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Are homes hot or cold potatoes? The distribution of marketing time in the housing market☆

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ABSTRACT

This paper analyzes how the distribution of marketing time of residential real estate evolves across time. Using real estate data from a large suburb in the Washington D.C. area we first show that the whole distribution of marketing time shifts to the right when a "hot" housing market in 2003 is compared with a "cold" one in 2007. The shift, however, is not homogenous across the distribution: it is negligible at lower percentiles, very large at the median and much smaller at higher percentiles. Moreover, the shift in the distribution cannot be explained by changes in the characteristics of the units. We then compute (quality adjusted) time on the market distributions and hazard functions for each year during the period 1997 to 2007. We find that while there are no changes at the bottom of the (conditional) distribution over time, higher percentiles, such as the first quartile and the median, are notably more volatile. We also find that the distribution of marketing time is heterogeneous across property types and property location. The focus on the distribution of marketing time rather than solely on the mean or on the median provides a comprehensive description of the evolution of this asset's liquidity and may help homeowners and financial institutions to better grapple with liquidity risk.

1. Introduction

The recent housing market boom and bust was staggering. The Federal Reserve's Flow of Funds Report documents that the asset value of owner-occupied housing units for the entire U.S. was approximately 13 trillion dollars in 2000, rose to approximately 23 trillion dollars in 2006, and then fell dramatically to approximately 16 trillion dollars by 2010.[1] The media and popular housing price indices such as the Case–Shiller index have documented the substantial heterogeneity in price fluctuations across metro areas. Recent work has begun to document that there was also substantial heterogeneity in price fluctuations *within* a metro area.[2] It is clear that these price fluctuations have adversely affected many households and financial institutions. However, housing price fluctuations are only part of the story and part of the costs of the recent boom and bust. As the housing market began entering the bust phase, housing assets became much more illiquid as the time it took to sale a house increased. Many homeowners and financial institutions were left with an illiquid financial asset when they desperately needed liquidity. Although this liquidity risk in the housing market has obvious importance and is likely to be heterogeneous within a metro area, there has not been a systematic analysis in the literature of how the *distribution* of marketing time evolves during "hot" and "cold" housing markets.

This paper attempts to fill this gap by providing a simple framework to analyze how the liquidity of residential real estate changes over time, where liquidity is measured by the time that it takes to sell (time on the market). The focus on the distribution of marketing time rather than solely on the mean or on the median provides a more comprehensive picture of how the liquidity of this asset evolves. For instance, using residential real estate data from a large suburb in the Washington D.C. area (Fairfax County, VA), we show that the whole distribution of marketing time shifts to the right when we compare a tight market in 2003 with a slow one in 2007.[3] The shift, however, is not homogenous across the distribution: it is negligible at lower percentiles (in both periods, at least 2% of transactions occurred in less than 1 day), very large

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[1] This information was taken from Table B.100 entitled "Balance Sheet of Households and Nonprofit Organizations" in the Federal Reserve's Flow of Funds Report which can be found at http://www.federalreserve.gov/releases/z1/current/ and was last accessed on 3/29/2011.

[2] See for example Kuminoff and Pope (2011) and Landvoigt et al. (2011). McMillen (2003) also documents similar spatial heterogeneity in housing price fluctuations in the early 1990s in the Chicago metro area.

[3] Focusing on data for 2003 and 2007 is convenient for our analysis since the number of listings in each year was basically the same, but the time on the market was substantially higher in 2007 than in 2003.

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at the median (median time on the market is about 11 times larger in the slow market) and much smaller at higher percentiles. The levels of the hazard function in 2003 contrast with those in 2007, particularly during the first 2 months of the listing. For instance, the likelihood of selling a home given that it has been on the market for 1 week is about 6 times higher in 2003 compared to that in 2007. These differences sharply decline with time on the market and virtually disappear after 6 months. We also show that the distribution of time on the market can vary by home type, and by the spatial location of the home within the county.

For our analysis of the distribution of time on the market it is important to ask if the shift in the *unconditional* distribution of marketing time and in the *unconditional* hazard function between 2003 and 2007 can be explained by differences in the characteristics of the housing units that were traded in these periods. This is a valid concern since homes for sale in 2003 are indeed statistically different than those for sale in the latter period. To address this question, we extend a method developed by DiNardo, Fortin and Lemieux (1996) to decompose the shift in the distribution into a component that can be attributed to changes in observed housing characteristics and an unobserved component. The extension proposed in this paper combines the DiNardo, Fortin and Lemieux approach with the Kaplan–Meier estimator (Kaplan and Meier, 1958) to allow the decomposition to work in cases where the dependent variable is subject to random censoring. This method allows us to simulate the distribution of time on the market in 2007 as if the housing units in this period had the same characteristics as those units for sale in the 2003 sample. The difference between the estimated counterfactual distribution and the actual distribution of time on the market in 2007 is minimal. Thus, we conclude that the observed shift in the distribution and in the hazard function is not a consequence of changes in the characteristics of the houses in our sample. Rather it can be almost fully attributed to other unobserved factors that affect the liquidity of residential real estate.

Finally, we use this approach to compute "quality adjusted" time on the market distributions and hazard functions for each year during the period 1997–2007. In particular, we simulate the duration distribution and hazard function during each year in our sample assuming that housing units had the same characteristics as homes in 2003. The results show that the *conditional* median time on the market is quite volatile: it sharply decreased from 133 days in 1997 to 12 days in 2000, remained somewhat constant between 2001 and 2004, and then increased close to 1997 levels by the end of 2007. However, there is substantially less volatility at lower percentiles. For instance, in almost all periods, at least 2% of transactions occurred in less than 1 day. Similarly, the hazard rate for those properties that have been on the market for 1 week exhibit substantial volatility over time: during our ten year sample it ranges from 0.007 to 0.077. As time on the market increases, this volatility sharply diminishes. For example, the likelihood of selling a home given that it has been on the market for 6 months lies between 0.003 and 0.005. In summary, to measure the liquidity of the housing market and to help homeowners and financial institutions to better analyze liquidity risk, it is important to look beyond the conditional mean and median and focus on the full distribution of time on the market.

Our paper was motivated by the work of McMillen (2008) who analyzes changes in the *distribution* of home prices in Chicago over time.[4] He finds that the shift in home prices between 1995 and 2005 is significantly larger at the right tail of the distribution and that these shifts cannot be fully attributed to changes in the structural characteristics nor the location of the housing stock.[5] Our work is different than McMillen's in two important ways. First, we focus on time on the market instead of housing prices, and second, we use a different decomposition method that lends itself to studying time on the market. The decomposition used by McMillen which is based on quantile regressions (Machado and Mata, 2005) is not suitable for our application, because marketing time is subject to random censoring. The DiNardo, Fortin and Lemieux decomposition has been used to explain changes in the distribution of home prices (Cobb-Clark and Sinning, 2011). The extension to the DiNardo, Fortin and Lemieux method we propose a methodological contribution to the literature that may be easily implemented in other circumstances when the dependent variable is censored.

This paper is also related to an extensive literature that analyzes the determinants of time on the market. For example, Genesove and Mayer (1997, 2001) have shown that the seller's equity position and loss aversion are key determinants of marketing time: the smaller the equity, the longer the time to sell. Haurin (1998) shows that the time a home stays on the market, is related to the atypicality of the housing unit. Other authors have analyzed the relationship between list prices and marketing time from both a theoretical and empirical point of view (Allen et al., 2009; Anglin et al., 2003; Carrillo, forthcoming; Haurin et al., 2010; Horowitz, 1992; Kang and Gardner, 1989; Knight, 2002; Springer, 1996 and Yavas and Yang, 1995, among others). The focus of the previous literature, however, is on the conditional mean. To the best of our knowledge, ours is the first attempt to evaluate changes in the full distribution of time on the market.

The paper is organized as follows. The next section presents and discusses the data. The third section presents the decomposition method and results from a comparison between the 2003 and 2007 time periods. Section 4 computes the distribution of time on the market for each year during the 1997 to 2007 time period. Finally, the last section concludes the study.

2. Data

Our analysis uses residential real estate data from Fairfax County, Virginia. Fairfax County is located in northern Virginia and it is part of the Washington, D.C. metropolitan statistical area. This county hosts more than one million residents and more than 350,000 housing units (Fairfax County website 2010) and it is one of the richest and best-educated counties in the United States.[6]

We gathered data from the local Multiple Listing Service (MLS) and collected information from all housing listings that were posted on the MLS between January 1, 1997 and December 31, 2007. The data include all listings that ended up in a transaction as well as those that expired or were withdrawn from the market. The data contain detailed property characteristics, such as the number of bedrooms, bathrooms, age and location, as well as list prices, transaction prices and the time that the listing stayed on the market (time on the market).

Time on the market is measured by the number of days that the MLS listing stays "active" on the market. For units that are sold, we compute marketing time as the difference between the date when an offer was accepted and the date when the listing was posted.[7] When a listing is withdrawn from the market or it expires without a sale, we compute the time between the initial listing and withdrawal, and treat it as a censored observation. Notice that we analyze the time that a *listing* stays on the market, which can be different from the total time that the *property* has been on the market. This occurs because sellers can withdraw the listing for a few days, weeks or

[4] The paper by Deng et al. (forthcoming) also looks at distributional issues in real estate prices in Singapore.

[5] A few recent studies in urban economics also analyze changes in the distribution of the dependent variable. For example, Cobb-Clark and Sinning (2011) compare the distribution of home prices between natives and immigrants in Australia, and Carrillo and Yezer (2009) evaluate the differences in homeownership rates between segregated neighborhoods.

[6] It ranked second in median household income in 2008, with 58.5% of adults over the age of 25 holding at least a bachelor's degree.

[7] Notice that the date when the offer is accepted is generally different than the transaction date recorded in court. It usually takes between 3 and 8 weeks from the date when the offer is accepted to complete the sale process (this includes the inspection process, securing financing, etc.).