Firm Size, Dual Brokerage, and National Franchise Affiliation of Real Estate Brokerage Firms: Unexpected Results from 2008 to 2013

Angjellari-Dajci, Fiorentina and Boylan, Robert and Cebula, Richard

Jacksonville University, Jacksonville University, Jacksonville University

9 May 2014

Firm Size, Dual Brokerage, and National Franchise Affiliation of Real Estate Brokerage Firms: Unexpected Results from 2008 to 2013

Fiorentina Angjellari-Dajci, Robert Boylan, and Richard J. Cebula,
Jacksonville University

Abstract
In this study we examine the impact of real estate brokerage firm characteristics on real estate prices from 2008 to 2013. We focus on single-family homes and condominiums from Duval County, the largest county in the Northeast Florida real estate market. Contrary to most research findings to date, we have strong evidence to suggest that homebuyers will fare better if they associate with small brokerage firms to represent their interest in the purchase transaction. Contrary to the previously published research, we found that firms associated with a national franchise garnered lower sales prices.

Keywords: real estate brokers; brokerage; housing market; hedonic pricing model

1. Introduction

From 2008 until 2013, nearly 58,000 single-family homes and over 8,000 condominiums, totaling over $24.5 billion in sales volume, were transacted in Duval County, Northeast Florida with the assistance of a real estate agent. Nationwide, real estate brokerage is a large industry, which annually generates sixty to seventy billion dollars in revenue from home transactions. About seventy percent of Americans own the home they live in. Since a house often represents the largest portion of an individual's wealth, understanding the home brokerage industry offers interesting strategic insight into the types of brokerage that will maximize the return from the real estate transaction. Understanding the residential real estate brokerage process and market takes on special significance in the context of the upheaval in the residential real estate markets that reached major proportions in late 2007.

Since selling one's home is likely to represent one of the largest lifetime transactions, and because most people purchase or sell residences only a few times in their lifetime, a market for specialized transaction assistance developed to assist home buyers and home sellers in finding a match, writing a contract, assisting with home inspections, financing, and ultimately closing the sale. The purchase or sale of real estate property is a complex process involving several sequential decision-making stages, in which most buyers and sellers seek out the professional services of real estate agents. The main stages in purchasing real estate from both the buyer's and seller's perspectives include: (1) the selection of 'the right property' for the buyer and making the initial offer, and, for the seller, accepting an offer from the potential buyers; (2) the home inspection; (3) getting financing approval; and (4) closing after the final walk-through inspection. In real estate terminology, only the last stage is commonly referred to as the "closing", but because of the unique nature of the decision-making that takes place along the way, due diligence must be exercised at each stage. The deal can dematerialize at any of the four stages, as each of these decision stages is tactically complex and prone to mishap. Should the buyer or the seller walk out of any decision-making stage, a start-over is obviously required.

For a sales transaction to close successfully, a stable state needs to prevail at each decision-making stage. Real estate sale associates, brokers, and other real estate professionals do recognize these stages as unique processes and dedicate time and energy to developing strategies to best assist buyers and sellers in successfully moving through the stages and eventually closing the real estate sale. A successful closing is important for buyers and sellers as well as for commission-paid brokerage firms and agents splitting the commission.

According to the National Association of Realtors (NAR), 82% of residential real estate transactions are conducted with the assistance of real estate agents. The high frequency with which buyers and sellers choose to rely on brokers' services suggests that brokerage services are valued (Beck, et al., 2013). The NAR reports that in 2004 there were over 236,000 active real estate brokerage offices operating in the United States. Offices in our dataset range in size from a single broker, with only one agent in the office, to very large firms with several offices and hundreds of agents serving the Jacksonville metropolitan area.

In this study, we seek to extend the literature on the effect of brokerage firm size, national affiliation, and dual brokerage on the real prices of residential real estate. In our formulation we utilize a hedonic pricing model which has gained acceptance in the literature as shown in the comprehensive survey articles by Boyle and Kiel (2001) and Sirmans, Macpherson, and Zeitz (2005). This type of model has proven to be useful in identifying and exploring housing price determinants.

Using MLS transactions from Greensboro, North Carolina, from 1991 to 1993, Jud and Winkler (1994) found that individual brokerage offices do not have a statistically significant influence on generating excess returns. Turnbull and Dombrow (2007) find that larger firms, both on the listing side as well as on the selling side, tend to be associated with higher sales prices. This could be related to the presence of a seller's market (an "up" market) in those years. Similarly, Hughes (1995) finds evidence that larger brokerage firms are associated with higher sales prices.

While earlier studies (Frew and Jud, 1986; Jud and Winkler, 1994) have found a non-negative association between franchise affiliation and firm earnings, a later study by Beck et al., (2013) found a negative association for the period 2006-2010 using data from Chatham County, Georgia. To explain the findings, Beck, et al. (2003) argue that franchise affiliation has historically offered a recognized brand and may have signaled greater quality service, especially to buyers who are new to an area or possess limited knowledge of local firms, but the advent of the digital age has diminished the competitive advantage of national affiliation. Nadal (2006) asserts that clients often conduct online research before contacting a brokerage firm. With MLS information becoming public, as opposed to being the exclusive domain of brokers and agents, residential real estate transaction information is available to anyone who has access to the internet. Beck, et al., (2013) argue that the leveling of exposure across firms could explain the reduced value of a franchise affiliation in later years.

In Sections 2 and 3 of this study, the framework for the empirical analysis and a description of the data used in the estimations, including descriptive statistics, to test the potential effects of brokerage characteristics on real home sale prices in Duval County, Florida are provided. In

Section 4, the results of several specifications of the model are presented. In Section 5, a summary and overview of the findings is provided.

2. Framework for Empirical Analysis

Murdoch, Singh, and Thayer (1993), Sirmans, Macpherson and Zeitz (2005), Cebula (2009), Mihaescu and Von Hofe (2012), and many others provide a thorough overview of the underlying theory of the hedonic pricing model. These authors also provide numerous applications of the model in the context of real estate, thus the theoretical foundation receives little more than a summary treatment herein. The straight-forward premise is that a house characterizes a bundle of desirable and undesirable features for utility-maximizing consumers to evaluate. The evaluation of these features is capitalized into the transaction price of the house. The hedonic pricing model parses the transaction price into attributes such as interior and exterior features, locational factors, idiosyncratic characteristics associated with the house, and seasonal and timing (according to year) considerations.

The model's estimated parameters provide information about the significance and magnitude of the effect of any observable attribute of the house.

The hedonic pricing model applied in this study takes the following general form:

$$LNRSPj = f(Ij, Ej, Bj, Oj) \quad (1)$$

where:
LNRSPj = the natural log of the real price of house j, where the price of house j is expressed in 2005 dollars;
Ij = a vector of interior physical characteristics for house j;
Ej = a vector of external physical characteristics for house j;
Bj = a vector of characteristics associated with the brokerage process for house j; and
Oj = a vector of other factors associated with house j.

This model is estimated using a six-year period of data from January, 2008 through December, 2013 from the Northeast Florida Association of Realtors (NEFAR) Multiple Listing System (MLS). The data is used to assess the relative importance of housing characteristics, brokerage characteristics, spatial effects, and time-related effects on real home sales prices in Duval County in Northeast Florida.

Consistent with the literature where the hedonic model is applied to real housing prices, the interior physical characteristics of house j include the following: *SQFTFIN,* the total listed number of square feet of finished interior living space; *BATHS,* the listed number of full baths and half baths; and *BEDS,* the total number of listed bedrooms. As observed in Sirmans, et al. (2005) and Boyle and Kiel (2001), and based on a variety of other studies, including Coulson and Lahr (2005) and Cebula (2009), the real sales price of house j is expected to be an increasing function of the number of desirable internal and external physical housing characteristics. For example, the real sales price was expected to be an increasing function of square footage of finished living space and the number of bathrooms and bedrooms.

Among the exterior physical characteristics of house j in both single-family homes and condominium units, *AGE*, the age of each home in terms of the number of years since construction, was an exterior characteristic available in the dataset. Other studies have used the number of stories in the house structure, or the presence of brick or stucco on the exterior, the presence of an automatic sprinkler system, or the type of roof, as explanatory variables. These variables did not make much sense in the context of both condominium units and single-family houses. Indeed studies such Zietz, et al., (2008) and Zietz, et al., (2009) do not explore any other exterior characteristic variables besides AGE, in the presence of large datasets.

Older homes may have a higher likelihood of needing repair and more imperfectly match modern preferences. As suggested in Sirman, et al., (2005), Clark and Herrin (1997), Decker, et al., (2005) and Laurice and Bhattacharya (2005), the age of a house is expected to adversely influence the market value of a house. In other words, the real sales price of the house is a decreasing function of AGE, *ceteris paribus*.

A community feature constituting an additional exterior physical characteristic is *GATED* (=1 or 0), whether the house is part of a gated community. Given that the presence of community features is related to additional costs homeowners have to pay (i.e., HOA fees), and arguably these features would be capitalized into the real price of house j. Because families derive a sense of prestige or security by a gated community, it is hypothesized that real housing prices are expected to be an increasing function of *GATED.*

As any real estate professional will tell you, the three most important considerations when buying a home are location, location, and location. Accordingly, to control for spatial effects we have included binary variables for all the zip code areas, ZIP32202 thru ZIP32277 for which sales had occurred from 2008 to 2013. In addition, the NEFAR MLS system breaks down the Duval County using areas, AREA11 thru AREA232, for which we included binaries as an alternative to the zip codes.

In addition, there are two other spatial control variables included in the models. It is hypothesized that houses that are located affront a river, lake, marsh, canal, creek, intracoastal waterway, or the ocean, *WATERFRONT* (=1 or 0) and those that are navigable to the ocean *NAVOCEAN* (=1 or 0) command a higher price due to their preferred prime location (Archer et al., 1996).

Given that historic designation is associated with higher sales prices (Boyle and Kiel, 2001; Cebula, 2009; Clark & Herri, 1997; Coffin, 1989), it is hypothesized that a house with the designation as belonging to a national, or local historic district, should command a higher market price to reflect an element of prestige associated with such location. We expect HISTORIC (=1 or 0) to be an increasing function of real house prices.

Due to the ease and more secure nature of transactions represented by a cash purchase, it is hypothesized that CASH (=1 or 0) will negatively impact real house prices as sellers are willing to accept a lower cash offer, rather than a higher offer that is contingent on financing. This is especially true if sellers, banks, or the buyers want to close quickly.

Yearly control variables are present in the form of year fixed effects Y2008 thru Y2013. Given that this was a difficult time in the real estate industry, and that both average household income and employment rates significantly dropped after 2008, we expect that the Y2009 thru Y2013 will have a negative effect on the real sales price. Likewise, seasonal controls by quarter, Q1, Q2, Q3 and Q4 are included to control for seasonal effects. Given the seasonal nature of single-family house sales in general, we would expect that Q2 and Q3 would have a positive effect, while Q1 and Q4 would have a smaller positive effect than Q2 and Q3, or a negative effect.

Lastly, we included *DOM*, the number of days the property was listed in the MLS system prior to the closing date. We hypothesize that this variable should have a negative effect on the real house prices, reflecting an undesirable property sitting in the market for too long, which leads to lower real sales prices, *ceteris paribus*.

Since brokerage characteristics are the focus of this study, variables related to the brokerage of each observation are included. NATFRAN is a binary variable equaling one if the listing brokerage firm is affiliated with a national franchise, such as RE/MAX, Keller Williams or Century 21. The National Association of Realtors (NAR) 2013 reports have published a list of 32 franchise brands, beginning operation in the US since 1971. We used this publication to create our binary variable NATFRAN equaling one for all listing brokerages in our dataset that were found on NAR's publication, and zero otherwise. While earlier studies have found a non-negative association between franchise affiliation and firm earnings (Frew and Jud, 1986; Jud and Winkler, 1994), a later study by Beck at al. (2013) found a negative association for the period 2006-2010. While we recognize that franchise affiliation can offer a recognized brand and may signal quality, (Frew and Jud, 1986; Jud and Winkler, 1994), especially to buyers new to an area or with limited knowledge of local firms, we believe that the brokerage process has evolved over the last two decades. With MLS information becoming readily available on the internet, we believe that the competitive advantage of associating with a national franchise has diminished. Accordingly and in agreement with Beck, et al., (2013), NATFRAN is expected to have a negative effect on the real sales price.

DUALBROKER is a binary variable equaling one if the same firm handles the listing and selling brokerage. Jud (1994) finds that when the listing and selling firms in a transaction are the same, this leads to a slightly higher sales price. Turnbull and Dombrow (2007) and Beck, et al., (2013) find that houses listed and sold by the same firm sell for less. We expect DUALBROKER to negatively affect the real sales price.

Variables capturing listing and selling firm size were also constructed. The variable LIST365 is the number of homes that were listed and sold by the same listing firm within the last 365 days. This variable serves as a measure of the size of the brokerage firm at the time of sale (Beck**,** et al., 2013). Similarly, the variable SELL365 was used as a measure of the selling brokerage firm size, as measured by other selling transactions by that broker within the last 365 days (Beck, et al., 2013).

After consideration of an initial specification with LIST365 and SELL365, these variables were redefined as binary variables representing quintiles to allow for nonlinearity in their effects (Beck et al., 2013). The variable LIST0_19 is a binary variable equaling one if the associated

listing firm is in the bottom quintile of listing firms (between 0 and 19 listing transactions). LIST20_62 is a binary variable equaling one if the associated listing firm is in the second quintile (20 to 62 transactions). LIST63_147, LIST148_322 and LIST323_2466 correspond to the next three quintiles (63 to 147, 148 to 322 and 323 to 2466 listing transactions respectively). LIST323_2466 is the group's reference category (the omitted category).

Similarly, SELL0_16 is a binary variable equaling one when the associated selling firm is in the bottom quintile of selling firms (0 to 16 selling transactions), and this is the group's reference category. SELL17_60, SELL61_155, SELL156_351 and SELL352_2927 correspond to the next four quintiles (17 to 60, 61 to 155, 156 to 351 and 352 to 2927 selling transactions**,** respectively).

3. Data

Our dataset for single-family homes and condominium units sold in Duval County over the six-year period from January, 2008 through December**,** 2013 was obtained from the Northeast Florida Association of Realtors (NEFAR) Multiple Listing System (MLS). Duval county sales for the period under study were about half the sales of the entire NEFAR MLS five county area. Duval County contains four cities, Jacksonville, Atlantic Beach, Jacksonville Beach**,** and Neptune Beach.

Data for 69,259 single-family houses and condominium unit sales, for which there was sufficient information for analysis during this time frame in Duval County, were converted to and expressed in 2005 dollars using the price index for single-family homes from the U.S. Census Bureau, to permit comparison of sales prices across the study period.

Although we collected data for the period 2007-2013, all observations for year 2007 were dropped due to calculations regarding firm size, which required the number of previous sales for the last 365 days in each year. This reduced the total number of observations to 58,603. Our results in this study were drawn from the final data set of 58,603 observations.

The data is used to assess the relative importance of housing characteristics, brokerage characteristics, spatial effects, and time-related effects on real home sales prices in Duval County in Northeast Florida. Table 1.1 provides summary statistics for all variables used in the specifications.

Table 1.1: Summary Statistics

We checked for high correlation coefficients among regression variables and the coefficients in Table 1.2 below were the highest present in our dataset.

Table 1.2: Partial Correlation Matrix

4. Empirical Results

In this section, a total of five model specifications are discussed: two for the baseline model, and three specifications for the main model.

Baseline Model Specifications

For the baseline model we used two specifications, differing only in the way spatial controls were introduced. In the first baseline specification, the spatial variables were zip codes 32202 thru 32277, as shown in the summary statistics Table 1.1, and the omitted zip code binary was ZIP32202. In the second specification we omitted the zip code variables and substituted variables AREA11 thru AREA232 as shown in the summary statistics Table 1.1, and the omitted area binary was AREA 66 in the second specification.

The differences between the baseline specification results were minimal. The specification with the AREA variables yielded a slightly higher R-squared and Adjusted R-squared; R-squared and Adjusted R-squared were each roughly 79% for the AREA specification and 77% for the ZIP. Each specification yielded consistent and reasonable coefficients, and *F*-statistics were well within the acceptable range. Semi-log specifications were employed with LNRSP (=log (RSP)) as the dependent variable. In each of the estimates, the White (1980) procedure was adopted to correct for heteroskedasticity.

In the interest of the efficient use of journal space, the full results of the baseline specifications are not presented; these results are available are available upon request (and partially shown in the appendix). Also, in the main model specifications that follow, as in the baseline specifications, the AREA variables were included for control purposes. We only provide specifications where AREA11 thru AREA232 spatial controls were present. Specifications with ZIP 32204 thru ZIP 32277 yielded very similar results, and were not included, but are available upon request. Also, in the main model specifications that follow, the coefficients for the AREA variables were suppressed. While recognizing that location is a very important determinant of the pricing in any real estate transaction, in this study, the intent is to focus on the impact of brokerage firms and identify the most salient variables.

Main Model Specifications

For the main model, two specifications are estimated initially; subsequently, a third specification is estimated. Specification 1 differs from Specification 2 only in the way the firm size control variables were operationalized. In the first specification, the firm size variables LISTSALES365 and SELLSALES365, which measure previous transactions by the brokerage firms (on the listing and selling side respectively) within the last year, were used. In the second specification, to allow for the non-linear effect of firm size, these variables were parsed into categorical binary variables, each representing a quintile. In both, a semi-log specification was employed with LNRSP as the dependent variable. In each of the estimates, the White (1980) procedure was adopted to correct for heteroskedasticity. The results for each of the binary variables were interpreted according to the procedure developed in Halvorsen and Palmquist (1980).

Table 2. Main Model Specifications

In the main model specifications, the Y2009 binary was the omitted year binary, and the fourth quarter (Oct-Dec), Q4 was the omitted quarter. In main model specification 2, LIST323_2466 was the omitted quintile for the listing firm quintiles, and SELL352_2927 was the omitted quintile for the selling firm quintiles.

Most pertinent to this study are brokerage effects. In Table 2, association with a national brokerage house (i.e., when NATFRAN=1), such as REMAX or Keller Williams is associated with a 1.9% to 2.2% decrease in sales price of the home, and significant at the 1% level in each specification. One possible explanation for this could involve the evolution of the brokerage process over the last few decades. Another possibility is that access to internet-based transactional information has reduced the value of intermediaries like national franchise brokerage companies. According to Beck, et al., (2013) the leveling of exposure across firms could explain the reduced value of a franchise affiliation in later years. Our result is in line with expectations and consistent with Beck, et al., (2013).

Homes that are listed and sold within the same brokerage house (i.e., when DUALBROKER=1) were associated with around a 4.2% lower sales price and significant at the 1% level or better. Rutherford (2005) and Levitt and Syverson (2005) suggest that agents and brokers have an informational advantage over their clients. They argue that potential home buyers who have reached out to a specific brokerage firm and do not have time deadlines, constitute a group of potential buyers that are more readily available than the pool of potential buyers at large (Beck et al., 2013). Our results suggest that brokerage firms may use their informational advantage to persuade their clients to accept internal offers. This obvious moral hazard situation causes home sellers to accept a significantly (4.2%) lower price, allowing the broker to sell "in house" and collect both sides of the commission (Beck, et al., 2013). Clearly, it is important that home sellers be vigilant about in-house selling to guard against lower returns, whereas homebuyers would be the beneficiaries of the lower prices and benefit from in-house sales.

Results with regard to firm size effects in Specification 1 suggest that the marginal effect of additional homes sold by the brokerage firm, LIST365, was associated with slightly lower sales price. This result was statistically significant at the 1% level. The interpretation of this result suggests that evaluated at the mean sales price, listing one's home with a firm that sells five houses more per month than an alternative firm will on average be associated with an approximately $1,000 lower relative selling price. This result is inconsistent with previous findings including Beck, et al. (2013) and a contribution of this study. This result could be due to differences in real estate markets in the two metropolitan areas, although Savannah, Georgia and Jacksonville, Florida would seem to be similar. It also may be influenced by the "down market" during the course of our dataset. Beck, et al., (2013) have both "up market" and "down market" years in their dataset which may explain the difference result.

Size of the selling firm, SELL365 has no statistically significant effect in this specification, which is consistent with Beck, et al., (2013) findings.

In the second specification, with the firm size variables decomposed into binary categorical variables, an empirically richer picture emerges. Comparing the variables LIST0_19, LIST20_62, LIST63_147, and LIST148_322 to the fifth quintile group, LIST323_2466, which

was omitted as the reference group, the results suggest that there is a small advantage (to the seller) in hiring relatively smaller to firms. As can be seen in specification 2, the relative return of the smallest quintile at 6%, is slightly larger than the relative return of the second quintile at 5.5%, which is slightly larger than the relative return of the third quintile at 5.2%. So the relative return tops out at 6% for the small firms in the first quintile, and the return gets smaller for each successively larger quintile.

A very different picture emerges when looking at the results from the selling side. In comparison to the very largest firms, the very small and small firms appear to be associated with a lower sales price, which is hugely advantageous to the buyers. The negative coefficients on Sell0_19 and SELL20_62 variables (significant at the 95% level), suggest that in comparison to the fifth quintile the buyers are experiencing a relative reduction in price, in the range of 1.2% to 1.3%. Those buyers associated with medium and large firms appear to experience about 1.2% to 2% higher prices compared to the very largest firms, which, of course is relatively disadvantageous to the buyers, but consistent with the Beck, et al., (2013) findings.

Summarizing, from the buyer's perspective, working with smaller brokerage houses appears to be associated with the most desirable outcome. Relative to the very largest firms, the very smallest (first quintile) and smallest (second quintile) firms are associated with statistically significant lower prices of 1.3% and 1.2%, respectively. The next best brokerage houses for the byers appear to be the very largest firms.

4.1 Empirical Findings for the Top Five Largest Listing Firms

The NAR reports that in 2004 there were over 236,000 active real estate brokerage offices operating in the United States. Offices in our dataset range in size from a single broker, who may be the only agent in the office, to very large firms with several offices and hundreds of agents serving the Jacksonville metropolitan area. Our dataset contains 1,162 unique listing firms/offices and 901 unique selling firms/offices. The large disparity in firm size can be attributed to the presence of the Multiple Listing Service system, and the relatively low barriers to entry, granting all participants equal listing exposure regardless of size. As a result one may expect this market to be highly competitive. Via such a platform, smaller firms can advertise listings on equal grounds with larger ones, while obtaining exposure to a local, national and international audience.

The Department of Justice, however, has reported evidence of high market concentrations in some areas. In response to the DOJ's concerns, a 2005 study of the NAR offers evidence to suggest that real estate markets are competitive in every dimension, including price.

On the other hand, the rigid six percent commission structure raises additional questions about the competitiveness of the real estate industry. While collusion over commission rates is illegal, brokerage firm owners can and do impose floors on commissions their agents can charge.

Since each city/town is an individual and autonomous market, national measures of concentration are of little value in analyzing individual markets such as the real estate market in

Duval County comprising the cities of Jacksonville, Neptune Beach, Atlantic Beach**,** and Jacksonville Beach.

The largest listing brokerage firms in our dataset were Watson Realty Corp. with 25 offices, Berkshire Hathaway Homeservices Florida Network Realty with 8 offices (formerly Prudential Network Realty), Coldwell Banker with 16 offices, RE/MAX with 17 offices and Keller Williams with 7 offices.

In Table 3 we turn our attention to the largest listing firms in the fifth quintile. To investigate whether there are advantages to being among the largest firms, and to explicitly account for the effects on the real sales price that the largest real estate brokerage firms had in our dataset, we added an additional estimate, Specification 3. Specification 3 is identical to Specification 2 with the exception that variables were added for each of the top 5 firms. For instance, consider the WATSON variable; when the sale was made by the Watson firm the binary variable would be 1, 0 otherwise.

Table 3. Top Five Largest Firms Specifications

In Table 3, the results suggest that listing with Watson Realty Corp (WATSON) or Keller Williams (KELLWILLIAMS) contributes to about 11.6% higher prices. Listing with Berkshire Hathaway Homeservices Florida Network Realty (formerly Prudential Network Realty) contributes to higher prices of 8.4%, while listing with Coldwell Banker contributes to 2.4% higher prices, and listing with RE/MAX (REMAX) contributes to 4.8% higher prices. Our conclusion is that there are advantages to listing with the largest brokerage firms as they seem to be able to garner higher prices and may have some market power in the Northeast Florida market. This result is not surprising. It is reasonable to suspect that the firms garnering relatively more of the market share in any area are doing so because they are providing a relatively better service. This may be due to advantages, such as more experienced sales associates or perhaps a better marketing plan.

Lastly, the results in Specification 3 are sufficiently similar to the results of Specifications 1 and 2 that we feel they corroborate and support the conclusions stated earlier in the paper.

5. Conclusions

In this study, a hedonic pricing model is applied to single-family houses and condominiums sold in Duval County, Florida in the six-year period from January 2008 through December 2013. The 3 major specifications include internal and external housing attributes, general spatial controls, and controls for brokerage characteristics, such as brokerage firm size, national franchise affiliation, and the presence of dual brokerage.

Many of the results of this study are consistent with, and in line with what has been published previously. In particular we find that dual brokerage results in relatively lower sales prices. This finding is consistent with the expectations found in the present specification, and it results in a lower return to the seller and the advantage going to the buyer. It is also found in this study that,

contrary to nearly all of the existing published literature on the topic, that firms associated with a national franchise garnered lower sales prices. This outcome also was in line with the expectations expressed in this study, as the availability of brokerage transaction information on the internet has leveled the playing field, giving small brokerage houses the tools to compete with the national franchise organizations.

Contrary to nearly all of the published related research findings to date, a significant contribution to the literature is provided in this study, namely, there is current evidence suggesting that home buyers will fare better and garner lower purchase prices if they associate with small brokerage firms. Presumably, this phenomenon is also due to the widespread information availability, which has allowed small firms to compete with large firms especially on the buying side. Also found in this study is weak evidence suggesting that sellers may be better off associating with smaller firms, unless they can associate with the top-selling firms in the area. These results imply that sellers are better off to list with small firms or the top selling firms in the area, while buyers are better off working with small firms.

References

Archer, W.R., D. H. Gatzlaff, and D. C. Ling. (1996). Measuring the Importance of Location in House Price Appreciation. Journal of Urban Economics. 40, 334-53.

Asabere, P. K., Huffman, F. E., and Mehdian, S. (1994). The adverse impacts of local historic designation: The case of small apartment buildings in Philadelphia. Journal of Real Estate Finance and Economics, 8, 225-234.

Baranzini, A., Ramirez, J., Schaerer, C., and Thalman, P. (Eds.). (2008). Hedonic methods in housing markets: Pricing environmental amenities and segregation (2008 edition). New York, NY: Springer.

Beck, Hason, Toma, M., and Page, A. (2013) Real Estate Brokerage Firm Characteristics and Home Sales Price Outcomes. International Journal of Business and Social Science, 4 (13).

Benjamin, J.D., Jud, G. D., and Sirmans, G.S. (2000). What do we know about real estate brokerage? Journal of Real Estate Research, 20(4), 695-713.

Bin, O., and Polasky, S. (2004). Effects of flood hazards on property values: Evidence before and after Hurricane Floyd. *Land Economics*, 80, 490-500.

Bourassa, S. C., Hoesli, M., and Peng, V. S. (2003). Do housing submarkets really matter? *Journal of Housing Economics*, 12(1), 12-28.

Boyle, M. A., and Kiel, K. A. (2001). A survey of house price hedonic studies of the impact of environmental externalities. *Journal of Real Estate Literature,* 9, 117-144.

Bureau of Labor Statistics (n.d.). Consumer price index-all urban consumers. Retrieved from http://data.bls.gov/cgi-bin/surveymost

Cebula, R.J. (1997). An empirical analysis of the impact of government tax and auditing policies on the size of the underground economy: The case of the United States, 1973-1994," *The American Journal of Economics and Sociology,* 56 (2), 173-186.

Cebula, R.J. (1978). An empirical note on the Tiebout-Tullock hypothesis, *Quarterly Journal of Economics*, 92 (4): 705-711.

Cebula, R.J. (1979). *The determinants of human migration*. Lexington, MA: Lexington Books.

Cebula, R.J. (2009). The hedonic pricing model applied to the city of Savannah and its historic landmark district," *Review of Regional Studies*, 39 (1), 9-22.

Cebula, R.J., & Alexander, G. (2006). Determinants of net interstate migration, 2000-2004, *Journal of Regional Analysis and Policy*, 27 (2): 116-123.

Coffin, D. A. (1989). The impact of historic districts on residential property values. *Eastern Economic Journal*, 15, 221-228.

Coulson, N. E., and Leichenko, R. M. (2001). The internal and external impact of historical designation on property values. *Journal of Real Estate Finance and Economics*,23, 113-124.

Decker, C. S., Nielsen, D. A., and Sindt, R. P. (2005). Is pollution a homogeneous determinant of value? *The Appraisal Journal* 73, 183-196.

Dorsey, R. E., Hu, H., Mayer, W. J., &Wang, H. (2010). Hedonic versus repeat-sales housing price indexes for measuring the recent boom-bust cycle. *Journal of Housing Economics*, 19(2), 87-105.

Dubin, R. (1998). Predicting house prices using multiple listings data. *Journal of Real Estate Finance and Economics*, 17, 35-60.

Farmer, M. C., and Lipscomb, C. A. (2010). Using quintile regression in hedonic analysis to reveal submarket competition. *Journal of Real Estate Research*, 32(4), 435-460.

Ford, D A. (1989). The effect of historic district designation on single-family home prices. *AREUEA Journal*, 17, 353-362.

Frew, J. R. and Jud, G. D. (1986). The value of real estate franchise. *Real Estate Economics*, 14(2), 374-383.

Garrod, G., and Willis, K. G. (1992). The environmental economic impact of woodland: A two state hedonic price model of the amenity value of forestry in Britain. *Applied Economics*, 24, 715-728.

Graves, P., Murdoch, J., and Thayer, M. (1988). The robustness of hedonic price estimation: Urban air quality. *Land Economics*, 64, 221-233.

Halvorsen, R., and Palmquist, R. (1980). The interpretation of dummy variables in semilogrithmic regressions, *American Economic Review*, 70 (3), 474-475.

Harrison, D. M., Smersh, G.T., and Schwartz, A. L. (2001). Environmental determinants of housing prices: The impact of flood zone status. *Journal of Real Estate Research*,21, 3-20.

Hughes, W. T. (1995). Brokerage firms' characteristics and the sale of residential property. *Journal of Real Estate Research*, 10(1), 45-56

Jud, G. D. and Winkler, D. T. (1994). What do real estate brokers do: An examination of excess returns in the housing market. *Journal of Housing Economics*, 3(2), 283-295.

Laurice, J., and Bhattacharya, R. (2005). Prediction performance of a hedonic pricing model for housing. *The Appraisal Journal*, 73, 198-209.

Leichenko, R. M., Coulson, N. E., and Listokin, D. (2001). Historic preservation and residential property values: An analysis of Texas cities. *Urban Studies*, 38, 1973-1987.

Levesque, T.J. (1994). Modeling the effects of airport noise on residential housing markets. *Journal of Transport Economics and Policy*, 28, 199-210.

Levitt, S. D. and Syverson, C. (2008). Market distortions when agents are better informed: The value of information in real estate. *Review of Economics and Statistics*, 90(4), 599-611.

Mihaescu, O. and Von Hofe, R. (2012). The Impact of Brownfields on Residential Property Values in Cincinnati, Ohio: A Spatial Hedonic Approach, *Journal of Regional Analysis and Policy*, 42, 223-236.

Murdoch, J., Singh, H. and Thayer, M. (1993). The impact of natural hazards on housing values: The Loma Prieta earthquake." *American Real Estate and Urban Economics Association Journal*, 21, 167-84.

Nadel, M. (2006). A critical assessment of the traditional real estate broker commission rate structure. *Cornell Real Estate Review*, 5, 26-46.

Neill, H.R., Hassenzahl, D. M. and Assane, D. D. (2007). Estimating the effect of air quality: Spatial versus traditional hedonic price models. *Southern Economic Journal*, 73, 1088-1111.

Netusil, N.R. (2005). The effect of environmental zoning and amenities on property values: Portland, Oregon. *Land Economics*, 81, 227-246.

Shimizu, C., and Watanabe, T. (2010). Housing bubbles in Japan and the United States. *Public Policy Review*, 6(3), 431-472.

Sirmans, G.S., Macpherson, D. A., and Zeitz, E. N. (2005). The composition of hedonic pricing models. *Journal of Real Estate Literature*, 13, 3-43.

Smith, V.K., and Huang, J. C. (1993). Hedonic models and air pollution: Twenty-five years and counting. *Environmental and Resource Economics*, 3, 381-394.

Steimetz, S. S. C. (2010). Spatial multipliers in hedonic analysis: A comment on 'spatial hedonic models of airport noise, proximity, and housing prices. *Journal of Regional Science*, 50(5), 995-998.

Sutter, D., and Poitras, M. (2010). Do people respond to low probability risks? Evidence from tornado risk and manufactured homes. *Journal of Risk and Uncertainty*, 40(2), 181-196.

The National Association of REALTORS, Research Division. (2005). Structure, Conduct, and Performance of the Real Estate Brokerage Industry. Retrieved Feb 5 from: http://www.justice.gov/atr/public/workshops/rewcom/213400.pdf

Turnbull, G. and Dombrow, J. (2007). Individual agents, firms, and the real estate brokerage process. *Journal of Real Estate Finance and Economics*, 35, 57-76.

Zietz, J., E. Zietz, and S. Sirmans. (2008). Determinants of House Prices: A Quintile Regression Approach. *Journal of Real Estate Finance and Economics*, 38 (4), 317-33.

Zietz, J., S. Sirmans and T. Smersh. (2009). The Impact of Inflation on Home Prices and the Valuation of Housing Characteristics Across the Price Distribution. *Journal of Housing Research,* 7 (2), 119-37.

Zumpano, L. V., Elder, H. and Crellin, G.E. (1993). The market for residential real estate brokerage services: Costs of production and economies of scale. *Journal of Real Estate Finance and Economics*, 6, 237-250.

TABLES

Table 1.1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
LNRSP	11.615	0.857	9.17	15.52
SQFTFIN	1759.850	710.292	348	12000
BEDROOMS	3.145	0.811	1	9
BATHS	2.018	0.653	0	22
AGE	28.483	28.673	0	1813
GATED	0.134	0.340	0	1
AREA11	0.014	0.118	0	1
AREA12	0.025	0.157	0	1
AREA13	0.040	0.196	0	1
AREA14	0.060	0.238	0	1
AREA15	0.029	0.167	0	1
AREA21	0.016	0.124	0	1
AREA22	0.038	0.190	0	1
AREA23	0.051	0.221	0	1
AREA24	0.048	0.214	0	1
AREA25	0.025	0.155	0	1
AREA26	0.044	0.204	0	1
AREA27	0.012	0.107	0	1
AREA31	0.008	0.087	0	1
AREA32	0.017	0.130	0	1
AREA33	0.009	0.092	0	1
AREA41	0.061	0.240	0	1
AREA42	0.038	0.190	0	1
AREA43	0.030	0.171	0	1
AREA51	0.015	0.120	0	1
AREA52	0.010	0.099	0	1
AREA53	0.012	0.109	0	1
AREA54	0.010	0.098	0	1
AREA55	0.004	0.066	0	1

AREA56	0.024	0.152	0	1
AREA61	0.017	0.130	0	1
AREA62	0.020	0.139	0	1
AREA63	0.023	0.150	0	1
AREA64	0.011	0.104	0	1
AREA65	0.004	0.066	0	1
AREA66	0.002	0.047	0	1
AREA67	0.032	0.175	0	1
AREA71	0.013	0.112	0	1
AREA72	0.010	0.100	0	1
AREA73	0.003	0.057	0	1
AREA74	0.015	0.122	0	1
AREA75	0.035	0.184	0	1
AREA81	0.015	0.123	0	1
AREA82	0.001	0.038	0	1
AREA91	0.036	0.187	0	1
AREA92	0.028	0.164	0	1
AREA95	0.004	0.066	0	1
AREA96	0.020	0.141	0	1
AREA211	0.005	0.074	0	1
AREA212	0.010	0.101	0	1
AREA213	0.008	0.090	0	1
AREA214	0.018	0.134	0	1
AREA221	0.002	0.043	0	1
AREA222	0.005	0.073	0	1
AREA231	0.015	0.122	0	1
AREA232	0.007	0.084	0	1
ZIP32202	0.003	0.054	0	1
ZIP32204	0.007	0.081	0	1
ZIP32205	0.038	0.191	0	1
ZIP32206	0.013	0.114	0	1
ZIP32207	0.036	0.186	0	1
ZIP32208	0.029	0.168	0	1
ZIP32209	0.016	0.125	0	1
ZIP32210	0.063	0.244	0	1
ZIP32211	0.030	0.172	0	1
ZIP32216	0.040	0.195	0	1
ZIP32217	0.021	0.143	0	1
ZIP32218	0.061	0.240	0	1
ZIP32219	0.011	0.106	0	1
ZIP32220	0.009	0.095	0	1

ZIP32221	0.028	0.164	0	1
ZIP32222	0.013	0.114	0	1
ZIP32223	0.030	0.169	0	1
ZIP32224	0.055	0.228	0	1
ZIP32225	0.069	0.253	0	1
ZIP32226	0.025	0.155	0	1
ZIP32233	0.022	0.148	0	1
ZIP32234	0.003	0.053	0	1
ZIP32244	0.067	0.250	0	1
ZIP32246	0.060	0.237	0	1
ZIP32250	0.046	0.210	0	1
ZIP32254	0.012	0.109	0	1
ZIP32256	0.058	0.233	0	1
ZIP32257	0.041	0.197	0	1
ZIP32258	0.058	0.234	0	1
ZIP32266	0.007	0.085	0	1
ZIP32277	0.030	0.170	0	1
WATERFRONT	0.092	0.289	0	1
NACOCEAN	0.024	0.153	0	1
HISTORIC	0.028	0.165	0	1
CASH	0.371	0.483	0	1
DOM	0.130	0.336	0	1
Y2009	0.146	0.354	0	1
Y2010	0.162	0.369	0	1
Y2011	0.165	0.371	0	1
Y2012	0.179	0.383	0	1
Y2013	0.217	0.412	0	1
Q1	0.213	0.409	0	1
Q2	0.277	0.447	0	1
Q3	0.259	0.438	0	1
Q4	0.251	0.434	0	1
DOM	102.022	123.757	0	2077
NATFRAN	0.257	0.437	0	1
DUALBROKER	0.196	0.397	0	1
LIST365	196.885	264.925	0	2517
SELL365	214.053	297.649	0	2927
LIST0_19	0.201	0.401	0	1
LIST20_62	0.197	0.398	0	1
LIST63_147	0.202	0.401	0	1
LIST148_322	0.200	0.400	0	1
LIST323_2466	0.200	0.400	0	1

SELL0_16	0.200	0.400	0	1
SELL17_60	0.199	0.399	0	1
SELL61_155	0.200	0.400	0	1
SELL156_351	0.201	0.401	0	1
SELL352_2927	0.199	0.400	0	1
WATSON	0.162	0.369	0	1
BERKSHIRE	0.053	0.225	0	1
COLDWELL	0.059	0.235	0	1
REMAX	0.077	0.267	0	1
KELLWILLIAMS	0.039	0.194	0	1

Table 1.2: Partial Correlation Matrix

	BATHS	**BEDROOMS**	**WATERFRONT**	**NAVOCEAN**
BATHS	1			
BEDROOMS	0.5619	1		
WATERFRONT	0.1802	0.0486	1	
NAVOCEAN	0.1352	0.0108	0.4938	1

Table 2. Main Model Specifications

Table 2	**Specification 1**		**Specification 2**	
LNRSP	**Coefficient**	**T-Value**	**Coefficient**	**T-Value**
Constant	10.569	337.12	10.512	334.2
SQFTFIN	0.0005	125.77	0.0005	125.63
BEDROOMS	0.064	21.9	0.064	21.97
BATHS	0.052	13.97	0.052	14.06
AGE	-0.003	-45.3	-0.003	-45.22
GATED	0.047	8.78	0.048	8.96
AREA11	0.694	21.24	0.692	21.18
…				
AREA232	0.246	7.02	0.246	7.03
WATERFRONT	0.158	24.94	0.157	24.92
NAVOCEAN	0.384	32.12	0.385	32.22
HISTORIC	0.395	28.57	0.395	28.63
CASH	-0.446	-125.55	-0.447	-125.61
Y2008	0.192	32.6	0.192	32.56
Y2010	-0.096	-17.21	-0.095	-17.15

Y2011	-0.186	-33.19	-0.185	-33.1
Y2012	-0.161	-28.93	-0.161	-29.0
Y2013	-0.049	-8.99	-0.049	-9.01
Q1	0.006	1.28	0.005	1.13
Q2	0.023	5.49	0.023	5.43
Q3	0.017	3.96	0.017	3.9
DOM	-0.00003	-2.33	-0.00003	-2.32
NATFRAN	-0.018	-5.03	-0.021	-5.84
DUALBROKERAGE	-0.043	-10.67	-0.042	-10.56
LIST365	-0.0001	-13.55		
SELL365	0.00001	1.0		
LIST0_19			0.061	11.78
LIST20_62			0.054	10.57
LIST63_147			0.051	10.09
LIST148_322			0.039	7.87
SELL0_16			-0.013	-2.6
SELL17_60			-0.012	-2.42
SELL61_155			0.020	4.12
SELL156_351			0.012	2.43
N	58,603		58,603	
F-statistics	F(71, 58531) = 3549.46		F(77, 58525) = 3275.98	
Prob > F	0		0	
R-squared	0.8115		0.8117	
Adj R-squared	0.8113		0.8114	

Table 3. Top Five Largest Firms Specifications

	Specification 3	
LNRSP	**Coefficient**	**T-Value**
Constant	10.505	336.24
SQFTFIN	0.0005	125.89
BEDROOMS	0.064	21.95
BATHS	0.053	14.19
AGE	-0.003	-46.84
GATED	0.046	8.65
AREA11	0.667	20.55
…		
AREA231	0.956	29.74
WATERFRONT	0.149	23.65
NAVOCEAN	0.382	32.21

HISTORIC	0.384	27.99
CASH	-0.437	-123.33
Y2008	0.191	32.68
Y2010	-0.097	-17.58
Y2011	-0.193	-34.68
Y2012	-0.174	-31.44
Y2013	-0.066	-11.98
Q1	0.009	2.08
Q2	0.024	5.73
Q3	0.017	3.99
DOM	-0.0001	-4.56
NATFRAN	-0.021	-3.54
DUALBROKER	-0.045	-11.19
LIST0_19	0.096	18.13
LIST20_62	0.077	14.84
LIST63_147	0.061	12.1
LIST148_322	0.039	7.87
SELL0_16	-0.008	-1.58
SELL17_60	-0.008	-1.63
SELL61_155	0.022	4.4
SELL156_351	0.011	2.29
WATSON	0.116	25.2
BERKSHIRE	0.084	11.7
COLDWELL	0.025	3.05
REMAX	0.048	6.2
KELLWILLIAMS	0.116	12.19
N	58,603	
F-statistics	F(82, 58520) = 3128.29	
Prob > F	0.000	
R-squared	0.814	
Adj R-squared	0.814	