

The Relative Performance of Real Estate Marketing Platforms: MLS versus FSBOMadison.com*

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Abstract

We compare outcomes obtained by sellers who listed their home on a newly developed For-Sale-By-Owner (FSBO) web site versus those who used an agent and the Multiple Listing Service (MLS). We do not find support for the hypothesis that listing on the MLS helps sellers obtain a significantly higher sale price (even before subtracting commissions). However, we find that MLS listings sell faster. The diffusion of the new FSBO platform was quick, with the market share stabilizing after 2 years. The lower effectiveness of FSBO (in terms of time to sell and probability of a sale) may be due to network size or the type of buyers and sellers that use it. We do not find direct evidence of the importance of network size, but we do find evidence of platform selection: more patient sellers use FSBO while more patient buyers buy on MLS (where they face less patient sellers). We discuss the implications for platform competition and welfare.

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1 Introduction

A large proportion of housing transactions are carried out with the help of realtors.¹ Realtors provide expertise (on pricing, conditioning the house for sale and bargaining) and convenience (by showing the house, advertising and holding open houses and helping with the paperwork). Another advantage of working with a realtor is access to the Multiple Listing Service (MLS), a database that compiles information on all the properties listed by local realtors. For their services realtors charge a commission at, or around, 6%. The commission rate has been stable over time and across regions and has been the subject of the scrutiny of antitrust authorities (see DOJ, 2007).

The advent of the internet has affected many markets. The real estate market is one of them. Direct marketing was always possible using newspapers, flyers and other forms of advertising. However, the internet offers a cheaper and potentially more effective platform that facilitates direct (by owner) marketing. Sellers can post detailed information, photos as well as virtual tours. For-Sale-By-Owner (FSBO) websites provide an alternative platform, or two-sided network, that competes with the MLS network.

In this paper we study the performance of these two competing platforms: MLS and FSBO. The established platform offering the bundle of services available from realtors, versus the newly established no-service platform. The financial cost of MLS transactions is the commission minus the price premium an MLS transaction might generate and the financial savings from a faster sale. The price premium may largely offset, or even more than make up for, the commission.² We quantify the financial cost of using an agent by comparing the performance of listings by owner to transactions with realtors. We also assess the platforms' effectiveness, comparing measures like time on the market and the probability of sale within a time window.

¹Real estate agents are licensed by the state. A realtor is a real estate agent who is a member of the Realtor Association.

²The National Association of Realtors website claims, based on the 2005 Home Buyer & Seller Survey that "the median home price for sellers who use an agent is 16.0 percent higher than a home sold directly by an owner; \$230,000 vs. \$198,200; there were no significant differences between the types of homes sold."

We focus on the city of Madison, Wisconsin, where a single website (FSBOMadison.com) has become the dominant for-sale-by-owner platform. With the cooperation of FSBOMadison.com we gained access to all FSBO listings since the start of the platform. We combined the FSBO data with data from two other sources. First, the South-Central Wisconsin Realtors Association granted us access to all MLS listings in the city. Second, we matched every listing with data from the city of Madison. The city of Madison assessor office maintains a database with the full history of transactions on every property together with an exhaustive set of property characteristics. By merging these data sets we get a complete history of events that occurred for virtually every single-family home for sale, 18,466 observations, between January 1998 and December 2005. A history of a listing includes: date and platform of initial listing, date of any moves across platforms, and outcome (sale date and price if sold, withdrawal date otherwise).

After controlling for houses and seller heterogeneity, we find no support for the hypothesis that the MLS delivers a higher sale price (before subtracting commissions) than FSBO. Considering that realtors charge a 6% commission versus \$150 for FSBO, FSBO sellers come ahead financially. The lack of a MLS premium does not mean realtors do not provide value to the seller. It means instead that the cost of the convenience provided by realtors seems to be the full commission.³

MLS transactions are faster. The longer time to sell on FSBO is driven by two factors. First, over 20% of FSBO listings do not sell on FSBO and list afresh on the MLS. Second, the probability of a quick sale is larger for houses initially listed on the MLS.

The quicker time to sell on the MLS might be explained by scale effects or by network composition. FSBO's size may not fully exploit economies of scale in network size. We do not find direct evidence of an effect of network size on FSBO performance. We do, however, find evidence of platform selection. By matching names in the city data, we checked whether buyers and sellers are local. We think being local is a proxy for a better understanding of the market, more patience and better ability to search (relative to an out of town buyer who has to search and buy during trips to town). Consistent with being more patient locals sellers sell

³We would like to compare prices net of commissions as well, however, absent information on commissions we can only compare transaction prices. One reason for variation in commissions is whether a buyer is represented by an agent, in this case a FSBO transaction only saves half of the 6% commission.

at a premium, while local buyers pay less. Using this measure, we find that patient sellers are more likely to use FSBO while patient buyers are more likely to purchase on MLS, where they face less patient sellers. These findings are in line with the literature on platform sorting (Foucault and Parlour (2004), Jin and Kato (2007), Ambrus and Argenziano (forthcoming), Damiano and Li (forthcoming)).

The raw price comparison, controlling for observed house characteristics and market trends, shows that the average sale price of homes that sell on FSBO is higher than the average price of homes that sell with a realtor. Platform selection might be a main reason behind the persistent premium.

There are two concerns due to platform selection. First, there might be unobserved house characteristics that affect both the decision to sell on FSBO and outcomes. For example, easier to sell homes (i.e., conform better to the taste of the population) may be more likely to be listed and sold through FSBO. At the same time these popular homes may sell at a premium. To deal with unobserved house heterogeneity we examine properties that sold multiple times. The inclusion of a house fixed effect is essentially inconsequential. We therefore conclude that unobserved house heterogeneity, which is fixed over time, does not seem to be a quantitatively relevant issue.

The second concern is the selection of sellers into FSBO. Sellers may differ, for example, in their patience or bargaining ability.⁴ More patient sellers are likely to get a better price, regardless of the platform they choose. At the same time they may be more prone to list on FSBO. In that case we will get a positive correlation between FSBO and sale price.

We deal with seller selection in several ways, all of which suggest a non-significant FSBO premium. First, we compare the houses that listed and sold on FSBO, to those that listed on FSBO, failed, and eventually sold on the MLS.⁵ The second approach is related to Levitt and Syverson (forthcoming). They find – as we do in our data – a premium for realtors’ own properties sold on the MLS. We compare the realtors’ premium to the premium sellers get on FSBO, both are by-owner transactions on different platforms. The third approach is to

⁴For a descriptive study of bargaining patters using English data see Merlo and Ortalo-Magné (2004), and Merlo, Ortalo-Magné and Rust (2006) for a structural model of bargaining using the same data.

⁵Moving from FSBO to MLS may depend on seller type, nevertheless, the selection bias is likely to be attenuated, as the group of FSBO listers is likely to be more homogenous than the population as a whole.

compare transactions of the same seller using different platforms, by matching seller names across transactions.

Our data comes from a single city and we do not know how representative the results are of other markets. Similar FSBO websites exist in many other markets, mostly in medium size cities (see www.fsbopublishers.org). Madison is reasonably representative in measurable demographics, although it is unique in other dimensions (college town, state capital), it is unclear how this would impact our main findings. During the sample period real estate prices increased significantly nationwide. However, price increases in Madison were lower, in par with increases in many other towns. The average yearly house price increase during the sample in real terms was 4.9%. For example, our sample includes 2005 with a real price increase of 2.4%, which is by no means a boom year. Thus, enabling us to check the robustness of our findings.

A related study that complements our findings, by Bernheim and Meer (2007), compares non-MLS listings with and without agent.⁶ They look at sales of faculty and staff homes on the Stanford University campus with and without an agent. They find, consistent with our findings, that brokers accelerate sales but do not deliver higher prices. They isolate the effect of information from other broker services, since the Stanford Housing Office maintains a free listing service for eligible buyers they know the value of a broker does not reside in information diffusion (i.e., the platform). Instead, brokers' value "is likely confined to promotional services, negotiations, and the interpretation of market data." Levitt and Syverson (2007) use data from three different counties to compare the performance of flat-fee realtors to full service agents. They find that there is no difference in the selling price but that the time to sell is slightly longer when using a flat fee agent.

The rest of the paper is organized as follows. Section 2 presents the institutional background with special emphasis on Madison. Section 3 presents the data and basic descriptive analysis. Section 4 presents the results. It starts with raw platform comparisons followed by several approaches to deal with selection. Section 5 presents some descriptives on network diffusion, platform sorting and welfare implications.

⁶See also Jud and Frew (1986) and Zumpano et al. (1996).

2 Realtors and FSBOMadison.com

Historically, most real estate transactions have been performed using real estate agents. Homeowners wishing to sell their homes contract with a real estate agent (the listing agent) offering the agent exclusivity for a limited period, usually 6 months, and agreeing to pay a commission, of usually 6% of the sale price, if the house is sold during the contract period (DOJ (2007)). The commission is typically split between the listing agent and the selling agent, who is the agent that brings the buyer.⁷ When the same agent lists and sells the property, this agent gets the whole commission.

Real estate agents are licensed by the state. In most states licensing requires a short course and passing an exam. A real estate agent becomes a realtor when s/he joins the realtor association and subscribes to its code of ethics. Joining the association provides the agent with several advantages; one of them is access to the MLS.

Working with an agent, and agreeing to pay the commission, gives the homeowner access to a number of services. The National Association of Realtors (NAR) argues that Realtors provide valuable help with setting the listing price, preparing the house, checking potential buyers' qualifications, showing the house, bargaining the terms of the deal, and handling the paperwork. Another advantage of working with a realtor is access to the MLS. In the market we examine this involves the ability to list on the South Central Wisconsin MLS, which costs a minimal fee, \$10 as of 2007, but requires membership in the organization, and thus is available only to local realtors.

In 1998 an alternative to the MLS was launched in Madison, Wisconsin: the website FSBOMadison.com. The FSBO founders recruited 9 listings from advertisements in the local newspaper, added their own house and launched their website with 10 listings. From the get-go, the strategy of FSBOMadison.com was to provide a cheap no-frills service. In exchange for a fee of \$75 initially, \$150 for most of the period of our sample, homeowners can post their listing on the website (property characteristics, contact details and a few pictures). FSBO provides sellers with a yard sign similar to those provided by realtors but

⁷Some states, for example, Wisconsin, also recognize the status of buyer agency. If a buyer agent is involved in the transaction, s/he deals with the listing agent to settle the terms of the transactions, and gets the selling agent commission.

with the distinctive logo and color of FSBOMadison.com. Listings are kept active for 6 months, more if the fee is paid again. FSBOMadison.com has established itself as basically the only website for for-sale-by-owner properties in the city.

Properties are removed from the site upon instruction of the homeowners. Typical events that trigger removal include sale of the property, withdrawal of the property from the market, or transfer of the property to the MLS platform. The staff of FSBOMadison.com monitors listings on the MLS and extinguishes any listing from their website that ends up on the MLS. This is done primarily to avoid disputes with the MLS.

Real estate agents are occasionally involved in FSBO sales when they represent the buyer and one of the parties to the transaction accepts to pay a buying agent commission, typically 3%. In such a case, a FSBO transaction only saves half the realtor commission.

Recently, a number of limited-service brokers have emerged. In Madison, the dominant firm appears to be Madcity Homes (www.madcityhomes.com). Madcity Homes charges \$399 to list a house on the MLS for 6 months and also provides the seller with a yard sign. The homeowner gets no other service. Additional services are available for an extra fee upon request. The homeowner is responsible for paying commission (roughly 3 percent) to any realtor that sells the house, whether the realtor is under buyer agency agreement or not. No commission must be paid if the sale does not involve a realtor. By the end of 2005, when our sample ends, this firm was fairly small. As we discussed in the Introduction, Levitt and Syverson (2007) compare flat fee sales in three markets.⁸

3 Data

We obtained data from FSBOMadison.com, the South-Central Wisconsin Realtors Association, the City of Madison and Dane County. We merged the data into a single database, organized by parcel numbers as designated by the City. We restrict our attention to single-family homes because of lack of address details for condos in the FSBO and MLS records and incompatibility between the city and county database for condos records.

⁸See also Carrillo (2007) and for a discussion of brokerage choice Salant (1991), Yavas and Colwell (1999), Munneke and Yavas (2001) and Nadel (2007).

MLS data The South-Central Wisconsin Realtors Association provided us with all listing activity on their Multiple Listing Service between 1/1/1998 and 12/31/2005. For each listing, we know the address of the property, its parcel number, the listing date, and the status of the listing. In addition, whenever relevant, each record contains the expiration date of the listing, the accepted offer date, the closing date and the sale price as recorded by realtors. We also know whether the listing realtor has an interest in the property.

FSBO data The owners of the FSBOMadison.com website provided us with information on all the listings with their service since it started in 1998. For each listing, we know the address of the property, the last name of the seller, the date the property is put on the web and sometimes information about the outcome of the listing. We use data for the years 1998-2005, with an address in the city of Madison.

City Data The city of Madison is located within Dane County. The city assessor database provides information on sale prices and a large set of property characteristics, about both the parcel and the buildings. In addition, the county maintains a county-wide database with location information for each parcel. We use this database to obtain spatial coordinates for each property. Whenever there are incompatibilities between the county and the city database, we use Streetmap to locate the properties.

Matching the three data sets we get 22,455 observations. An observation is a marketing history from initial listing, on one of the platforms, until sale or withdrawal from the market. Actual histories can be complicated, like listing with several agents. We exclude new construction from the sample, 3,163 observations. New units are generally sold by developers. The reason we exclude them is that we are interested in platform performance for the average non-professional seller. We exclude 149 houses that went through major renovations (we do not know their characteristics at the time they sold). We exclude 239 observations due to missing price or sales information. We include units between \$50,000 and \$1,000,000, which top censors 11 high price units and bottom censors 82 inexpensive units. After merging these data sets and excluding observations as described we get 18,466 listings, which represent 14,057 unique properties, in the period 1998 to 2005.

3.1 Descriptive Statistics

Table 1 summarizes platform usage over time. A row represents where the property was initially listed. The columns represent the eventual outcome of the listing, namely, whether it sold and how.

The market share of FSBO in listings during the entire sample period is roughly 21%. We define a non-sale as any listing that showed up on either MLS or FSBO but was not recorded later in the city data with a sale price. Approximately 86% of the properties eventually sell. Out of the properties that sell, 94% sell through the initial listing platform. The remaining 6% are almost completely switches from FSBO to MLS. Switches from MLS to FSBO are almost nonexistent, accounting for just 0.3% of the MLS listings.

The market share of FSBO in properties sold is 14%, slightly below its listing share. Since FSBO was only introduced in 1998, these numbers somewhat underestimate the current FSBO market share. Therefore, in the rest of Table 1 we present the breakdown for every other year of the sample. FSBO's share in listing and in outcome increases over time. By 2005, the last year of the sample, FSBO share in listing is over 24%, and the share of sold properties is over 20%.

In terms of diffusion, it is interesting to point out how quickly FSBO came to maturity. While the first listings are in mid 1998, by 2000 FSBO's market share mostly plateaued.

To judge the performance of each platform we look at the proportion of properties that sell through their initial listing platform. Of the 3,900 initial FSBO listings 2,600 or 66.7% sell on FSBO. In contrast, 84.6% of initial MLS listings (12,322 out of 14,566) sell on MLS. While there is a clear trend in FSBO listing, increasing from 6% in 1998 to 24.3% in 2005, the success rate is more stable. The success rate in 2005, 62.0%, is higher than the rate in 1998, 55.8%. However, there is no clear trend in the intermediate years.

Just as the penetration of FSBO increases over time it also differs across neighborhoods. In Table 2 we present the FSBO penetration rate across different assessment areas. These areas are defined by the City of Madison for assessment purposes. We get similar variation if we look at elementary schools areas. The FSBO listing share varies between 8.9% and

45.5%. The top FSBO share neighborhoods tend to be close to campus. Similar variation is present also in the FSBO share of sales.

The success rate of FSBO listings also varies by neighborhood. For a neighborhood with at least ten FSBO listings the success rate ranges from 31% to 100% (with one outlier at 9%). The mean success rate is 66% and the standard deviation is 13.2%. There is a positive relation between the propensity to list on FSBO and the success rate, which can be seen through a linear regression. Using the estimated slope, one standard deviation increase in the success rate translates into 2 percentage points increase in the propensity to list on FSBO.

In Table 3 we compare the dependent variables (of the subsequent analysis) and several property characteristics. The columns present the mean and standard deviation for properties listed initially through FSBO and MLS. The last two columns present the difference between these means and the t-statistic of the difference. Explaining the gap in the dependent variables is the goal of the next sections. The differences in the means for most characteristics are small. FSBO properties are older, tend to be on smaller lots and have smaller basements, but have newer roofs and furnaces.

4 Results

4.1 Outcomes by FSBO and MLS platforms

We now explore the differences in outcomes for properties sold through FSBO and MLS. Tables 4-6 present the results from regressing sale price, time on the market and the probability of a sale, on a FSBO dummy variable and various controls.

In Table 4 we display the effect of platform on sale price (before netting any commission that sellers pay agents). In the top panel of the table the dependent variable is the logarithm of price, while in the bottom panel we regress the price level on various controls. The sample in columns (i) through (iv) includes only properties that sold on the platform they were originally listed. In the first column we regress price on a dummy variable that equals one if the house was sold on FSBO (divided by 100). If listing platform is determined at random, and the seller cannot switch from the platform they were assigned then this

regression measures the causal effect of selling on FSBO. In the spirit of this ideal situation the sample includes only houses that sold on the platform they were originally listed.

The results suggest that on average there is a large positive premium for selling on FSBO, roughly a 9.5 percent premium or 12,300 dollars. Since the dependent variable is the sale price, and not the sale price net of commission, this premium is on top of the saved commission. The magnitude of the premium is driven by the time trends that we saw in Table 1. Over time prices have gone up and so has the share of FSBO. Indeed, once we control for year and month time dummy variables and a linear time trend, in column (ii), the effect goes down to 3.45 percent, or 1,600 dollars, but is still statistically significant.

In order to control for the differences in houses we construct a hedonic model of prices. Column (iii) reports the results from this model. In the controls we include the characteristics of the house, displayed in Table 3. The effect of selling on FSBO is mostly unchanged and stays at roughly 4 percent. This is consistent with the numbers in Table 3 that suggested that while some characteristics were statistically different, the differences are small. In column (iv) we also control for neighborhood characteristics by including neighborhood fixed effects. The coefficients on these controls are of no direct interest. However, the key is that we are able to explain 92.6 percent of the variation in the logarithm of price, and 89.1 percent of the variation in price. The impact of selling through FSBO goes down to approximately 3.14 percent.

The regressions in columns (i) through (iv) focus on the impact of the platform through which the house was sold. In column (v) we explore the impact of the initial listing channel. There are two differences relative to the results in column (iv). First, the sample now includes switchers: houses that initially listed on one platform but that sold through the other. These are mostly houses that listed on FSBO but ended up being sold through MLS. Second, now the FSBO dummy is defined as being initially listed on FSBO, as apposed to being sold through FSBO.

This regression is of interest for a potential seller asking what is the expected impact on price if they list on FSBO, and then behave like the sellers in the sample (depending on how lucky they were with the FSBO stock of buyers), regardless of where they end up selling. If

we interpret the results as causal they suggest that the premium for listing on FSBO, which is estimated at 3.1 percent, is almost identical to the premium for selling through FSBO.

To further explore the distinction between listing and selling on FSBO we also examine, in column (vi), the regression that includes both the initial listing platform and the sales channel. We see that there is a small additional premium of selling on FSBO of 0.75 percent. This premium is driven by the very small number of houses that initially listed on MLS, but were eventually sold on FSBO. In the last column we separate these houses. These houses command a large premium, of about 5 percent relative to houses that listed and sold on MLS. Once we isolate the forty properties that list on MLS but eventually sell on FSBO, we find that the additional premium of selling on FSBO disappears.

Overall the results in Table 4 deliver a surprising result. Sellers on FSBO are able to sell their houses at a premium relative to MLS, in addition to saving the commission. Furthermore, sellers that initially list their houses on FSBO but then move to MLS also command a significant premium relative to initial MLS listings. The causal interpretation of the results relies on random assignment to platform, or random success, conditional on time, house and neighborhood characteristics. Random assignment is a strong assumption in this context. We deal with selection in the next section.

We also explored the FSBO premium by year. We ran the regression in column (v) separately for each year. The estimated coefficients (standard errors) from 1998 to 2005 are: 3.77 (0.99), 1.89 (0.71), 1.78 (0.61), 2.57 (0.52), 3.35 (0.53), 2.95 (0.49), 3.52 (0.50) and 3.79 (0.52). These numbers suggest that the FSBO premium was roughly stable through out the sample period.

Finally, we used a quantile regression to estimate the effect of listing on FSBO, the effects were constant across quantiles and thus essentially identical to the effects in the mean regression in Table 4.

We now examine other outcomes. In Table 5 we focus on the total time to sell, defined as the time between the initial listing and the sale date as recorded in the city data. The dependent variable in all regressions is the total time to sell, and the controls follow a similar structure to Table 4. In columns (i) through (iv) we focus on the sample of houses that sold on the platform where they were initially listed.

Without any additional controls, the results in column (i) suggest that total time to sell is 6 days shorter when selling on FSBO. Once we control for year and month dummies, and for house and neighborhood characteristics, the effect of selling on FSBO is not statistically significant. The additional controls change the R-squared modestly compared to the price regression where the house and neighborhood characteristics explained a large fraction of the variation.⁹

Notice that the lack of a statistical difference in the time on the market does not imply that FSBO is as effective a platform as the MLS. Quite the contrary, this suggests that the MLS is more effective. While the average time to sell on the MLS reflects the whole population of houses listed on MLS, since there are few switches to FSBO, the FSBO average represents the average conditional on being sold and belonging to the 75% that sold on FSBO without moving to MLS. Even absent unobserved heterogeneity the FSBO average represent the luckiest draws, in terms of time to sell, while MLS the whole population.

In the last three columns we once again study the full sample of houses that sold, not just houses that sold on the platform originally listed. In column (v) we find that sellers who originally list on FSBO should expect to take 19.47 days longer to sell. This is largely driven by houses that originally listed on FSBO but then switch to MLS. The results in column (vii) allow us to separate the effects in four groups. The base group is properties listed and sold on MLS. Relative to this group the properties listed and sold on FSBO take 0.3 day shorter, the same result we found in column (iv). For houses that listed on FSBO but eventually sold on MLS the time to sell is almost 69 days longer. Finally, for –the few– houses that listed on MLS but that were sold through FSBO the expected time to sell is 115 days longer.

To further characterize the differences of outcomes between the two platforms we report, in Table 6, the effect of platform on the probability of sale. In all cases we regress a dummy variable, which varies by column, on platform dummy variables, year and month dummy variables, a linear time trend, house and neighborhood characteristics.

⁹Time on market is defined by the timing of closing which depends on considerations hard to predict, thus a lower explanatory power is expected.

We start by examining in columns (i) and (ii) the probability of a sale. The dependent variable is equal to one if the property sold. A non-sale is defined if we do not observe a sale price in the city data. Overall in the sample 85.8 percent of the properties sold. The properties initially listed on FSBO tend to have a higher probability of eventually being sold, although some of them are eventually sold through MLS. In column (ii) we separate properties into four groups depending on initial listing and final channel. If the property sold the final platform is the platform where it sold, otherwise it is the last platform used for listing. We find that relative to the base group – properties that listed and sold on MLS – properties that listed and sold on FSBO are roughly 2 percentage points more likely to sell, although the difference is not statistically significant. The properties that listed on FSBO but eventually switched to MLS are even more likely to sell. Relative to the base group they are roughly 4 percentage points more likely to sell. The properties that list MLS and switch to FSBO are less likely to sell, but this is an extremely small group and the effect is not estimated precisely.

In columns (iii)-(viii) we examine the probability of a sale, conditional on eventually being sold, within a fixed number of days. We look at 180, 90 and 60 days. We find a pattern similar to what we saw in Table 5: the properties listed on FSBO tend to take longer to sell. Thus, within a fixed interval of time a FSBO property is less likely to sell. Although FSBO listings are somewhat more likely to eventually sell, their initial success is lower than MLS. In columns (iv), (vi) and (viii) we separate the properties into four groups. The FSBO listing that sold on FSBO are less likely to sell within 60 or 90 days. The properties that start on either FSBO or MLS, and then switch, take an even longer time to sell and thus are much less likely to sell within a fixed time period.

4.2 Selection

In the previous section we documented the difference in outcomes for properties listed on FSBO and MLS. A key issue in interpreting the results is selection. There are two separate concerns. First, are properties sold on FSBO comparable to those sold on MLS? We control for a rich set of observed house characteristics, but it is still possible that there are unobserved

differences (perhaps on the liquidity of the property) that are correlated with the platform choice. Second, sellers attributes might be correlated with platform choice.

4.2.1 Unobserved House Characteristics

As we show in Table 2 there are some differences in observed characteristics between the properties listed on FSBO and MLS. The differences in the observed characteristics might suggest differences in unobserved characteristics as well. To examine this issue we exploit properties that were sold multiple times in our sample using different platforms. As long as the unobserved characteristics are constant over time, including a house fixed effect will control for the unobserved characteristic. Recall that we eliminated from our sample properties that undergo a major renovation during our period of study (this is one of the characteristics reported by the city assessor).

In our sample, there are 2,597 properties that sold more than once. The majority, 2,304 sold twice, with 275 and 18 selling three and four times. Together this yields 5,737 sales. Out of these sales, 4,557 (or 80%) were listed and sold on MLS, 867 (15%) listed and sold on FSBO, 306 (5%) listed on FSBO and sold on MLS, and only 7 listed on MLS but sold on FSBO. Out of the 2,597 properties that were sold multiple times we have 847 that were sold using different platforms at different times.

Table 7 presents results using this sample. Different columns focus on different outcome variables. In all regressions we include year and month dummy variables and a linear time trend. In almost all cases the results are similar to those we found in Tables 4-6, where we controlled for differences across properties using the house and neighborhood characteristics.

We also display in Table 7 regressions using the same sample, but dropping the fixed effects and controlling for differences using the house and neighborhood characteristics instead. The results are essentially identical. The motivation behind this comparison is twofold. First, to highlight that the sample of houses that sell multiple times – used in this section – is representative, namely, that findings for those houses (without fixed effects) are similar to those for the whole sample (compare the coefficient on FSBO listing in column (ii) to the coefficient in Table 5 including the whole sample). Second, to show that controlling for house

characteristics delivers similar findings as those rendered using fixed effects (i.e., comparing columns (i) and (ii)).

Together these results suggest that there is no bias in the estimates due to an unobserved house effect that is fixed over time. This should not be surprising. The differences in the observed characteristics were not large and controlling for them did not make a large difference. Since most unobserved house characteristics, we can think of, seem (roughly) fixed over time we conclude that unobserved house characteristics are not a serious concern.

4.2.2 Seller Selection

If an unobserved seller type affects both the outcome variable and platform choice our estimates will be biased. Some sellers might be better, or more patient, at bargaining and therefore able to get a higher price regardless of the platform they use. Being more patient, they are also more likely to list on FSBO. Absent appropriate controls for seller type we will overestimate the effect of selling on FSBO. We explore several ways to deal with this problem.

Conditioning on Initial Listing The first approach is to compare the differences in outcomes between those sellers who listed on FSBO and sold on FSBO and those who initially listed on FSBO but ended up switching to MLS. The results in Table 4 suggest that conditional on listing on FSBO there is a small, and not statistically significant, increase in price from also selling on FSBO. If we believe that moves to MLS, after listing on FSBO, are purely driven by random forces then the estimates suggest that the two platforms deliver the same prices.

Even if moving to MLS depends on seller type the selection bias should be reduced, as the group of FSBO listers is likely to be more homogenous than the population as a whole. Namely, in the range of sellers, these observations belong to the set that self-selected into FSBO. Furthermore, it is not clear that the selection indeed dictates a bias. Consider selection on patience. Is it the more or the less patient seller who moves to MLS? A patient seller may stay longer on FSBO. On the other hand, moving to MLS entails a long wait (given the findings in the previous section), thus it might be that the more patient sellers

are those that decide to move on to the MLS. In other words, there might be selection, but its relation to sales price is less clear.¹⁰

By-Owner Sales on MLS Our second approach to quantify the role of unobservable seller characteristics is to compare FSBO sales to realtors' transactions of their own properties. These transactions provide us with a "sale by owner" using the MLS. Levitt and Syverson (forthcoming) report that realtors are able to obtain better prices when they sell properties in which they have an ownership stake. We assume that realtors are no worse at selling their own properties than non-agents. In other words, the effect of realtors selling their own homes is an upper bound on the impact of seller selection.

The results are presented in Table 8. The variable "Sold by Owner" is a dummy variable that equals one for all sales by either a realtor selling their own home on the MLS, or a sale on FSBO. The variable "Sold on FSBO" equals one for sales on FSBO, and therefore its coefficient measures directly the difference between the performance of FSBO sales and sales by owner/agents on MLS. The regressions in columns (i) and (iii) include only properties that sold on the platform where they were initially listed. The results in the other columns include all properties that sold.

As in Levitt and Syverson we find that agents obtain a premium when selling properties in which they have an ownership share. However, for price, time to sell and probability of sale within 180 days there is no statistically significant difference between agent/owner and sales on FSBO (see in particular columns (i) and (ii)). FSBO sales on the other hand are less likely to happen within 60 or 90 days.

Seller Fixed Effects Our final approach is based on comparing multiple sales by the same seller. We use the observed multiple sales to control for unobserved seller heterogeneity.

¹⁰For the sample of movers (from FSBO to MLS) we regressed price, time on the market on the MLS, and probability of selling within the first 60 days after moving on the time the house spent on FSBO before changing platforms. We found that the time spent on FSBO has no explanatory power on any of those performance variables on the MLS. The lack of correlation between stay in FSBO and MLS performance seems to suggest that the decision to stay more or less on FSBO does not seem to reflect systematic selection.

Matching names across transactions we identified 287 sellers who listed properties using different platforms, these involved 809 sales.¹¹ The results are presented in Table 9.

In the first column we regress the logarithm of price on a dummy variable that equals one if the seller listed a property on FSBO any time during the sample, not necessarily at that observation. The sample includes all sales and the regression includes the usual time, house and neighborhood controls. We see that most of the effect of FSBO we saw in Table 4 can be explained by this dummy variable.

This might not be too surprising since this coefficient is a weighted average of the sellers that sold only once using FSBO and those that sold more than once and used FSBO at least once. Since the first group is larger they might explain most of the effect. For that reason in column (ii) we run the same regression but for MLS transaction only. Since the sample includes exclusively MLS transactions the coefficient on FSBO lister reflects the selection effect and not a platform effect.

The results suggest that FSBO listers are indeed likely to get a higher price even when selling through MLS. On average they get 1.21% more. Note, that they take slightly longer to sell, although the effect is not statistically significant. All this points out that seller selection is indeed present: selection is creating a positive correlation between price and propensity to list on FSBO. However, even controlling for selection MLS does not command a premium.

In the last two columns in the table we restrict the sample to the properties sold by sellers who had multiple sales/listings in different platforms. In column (iii) we report the result of regressing the log of price, and time to sell, of the properties sold by these sellers on a dummy variable that equals one if the property was listed on FSBO, and the usual controls. We include also fixed effects for the sellers. The results suggest that when listing on FSBO these sellers get 1.58% higher price, but the effect is not statistically significant. On average it takes 20 days longer to sell the house when listing on FSBO. In column (iv) we repeat the analysis with a dummy variable that equals one if the property is listed and sold using FSBO. As in column (iii) we include seller fixed effects. The results suggest that there is no price premium associated with either platform.

¹¹There are two possible mistakes in matching names. Sellers that register transactions with somehow different names (e.g., with or without initials, or with spouse vs without) may be overlooked. On the other hand, we may misclassify as a match different sellers with identical names.

We also examined instrumental variables regressions to control for the potential correlation between FSBO and the unobserved characteristics. In all these cases the impact of FSBO was not statistically different than zero. However, depending on the exact functional form, the standard errors were very large, which is consistent with the instrumental variables being only weakly correlated with the decision to use FSBO. Indeed the “first stage” verifies this. The instruments we tried include the neighbors’ propensity to list, or their success, on FSBO.

In summary, we explored various ways to control for seller selection in the decision to use FSBO. The results suggest that indeed selection is present. After controlling for selection we find that the FSBO price premium disappears. We find no evidence that MLS provides any price premium relative to FSBO. Considering the realtors commission versus the FSBO fee, FSBO sellers come ahead financially.

4.3 Cost-Benefit of using FSBO

Up to this point we have focused on the transaction price, not netting any commission paid. Unfortunately, we do not observe the commissions or in the case of FSBO even whether a commission was paid to the buyer’s agent. We now present a back-of-the-envelope calculation to examine the platforms’ relative costs. Obviously this computation is very rough, as it ignores many other considerations.

Let’s consider the listing of an average house on FSBO. Our results suggest that the seller should expect the same sale price regardless of the platform. Selling on FSBO involves an additional marketing effort quantified in Levitt and Syverson (2007) as \$1,000 of out of pocket expenses and 50 hours at \$30 an hour, for a total of \$2,500. If the buyer has an agent the seller would pay roughly 2.75%, which on a \$200,000 home amounts to \$5,500, for a total of \$8,000.

If the seller does not sell on FSBO and switches to MLS, she should expect an additional 64 days to sell the house, which at an annual 8% interest rate amounts to \$2,700. In addition, she should expect to pay the full MLS commission. Assuming a 5.5% commission, the total cost amounts to \$16,200.

In order to compute the expected cost we need the probabilities of the different events. The observed probability of switching to MLS is 25%. If the probability of having to pay a buyer’s agent, conditional on selling on FSBO, is 20%, then the expected cost is \$6,750 compared to roughly \$11,000 (5.5% of 200,000) using MLS. Alternatively, if the probability of paying a buyer’s agent is 100% then the expected cost is \$10,050. Depending of the probability of selling to a buyer without an agent, the seller could either come mildly ahead, basically, hiring herself for \$30 an hour, or make \$5,925 dollars.

5 Implications for Platform Competition and Welfare

The performance of two-sided networks depends of the size of the network and on product differentiation (Armstrong, 2006, and Rochet and Tirole, forthcoming, Ambrus and Argenziano, forthcoming). In the next two sections we discuss both issues. The first section considers the diffusion of FSBO, and the apparent determinants of the size of the network. The second section examines buyer and seller heterogeneity as well as sorting as a source of – endogenous – platform differentiation. The final section evaluates the different welfare determinants.

5.1 Diffusion and Network Size

Table 1 shows FSBO quickly came to maturity. FSBO’s market share basically plateaued by year 2000 just two years after it started. Although FSBO share of listings increased over time, from 6% in 1998 to 19.7% in 2000 and on to 24.3% in 2005, its success rate, measured by the probability of selling conditional on listing, has been relatively steady. After an initial success rate of 55.8% at inception in 1998 the rate remained in the 60 and 70% range for the rest of the sample. Other measures of success like FSBO premium by year (see the discussion on page 12) and time on the market of FSBO listings remained stable as well. This cursory look at diffusion suggests that performance did not change with the network’s size.

A potential explanation why FSBO performance remained unchanged is that the marginal FSBO adopter has to be indifferent between platforms, while in this period MLS performance was presumably constant. In other words, optimal adoption may be holding

FSBO performance close to MLS (which as the dominant platform probably remained unaffected throughout this period).

Furthermore, notice that in this market only the sellers have to choose between platforms. Buyers can multi-home, the only cost involved is the time spent browsing. The main limiting factor on the buyer side is awareness. Not all buyers, specially those from out of town, are familiar with FSBO Madison.com. Thus, network size (at least in the short run) is driven by buyers' information which in turn affects sellers' incentives to join FSBO.¹²

In such a set up, short run variation in the number of FSBO listers does not affect buyers' behavior. Namely, more listings in a specific month do not translate into more buyers shopping on FSBO. Thus, we expect sellers to crowd out. In other words, more listings competing for the same number of buyers hamper rather than enhance seller performance.

As a test of the previous argument we regressed time on market of FSBO listings as well as the probability of succeeding on FSBO on: the level of market activity (number of listings that month), the ratio of FSBO listings out of total listings and controls. As expected more active periods are associated with shorter time on the market and higher success rate. In contrast, the opposite is true for the proportion of the listings on FSBO. On periods where more listings go on FSBO it takes longer to sell on FSBO (given the total number of listings) and the probability of success is lower.

In sum, we do not find that FSBO performance changes with the number of listers. A potential explanation comes from a model with an exogenous increase in demand due to information diffusion among buyers and endogenous platform choice by sellers. The increased benefits of listing on FSBO as demand grows are competed away by the additional sellers. Indeed, we find correlations that are consistent with crowding out among sellers, who compete for a fixed number of FSBO buyers.

¹²Naturally, in the long run sellers' success may affect the spread of information about FSBO. However, the situation is quite different from the typical paradigm in the literature which considers an instantaneous coordination game between buyers and sellers. FSBO diffusion does not seem determined by a short run coordination problem.

5.2 Heterogeneity and Sorting

We now turn to heterogeneity of buyers and sellers. In the previous sections we document differences in platform performance that can reflect platform scale, as just discussed, or perhaps are driven by composition.¹³ In section 4 we saw that controlling for seller selection impacts the estimate of the FSBO price premium. We now search for direct evidence of heterogeneity and selection. We also examine selection by the buyers.

We know very little about buyers and sellers. Essentially, we only know their name as recorded by the city in completed transactions. By matching names across transactions in the city data we can check if buyers and sellers are local. For each transaction we define the buyer as local if she sold a property in the city no later than 90 days after closing, and a seller if she bought another property in the city 90 days prior to closing or later. Local buyers probably know the market better and perhaps are more patient. Non-local buyers are more likely to search during visits to town. A seller who does not remain in town, i.e. a non-local, is more likely to be in a rush to close a deal before they move. We classify 20.2% of sellers, and 14.4% of buyers, as local. The name matching procedure is potentially fairly noisy. Nevertheless, despite the noise involved in defining locals, the proxy correlates with several relevant variables.

In order to explore buyer and seller heterogeneity we correlate local with price and whether they trade on FSBO. The main findings are the following:

First, when we include local seller/buyer fixed effects in the hedonic regressions, like those in Table 4, we find that local sellers get a 1.4% premium (with a standard error of 0.2%) when selling their house. Local buyers pay 1.2% less (with a standard error of 0.3%) when buying. We interpret these results as evidence of heterogeneity suggestive that locals get a better deal, which is consistent with locals being more patient.

Second, local sellers are more likely to use FSBO. The probability of non-local sellers listing on FSBO is 21.0% (0.4%), while local sellers are 4.7% (0.8%) more likely to list on FSBO. On the other hand, local buyers are less likely to be involved in a FSBO transaction. Non-local buyers have a 22.4% chance of buying a property listed on FSBO, while local

¹³There is a small literature on platform heterogeneity based on sorting (Foucault and Parlour (2004), Jin and Kato (2007), Ambrus and Argenziano (forthcoming), Damiano and Li (forthcoming)).

buyers are 3.2% (1.0%) less likely to do so. These findings are consistent with better or more patient bargainers selecting to sell on FSBO, but patient buyers who can avoid FSBO prices end up trading more often on the MLS.

A final word on sorting. The fact that FSBO listings sell at a premium does not mean that no buyer would trade on FSBO. Buyers search everywhere for the best deal. When faced with tougher sellers (in any platform) they get a lower share of the surplus. Thus, given that FSBO sellers are tougher bargainers on average we should expect patient buyers to complete transactions on MLS more often than non locals (more surplus is needed to keep buyers equally happy to trade on FSBO). Indeed, we find that local buyers trade less often on FSBO. They are also less likely to trade with local sellers, regardless of the platform.

In summary, we find evidence that local sellers sell at a premium and local buyers pay less, which is consistent with local being a proxy for patience. More importantly, we find that being local correlates with platform selection. Thus, the sorting by agents endogenously differentiates the platforms.

5.3 Welfare Implications

Lets consider the welfare impact of FSBO's presence. FSBO differs from MLS in several ways: FSBO involves no commissions, it possibly delivers a different matching technology and it involves no agent services. Consider these differences. We argue the former represents a welfare neutral transfer, while the latter two differences may impact total welfare.

We assume that, in the relevant range, the impact of commissions on the number of transactions is negligible. Thus, commission avoidance represents just a transfer from realtors to FSBO users. Sellers on FSBO enjoy a substantial reduction in the financial cost of transacting in the real estate market. While they have to put in more effort, revealed preferences tell us FSBO users must be better off, at the expense of realtors who lose part of their rents. The lesson from the Madison case is that this welfare transfer can be achieved with a relatively small initial investment.

There is an additional potential efficiency gains associated with eliminating commissions, as in FSBO. As pointed out by Hsieh and Moretti (2003) the fixed agent commission leads to

excess realtor entry (especially in expensive areas) and to rent dissipation through non-price competition among agents (DOJ (2007)). As the share of FSBO rises the rent of the realtors goes down, potentially mitigating the excessive entry.

We turn now to the second distinction: FSBO represents a different matching technology. As the discussion in Section 4 points out, our findings suggest that FSBO is a slower matching technology. FSBO's performance may reflect the mix of buyers and sellers present on the platform, namely, selection. Alternatively, the slower matching may be due to platform size, in which case FSBO could be regarded as inefficient.

We found evidence consistent with both explanations. First, we found evidence of selection of more patient sellers into FSBO, which can explain the longer time to sell on FSBO. Second, regarding efficiency, as we discuss above in Section 5.1, the performance of FSBO is not directly related to the number of current listings. However, in Table 1 we see very clear platform migration patterns: while over 22.8% of FSBO listers eventually move to the MLS only 0.3% of MLS listers move to FSBO.¹⁴ These patterns are consistent with MLS being a bigger, more effective, platform. We can interpret this finding through a stock-and-flow model (Coles and Muthoo (1998)). MLS offers the bigger stock of buyers, probably all buyers (due to multi-homing) shop on MLS, while only a subset of buyers shop on FSBO. A seller who fails to match with the stock of FSBO buyers has to migrate to MLS to expose her property to the stock of MLS buyers who do not shop on FSBO. A potential interpretation the lack of MLS to FSBO moves is that FSBO buyers are a subset of MLS ones.

The final distinction between platforms is the services (showing, pricing, conditioning the house) offered by real estate agents on MLS. FSBO provides a product for sellers with low willingness to pay for services.

Could FSBO be welfare decreasing? In theory, due to insufficient network size, it could be. The potential losers from FSBO are non-informed buyers who will not get exposed to FSBO listings (and miss potential matches that would have seen if there was a single platform).

¹⁴Lack of movements from MLS to FSBO cannot be fully explained by the 6 month lock-in to an agent since we observe almost 700 re-listing on the MLS. These are properties that re-enter the MLS with a different agent. The median relisting happens after 120 days, and 75% of them happen before 6 months. Namely, a good proportion of sellers manage to get out of the contract with an agent.

Informed buyers who can multi-home, FSBO listers (opted for FSBO) and uninformed sellers (because buyers multi-home) are all –weakly– better off by FSBOs presence.

On the other hand, FSBO offers platform differentiation, which might be welfare enhancing (Armstrong (2006)). FSBO is differentiated in two dimensions. It offers no frill service and due to sorting, FSBO offers a different kind of matching. The sorting of sellers into platforms may ease targeted search. Buyers can concentrate on the platform where they are more likely to find a counterpart. For instance, an aggressive buyer knows she is less likely to agree with a tough seller, thus she may look mostly on MLS to avoid unfruitful searches.

6 Concluding Remarks

We examine the relative performance of MLS and FSBO. After controlling for differences in house and seller characteristics we find that MLS delivers no price premium (even before netting commissions). MLS transactions, on the other hand, involve a shorter time to sell. The longer time to sell on FSBO is driven FSBO listings that fail to sell, and have to move to the ML, and the higher probability of a quicker sale on the MLS.

The findings suggest platform selection: FSBO attracts certain type of sellers. The higher prices these sellers are able to command suggest these sellers are the better bargainers, and the longer time to sale on FSBO suggest they are more patient.

As we discussed in Section 5.3, we found an asymmetric flow of sellers across platforms. If only some buyers are familiar with FSBO, then after listing on FSBO a seller has an incentive to move to the MLS to expose her property to additional buyers. On the other hand, if most buyers are familiar with MLS there is no incentive to move to FSBO. A stock-and-flow model (Coles and Muthoo (1998)) can explain these migration patterns, and might be a useful way to study two-sided markets like real estate. The theoretical literature on two-sided markets has not used the stock-flow framework.

What do our results imply for market structure in the brokerage industry in Madison? If one believes that sellers are aware of the FSBO option, and know that there is no premium associated with MLS, then our results suggest that a large fraction of the population is willing to pay a significant amount for the services provided by realtors. Thus, despite the

6% commission rate, realtors are going to continue to maintain a high market share. An alternative view is that FSBOMadison.com is still in diffusion. As more people become aware of it, and realize that there might not be a price penalty associated with FSBO, its share of the market will increase.

The data set we use in this paper comes from one market. We selected this market because of the availability of data and the willingness of FSBOMadison.com and the local realtors association to cooperate with us and share their data. Without further data and analysis we do not know if our results hold more broadly. The sample we analyzed includes 1998 to 2005. It is a good period for the housing market, but it includes years like 2005 in which the market cooled down. A concern with our results might be that they hold only during periods of boom: during a down market the numbers might be different. As we discussed, our main results are similar in different years in our sample. Furthermore, the price increases in Madison during the “boom” years were relatively modest, with an average yearly real price increase of 4.9%.

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Table 1: Properties by Initial Listing Platform and Outcome, By Year

List\Outcome	MLS	FSBO	Unsold	Total
1998 to 2005				
MLS	12,322 (84.6%)	40 (0.3%)	2,204 (15.3%)	14,566 (78.8%)
FSBO	887 (22.8%)	2,600 (66.7%)	413 (10.6%)	3,900 (21.1%)
Total	13,209 (71.5%)	2,640 (14.3%)	2,617 (14.2%)	18,466
1998				
MLS	1,806 (84.2%)	3 (0.1%)	336 (15.7%)	2,145 (94.0%)
FSBO	43 (31.2%)	77 (55.8%)	18 (13.0%)	138 (6.0%)
Total	1,849 (81.0%)	80 (3.5%)	354 (15.5%)	2,283
2000				
MLS	1,285 (87.0%)	4 (0.3%)	187 (12.7%)	1,476 (80.3%)
FSBO	106 (29.3%)	226 (62.4%)	30 (8.3%)	362 (19.7%)
Total	1,391 (75.6%)	230 (12.5%)	217 (11.8)	1,838
2002				
MLS	1,458 (86.9%)	3 (0.2%)	216 (12.9%)	1,677 (76.6%)
FSBO	101 (19.7%)	381 (74.4%)	30 (5.9%)	512 (23.4%)
Total	1,559 (71.2%)	384 (17.5%)	246 (11.2%)	2,189
2005				
MLS	1,557 (72.9%)	7 (0.3%)	571 (26.7%)	2,135 (75.7%)
FSBO	137 (20.0%)	425 (62.0%)	123 (18.0%)	685 (24.3%)
Total	1,694 (60.1%)	432 (15.3%)	694 (24.6%)	2,820

The year is defined by initial listing date. An unsold property is defined as not having a sales price in the city data.

Table 2: FSBO Penetration Rates, By Area

	FSBO Listing Share (%)	FSBO Outcome Share(%)	Properties Sold
Area 70	45.5	31.4	121
Area 28	44.3	27.1	70
Area 17	39.3	28.6	262
Area 89	37.0	29.0	176
Area 19	29.8	19.1	178
Area 1	25.9	17.6	255
Area 21	25.6	17.8	180
Area 2	19.7	12.6	239
Area 88	19.4	11.3	417
Area 76	17.4	12.1	363
Area 39	13.21	9.0	212
Area 73	11.3	8.9	452
Area 86	8.9	2.6	192
Overall	21.1	14.3	18,466

An area is defined by the City of Madison for assessment purposes. The above areas are a sample out of areas defined by the city.

Table 3: Sample Property Characteristics by Listing Channel

Characteristic	MLS		FSBO		Difference	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	t-stat
Dependent Variables						
sale price	180,858	86,720	199,423	77,507	18,565	11.42
time on market	106.04	71.16	119.23	76.57	13.18	9.50
prob sold within 60 days	0.54	0.50	0.46	0.50	-0.07	-9.23
prob sold within 90 days	0.25	0.43	0.17	0.38	-0.08	-8.76
sold	0.85	0.36	0.89	0.31	0.05	7.23
Independent Variables						
age (as of 2007)	45.84	24.68	47.96	26.82	2.12	4.39
# of bedrooms	3.07	0.71	3.04	0.69	-0.03	-2.09
# of full bath rooms	1.60	0.67	1.58	0.65	-0.01	-1.04
# of rooms	3.65	1.19	3.66	1.14	0.01	0.49
total sq footage	1,734.53	694.29	1,705.74	576.75	-28.79	-2.24
lot size	9,585.78	5,345.43	8,933.02	5,029.47	-652.76	-6.45
basement sq footage	997.66	382.77	955.41	330.68	-42.25	-5.92
inside condition	3.72	0.55	3.66	0.59	-0.06	-5.97
outside condition	3.77	0.49	3.75	0.51	-0.02	-1.66
roof age (as of 2007)	25.39	23.75	24.42	24.23	-0.97	-2.12
furnace age (as of 2007)	25.62	23.13	24.52	23.30	-1.10	-2.48
central air	0.81	0.39	0.82	0.39	0.01	1.10
quality class	4.79	1.15	4.82	1.06	0.03	1.60
street noise	15.94	26.80	15.13	26.35	-0.80	-1.58
water front	0.37	5.16	0.26	4.07	-0.12	-1.24
parcel view	2.03	0.20	2.02	0.18	-0.002	-0.60

The above characteristics are a sample of those available to us from the city data. Based on 15,849 observations, 13,209 in MLS and 2,640 in FSBO.

Table 4: The Effect of Platform on Price

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Dependent variable: logarithm of price							
Sold on FSBO/100	9.48 (0.86)	3.45 (0.78)	4.01 (0.32)	3.14 (0.25)	–	0.75 (0.41)	0.45 (0.42)
Initially Listed on FSBO/100	–	–	–	–	2.98 (0.22)	2.48 (0.36)	2.68 (0.37)
MLS Listing, Sold on FSBO/100	–	–	–	–	–	–	4.98 (1.73)
$R^2 =$	0.012	0.221	0.871	0.925	0.926	0.926	0.926
Dependent variable: price (in 1000's of dollars)							
Sold on FSBO	12.30 (1.94)	1.60 (1.82)	5.13 (0.82)	4.74 (0.68)	–	-0.66 (1.12)	-1.20 (1.16)
Initially Listed on FSBO	–	–	–	–	5.00 (0.60)	5.44 (1.00)	5.89 (1.02)
MLS Listing, Sold on FSBO	–	–	–	–	–	–	9.73 (4.73)
$R^2 =$	0.005	0.144	0.837	0.890	0.891	0.891	0.891
Time Controls	no	yes	yes	yes	yes	yes	yes
House Characteristics	no	no	yes	yes	yes	yes	yes
Neighborhood Effects	no	no	no	yes	yes	yes	yes
$N =$	14,922	14,922	14,922	14,922	15,849	15,849	15,849

The dependent variable is transaction price (without subtracting commission). All columns report results from OLS regressions. In columns (i)-(iv), the sample includes only properties that sold on the platform they originally listed. The sample in column (v) -(vii) also includes properties that sold on a different platform than originally listed. Time controls include year and month dummy variables and a linear time trend. Standard errors are reported in parentheses.

Table 5: The Effect of Platform on Time to Sell

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Sold on FSBO	-6.23 (1.57)	-4.97 (1.52)	-1.53 (1.49)	-0.36 (1.50)	–	-62.45 (2.54)	-69.31 (2.61)
Initially Listed on FSBO	–	–	–	–	19.47 (1.38)	63.67 (2.25)	69.00 (2.29)
MLS Listing, Sold on FSBO							115.05 (10.65)
Time Controls	no	yes	yes	yes	yes	yes	yes
House Characteristics	no	no	yes	yes	yes	yes	yes
Neighborhood Effects	no	no	no	yes	yes	yes	yes
N =	14,922	14,922	14,922	14,922	15,849	15,849	15,849
R ² =	0.002	0.087	0.174	0.198	0.203	0.233	0.239

All columns report results from OLS regressions. The dependent variable is total time to sell, measured in days, from the date of the initial listing until the sale date, recorded in the city data. In columns (i)-(iv), the sample includes only houses that sold on the platform they originally listed. The sample in column (v)-(vii) also includes houses that sold on a different platform than originally listed. Time controls include year and month dummy variables. Standard errors are reported in parentheses.

Table 6: The Effect of Platform on Probability of Sale

Dep. variable: dummy variable equal to 1 if:	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
	Sold		180 days		90 days		60 days	
Initially Listed on FSBO/100	2.04 (0.64)	–	-7.11 (0.66)	–	-11.81 (1.00)	–	-9.69 (0.87)	–
FSBO listing stayed on FSBO/100	–	1.21 (0.73)	–	1.36 (0.74)	–	-2.37 (1.13)	–	-5.24 (0.99)
FSBO listing moved to MLS/100	–	4.02 (1.21)	–	-28.27 (1.10)	–	-35.28 (1.68)	–	-20.89 (1.47)
MLS listing moved to FSBO/100	–	-5.91 (4.66)	–	-18.73 (4.97)	–	-10.13 (7.58)	–	-14.22 (6.61)
Mean of dep. variable(%)	85.8		87.0		51.9		22.2	
N =	18,466				15,849			
R ² =	0.137	0.137	0.147	0.178	0.118	0.134	0.076	0.082

All columns report results from OLS regressions. The dependent variable is a dummy variable, which varies by column. In columns (i) and (ii), the sample includes properties that were not sold, while in columns (iii)-(viii) the sample is only properties that a sale was eventually observed. All regressions include year and month dummy variables, a linear time trend, house and neighborhood characteristics. Standard errors are reported in parentheses.

Table 7: House Fixed Effects Regressions

Dep. variable:	log of price				time to sell			
Initially Listed on FSBO/100*	2.13 (0.43)	2.56 (0.36)	–	–	23.20 (3.01)	18.74 (2.12)	–	–
FSBO listing sold on FSBO/100*	–	–	2.12 (0.49)	2.64 (0.41)	–	–	4.59 (3.36)	0.77 (2.33)
FSBO listing moved to MLS/100*	–	–	2.34 (0.72)	2.42 (0.63)	–	–	69.63 (4.96)	67.81 (3.61)
MLS listing moved to FSBO/100*	–	–	9.15 (3.36)	3.10 (3.02)	–	–	34.07 (29.78)	38.27 (22.60)
House Fixed Effects	yes	no	yes	no	yes	no	yes	no
House+Nbhd. Char	no	yes	no	yes	no	yes	no	yes

Dep. variable: dummy variable equal to 1 if:	Sold		Conditional on sale, sold within:					
			90 days			60 days		
Initially Listed on FSBO/100	0.23 (0.26)	0.42 (0.19)	-12.30 (2.37)	–	–	-7.63 (2.11)	–	–
FSBO listing sold on FSBO/100	–	–	–	-1.59 (2.67)	0.01 (1.88)	–	-1.68 (2.40)	-1.20 (1.69)
FSBO listing moved to MLS/100	–	–	–	-38.50 (3.93)	-38.02 (2.90)	–	-22.34 (3.54)	-21.88 (2.61)
MLS listing moved to FSBO/100	–	–	–	11.97 (18.30)	10.10 (14.01)	–	-1.00 (16.46)	-10.94 (12.57)
House Fixed Effects	yes	no	yes	yes	no	yes	yes	no
House+Nbhd. Char.	no	yes	no	no	yes	no	no	yes

*In columns where the dependent variable is “time to sell” the independent variables are not divided by 100.

All columns report results from OLS regressions. The sample includes properties where multiple sales were observed, there are 2,710 such properties involving 5,737 sales. In columns where “sold” is the dependent variable the sample also includes properties that were listed more than once, at different times even if they did not sell, there are 3,675 such properties involving 8,084 listings. All regressions include year and month dummy variables and a linear time trend. Standard errors are reported in parentheses.

Table 8: FSBO versus Sales by Agent/Owner on MLS

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Dependent variable:	log of price		time to sell		sold in 60	sold in 90	sold in 180
Sold by Owner/100	2.13 (0.65)	1.86 (0.63)	-0.42 (3.82)	-3.07 (3.98)	2.44 (2.49)	6.33 (2.88)	1.38 (1.90)
Sold on FSBO/100	1.06 (0.68)	1.14 (0.66)	0.05 (4.02)	-2.12 (4.20)	-6.08 (2.63)	-5.81 (3.03)	1.96 (2.00)
N=	14,922	15,849	14,922	15,849	15,849	15,849	15,849

All columns report results from OLS regressions. In columns (i) and (iii), the sample includes only houses that sold on the platform they originally listed. The sample in columns (ii) and (iv) -(vii) also includes houses that sold on a different platform than originally listed. All regressions include year and month dummy variables, a linear time trend, house and neighborhood characteristics. Standard errors are reported in parentheses.

Table 9: Controlling for Unobserved Seller Heterogeneity

	(i)	(ii)	(iii)	(iv)
Dependent variable: logarithm of price				
Initially Listed on FSBO/100			1.58 (0.81)	
FSBO listing sold on FSBO/100				1.35 (0.94)
FSBO Seller/100	2.67 (0.20)	1.21 (0.44)		
R ² =	0.926	0.928	0.961	0.965
Dependent variable: time to sell				
Initially Listed on FSBO			19.92 (5.64)	
FSBO listing sold on FSBO				-3.18 (6.71)
FSBO Seller	16.45 (1.28)	2.68 (2.67)		
R ² =	0.201	0.196	0.497	0.541
Sample	all sales	MLS listings	sellers w/ listings/sales	multiple listings/sales
Fixed Effects	no	no	yes	yes
N=	15,849	12,362	964	809

All columns report results from OLS regressions. In column (ii) the sample includes only properties there were listed on MLS. In columns (iii) and (iv) the samples include properties sold by sellers with multiple sales between 1998 and 2005, there are 341 sellers that sold properties listed using different platforms, involving 964 sales, 287 sellers sold properties using different platforms, involving 809 sales. The regressions in columns (iii) and (iv) include seller fixed effects. All regressions include year and month dummy variables. a linear time trend, house and neighborhood characteristics. Standard errors are reported in parentheses.