The market for real estate brokerage services in low- and high-income neighborhoods: A 6 city study

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Abstract: We examine the market structure for real estate brokerage services across six large metropolitan areas, by collecting more than 300,000 real estate listings and computing the Herfindahl-Hirschman Index (HHI) for each neighborhood. When we divide neighborhoods based on income, house value, and race, we find no evidence of redlining; that is, the market structure for brokerage services is at least as competitive in less advantaged neighborhoods as it is in more advantaged ones.

Keywords: HHI, real estate brokerage competition, Herfindahl-Hirschman Index, redlining

The data and programs used in this study can be obtained from the authors. Contact Aaron Yelowitz at aaron@uky.edu for this information.

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Introduction

There is broad agreement that real estate markets are local and not national in geographic scope. Real estate brokers and agents thus compete in local markets. In large metropolitan areas most agents and many brokers tend to specialize even more, and compete in sub-markets/neighborhoods within the larger metropolitan market area. This outcome is not surprising, since sellers and buyers value the localized knowledge that agents and brokers bring to the transaction.

Geographically proximate neighborhoods can differ markedly in per capita income and ethnic and racial composition. Average home prices can also differ significantly by neighborhood. The prevailing method of compensating real estate agents and brokers involved in a housing transaction is that the seller pays a fixed percentage commission on the selling price of the home. This structure limits how real estate agents and brokers are compensated for their services. Payment for services rendered may be more closely connected to the selling price of the product than to the costs incurred in facilitating the transaction.

On both the buying and selling side of a real estate transaction, there are fixed and variable components of cost.[1] It is also the case that to a large degree costs are endogenous, i.e. agents and brokers themselves determine the level of effort and expense involved in listing and selling a particular house. The nature of costs combined with the fixed percentage commission structure means that the profitability of any transaction is likely to increase with the selling price of the house.

The type and degree of services demanded by buyers and sellers differ for low vs. high-priced houses. Real estate markets tend to be thicker in lower price ranges. Product heterogeneity tends to be greater in higher price ranges. The question that naturally arises then is whether low-income

[1] See the discussion in White (2006, pp. 7-8).

neighborhoods are as well-served by real estate agents and brokers as high-income neighborhoods. One can imagine that even in areas that are geographically proximate, different neighborhoods have different clienteles and are ripe for specialization, which may result in poorer neighborhoods getting less competition.

For this reason, we investigate whether sub-markets within broader metropolitan markets face different levels of competitiveness among real estate brokers. This research builds upon our earlier work that analyzes market concentration in small, medium, and large real estate markets.[2] We have gathered data for six large metropolitan statistical areas: Atlanta, Boston, Chicago, Dallas, Los Angeles, and Washington, D.C. These cities were chosen for their geographic diversity, income diversity, and very different average house prices. Demographic information on income, house values, population, racial composition, and home ownership were obtained at the zip code level from the 2000 Census. These data were merged with information obtained in 2011 from the National Association of Realtors' Realtor.com website on listings by broker for each zip code neighborhood.

Our final sample consists of 1,321 zip codes in these six cities which can be merged with Census Factfinder data and where there were at least 50 MLS listings. We compute Herfindahl-Hirschman Indices for each MSA and then for each zip code within the six MSA's. After presenting zip code level summary statistics for each MSA, we analyze HHI's at the zip code level. We compare HHI's for zip codes in the bottom income quartile with those in the top income quartile. We also compare HHI's for zip codes ranked by average house price. Finally, we compare HHI's for zip codes ranked by percent non-white. We find that sub-markets are less concentrated in low-income and low-house-price neighborhoods than in high-income and high-house-price neighborhoods. We also find that sub-markets are less concentrated in neighborhoods with greater percent nonwhite. This result indicates that real

[2] Beck, Scott, and Yelowitz (2012).

estate buyers and sellers in these sub-markets do not face market structures for brokerage services that are more susceptible to a lessening of competition.

Income and Racial Gaps in Home Ownership

Home ownership rates differ among various economic and demographic groups. Two dimensions that have probably attracted the most attention are income and race. Very low income households have home ownership rates that are 37 percentage points lower than the rate for high income households, while home ownership rates for minority households lag behind those of white households by 24 percentage points.[3]

Considerable effort has gone into understanding the determinants of home ownership rates by income, racial, and ethnic status.[4] Haurin, Herbert, and Rosenthal (2007) assess the extent of differences in home ownership rates among different socioeconomic groups, and review existing research on possible explanations for these differences. They first discuss factors that affect the formation of households, and then turn to the propensity for homeownership.

In addition to factors that influence household demand for home ownership, Haurin, Herbert, and Rosenthal evaluate three types of supply constraints that may restrict different households' access to single-family housing: (1) the supply of mortgage credit may affect low income and minority households differently; (2) there may be racial discrimination in mortgage markets; and (3) the type of housing stock may vary across different neighborhoods.

Racial or ethnic discrimination that affects access to homeownership can occur at several different levels. Munnell, Tootell, Browne, and NcEneaney (1996) supplemented data generated as a result of the Home Mortgage Disclosure Act with data collected by the Federal Reserve Bank of Boston

[3] Bunce and Reeder (2007, p. 1).
[4] *Cityscape* recently devoted two special issues that focused on recent research on low income and minority homeownership (Bunce and Reeder, 2007 and Reeder, 2008).

from lending institutions on financial, employment, and property characteristics to see whether race plays a role in the lending decision. They found significant disparities between minority and white rejection rates, even after controlling for other factors. Yinger (1991) used data from the 1989 HUD Housing Discrimination Study that conducted fair housing audits. He found statistically significant differences in the treatment of blacks and whites and in the treatment of Hispanics and Anglos by sales and rental agents. Ondrich, Stricker, and Yinger (1998) used a similar approach to investigate the treatment of whites, blacks, and Hispanics by real estate brokers. They too found evidence of discrimination.

These and many other studies have examined person-based discrimination. A related issue is whether different types of neighborhoods are treated differently by various parties involved in the supply of housing. Berkovec, Canner, Gabriel, and Hannan (1994) used individual loan records from HUD along with census tract data to study default risk characteristics and performance of FHA-insured mortgages. They found that loans in high income and high housing price census tracts are less likely to default. They found no strong relationship between racial characteristics of a neighborhood and likelihood of default. Tootell (1996) addressed the issue of "redlining" directly by studying the racial composition of the neighborhood while controlling for the race of the applicant. He found that the racial composition of the neighborhood where a property is located is not significantly related to the lending decision.

Yet to be analyzed is whether the supply response of real estate agents and brokers differs by neighborhood characteristics. In a non-discriminatory competitive market characterized by free entry, we would expect real estate middlemen to pursue profitable opportunities wherever they occur. In equilibrium, agents and brokers would list and sell properties and be compensated for their services at prices that yielded the same return in low income neighborhoods as high income neighborhoods, and in census tracts where house prices are low as in tracts where prices are high. Only the profit

opportunities, and not the racial and ethnic characteristics of a neighborhood, would affect agents' and brokers' supply decisions.

Conceptual Framework

Residents of low income or minority neighborhoods pay higher prices and have fewer choices for a variety of products and services. Underserved sectors include supermarkets, banks, and large drug stores,[5] credit cards,[6] gasoline retailing,[7] and auto insurance.[8] Given the relatively low home ownership rates among low income and minority households, a natural question is whether neighborhoods with higher proportions of low income or minority households are underserved by real estate middlemen. If brokers "redline" neighborhoods, then a lack of competition among agents and brokers may lead to higher prices and reduced services for residents of such neighborhoods.

Competitiveness in real estate brokerage has been a concern of the Antitrust Division of the U.S. Department of Justice and the Federal Trade Commission for a long time. The two agencies issued a joint report on competitiveness in the real estate industry in 2007. They cited anecdotal evidence of high concentration levels in local real estate markets as cause for concern. Motivated by that and other studies that analyzed one or a handful of markets, we collected data in 2007 and 2009 on the number of brokers and market shares for 90 small, medium, and large real estate markets around the country and computed HHI's. In medium and large-sized markets we found no evidence of market concentration levels that might create problems for competition. In some of the small markets in our sample, we found HHI's in the range that would invite antitrust scrutiny under the FTC/DOJ Horizontal Merger

[5] Alwitt and Donley (1997) use Chicago as a case study and find that poorer zip codes have fewer and smaller outlets than nonpoor zip codes for supermarkets, banks, and large drug stores.
[6] Cohen-Cole (2011) finds that, after controlling for place-specific factors, qualitatively large differences exist in the amount of credit offered to similarly qualified applicants living in black vs. white areas.
[7] Myers, Close, Fox, Meyer, and Niemi (2011) analyze gasoline retailing and find that prices are higher in poorer areas, partially because of low competition and inelastic demand.
[8] Ong and Stoll (2007) find that variations in insurance costs occur because of both risk and redlining factors, and that black and poor neighborhoods are adversely affected.

Guidelines if two larger firms proposed to merge. We were also able to analyze the size distribution of firms in sub-markets within a larger metropolitan area, Louisville, KY, but were unable to look at sub-markets stratified by income, house prices, or racial composition.

The general concern about competition in real estate brokerage alongside the differential rates of home ownership by income and race suggest an analysis of concentration levels by neighborhood. The structural question that we analyze is whether low income, low price, or high minority neighborhoods face redlining by real estate brokers, i.e. do brokers avoid low income and low house price neighborhoods because it is less profitable to do so? If so, the lack of competition may lead to less market activity and higher prices for real estate services. Similarly, do brokers discriminate against and avoid minority-dominated neighborhoods, possibly leading to lower levels of service and higher prices for real estate services?

To answer these questions we chose six large MSA's, Atlanta, Boston, Chicago, Dallas, Los Angeles, and Washington, D.C. We gathered data that allow us to analyze the number and market shares of real estate brokers serving each zip code neighborhood. We combined these data with Census data on income, house values, and racial composition, so that we can determine whether the supply of real estate brokerage services differs by income, house price, or racial composition in a neighborhood.

Data

We collected data from www.Realtor.com in April, 2011 for all zip codes in the Atlanta, Boston, Chicago, Dallas, Los Angeles, and Washington D.C. metropolitan statistical areas. We gathered information on all single-family homes, townhomes, and condominiums within each zip code, including the dwelling's address, city, lot size, bedrooms, bathrooms, listing broker, and unique URL link. Using a web scraping program, we attempted to collect information from 2,984 zip codes within these six MSA's; within those zip codes our program collected over 300,000 listings. Some zip codes did not

contain any listings, most often because they were P.O. Boxes or unique zip codes (for example, related to a government facility). Overall, 1,884 zip codes had at least one real estate listing. The amount of real estate activity in each MSA differed substantially. For example, Atlanta had 265 real estate listings per zip code, more than three times higher than Boston's average of 85.[9]

We compiled a list of firms in each market from the core data set of 314,232 real estate listings. This was a non-trivial task, because real estate listings by the same office often have slightly different names. Consider, for example, the Keller Williams franchise in Atlanta. According to the Keller Williams website, there are 32 offices in the Atlanta area.[10] One of the larger offices is "Keller Williams Realty Atlanta Partners". Various listings in Atlanta substitute the word "Ptnrs" or "Part" or "Part." or "Ptnr" for the word "Partners". Other listings substitute the word "Atl" or "Atl." for the word "Atlanta". Some other listings substitute "Rlty" or "Re" for the word "Realty". And a few listings use the abbreviations "KW" or "Keller Wms" for "Keller Williams". Overall, across the six MSA's, there were 18,825 unique names for offices or firms, although clearly from this example, a particular real estate brokerage firm can have multiple unique names in the data.

To create the HHI for each MSA and for each zip code, we had to perform the particularly time-intensive task of editing the firm names in defensible ways. Our first approach was to make extremely minor changes to office names, and then to treat each office as a unique firm. These minor changes included changing all lower case letters to upper case, removing extra spaces, dashes, periods, commas, slashes, explanation points, and converting obvious abbreviations (e.g. "C 21" to "CENTURY 21"). After these minor changes were made, there were a total of 16,264 firms across the six MSA's, varying from 1,767 in Boston to 5,855 in Los Angeles. To the extent that some of the individual offices identified by this process are parts of larger multi-location brokerage firms, then this "minor change" approach *understates* the HHI in the locality. Our second approach was to make "major edits", the most important

[9] See Appendix Exhibit 1 for a complete description and breakdown of the construction of our sample.
[10] http://www.kw.com/kw/OfficeSearchSubmit.action?startRow=1&rows=50&city=Atlanta&stateProvId=GA&zip=

of which is grouping all listings with a given franchise name and treating them as part of the same firm. For example, this approach would group the 32 Keller Williams offices in Atlanta into one firm.[11] As a consequence, this method likely *overstates* market concentration. The "major edit" approach leads to 14,922 firms across all areas, varying from 1,618 in Boston to 5,296 in Los Angeles. In this way, we are able to provide lower and upper bounds on the size distribution of firms in each given market.

From the initial 1,884 zip codes with real estate listings in the MSAs, we created various geographies besides the MSA. In one specification, we restrict zip codes to those that are officially in the central city according to the US Postal Service.[12] These political jurisdictions yield many fewer zip codes, as illustrated in Appendix Exhibit 1. In another specification, we rely on agent-reported city names, even if the city name is inconsistent with the official name in the zip code. This again yields many fewer zip codes.

The MSA sample of zip codes forms the starting point for much of our analysis on disparities in market structure by income, house value, or race. From the initial sample of 1,884 zip codes, we restrict the sample to the 1,361 zip codes with at least 50 or more real estate listings. By doing so, we believe that our computation of HHI will not be mechanically influenced by small sample sizes (for example, the HHI must be 10,000 if there is only one listing in a zip code, and cannot be lower than 5,000 if there are two listings). We then append data from "Census Factfinder," drawing on the 2000 Census.[13] Overall, approximately 97 percent of zip codes – or 1,321 of 1,361 – had information tabulated from the decennial Census. We chose three critical characteristics at the zip code level – median value of single-family owner-occupied homes, median family income, and percent white – from the Factfinder tool.

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[11] Most real estate franchisors structure their franchise contracts so as to give legal autonomy to each franchisee, which would suggest that our first approach gives a better measure of the number of independent producers in a market than our second approach.

[12] See http://zip4.usps.com/zip4/citytown.jsp, where the central cities are Atlanta, Boston, Chicago, Dallas, Los Angeles and Washington.

[13] See http://factfinder.census.gov/ .

Empirical Results

Our goal in this paper is to divide large markets (MSA's) into neighborhoods (zip codes) where we can obtain demographic information on income, house values, population, and home ownership for 2000, merged with concentration levels from 2011, and use these data to investigate whether low income and high minority neighborhoods are underserved by real estate brokers. Exhibit 1 contains HHI's computed for each of the six cities at the MSA level, the city level where the listing real estate agent inputs the city, and at the city level as defined by the USPS zip code. We include HHI's where all offices are considered separately, and where all offices of each franchisor are treated as part of one firm. At the MSA level, HHI's range from 36 to 341 when all offices are considered separately and from 302 to 678 when all offices of a franchisor are combined. HHI's are slightly higher when calculated at the city level, but not appreciably. All are clearly in the range considered competitive by the USDOJ and the FTC when evaluating horizontal mergers.[14]

This point is reinforced when we examine market shares of the top four brokerages in each MSA. Exhibit 2a contains this information when all offices are considered separately, and Exhibit 2b does the same when all offices of a franchisor are combined. At the MSA level, even the largest real estate broker has less than a five-percent market share in Atlanta, Boston, Dallas, and Los Angeles when each office is considered as an independent firm. In Chicago, the largest broker has 7.8% of the market, and in Washington, D.C. the largest broker has 16.2% market share. When we treat all offices of a franchisor as one firm, a slightly different picture emerges. The larger franchisors in each MSA now have market shares in the teens, although none have as much as twenty percent of the market for real estate listings in the entire MSA.

[14] Markets are classified according to HHI into three types under the 2010 Horizontal Merger Guidelines: unconcentrated (HHI<1500), moderately concentrated (1500<HHI<2500), and highly concentrated (HHI>2500). See http://www.justice.gov/atr/public/guidelines/hmg-2010.html

These results confirm our earlier research that indicated a lack of concentration in markets for real estate brokerage in larger urban areas.[15] Now we turn our attention to smaller sub-markets within the larger MSA's. Exhibit 3 contains summary statistics at the zip code level for each of the six MSA's in our sample. Average population per zip code area varies from 20,300 in Boston to 38,009 in Los Angeles. Boston had the fewest housing units, 8,097, and Los Angeles had the most, 13,024. Median income ranged from $58,400 in Atlanta to $77,200 in Washington, D.C. Considerable variation exists across cities in median house value, with housing being the cheapest in Dallas (median = $124,900) and most expensive in Los Angeles (median = $286,700). The percent of the population classified as white varies from 58.1% in Los Angeles to 87.1% in Boston. Finally, the level of housing market activity varies considerably as well. In Boston there were only 113 MLS listings per zip code, which is less than one-third the level in Atlanta which had 380 MLS listings per zip code.

Exhibit 3 also contains HHI's computed at the zip code level and averaged over the entire urban area for each of the six MSA's. Again we compute HHI's when all franchise offices are considered separately and when all offices of a franchisor are combined. Considering all franchise offices separately yields average HHI's that range from 355 in Los Angeles to 815 in Washington, D.C. Combining all offices of each franchisor and treating them as one firm yields average HHI's that range from 642 in Los Angeles to 1151 in Chicago. None of the six MSA's on average have market structures at the zip code level that even fall into the moderately concentrated level according to the 2010 Horizontal Merger Guidelines. These average HHI's also fall in the middle of the range of HHI's that we observed when we analyzed small markets (fewer than 1000 listings) in our 2012 study.[16]

Now we are ready to examine the main topic of this paper—are low income or high minority neighborhoods differentially served by the real estate brokerage industry? We have ranked zip codes in each of the six MSA's by median income quartile, by median house value, and by percent of the

[15] Beck, Scott, and Yelowitz (2012 forthcoming), Tables 2a and 2b.
[16] See Beck, Scott, and Yelowitz, 2012 forthcoming, Table 2c.

population classified as white. We compute HHI's for each quartile, and compare the bottom quartile in each category with the top quartile. Exhibits 4a, 4b, and 4c contain these results for median income, median house value, and percent white, respectively.

As can be seen in Exhibit 4a, when ranked by median income level, the average HHI for zip codes in the bottom income quartile is 536 and in the top income quartile is 754, when all offices are considered separately. When all offices of a franchisor are combined, the bottom quartile average HHI is 825 and the top income quartile HHI is 1176. Only in the Atlanta and Dallas MSA's is that ordering reversed when all offices are considered separately and in the Atlanta MSA when all offices of a franchisor are combined. Lower income neighborhoods are on average being served by more real estate brokers who have smaller market shares than are higher income neighborhoods. The market structure of real estate brokerage in lower income neighborhoods would seem to be more conducive, and not less, to competition among brokers in poorer sections of these six large urban areas.

Exhibit 4b contains the same analysis, except that zip code neighborhoods are ranked by median house values. The average HHI for zip codes in the bottom house value quartile is 543 and in the top house value quartile is 769, when all offices are considered separately. When all offices of a franchisor are combined, the bottom quartile HHI is 855 and the top house value quartile HHI is 1163. Only in the Atlanta and Dallas MSA's is that ordering reversed, and then only when all offices are considered separately. Similar to above, lower house value neighborhoods are on average being served by more real estate brokers who have smaller market shares than are higher house value neighborhoods.

The final attribute for our analysis is the racial composition of the neighborhood. Exhibit 4c contains results for neighborhoods ranked by the percent of the population in the zip code that is classified as white. The average HHI for zip codes in the lowest percent white quartile is 447 and in the highest percent white quartile is 739, when all offices are considered separately. When all offices of a franchisor are combined, the bottom quartile HHI is 728 and the top percent white quartile HHI is 1145.

Only in the Boston MSA is that ordering reversed, and then only when all offices are considered separately. Just as when zip codes are ranked by income and by house value, high minority/low percent white neighborhoods are on average being served by more real estate brokers who have smaller market shares than low minority/high percent white neighborhoods.

Summary and Conclusions

Real estate brokers often specialize in local sub-markets within larger urban markets, especially since geographically proximate neighborhoods can differ nontrivially by income levels, house prices, racial composition, and other attributes. Real estate agents and brokers are typically compensated based upon the selling price of the home. The nature of agents' and brokers' costs is such that the profitability of any real estate transaction is likely to increase with the selling price of the house.

The question naturally arises whether low-income neighborhoods or neighborhoods where house prices are low are as well served by real estate middlemen as higher income or higher price neighborhoods. If so, this might partially explain the income gap in home ownership. A related question is whether neighborhoods with high minority populations are underserved by brokers, which might partially explain the racial gap in home ownership.

To answer these questions we gather data for six large metropolitan areas: Atlanta, Boston, Chicago, Dallas, Los Angeles, and Washington, D.C. We collected information on income, house values, racial composition, and home ownership at the zip code level from the 2000 Census. We combined these data with information that we collected from Realtor.com in 2011 on real estate listings by broker for each zip code neighborhood.

After calculating each broker's market share of listings within each zip code in the six MSA's, we compute HHI's. We rank zip codes by median income, median house price, and percent white, and then compare HHI's for zip codes in the top quartile to those in the bottom quartile. We find that HHI's are

lower in neighborhoods with lower median incomes, lower median housing values, and higher percent nonwhite. These sub-markets are served by relatively more agents and brokers with smaller market shares than higher median income, higher median house value, and higher percent white neighborhoods. The income and racial gaps in home ownership do not seem to be due to concentrated market structure in real estate brokerage.

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Exhibit 1

HHI's by different geographic levels and brokerage definitions

	Atlanta	Boston	Chicago	Dallas	Los Angeles	Washington DC
MSA Level						
HHI - All Offices Considered Separate	120	36	122	107	52	341
HHI - All Franchise Offices Combined	512	418	677	622	302	678
Sample Size	67,426	19,783	85,825	34,782	52,037	32,986
City Level (Realtor Defined)						
HHI - All Offices Considered Separate	233	142	249	184	46	562
HHI - All Franchise Offices Combined	633	393	414	460	340	773
Sample Size	13,441	2,269	18,531	6,494	5,363	2,878
City Level (USPS Zip Codes)						
HHI - All Offices Considered Separate	224	144	228	259	46	560
HHI - All Franchise Offices Combined	620	396	408	498	366	772
Sample Size	15,142	2,255	19,850	6,113	6,126	2,881

Notes: Sample size refers to the number of MLS listings used to compute the HHI. All data obtained from Realtor.com in April 2011. The zip codes used to define MSAs come from http://www.census.gov/population/www/metroareas/metroarea.html . MSAs include both the central city and other cities that are part of the same labor market. In the Atlanta MSA, the cities with the most listings were: Atlanta, Marietta, Lawrenceville, Decatur, Cumming, Alpharetta, Smyrna, Kennesaw, Douglasville, and Acworth. In the Boston MSA, the cities with the most listings were: Boston, Plymouth, Newton, Quincy, Cambridge, Brockton, Lowell, Rochester, Manchester, and Haverhill. In the Chicago MSA, the cities with the most listings were: Chicago, Aurora, Naperville, Elgin, Joliet, Plainfield, Palatine, Des Plaines, Evanston, and Arlington Heights. In the Dallas MSA, the cities with the most listings were: Dallas, Fort Worth, Arlington, Plano, Mckinney, Frisco, Garland, Irving, Carrollton, and Denton. In the Los Angeles MSA, the cities with the most listings were: Los Angeles, Long Beach, Lancaster, Irvine, Palmdale, Santa Ana, Anaheim, Huntington Beach, Whittier, and Orange. In the Washington DC MSA, the leading cities were: Washington, Alexandria, Silver Spring, Woodbridge, Fredericksburg, Arlington, Frederick, Hyattsville, Upper Marlboro and Bowie. The city-level definitions include only listings in the city proper, not adjoining areas.

Exhibit 2a

Top Four Brokerages by MSA: HHI - All Offices Considered Separate

Atlanta		Boston		Chicago	
Firm Name	Market Share	Firm Name	Market Share	Firm Name	Market Share
Harry Norman Realtors	4.5%	Keller Williams Realty	2.5%	Coldwell Banker Residential	7.8%
Prudential Georgia Realty	4.3%	Re/Max Prestige	1.8%	Baird & Warner	3.7%
Better Homes & Gardens Real Estate Metro Brokers	4.1%	William Raveis Real Estate & Home Services	1.7%	@Properties	2.6%
Coldwell Banker Residential Br	4.1%	Century 21 Commonwealth	1.2%	Koenig & Strey Real Living	2.5%
Dallas		**Los Angeles**		**Washington DC**	
Firm Name	Market Share	Firm Name	Market Share	Firm Name	Market Share
Keller Williams Realty	4.9%	Prudential California Realty	4.8%	Long & Foster Real Estate Inc	16.2%
Ebby Halliday Realtors	4.7%	First Team Real Estate	3.0%	Weichert Realtors	4.5%
Coldwell Banker Residential	3.5%	Keller Williams Realty	1.8%	Coldwell Banker Residential Brokerage	3.1%
Coldwell Banker APEX	2.4%	Coldwell Banker	1.7%	Keller Williams Realty	3.1%

Notes: Sample sizes are the same as for the MSA sample in Exhibit 1.

Exhibit 2b

Top Four Brokerages by MSA - HHI - All Franchise Offices Combined

Atlanta		Boston		Chicago	
Firm Name	Market Share	Firm Name	Market Share	Firm Name	Market Share
Keller-Williams	15.0%	Coldwell Banker	12.7%	Re/Max	18.8%
Re/Max	11.8%	Re/Max	10.9%	Coldwell Banker	13.5%
Coldwell Banker	7.0%	Century 21	7.4%	Century 21	8.0%
Prudential	5.5%	Keller-Williams	5.6%	Prudential	4.8%
Dallas		**Los Angeles**		**Washington DC**	
Firm Name	Market Share	Firm Name	Market Share	Firm Name	Market Share
Keller-Williams	16.1%	Coldwell Banker	8.4%	Long & Foster	17.2%
Re/Max	12.1%	Century 21	7.6%	Re/Max	15.9%
Coldwell Banker	8.5%	Re/Max	7.4%	Keller-Williams	6.7%
Ebby Halliday Realtors	8.0%	Prudential	7.3%	Weichert	4.6%

Notes: Sample sizes are the same as for the MSA sample in Exhibit 1.

Exhibit 3

Zip Code Level Summary Statistics

	All MSAs	Atlanta MSA	Boston MSA	Chicago MSA	Dallas MSA	Los Angeles MSA	Washington DC MSA
Population	28216	25369	20300	28959	25395	38009	23077
	(18429)	(14334)	(12472)	(21962)	(15018)	(19525)	(13478)
Housing Units	10570	9853	8097	11023	10013	13024	9119
	(6496)	(5398)	(5113)	(8316)	(5996)	(5613)	(5456)
Median Income (in $1000s)	65.9	58.4	71.4	67.6	60.7	61.4	77.2
	(25.6)	(21.3)	(24.3)	(25.2)	(22.8)	(27.6)	(25.3)
Median House Value (in $1000s)	205.1	142.3	242.7	184.8	124.9	286.7	205.7
	(135.4)	(77.1)	(146.7)	(114.1)	(77.4)	(170.3)	(91.1)
Percent White (%)	70.4	67.6	87.1	76.1	75.2	58.1	66.0
	(24.4)	(26.3)	(14.8)	(25.3)	(18.0)	(21.8)	(25.3)
MLS Listings	207	380	113	258	175	160	154
	(156)	(225)	(66)	(162)	(111)	(88)	(86)
HHI All Franchise Offices Considered Separate	597	473	794	668	593	355	815
	(417)	(347)	(443)	(440)	(352)	(234)	(465)
HHI All Franchise Offices Combined	971	824	1138	1151	1062	642	1115
	(481)	(360)	(528)	(477)	(417)	(312)	(515)
Sample Size	1321	172	157	310	176	308	198

Notes: Zip codes restricted to those with 50+ MLS listings on Realtor.com and where the zip code could be merged to Census Factfinder data from 2000. MLS listings gathered between April 11-13, 2011. Standard deviations in parentheses. The HHI measures and listings are computed in 2011, while the population, housing, income, house value and race statistics are computed from the 2000 Census.

Exhibit 4a

Zip Code Level HHI Analysis

By Income Quartile

	All MSAs	Atlanta MSA	Boston MSA	Chicago MSA	Dallas MSA	Los Angeles MSA	Washington DC MSA
Zip Codes in Bottom Income Quartile							
HHI - All Offices Considered Separate	536	561	584	576	693	233	743
	(451)	(484)	(232)	(486)	(498)	(112)	(556)
HHI - All Franchise Offices Combined	825	894	857	887	1031	473	1001
	(491)	(479)	(301)	(564)	(525)	(175)	(540)
In Top Income Quartile							
HHI - All Offices Considered Separate	754	484	1046	829	576	575	1070
	(449)	(276)	(515)	(492)	(229)	(284)	(461)
HHI - All Franchise Offices Combined	1176	878	1461	1313	1204	902	1391
	(482)	(226)	(602)	(409)	(363)	(366)	(559)

Notes: Zip codes restricted to those with 50+ MLS listings on Realtor.com and where the zip code could be merged to Census Factfinder data from 2000. MLS listings gathered on April 11, 2011. Quartiles for income are based on zip codes within an MSA; for the "All MSA" category, a zip code is included if it is in the top or bottom quartile for its MSA.

Exhibit 4b

Zip Code Level HHI Analysis

By House Value Quartile

	All MSAs	Atlanta MSA	Boston MSA	Chicago MSA	Dallas MSA	Los Angeles MSA	Washington DC MSA
Zip Codes in Bottom House Value Quartile							
HHI - All Offices Considered Separate	543	611	628	643	668	216	649
	(422)	(502)	(220)	(476)	(481)	(122)	(388)
HHI - All Franchise Offices Combined	855	902	965	988	1041	479	933
	(473)	(498)	(348)	(559)	(511)	(180)	(364)
In Top House Value Quartile							
HHI - All Offices Considered Separate	769	472	1106	822	617	576	1101
	(463)	(284)	(524)	(501)	(224)	(302)	(465)
HHI - All Franchise Offices Combined	1163	903	1474	1219	1153	957	1373
	(482)	(265)	(609)	(439)	(379)	(364)	(573)

Notes: Zip codes restricted to those with 50+ MLS listings on Realtor.com and where the zip code could be merged to Census Factfinder data from 2000. MLS listings gathered on April 11, 2011. Quartiles for house value are based on zip codes within an MSA; for the "All MSA" category, a zip code is included if it is in the top or bottom quartile for its MSA.

Exhibit 4c

Zip Code Level HHI Analysis

By Percent White Quartile

	All MSAs	Atlanta MSA	Boston MSA	Chicago MSA	Dallas MSA	Los Angeles MSA	Washington DC MSA
Zip Codes in Bottom Percent White Quartile							
HHI - All Offices Considered Separate	447	295	733	455	512	217	631
	(379)	(185)	(484)	(339)	(327)	(98)	(507)
HHI - All Franchise Offices Combined	728	612	1000	753	842	477	856
	(410)	(271)	(562)	(393)	(337)	(163)	(488)
In Top Percent White Quartile							
HHI - All Offices Considered Separate	739	504	684	968	636	574	973
	(417)	(297)	(241)	(512)	(288)	(304)	(425)
HHI - All Franchise Offices Combined	1145	856	1025	1491	1109	906	1348
	(449)	(276)	(335)	(433)	(350)	(375)	(423)

Notes: Zip codes restricted to those with 50+ MLS listings on Realtor.com and where the zip code could be merged to Census Factfinder data from 2000. MLS listings gathered on April 11, 2011. Quartiles for percent white are based on zip codes within an MSA; for the "All MSA" category, a zip code is included if it is in the top or bottom quartile for its MSA.

Appendix Exhibit 1 – Data Extraction

	Atlanta	Boston	Chicago	Dallas	Los Angeles	Washington DC	Total
Initial Zip Codes Scraped	345	327	510	436	662	704	2984
Zip codes with at least 1 listing	254	234	419	279	375	323	1884
• Dwellings in these zip codes (including duplicates)	86663	20267	86461	34933	52619	33289	314232
• Listings per Zip Code (including duplicates)	341	87	206	125	140	103	
• Dwellings in these zip codes (no duplicates)	67426	19783	85825	34782	52037	32986	292839
% Unduplicated	78%	98%	99%	100%	99%	99%	93%
• Listings per Zip Code (no duplicates)	265	85	205	125	139	102	155
Zip codes within MSA	254	234	419	279	375	323	1884
Zip codes within official city according to USPS (source: http://zip4.usps.com/zip4/citytown.jsp)	50	26	62	46	63	25	272
Zip codes with agent-reported city name	71	27	61	50	87	22	318
Zip codes within MSA	254	234	419	279	375	323	1884
Zip codes within MSA (50 or more listings)	177	158	327	185	314	200	1361
Zip codes within MSA (50 or more listings, merged to Census Factfinder)	172	157	310	176	308	198	1321
Firms in MSA (Unedited)	2465	2180	3529	2166	6736	1749	18825
Firms in MSA (Minor Edits)							
• Change lower case, extra spaces, dashes, periods, commas, slashes, explanation points, ampersands, Convert RE MAX to REMAX, AND to &, C 21 to CENTURY 21, etc.; treats each office as its own brokerage	2028	1767	3179	1935	5855	1500	16264
Firms in MSA (Major Edits)							
• Change offices within a franchise to one firm; Examine all firm names within MSA	1775	1618	2964	1856	5296	1413	14922