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Can Real Estate Brokers Affect Home Prices Under Extreme Market Conditions?

Steven Stelk*
Department of Finance, Real Estate, and Business Law, College of Business, The University of Southern Mississippi, 118 College Dr, Box 5076, Hattiesburg, MS, 39406, USA. Email: steven.stelk@usm.edu. Phone: (601) 266-6655. Fax: (601) 266-6110.

Leonard V. Zumpano
Culverhouse College of Commerce and Business Administration, The University of Alabama, Box 870221, Tuscaloosa, AL 35487, USA. Email: lzumpano@cba.ua.edu. Phone: (205) 348-8988. Fax: (205) 348-6621.

This study investigates the impact of the brokerage market on home prices in both a seller's market (2006) and a buyer's market (2009). In both years, homes sold with brokerage assistance realized higher prices when compared with homes sold without the aid of a broker, even after controlling for selection bias in the seller's choice to use a broker. This is the first study that uses a national dataset from extreme boom and bust markets that has documented evidence of price segmentation in the residential real estate market. The findings may be the result of the market conditions in 2006 and 2009.

Keywords: Residential real estate market, intermediation, broker's effect on price, different market conditions

* Corresponding author

1. Introduction

The market for residential real estate, being local, has always been subject to high information and transaction costs, and therefore, deemed to be inefficient in the sense that prices may not reflect underlying market conditions and selling time may be unduly lengthy. Such a market gives rise to middlepersons (e.g. real estate brokers) who work to reduce information and transaction costs, thus helping to bring buyers and sellers together and, in turn, reduce economic inefficiencies. There is a sizeable literature that investigates what benefits, if any, real estate brokers provide home buyers and sellers. Among other things, researchers have investigated the impact of brokers on selling price and marketing time. In many of these studies, the effects are time-dependent or use local (state or metropolitan statistical area (MSA) level) data, with varying results depending on when the study was undertaken and what market was examined.

A literature search has revealed a rough consensus that broker intermediation does not necessarily result in different selling prices, but does tend to reduce time on market (TOM), when compared to a for sale by owner transaction (or FSBO). This paper extends the current literature by comparing the performance of the real estate brokerage market over different time periods and market conditions. Specifically, we compare the impact of broker intermediation on the sales price of a home during a seller's market, as represented by 2006 data, and the market conditions that prevailed in 2009, very much a buyer's market, when prices were falling and marketing time became much longer.

Using a nation-wide dataset from the National Association of REALTORS® (NAR) *Home Buyer and Seller Survey*, this study presents evidence that homes sold with broker intermediation realized higher sales prices when compared to FSBO transactions in both 2006 and 2009. The results are robust over a number of model specifications that control for selection bias in the choice to use a broker and for the endogeneity of sales price and TOM. This is the first study which uses nation-wide data from extreme boom and bust markets to document a significant difference in the sales price of broker-marketed versus owner-marketed homes. Some evidence suggests the results may be due to the extreme market conditions that existed in 2006 and 2009, but more data are necessary to verify that the price differential is an artifact of the unique real estate markets in those years.

The rest of the paper proceeds as follows. The next section presents the motivation and literature review, Section Three describes the data and methodology, Section Four presents the empirical results, and Section Five concludes.

2. Motivation and Literature Review

The imperfect flow of information is a well-established characteristic of the residential real estate market. Properties are heterogeneous and buyer and seller reservation prices are private information. In such a market, real estate brokers function as middlepersons to help market participants gather information. If a home seller knew all of the reservation prices of the potential buyers for his/her property, then the choice of who to sell to at what price would be obvious. This information is not readily available and costly to acquire, so the home seller is faced with the choice of paying for the services of a broker or gathering the information him/herself.

If a seller chooses to market the property without aid, s/he will expend time and money advertising the house, showing the house, negotiating with potential buyers, and tending to the various administrative duties associated with closing the sale. Engaging the services of a broker shifts a portion of this burden and requires the seller to pay a commission, usually a fixed percentage of the final sales price.

Brokerage firms often market their services to home sellers by claiming that intermediation can help find a buyer faster and negotiate a better price as compared to selling the property without aid (Huang and Rutherford (2007)). Some of the early theory and empirical work assume that brokers can better match buyers and sellers, which results in higher sales prices and lower marketing times (see Yinger (1981), Jud (1983), Jud and Frew (1986), Wu and Colwell (1986), Salant (1991), and Yavas (1992), for example). This assumption is rooted in the fact that most brokers have access to the multiple listing service (MLS). Users of the MLS claim that the system provides a broker with more up-to-date pricing, financing, and market information as well as access to a larger pool of buyers as compared to non-MLS users. If true, then the likelihood of selling at a higher price and in a shorter time frame through the MLS reduces the net cost of hiring a broker. Rational sellers will weigh the net cost of hiring a broker against the opportunity cost of marketing the property without aid. Whether brokers, or the MLS, help sellers obtain higher sales prices and shorter marketing times is an empirical question. Early results on the price impacts of brokers were mixed, but a rough consensus has emerged in that brokerage intermediation does not necessarily affect sales prices, but does tend to reduce marketing time.

The mixed results on the impact of the brokerage market on sales price are not surprising. Setting aside the various econometric problems that researchers face when trying to model home sales price, it is not clear ex ante whether brokers should obtain higher prices for homes that they help to market. On the one hand, a broker marketed property reduces buyer search costs and increases buyer welfare by helping to find a better match (Bagnoli and Khanna (1991) and Ford et al. (2005)). The reduction in search costs and the increase in welfare may

lead buyers to pay more for a broker-marketed home. If true, this would allow home sellers, who often pay the brokerage commission, to pass along at least part of the commission to buyers in the form of higher sales prices (Jud and Frew (1986) and Bagnoli and Khanna (1991)). On the other hand, brokers reduce the search costs of sellers and thus a seller may be able to obtain the same, or even higher, net present value by accepting a lower price on a broker-marketed property than if s/he were to market the property as an FSBO. There is also evidence that the fixed commission fee structure does not align the interests of the broker with those of the seller in obtaining the highest possible sales price in a given time period. Instead, the broker is incented to sell the home as quickly as possible. This could lead the broker to pressure a seller into accepting a lower sales price, even if a higher price might be obtained with a counter offer, or by waiting for another offer (Jud (1983); Zumpano and Hooks (1988); Rutherford et al. (2005); and Levitt and Syverson (2008)).

In one of the first studies to empirically investigate broker choice and broker impact on sales price, Jud (1983) extends the theoretical model of Yinger (1981) and finds that the choice to use a broker is primarily fueled by seller transactions cost and that brokers do not affect home prices. In contrast, Jud and Frew (1986) compare MLS and non-MLS listed properties in Charlotte, NC in 1977 and find that MLS listed properties tend to have higher sales prices. Since all properties listed on the MLS over the sample period are broker-listed homes and most non-MLS listed properties are FSBO homes, the authors argue the result as evidence that brokers are able to obtain higher prices for the homes that they list.

Johnson et al. (2005) find that broker-marketed properties sold outside the MLS have higher prices than similar properties sold by brokers within the MLS. The authors argue that brokers who are working outside the MLS may be better able to match buyers and sellers than more traditionally broker-marketed homes. Other studies find that brokers do not impact the final sales price of a home (Kamath and Yantek (1982) and Colwell et al. (1992), for example).

Many of these studies do not address the issue of selection bias when choosing to list the home with a real estate broker. Jud (1983) finds that transaction costs tend to drive the decision to use a broker, and an important source of transaction cost is the income of the seller. Higher income sellers incur greater costs as they take time away from work to show the home and negotiate with potential buyers. Since income and home prices are highly correlated, it could be that broker-marketed homes are systematically more expensive than FSBO properties due to the characteristics of the sellers who choose to work with brokers rather than any value-added service that brokers provide.

Although the authors only consider home buyers, Zumpano et al. (1996) and Elder et al. (2000) find evidence of selection bias in the choice to work with a broker. Specifically, both studies find that higher income home buyers are more likely to use a broker. After using a Heckman correction to control for selection

bias, neither study finds a significant difference in sales price between broker-assisted purchases and homes purchased directly from the owner in FSBO transactions. However, the use of a broker shortened the selling time.

More recently, Hendel et al. (2007) compare properties listed on the FSBOMadison.com website to MLS listed properties in Madison, Wisconsin from 1998 – 2005. They find that MLS listed properties sell faster, but not for higher prices. The authors control for selection by observing the same house and the same seller over multiple transactions. Bernheim and Meer (2008) compare homes sold on the Stanford University campus from 1980 – 2005. The homes are only available to Stanford faculty and senior staff, whom the authors argue are more homogeneous than the general population. Stanford also provides a free listing service for qualified faculty and staff, so there is no need to list a property on the MLS. Some sellers still choose to engage a broker while others do not. Comparing the broker-marketed homes with FSBO properties, the authors find that brokers accelerate sales, but do not have a significant impact on selling price. In addition to having a more homogeneous sample of home sellers than other studies, the authors also use home and seller fixed effects to control for selection.

The above literature review is only a sampling of the existing work on real estate brokerage intermediation. The interested reader will want to review Benjamin et al. (2000), Zietz and Sirmans (2011), and Benefield et al. (2014) for a more comprehensive review of the literature. The types of home sellers who tend to use brokers and how brokers impact sales prices for the homes that they market are well researched. This study extends the literature by testing whether the established relationships changed during one of the most dramatic residential real estate boom and bust cycles in US history.

3. Data and Methodology

3.1 Data

This study uses the NAR *Home Buyer and Seller Survey* from 2006 and 2009. The full dataset for 2006 (2009) includes 7,548 (9,138) responses from home buyers and sellers from every state in the US. This study only considers those respondents who sold a home without the assistance of a broker at any stage, and those who used a broker without trying to sell the home themselves at any stage. Limiting the 2006 sample to these sellers and dropping observations with missing or erroneous responses leave a minimum of 2,454 and a maximum of 2,455 observations depending on the model specification. Limiting the 2009 sample to these sellers and dropping observations with missing or erroneous responses leave a minimum of 1,759 and a maximum of 1,735 observations depending on the model specification.

3.2 The Models

Modeling the impact of a real estate broker on purchase price seems a straightforward process at first blush. The first studies used hedonic pricing models to control for the impact of housing characteristics (e.g. square footage, number of bedroom and bathrooms, age of the house, etc.) and buyer characteristics (e.g. age, race, sex, income, etc.). One could simply include a dummy variable for the presence of a real estate broker in the regression, or estimate separate equations for broker and non-broker assisted purchases. The problem with these approaches is two-fold. First, several studies have documented the endogeneity of sales price and TOM (Cubbin (1974), Miller (1978), Kang and Gardner (1989), Asabere and Huffman (1993), Asabere et al. (1993), Glower et al. (1998), Anglin et al. (2003), for example), which can make a pricing model inconsistent if not addressed. Second, there may be selection bias in the choice to use a real estate broker which, if present, must be corrected to isolate the impact of the broker on sales price (Springer (1996), and Zumpano et al. 1996).

This paper offers two model specifications to address these issues: a treatment effect model to identify and correct for selection bias in the choice to list a home with a broker, and a two-stage least squares (2SLS) model to control for the endogeneity of TOM and sales price.

3.1.1 Two-stage Treatment Effect

The first specification is a two-stage treatment effect regression with a Heckman correction. The first stage uses a probit model to estimate the choice of the seller to use a broker. Variables used to explain broker choice capture the demographics of the seller, opportunity costs, motivation, and relationship with the buyer. See Appendix Table 1 for a full variable list with descriptions.

Specifically, the first stage probit regression is specified as:

$$RE = f(BTW35\_85k,\ OVER85k,\ BTW35\_50,\ OVER50,\ WHITE,\ SINGLE,\ CHILD,\ URGENT,\ FINDIF,\ EM,\ NH,\ ACQUAINT) \quad (1)$$

RE is coded as one if the home was sold with broker assistance (without the seller trying to sell the home as an FSBO at any stage), and zero if the home was sold without the assistance of a broker at any stage.

Seller demographics include income (***BTW35_85k*** and ***OVER85k***), age (***BTW35_50, OVER50***), and race (***WHITE***). Previous research has shown that higher income buyers are more likely to utilize the services of a broker due to higher opportunity costs. The other demographic characteristics are included to control for the possible impact on broker choice, but the expected direction of the impacts is not clear.

Single heads of household (***SINGLE***) could find it more challenging to take on the time and financial burden of selling a home without assistance as compared to married or unmarried couples. Similarly, the number of children under 18 in the household (***CHILD***) is included to capture the time constraints of the seller. Sellers with many young children may find it more challenging to dedicate the time necessary to sell a home without assistance and may be more likely to hire a broker.

There is substantial evidence[1] that broker-marketed homes sell faster than FSBO properties, so sellers motivated to complete a transaction quickly may be more likely to engage a broker. ***URGENT*** captures the reported need of the seller for urgency in the home sale. Employer mandated moves (***EM***) tend to involve a set time frame, relocation assistance from the employer, and moving some non-trivial distance. These sellers may be more motivated and less price sensitive, thus making them more willing to pay a brokerage commission to sell the home sooner.

On the one hand, those selling due to a change in family situation such as marriage or divorce (***NH)*** or due to financial difficulty (***FINDIF***) may be more motivated to sell quickly and thus hire a broker. On the other hand, these buyers may not be willing pay a brokerage commission due to financial constraints and could be less likely to work with a broker.[2]

Since the primary purpose of the seller in engaging a broker is to help find a buyer, those who sell a home to an acquaintance or family member (***ACQUAINT***) should be less likely to utilize a broker.

In the second stage, the natural log of the final selling price (***lnSP***) is modeled as a function of seller income, motivation to sell, relationship with the buyer, and housing characteristics. It also includes ***INVMILL***, the inverse Mills ratio from the first stage. Including the inverse Mills ratio in the second stage allows one to test for selection bias and allows OLS to give consistent estimates if selection bias is detected. See Appendix Table 1 for a full list of the variables with descriptions.

The price regression is specified as:

$$lnSP = f(RE, BTW35\_85k, OVER85k, URGENT, FINDIF, ACQUAINT, DETSFAM, SF, RURAL, URBAN, SUBURBAN, RESORT, lnTOM, INVMILL) \quad (2)$$

[1] See Zumpano et al. (1996), Glower et al. (1998) Elder et al. (2000), and Wiley et al. (2011).

[2] Some seller reported variables may be unreliable. All models are run without ***FINDIF*** and ***URGENT***. The results are qualitatively unchanged.

Income is expected to be positively related to price; higher income households generally purchase more expensive homes than lower income families. Those who need to sell urgently may be more likely to take price concessions in order to reduce marketing time, which would predict a negative relationship between ***URGENT*** and sale price. ***FINDIF*** may be positively or negatively related to price. On the one hand, those who need to sell a home due to financial difficulty may be motivated to take price concessions in order to sell the home quickly. On the other hand, homeowners who are facing financial difficulty may be willing to wait for a higher offer in order to cover as much of the remaining mortgage obligation as possible, while those who do not receive a high enough offer price opt for foreclosure. Only those sellers that received offers high enough to accept are observed in the sample, which may bias the coefficient on ***FINDIF*** upwards and give a positive relationship with final sales price.

Selling a home to an acquaintance or family member is likely cheaper for the seller when compared to actively marketing the home, whether through a broker or not, thus ***ACQUAINT*** should be negatively related to the final purchase price.

Six variables capture the available housing characteristics, ***DETSFAM***, ***SF***, ***RURAL***, ***URBAN***, ***SUBURBAN***, and ***RESORT***. Detached single family homes tend to sell for more than other types of properties, so ***DETSFAM*** should be positively related to price, as should square footage (***SF***).[3] Homes in urban and resort areas are expected to sell for higher prices than similar homes in rural or suburban areas. Small town is the omitted category. While a more detailed description of the home would be preferable in modeling the purchase price, square footage and location are two of the more important determinants of home prices.

lnTOM is the natural log of the number of weeks that the home was on the market before it sold. Past studies have found that sales price and TOM are jointly determined, but the direction of the relationship is not necessarily predictable. On the one hand, higher priced homes tend to stay on the market longer because the pool of potential buyers is smaller, which makes it more challenging to find a match. In this case, TOM and price would be positively correlated. On the other hand, properties that stay on the market for a long period of time may become stigmatized and require price reductions to induce a purchase. If this effect dominates, then TOM and price would appear negatively correlated.[4]

If ***INVMILL*** is significant in the second stage, there is evidence of selection bias and including ***INVMILL*** is necessary to isolate the impact of brokers on

[3] Square footage is a categorical variable in the 2006 data and a discrete integer in the 2009 data. The 2006 regressions use dummy variables for each square footage category and the 2009 regressions use ***lnSF*** (the natural log of square footage).

[4] The treatment effect and OLS models are run without ***lnTOM*** and the results are qualitatively unchanged.

sales price. If ***INVMILL*** is not significant, then there is no evidence of selection bias and the results from a standard OLS model are preferable.

The presence of selection bias, or lack thereof, may imply a number of things. One possibility is that selection bias is present and brokers are associated with higher prices even after correcting for the bias. This would imply two separate housing markets, one for broker assisted sales and one for FSBO transactions. The price premium associated with broker-marketed homes in this case would represent the predisposition of those selling more expensive homes to utilize a broker. It would also imply that competitive pressure from FSBO properties was not enough to put an upper bound on broker-marketed home prices. A second possibility is that there is no evidence of selection bias, but brokers are still associated with higher home prices. This would imply that the higher home prices of broker marketed homes are a result of a value added service from the broker that the seller was able to pass along to the buyer in the form of higher prices. The final possibility is that brokers are not associated with different selling prices when compared to FSBO transactions when selection bias is controlled.[5] This would indicate that competitive pressure from owner-marketed properties kept an upper bound on the prices of broker-marketed homes and prevented two separate markets from developing.

3.1.2 Two-stage Least Squares

The final specification is a 2SLS model to correct for the endogeneity between TOM and sales price. In the first stage, ***lnTOM*** is estimated with the same explanatory variables from the structural price equation with additional instrumental variables. The generated regressor $\widehat{lnTOM}$ is then included in the second stage price model. Specifically, the first stage is:

$$lnTOM = f(RE\_S\ BTW35\_85k,\ OVER85k,\ URGENT,\ FINDIF,\ ACQUAINT,\ DETSFAM,\ SF,\ RURAL,\ URBAN,\ SUBURBAN,\ RESORT,\ EM,\ NH,\ REDUCE), \tag{3}$$

where ***EM, NH,*** and ***REDUCE*** are the instrumental variables. All three variables are highly correlated to ***lnTOM***, but not correlated with the final sales price. Although one would expect a negative relationship between the number of price reductions (***REDUCE***) and sales price, it may be that those homes that need multiple price reductions were over-priced to begin with and so the final sales price is closer to the price of similar homes. Intuitively, those selling as the result of an employer mandated move (***EM***) would be motivated to sell quickly, but would not do so at the expense of taking a reduced price on the home since they would likely have financial assistance from the employer to relocate. Those selling due to the creation of a new household due to marriage

[5] Higher income individuals have higher opportunity costs and hence, are more likely to employ a broker to expedite the sale.

or divorce (***NH***) may also be motivated to sell quickly, but there is no clear direction of the impact on sales price.

The second stage is then:

$$lnSP = f(RE, BTW35\_85k, OVER85k, URGENT, FINDIF, ACQUAINT, DETSFAM, SF, RURAL, URBAN, SUBURBAN, RESORT, \widehat{lnTOM}, \tag{4}$$

where $\widehat{lnTOM}$ is the generated regressor from the first stage.

4. Empirical Results

4.1 Summary Statistics

Despite the different market conditions between 2006 and 2009, the proportion of home sellers who used real estate brokers remained relatively unchanged. Table 1 reports that, in both years, just over 80 percent of sellers that completed the NAR survey utilized a broker. This is similar to past studies that find between 75 and 85 percent of all home sales transactions involve a real estate broker.[6]

Table 1 Statistics on Real Estate Broker Use

How did you sell this home?	2006		2009	
	Count	%	Count	%
Sold it using a real estate agent/broker	2,966	80.5	2,603	82.3
First tried to sell it myself, but then used an agent	143	3.9	82	2.6
Sold it to a home buying company	30	0.8	36	1.1
Sold it without ever using a real estate agent/broker	403	10.9	290	9.2
First listed with an agent, but then sold it myself	43	1.2	46	1.5
Other	100	2.7	106	3.4
Total	**3,685**	**100**	**3,163**	**100**

Table 2 highlights a few of the key differences between 2006 and 2009. The average TOM increased from 13.14 weeks to 17.67 weeks, while average selling price fell from $280,390 to $238,639. As one would expect, homes stayed on the market longer and sold for less on average in 2009 when compared to the height of the residential real estate bubble in 2006.

[6] See Zumpano et al. (1996), Elder et al. (2000), and Zumpano et al. (2003).

Table 2 Summary Statistics on Buyer Search Duration, Time-on-Market (TOM), and Final Selling Price (All Transactions)

	2006	2009
Avg. TOM in weeks	13.14	17.67
(Std. dev.)	(34.81)	(20.98)
Avg. selling price	$280,390	$238,639
(Std. Dev.)	(307,015)	(200,293)

Table 3 reports the average and median selling prices for homes sold with broker assistance and homes sold in FSBO transactions. In 2006, the average selling price of a home sold through a broker was $283,431. The average sales price for an FSBO transaction was $224,750. In 2009, the average price for a broker-assisted sale was $245,948 while the average price for a FSBO sale was $195,421. While the differences are suggestive, more rigorous methods are needed to determine if they are meaningful.

Table 3 Summary Statistics on Sales Price (Dollars)

	Broker/Agent		All FSBO	
	2006	2009	2006	2009
Average	$283,431	$245,948	$224,570	$195,421
Median	$212,750	$195,000	$168,800	$137,000

4.2 Treatment Effect Models

The results of the first stage probit model on broker choice are reported in Tables 4 (2006) and 7 (2009). The results paint an interesting picture of the housing market in these years. As expected, those that sold a home to an acquaintance were less likely to use a broker in both years. This is the only variable that matches sign and significance between the two years.

In 2006, only sellers over 50 years of age and those who needed to sell urgently were more likely to use a broker. Income is not significantly related to broker choice. It may be that in this extreme seller's market, opportunity costs, at least in the form of income, were not an important consideration for sellers when choosing how to market a home. In many areas across the country, demand was strong enough that homes were selling at or above the asking price with short marketing times. Perhaps even high-income sellers were more willing to attempt to sell a home without broker assistance under these market conditions. Buyers over 50 may have been less comfortable using technology to market a home without assistance and so were more likely to engage a broker.

Table 4 First-stage Probit Estimates on Choice of Broker (Dependent Variable is *RE*, 2006)

Variable	Coefficient	Standard Error	P-Value
CONSTANT	1.231***	0.251	0.000
BTW35_85k	-0.131	0.180	0.468
OVER85k	-0.010	0.185	0.956
BTW35_50	0.126	0.094	0.181
OVER50	0.354**	0.122	0.044
WHITE	-0.115	0.130	0.375
SINGLE	0.174	0.120	0.147
CHILD	0.052	0.043	0.228
lnEARNERS	0.048	0.128	0.709
URGENT	0.288***	0.083	0.001
FINDIF	0.144	0.287	0.616
ACQUAINT	-1.334***	0.121	0.000
EM	0.185	0.142	0.192
NH	-0.225**	0.114	0.048
Observations	2,464	**Chi-squared(27)**	1,208
		Prob > Chi-squared	0.000

In 2009, only higher income sellers and those between 35 and 50 years of age were more likely to work with a broker. Marketing times were longer and prices were still falling in 2009 compared to 2006. Here, in this type of market, the opportunity and search costs of waiting to purchase fall since prices are declining. Income is an obvious proxy for opportunity costs, but age may be as well. It is possible that those between 35 and 50 years of age, the prime earning years, are devoting more of their time to building their career and have less time to spend on marketing a home.

The second stage OLS results are reported in Tables 5 (2006) and 8 (2009). ***INVMILL*** is negative and significant at the five-percent level in the second stage in both years, thus suggesting evidence of selection bias. Even after controlling for selection bias, ***RE*** is positive and significant at the 1% level in both years.[7] In both the seller's market of 2006 and the buyer's market of 2009, real estate brokers were associated with higher sales prices even after correcting for selection bias in the choice to work with a broker. This finding is suggestive and may indicate two separate real estate markets: one for broker-marketed properties and one for FSBO properties, at least during market extremes. Although this is the first study of which we are aware that uses nation-wide data and finds evidence that brokers are able to influence prices, the result is not surprising given the extreme market conditions in 2006 and 2009.

[7] Collinearity is a concern with selection models. We also estimate a standard OLS regression and the results are qualitatively similar: broker-marketed homes are positively and significantly associated with sales price.

Table 5 Second-stage OLS Price Regressions with Selection Correction (Dependent variable is log(purchase price), 2006)

Variable	Coefficient	Standard Error	P-value
CONSTANT	10.275***	0.333	0.000
RE	0.098***	0.031	0.002
BTW35_85k	0.191***	0.056	0.001
OVER85k	0.456***	0.056	0.000
URGENT	-0.058**	0.031	0.056
FINDIF	0.246***	0.084	0.003
ACQUAINT	0.113	0.125	0.368
DETSFAM	0.088***	0.031	0.005
RURAL	0.074	0.047	0.112
URBAN	0.221***	0.042	0.000
SUBURB	0.101***	0.036	0.004
RESORT	0.432***	0.104	0.000
lnTOM	-0.057***	0.010	0.000
INVMILL	-0.368**	0.156	0.018
Observations	2,464	**Chi-squared(55)**	1,208
		Prob > Chi-square(	0.000

Note: Square footage categories omitted to save space.

Residential real estate market participants in 2006 faced a tight housing supply, strong housing demand, and relatively easy financing. News stories from the time discussed, "…tales of waiting lists for unbuilt condos and bidding wars over humdrum three-bedroom colonials" (CNN/Money, "Welcome to the dead zone", May 5, 2006). In such a market, home sellers may have a great deal of leverage over buyers and could more easily pass along broker commission costs in the form of higher prices.

This, however, does not address the issue of why there is price separation between broker-assisted and FSBO prices. Why were sellers not assisted by brokers unable to capture a similar price premium? Although brokers are typically agents of the seller, they also assist buyers in the home search. On the one hand, brokers reduce buyer search costs and increase buyer welfare by granting access to a larger supply of homes through the MLS, answering buyer questions, and often helping to arrange financing. This may induce buyers to pay higher prices for homes. Jud and Frew (1986) argue that broker intermediation can have an effect analogous to advertising in markets with imperfect information. On the other hand, there is evidence that the fixed commission fee structure does not perfectly align the interests of the broker with those of the seller in obtaining the highest possible sales price in a given time period. Instead, the broker is incented to sell the home as quickly as possible. This could lead the broker to pressure a seller into accepting a lower sales price, even if a higher price might be obtained with a counter offer, or by

waiting for another offer (Jud (1983); Zumpano and Hooks (1988); Rutherford et al. (2005); and Levitt and Syverson (2008)).

What if market conditions were such that sellers had little incentive to accept lower offers? What if supply was tight enough and demand was high enough that home sellers regularly entertained offers at or above the asking price? Sellers would have little incentive to accept lower offers if a higher offer was expected soon. Instead, they can pass along some or all of the commission costs of the broker to the buyer in the form of higher prices. Demand for housing may have been strong enough in the 2006 buyer's market that competitive pressure from FSBO properties did not place an upper bound on broker-marketed home prices.

Home buyers and sellers faced a much different market in 2009. Home prices had fallen significantly, interest rates were at historic lows, but credit was tight. Only well qualified buyers (good credit score, 20% down payment, etc.) could get mortgage financing, and those buyers were facing a volatile housing market. They could no longer be certain that home prices would increase after purchase as was the case over the previous decade. In fact, many markets continued to experience a downward trend in home values through to 2012. Likewise, home sellers faced the daunting task of selling a home in an oversupplied market with weak demand and falling prices. Even though the absolute information advantage brokers have today is less than it was ten years ago, thanks to the internet, any information advantage is valuable when facing such uncertainty. In such a market, sellers seek out the marketing expertise of brokers in an attempt to maximize selling price and reduce TOM in the face of slack demand.

It may also be that the extreme seller's market not only made certain sellers more likely to work with brokers, but also led brokers to be more selective in the types of homes that they agreed to market. With marketing time increasing, home prices falling, and fewer homes being sold, brokers may have focused their efforts on homes that were the most likely to sell. If these homes tended to be higher quality and higher priced, then brokers may be associated with higher prices not only because of a value added service they provide, but also because of the types of homes they choose to market.

Most of the other variables have the expected sign in both years. Selling a home to an acquaintance (***ACQUAINT***) tends to result in a lower sales price. The coefficient on ***FINDIF*** is positive and significant in the OLS regressions (and in every other model specification), which seems counter intuitive. Sellers who report wanting to sell the home mainly due to financial difficulty tend to receive higher prices, all else being equal. For both years, the average sales price is nearly $100,000 lower and the average TOM is six weeks longer for sellers who were reporting financial difficulty. Perhaps homeowners who were facing financial difficulty were willing to wait for a higher offer in order to cover as much of the remaining mortgage obligation as possible, while those that did not receive a high enough offer price opted for foreclosure. Only those sellers that

received offers high enough to accept are observed in the sample, which may bias the coefficient on ***FINDIF*** upwards.

The square footage of the home is reported in the following categories in the 2006 survey: The lowest category is 1 to 500 square feet. The next highest category is 501 to 1000 square feet (***SF501_1000***), the next highest is 1,001 to 1,500 (***SF1001_1500***), and so on in 500 square foot increments. The final category listed in the survey is over 5,000 square feet (***SFOVER5000***). The model is estimated with each category as a dummy variable. The lowest category, 1 to 500 square feet, is omitted. The coefficients are not tabulated for brevity, but the coefficient grows in magnitude and gains significance with each larger square footage category, as expected. Square footage is reported as an integer in the 2009 survey (***lnSF***) and positively related to sales price. Homes in urban and resort areas tend to have higher selling prices than homes in suburban, rural, or small town areas.

4.3 2SLS Models

Another potential weakness of using OLS to model home prices is the endogeneity of sales price and TOM. There are multiple ways that sales price and TOM may be simultaneously determined. All other things being equal, homes with higher prices have a smaller pool of potential buyers and may stay on the market longer than less expensive homes with a larger pool of potential buyers. This would lead to a positive relationship between the sales price and TOM.

The relationship could also run the opposite direction. As selling time increases and holding costs rise, seller reservation prices tend to fall. It may also be true that homes that remained unsold for long periods become stigmatized and require price reductions to sell. These examples would lead to a negative relationship between sales price and TOM.

Which effect dominates is an empirical question, but it is clear that price and TOM might be simultaneously determined. If so, the results from the OLS are biased. Testing for endogeneity revealed that the error term from the TOM model (Equation 3) is significant in the structural price model (Equation 4) at the one percent level in 2006, but not significant in 2009. This suggests that price and TOM were simultaneously determined in 2006 (or there is an omitted variable problem) and a 2SLS model is appropriate. In 2009, there is no evidence of endogeneity, thus indicating that OLS is appropriate. This suggests that price and TOM may not always be simultaneously determined and market conditions can have separate and independent effects on TOM. The results from the second stage of the 2SLS models are reported in Tables 6 (2006) and 9 (2009). As with other model specifications, the coefficient on ***RE*** is positive and significant, thus indicating that brokers are associated with higher sales prices.

Table 6 2SLS Price Regressions. *lnTOM* Instrumented with *EM*, *NH*, and *REDUCE*
(Dependent variable is log(purchase price), 2006)

Variable	Coefficient	Standard Error	P-value
CONSTANT	10.835***	0.189	0.000
RE	0.245***	0.044	0.000
BTW35_85k	0.129***	0.048	0.008
OVER85k	0.393***	0.049	0.000
URGENT	-0.051**	0.026	0.049
FINDIF	0.253***	0.075	0.001
ACQUAINT	-0.123**	0.054	0.024
DETSFAM	0.100***	0.030	0.001
RURAL	0.049	0.046	0.289
URBAN	0.228***	0.041	0.000
SUBURB	0.101***	0.035	0.004
RESORT	0.454***	0.093	0.000
$\widehat{\ln TOM}$	-0.010	0.022	0.657
Observations	2,655	**F(22, 2,632)**	52.59
Adj. R-squared	0.3013	**Prob > F**	0.000

Table 7 First-stage Probit Estimates on Choice of Broker. Dependent Variable is *RE.* 2009

Variable	Coefficient	Standard Error	P-Value
CONSTANT	0.870***	0.278	0.002
BTW35_85k	0.274	0.191	0.152
OVER85k	0.480***	0.193	0.013
BTW35_50	0.245*	0.128	0.055
OVER50	0.195	0.138	0.158
WHITE	0.177	0.156	0.256
SINGLE	0.001	0.148	0.992
CHILD	0.014	0.053	0.796
lnEARNERS	-0.047	0.164	0.775
URGENT	0.098	0.109	0.367
FINDIF	0.325	0.215	0.131
ACQUAINT	-1.654***	0.139	0.000
EM	0.014	0.132	0.916
NH	-0.059	0.144	0.682
Observations	1,771	**Chi-squared(18)**	1027
		Prob > Chi-squared	0.000

Table 8 Second-stage OLS Price Regressions with Selection Correction (Dependent variable is log(purchase price), 2009)

Variable	Coefficient	Standard Error	P-value
CONSTANT	5.647***	0.368	0.000
RE	0.092***	0.318	0.004
BTW35_85k	0.268***	0.064	0.000
OVER85k	0.499***	0.065	0.000
URGENT	-0.050*	0.028	0.074
FINDIF	0.127**	0.050	0.011
ACQUAINT	0.114	0.156	0.465
DETSFAM	0.147***	0.035	0.000
lnSF	0.737***	0.034	0.000
RURAL	-0.062*	0.036	0.082
URBAN	0.090**	0.036	0.014
SUBURB	0.004	0.042	0.930
RESORT	0.541***	0.139	0.000
lnTOM	-0.007	0.010	0.500
INVMILL	-0.360**	0.156	0.021
Observations	1,771	**Chi-squared(18)**	1,027
		Prob > Chi-squared	0.000

Table 9 2SLS Price Regressions. lnTOM Instrumented with *EM*, *NH*, and *REDUCE* (Dependent variable is log(purchase price), 2009)

Variable	Coefficient	Standard Error	P-value
CONSTANT	5.984***	0.217	0.000
RE	0.222***	0.046	0.000
BTW35_85k	0.239***	0.047	0.000
OVER85k	0.482***	0.047	0.000
URGENT	-0.039*	0.023	0.087
FINDIF	0.188***	0.040	0.000
ACQUAINT	-0.117*	0.052	0.025
DETSFAM	0.124***	0.030	0.000
lnSF	0.773***	0.030	0.000
RURAL	-0.071**	0.031	0.022
URBAN	0.106***	0.032	0.001
SUBURB	-0.015	0.037	0.693
RESORT	0.364***	0.096	0.000
$\widehat{\text{lnTOM}}$	0.013	0.05	0.383
Observations	2,316	**F(13 2,302)**	97.47
Adj. R-squared	0.3500	**Prob > F**	0.000

5. Conclusions

This study exploits a unique national dataset collected by the NAR to compare the performance of the real estate brokerage market over different time periods and in different market conditions with the goal of determining the extent that earlier findings are time-dependent. In both the seller's market of 2006 and the buyer's market of 2009, broker-assisted transactions commanded higher prices than FSBO sales, even after controlling for selection bias in the broker choice equations. The results stand in contrast with previous research that use nation-wide data. The presence of selection bias in both years indicates that even after controlling for the types of sellers who tend to work with brokers, broker-marketed properties still commanded a price premium over FSBO properties. This suggests two separate real estate markets in 2006 and 2009: One for broker-marketed properties and one for FSBO properties. Competitive pressure from FSBO homes was not enough to keep home sellers from passing along broker commission costs to buyers in the form of higher prices.

The year 2006 was such a strong seller's market due to the tight housing supply, strong demand, and relatively easy financing that home sellers could more easily have passed along brokerage commission costs to buyers in the form of higher prices. Housing market participants in 2009 were faced with an abundant supply of homes for sale, falling prices, weak demand, and strict underwriting standards for loans. In such a difficult market, sellers may have been more likely to seek out the market expertise of a broker to help ensure that they were getting the best price possible for their homes. It may also be that brokers were more selective in the types of homes they chose to list in a buyer's market, and chose only the more desirable homes that were more likely to sell sooner and at higher prices.

If market conditions are driving the results, then the price differential between broker- and owner-marketed properties should mitigate after the housing market returns to normal. Future research is needed to determine if the differential continues once home prices and housing supply stabilize.

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Appendix Table 1 Description of Variables

Variable	2006 Survey Question	2009 Survey Question	Description
RE	71	E19	Dummy variable equal to one if the seller used a broker and zero if the home was sold without a broker's assistance.
lnSP	64	E10	Natural log of the final selling price.
BTW35_85k	100	H8	Indicator variable that equals one if buyer's total household income was between $35,000 and $84,999 inclusive, and zero otherwise.
OVER85k	100	H8	Indicator variable that equals one if buyer's total household income was over $85,000. Under $35,000 is the omitted category.
BTW35_50	95	H4	Indicator variable equal to one if the buyer is between 35 to 50 years of age (inclusive) and zero otherwise.
OVER50	95	H4	Indicator variable equal to one of the buyer is over 50 years of age and zero otherwise.
WHITE	97	H5	Indicator variable that equals one if the buyer is white, and zero otherwise.
SINGLE	92	H1	Indicator variable equal to one if the seller is single and zero if a married or unmarried couple.
CHILD	93	H2	Number of children under the age of eighteen in the seller's household
EARNERS	94	H3	Natural log of the number of income earners in the home buyer's household.
URGENT	66	E13	Indicator variable that equals one if the seller reported needing to sell the home "very urgently" or "somewhat urgently", and zero otherwise.
FINDIF	63	E9	Indicator variable that equals one if the seller sold the home due to financial difficulty.

(Continued…)

(Appendix Table 1 Continued)

Variable	2006 Survey Question	2009 Survey Question	Description
ACQUAINT	68	E18	Indicator variable that equals one if the home was sold to an acquaintance of the seller and zero otherwise.
EM	63	E9	Indicator variable that equals one if the respondent is selling a home due to an employer mandated move.
NH	63	E9	Indicator variable equal to one if the move is due to a change in family situation such as marriage or divorce.
SF or lnSF	60	E6	Indicator variables for each square footage category (2006) or natural log of the home's square footage (2009).
DETSFAM	59	E7	Indicator variable that equals one if the home is described as a detached, single family home and zero otherwise.
RURAL	61	E7	Indicator variable equal to one if the location of the home is described as rural and zero otherwise.
URBAN	61	E7	Indicator variable equal to one if the location of the home is described as urban and zero otherwise.
BURB	61	E7	Indicator variable equal to one if the location of the home is described as suburban and zero otherwise.
RESORT	61	E7	Indicator variable equal to one if the location of the home is described as a resort and zero otherwise. "Small town" is the omitted category.
REDUCE	67	E14	Number of times the asking price was reduced before the home sold.
lnTOM	69	E15	Natural log of the number of weeks the home was on the market before it sold.
INVMILL	NA	NA	Inverse Mills ratio from the first stage probit regression.