	0.017	**	-9.337	10.143	
sch_clark	-0.023	0.013	*	-11.601	7.786	
Calendar Information						
spring	0.012	0.003	***	-12.378	1.725	***
summer	0.012	0.003	***	-6.335	1.739	***
winter	-0.003	0.003		-5.258	1.821	***
Contractual Terms						
foreclosure	-0.078	0.021	***	34.552	11.548	***
shortsale	-0.094	0.016	***	51.547	9.455	***
exclusive right to sell	0.014	0.007	*	5.232	4.514	
bac_per	0.018	0.002	***	-7.398	1.096	***
bac_num	0.000	0.000	***	-0.021	0.006	***
lglp_hat	0.449	0.005	***	31.413	3.165	***
Marketing Variables						
image	0.007	0.000	***	3.263	0.232	***
virtualltour	0.011	0.005	**	14.113	3.005	***
R-squared	0.951			0.484		

Note: This table reports a subset of the coefficients on the control variables in the specification shown in Column (6) of Table 2.

APPENDIX 4. THE IMPACTS OF NON-AGENT OWNERSHIPS ON THE HAZARD OF SOLD

	hazard ratio	
individually-owned	0.763 (0.037)	***
corporate-owned	1.448 (0.100)	***
bank-owned	1.474 (0.100)	***
government-owned	1.528 (0.151)	***
Log-likelihood	-175203	

Note: The coefficients reported in this table are estimated by a Cox semi-parametric regression. Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010.

**APPENDIX 5. THE IMPACTS OF NON-AGENT
OWNERSHIPS ON LIST PRICE**

	Dependent variable: log(list price)	
individually-owned	0.003 (0.008)	
corporate-owned	-0.078 (0.012)	***
bank-owned	-0.098 (0.013)	***
government-owned	-0.094 (0.021)	***
R-square	0.887	

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010. The dependent variable in the regression is the natural log of the list price, and the covariates include house physical characteristics, geographic location, calendar information related to listing, contractual terms, and listing agent fixed effects.

APPENDIX 6. THE IMPACT OF THE LISTING AGENTS' EXPERIENCE ON LIST PRICE

	A. Experience = the number of houses sold in the sample period			B. Experience = the number of months in which one or more listed houses are sold			C. Experience = the number of houses sold in the last month in the same city					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)			
	omitted category: less experienced	omitted category: moderately experienced	omitted category: highly experienced	omitted category: less experienced	omitted category: moderately experienced	omitted category: highly experienced	omitted category: less experienced	omitted category: moderately experienced	omitted category: highly experienced			
	I. Dependent variable: log(list price)											
individually-owned	-0.028 (0.010)	*** -0.027 (0.011)	** -0.023 (0.022)	-0.029 (0.009)	*** -0.027 (0.012)	** -0.017 (0.020)	0.000 (0.014)	-0.011 (0.008)	0.005 (0.013)			
corporate-owned	-0.107 (0.033)	*** -0.114 (0.020)	*** -0.112 (0.026)	-0.125 (0.032)	*** -0.092 (0.019)	*** -0.115 (0.025)	-0.103 (0.019)	*** -0.101 (0.022)	*** -0.098 (0.021)			
bank-owned	-0.181 (0.017)	*** -0.154 (0.017)	*** -0.109 (0.025)	-0.211 (0.018)	*** -0.131 (0.017)	*** -0.103 (0.023)	-0.173 (0.019)	*** -0.182 (0.014)	*** -0.092 (0.018)			
government-owned	-0.601 (0.177)	*** -0.201 (0.041)	*** -0.150 (0.024)	-0.231 (0.069)	*** -0.233 (0.054)	*** -0.144 (0.022)	-0.242 (0.075)	*** -0.236 (0.033)	*** -0.156 (0.016)			
R-square	0.863			0.864			0.876					

Note: Regression coefficients are reported in the table, along with standard errors in parentheses. Results are based on the full sample of 36,721 houses for sale in Johnson County, Indiana over the period 2001-2010. The dependent variable in all regressions is the natural log of the list price. All coefficients in the table correspond to variations of the specification reported in Table 8, by adding indicator variables of the agent's experience and their interactions with the ownership indicators. In Panel A, the agent's experience is proxied by the number of houses he or she sells in the sample period, in Panel B by the number of months in which the agent sells a house, and in Panel C by the number of houses sold by the agent in the last year and in the same city. Coefficients reported in each column are from a separate regression with different omitted category of the agent's experience. Coefficients reported in Columns 1, 4, 7 are from regressions in which the omitted category is less experienced agents, Columns 2, 5, 8 moderately experienced agents, and Columns 3, 6, 9 highly experienced agents.