Speculative Fever: Investor Contagion in the Housing Bubble

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Abstract

This paper examines the spread of speculative investing, or "contagion," by homeowners in the recent housing bubble, and documents the behavior of experienced, ugh volume investors vis-a-vis inexperienced, low-volume investors. Using detailed housing transaction records, we estimate the impact of speculative activity by one's neighbors and in one's neighborhood on subsequent real estate investment behavior and performance. Our research design, which isolates the impact of immediate neighbors relative to those on nearby blocks, controls for a host of potential issues that might create spurious correlation in neighbors' investment activities. We find evidence of strong spillovers within neighborhoods: homeowners were much more likely to engage in speculative activity both after a neighbor had successfully flipped a home and when a home had been successfully flipped in their neighborhood. Social contagion brought amateur real estate investors into the market at an increasing rate during the boom, and we provide evidence that amateurs were not acting on superior information, but were relying on market appreciation to make returns.

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1 Introduction

In his famous description of the boom and bust in the 1637 Dutch tulip market, Mackay (1841) commented that at its peak, "Nobles, citizens, farmers, mechanics, seamen, footmen, maid-servants, even chimney-sweeps and old clotheswomen, dabbled in tulips."[1]

The notion that excessive short-term trading by inexperienced investors signifies and may contribute to speculative bubbles endures to this day. From the perspective of economic theory, what matters about novice investors is not their lack of experience per se, but the possibility that they may be behaving naively–i.e., acting with poor information about market fundamentals or simply chasing returns. The behavior of such nave agents has been incorporated into many theoretical models of financial markets that have been developed over the past several decades.[2]

Despite their role in economic theory, there is little direct empirical evidence about the behavior of novice investors in most financial markets. In this paper, we take advantage of the large amount of publicly available information to study the behavior and apparent strategies of individual investors in the housing market. Drawing on comprehensive transaction data from the Los Angeles metro area from 1988-2009 (more than three million transactions in all), we show that a speculative fever among novice investors occurred during the boom and bust in the U.S. housing market in the 2000s. We establish that these investors were not especially well informed about market fundamentals and, in many cases, were simply emulating the types of investments they saw others making around them in an effort to chase returns in a rising market.

We do not make any claims about the causal impact of speculation by novice investors on the housing boom and bust itself in this paper.[3] Instead, the aim of our paper is to provide a series of related empirical findings that help to micro found the theoretical study of this important asset market. We marshal four key pieces of evidence about the role of novice investors in the housing boom of the 2000s.

(1) We begin by documenting that a large share of the properties that were purchased in the Los Angeles market late in the boom were bought by those already holding another property in the area, presumably as an investment property. These findings are consistent with the recent study by Haughwout, Lee, Tracy, and van der Klaauw (2011), which used

[1] See Mackay (1841), page 94. Similarly, in his "anatomy of a typical crisis"Kindelberger (1978) notes that financial market bubbles are frequently characterized by "More and more firms and households that previously had been aloof from these speculative ventures" beginning to participate in the market.

[2] add cites to literature that added noise traders here

[3] While a number of factors certainly contributed to the recent rise and fall in housing prices, there remains no current consensus as to the primary sources (e.g. Landvoight, Piazzesi, and Schneider (2011), Ferreira and Gyourko (2011), Glaeser (2013), Glaeser, Gottlieb, and Gyourko (2013)).

detailed data drawn from credit reports to document that, in the states that experienced the largest housing booms and busts, over 50 percent of the homes sold at the height of the boom were purchased by individuals who already had a mortgage on another property. The sheer magnitude of the activity of novice investors suggests they play a non-negligible role in the market and supports their use in theory at a basic level.

(2) We next show that the novice investors that entered the market in large numbers in the boom did not buy at much of a discount or sell at a premium (relative to local prices). Instead these investors earned almost of their return based on market timing i.e., market price appreciation in the area in which they bought. For this portion of our analysis, we focus primarily on the behavior of a set of individuals who we observe re-selling multiple properties after short holding periods, using the colloquial term "flipper to describe these investors. We introduce a novel research design using properties that sell repeatedly during the study period to decompose the observed price growth during the flipper's holding period into four components: (i) the discount relative to market price at the time of purchase, (ii) the premium relative to market at the time of sale, (iii) the market return during the holding period, and (iv) physical improvements made to the property by flippers. Our research design implicitly distinguishes any costly improvements that a flipper may have made (which are not directly observed in the data) by measuring the extent to which any above-market appreciation that a flipper earns at sale persists through a subsequent sale of the same property. This second key piece of evidence makes clear that most of the novice investors were not inordinately skilled real estate professionals.

(3) Having established that the novice speculators rely almost exclusively on market timing, we next explore whether they showed any signs of being able to foresee market price movements. In particular, we examine whether the novice investors that purchased homes late in the boom are able to anticipate the market peak. Remarkably, not only did they continue to purchase homes at near record rates right up to the peak,[4] there is also no change in the rate at which they sold their existing holdings, despite a clear financial incentive to do so. The latter result holds even for properties purchased many quarters before the peak, which had appreciated considerably before the peak. This portion of our analysis is very much in the spirit of Temin and Voth (2004) and Brunnermeier and Nagel (2004). Quite in contrast to our results for novice investors, Temin and Voth (2004) study a sophisticated investor who successfully profited from "riding" the South Sea bubble and Brunnermeier and Nagel (2004) find that hedge funds were able reduce their exposure to tech stocks before the dotcom bubble burst.

[4]While some of this activity may have been fueled by easy mortgage credit access, the average loan-to-value (LTV) ratio for speculators at the market peak remained near 80 percent, suggesting that many investors did have some of their own money at stake.

(4) We close the paper by providing causal evidence that many novice investors were drawn into the market by directly observing investment behavior in their neighborhood and by their neighbors. We show, in particular, that existing homeowners were much more likely to purchase a second property in the months after a home was flipped on their block or after one of their immediate neighbors began investing in real estate. The research design that we use in this portion of our analysis addresses the potential non-random assignment of the activity on a homeowners block by controlling for the investment activity that occurred just a block or two away. We also show that novice investors drawn into the market in this way generally underperformed the market as a whole. This fourth key piece of evidence not only provides direct evidence of the contagion of investment activity in the housing boom, but also implies that a good deal of investment activity was triggered by the (essentially) random event of whether a house flipped on a homeowners own block or one a street or two away. [5]

Taken as a whole, the evidence that we present provides a comprehensive picture of the activity of amateur investors in the housing boom that is consistent with the typical portrait of nave behavior captured in many theoretical models of financial markets. Not only did these novice investors show no signs of being especially proficient at real estate bargaining or well informed about market movements but a number were drawn into the market directly as a result of emulating the activity that they saw happening around them. That such agents were party to such a large number of transactions during the final few years of the housing boom not only justifies their use as a theoretical device but also suggests that their activity may be worth addressing from a policy perspective.

The paper proceeds as follows. Section 2 describes the data we use for our analysis and establishes some basic facts about the activity of investors in the housing market. In Section 3 we establish the existence of two distinct investing strategies that real estate investors follow and documents that novice speculators generally don't get an especially good deal when they buy and sell - so appear to be trying to make money by timing the market. This section also presents a simple theoretical discussion of the economic roles of flippers as middlemen and speculators to frame the empirical findings and lays out the research design we use to identify flipper returns and their sources. Section 4 documents that novice speculators were not well informed about the evolution of prices in the housing market. Section 5 presents our evidence that amateur investors were drawn into the market by observing others nearby them flipping houses and also that such novices did not do as well as other investors. Section 6 concludes. Appendix A studies the robustness of our findings.

[5] Could cite many other papers using this identification strategy including Bayer Ross Topa and Anenberg and Kung and also comment about meaningfulness of this result as evidence of local spillovers more generally.

2 Data

2.1 Background Description

The primary data set that we have assembled for our analysis is based on a large database of housing transactions compiled by Dataquick Information Services, a national real estate data company. Dataquick acquires data from public sources like local tax assessor offices, and they have provided us with the complete census of housing transactions in the five largest counties in the Los Angeles metropolitan area (Los Angeles, Orange, Riverside, San Bernardino, and Ventura), between 1988 and 2012. For each transaction, the data contain the names of the buyer and seller, the transaction price, the address, the transaction date, and numerous characteristics including, for example, square footage, year built, number of bathrooms and bedrooms, lot size and whether the house has a pool. While we are able to observe the date, price and names of the buyer and seller for every transaction in the data, a drawback of the data is that Dataquick only maintains a current assessor file and overwrites historical information on house characteristics. This means that because the data were purchased in 2012, we observe housing characteristics as they were the preceding, and consequently we cannot see how they may have evolved over time. This data limitation will partially motivate our research design to control for unobserved investment in houses that is explained below.[6] Using the transactions' information on property liens, a substantial subset of these data can be further merged with public data from the Home Mortgage Disclosure Act (HMDA) to attach information on purchaser/borrower income and race.

From the original census of transactions, we drop observations if a property was subdivided or split into several smaller properties and re-sold, the price of the house was less than \$1,[7] the house sold more than once in a single day, the price or square footage was in the top or bottom one percent of the sample, there is a potential inconsistency in the data such as the transaction year being earlier than the year the house was built, or the sum of mortgages is \$5,000 more than the house price, as this may indicate that the buyer intends to do substantial renovations.

Table 1 provides summary statistics for our primary data set based on a full sample of over 3.5 million transactions between 1988-2009. Homes in Los Angeles tend to be newer and more expensive than those in many other American cities. The vast majority of buyers take

[6] A research design to address the possibility of unobserved improvements to properties would be necessary even if Dataquick kept track of housing attributes on a continuous basis, as many home improvements (e.g., a renovated kitchen or bathroom) would not generally affect the more basic attributes of the home (e.g., lot size, square footage) collected by the tax assessor.

[7] A price of zero suggests that the seller did not put the house on the open market and instead transferred ownership to a family member or friend.

All Properties				
Variable	Mean	SD	Transactions	Properties
Price	276,864	199,945	4,141,201	2,166,506
Transaction Year	1,999.5	6.8		
Year Built	1970.2	21.0		
Square Feet	1,617.1	627.5		
Loan Present	0.89	0.31		
LTV	0.76	0.30		
Transactions on Property	1.91	1.10		
Investment Properties				
Variable	Mean	SD	Transactions	Properties
Price	272,630	203,250	539,345	465,705
Transaction Year	2,001.5	6.6		
Year Built	1967.4	22.0		
Square Feet	1,520.2	602.1		
Loan Present	0.84	0.36		
LTV	0.73	0.34		
Transactions on Property	2.61	1.32		

Table 1: The table shows transaction-level summary statistics for data that cover five counties in the Los Angeles area (Los Angeles, Orange, Riverside, San Bernardino, and Ventura) based on transactions from 1988-2012. LTV is measured relative to the price paid at the time of initial purchase.

out a mortgage, with an average LTV of 78.6 percent. Finally, the homes that were sold at least once during the sample period turned over on average every 9 to 10 years.

Figure 1 shows the basic dynamics of prices and transaction volume for the Los Angeles metropolitan area over the study period. The price index is computed with our data using a standard repeat sales method that we describe in Section 3.2. Following a rapid increase in prices in the late 1980s, the early 1990s were a "cold" market period for Los Angeles, with prices declining by roughly 30 percent between 1992 and 1997 and transaction volume averaging only a little more than 30,000 houses per quarter during this period. Starting in the late 1990s and continuing until mid 2006, the Los Angeles housing market experienced a major boom, with house prices more than tripling and transaction volume nearly doubling. Just two years later almost all of the appreciation in house prices from the previous decade had evaporated and transaction volume had fallen to record low levels (less than 20,000 houses per quarter). In the analysis below, we will reference the three key market periods evident in Figure 1: the "cold" market period in the early 1990's (1992-1998), the "hot" or boom market period in the late 1990's and early 2000's (1999-2005) and the "post-peak" period (2006-2012).

2.2 Flippers

A basic measurement challenge for anyone wishing to study the behavior of investors in the housing market in these data is identifying such agents in the first place. One clever approach

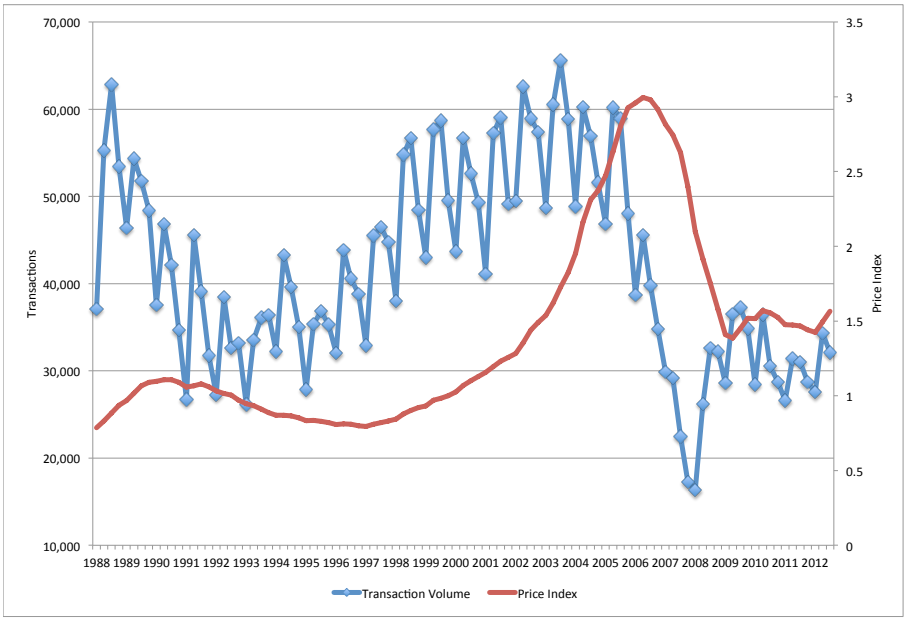


Figure 1: Quarterly transaction volume and price index in five counties in the Los Angeles area (Los Angeles, Orange, Riverside, San Bernardino, and Ventura).

utilized by Haughwout, Lee, Tracy, and van der Klaauw (2011) is to examine credit reports and look for cases where the same individual is observed to hold mortgages on multiple properties. While some instances of second home purchases may be motivated by reasons other than pure investment (e.g., vacation properties, first homes purchased for children), by carefully documenting the pattern of new home purchases by individuals who own multiple properties, these authors are able to provide a reasonable proxy for the amount of investor activity in the market at a given point in time. Haughwout, Lee, Tracy, and van der Klaauw (2011) document that a large fraction of new mortgage originations (almost 50 percent in some markets) in 2004-2006 in the states that experienced the largest housing booms/busts were made to individuals who already owned at least one house.

2.3 Designation of Investing Activity

Importantly, the transactions contain the names of the buyer and seller and the sale closing date, and we use this information to construct a tenure profile for each individual name.[8] We designate a property tenure as ending when we observe a transaction in which the name

[8]Names are detailed, typically including middle initials and often names of spouse/coborrowers, assuaging concerns that we attribute a single profile to two different people of the same name. We have reviewed names in transactions to exclude purchasers by businesses, nonprofits, and various levels and agencies of the government. However, we recognize that despite our best efforts the data will contain some degree of measurement error. We have taken care to be conservative, when in doubt preferring to label a profile a non-investor.

of the initial buyer is listed as seller. Then, for each unique name name, we construct a property purchase history with this tenure spell information. A property held for more than two years is designated as the person's home. "Home" is an important designation, as we use the location of home as the center for a circular spatial match of investing activity in the person's neighborhood. A profile is "at-risk" of becoming an investor until the sooner of entry to investment activity (defined below), or the sale of the home.

We then identify property investment activity in two nonexclusive ways. The first of these, which we call "Investment Properties", is constructed in the spirit of Haughwout, Lee, Tracy, and van der Klaauw (2011) by identifying individuals that own two homes at the same time. If in the data we observe the named buyer purchasing another property without selling their existing home, we designate the second home as an "investment" property, and the purchase date of the second home is the investor's entry to investing activity.[9] Second, we identify a set of transactions as "quick sales" in which a property is held for less than two years. This short tenure is indicative of the "house flipping" type of investment activity. Since there may be other explanations for short tenure (job relocation, change in martial status, etc), we designate only a person who is observed to do this two or more times in our dataset as a "flipper," with the purchase of the first quick sale being the flipper's entry date. A flipper can be designated without observation of a home location, since the flipper designation uses only the repeated name in quick sale activity, and not the tenure profile itself.

We make the distinction between flippers and regular investors since there are motivations for investing aside from speculation, arbitrage or property improvement that can drive investment in housing. One concrete example is the aim to rent the property. To identify flippers, therefore, we look for evidence that an individual is generally engaged in a strategy of purchasing homes with the intention of re-selling the property after a relatively short holding period. Well over 10 percent of all homes purchased near the peak of the boom in 2003-2005 were re-sold within two years, a rate that is more than triple the corresponding rate for the cold market period of 1993-1994, when home prices were declining. While certainly a portion of the buyers that re-sell homes within two years of purchase are owner-occupants rather than investors, this time series provides a proxy for flipper-like behavior in the market throughout the cycle and is economically significant.

The investor designation process is illustrated in Figure 2. The person with this tenure profile would be designated as an investor entering in year $t = 2$, and as a flipper entering in year $t = 6$. However, had the second flip in year $t = 8$ not been observed, the quick sale in

[9]We allow for a six month overlap to account for housing search. Any person who has only one "investment" property, and it was held for an overlap with home for one year or less is also excluded from the investor designation.

year $t = 6$ would not be considered a flip.

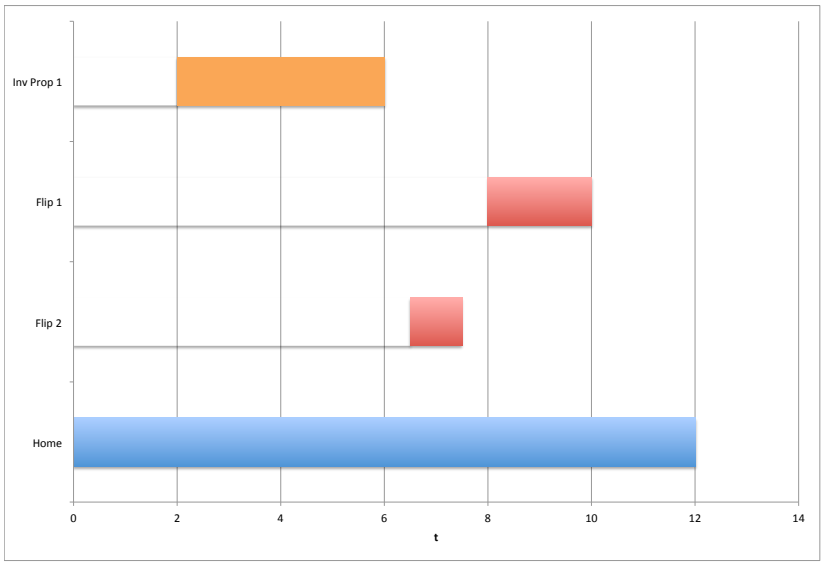


Figure 2: Illustration of Designation of Investors

There is significant overlap in the two measures, though given our two-flip restriction, the second home designation is much more common than the flipper designation. For persons for which we have identified a home location, flipping is essentially a proper subset of second home investing.

Figure 3 reports the time series for three distinct proxies for flipper behavior in the Los Angeles market between 1993-2012 derived from our transaction data set: investment properties, quick-sales, and flips. The upper-left figure shows raw counts and the upper right the fraction of all transactions. All three follow a similar pattern over time, though clearly our designation of flips is the most restrictive. A fundamental problem with the second-home "investment" definition is that for an individual to be observed as a home-owner at all, they need to have purchased a home since the beginning of our study period in 1988. Thus, our measure of "Second Homes" is likely to substantially understate the amount of actual second home purchases, especially near the beginning of the sample period. For this reason, it is important not to over-interpret the trends in the measure. However, even subject to this limitation, our measure of second home purchases closely tracks that of Haughwout, Lee, Tracy, and van der Klaauw (2011), rising to a peak of nearly 23 percent of the market in 2006.[10]

[10] A second limitation of our definition of second home purchases is that it is based on name matches and, therefore, might be overstated because of false matches of different individuals with the same name, or understated because of slight differences in naming (inclusion of a middle initial, etc). The qualitative pattern of a sharp peak in the presence of second home purchasers in 2004-2006, however, is not meaningfully affected by the exclusion of the most common names observed in the data set.

The bottom panel of Figure 3 displays the time series of investor entry behavior as raw frequencies and a hazard rate. That is, the bottom panel of Figure 3 displays the investing entry at the person level, while the top panel displays investing activity at the property level. Each display a strong upward trend during the period of house price appreciation from the late 1990s to late 2006, with the falloff thereafter.

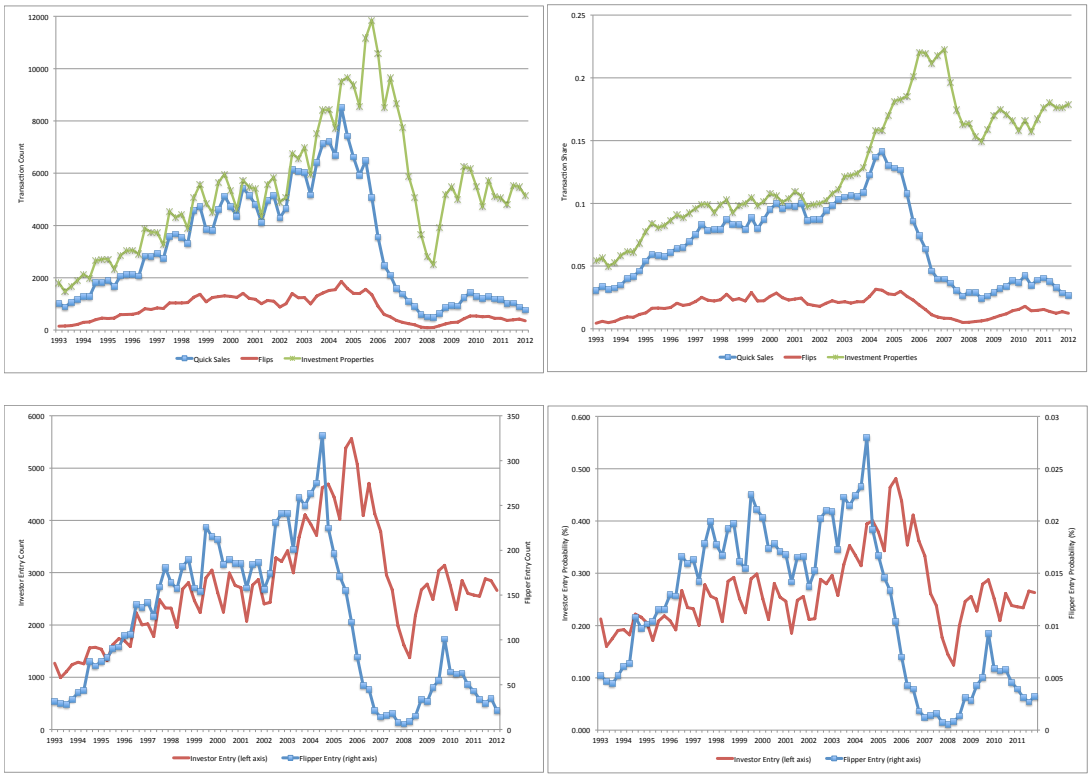


Figure 3: The figure plots three data series that serve as proxies for investor and flipper activity; definitions given in the main text. The top panel shows transaction counts and shares; the bottom panel shows entry counts and rates.

Overall, the three broad metrics of aggregate investor or flipper activity shown in Figure 3 show a consistent pattern of pro-cyclical behavior, with purchases by these agents reaching a maximum at the peak of the housing boom, at levels that are roughly three times the level activity observed during the market trough in the early 1990s. Below we will identify investor types whose strategies and participation over the housing cycle will differ from one another.

2.4 Purchase Activity by Flippers

In the analysis that follows, we document considerable heterogeneity in flipper behavior, strategy, and outcomes that is strongly associated with experience. Figure 4 shows the percentage of all homes purchased in a given quarter by flippers in four experience categories.

We define the categories as: "Low" experience for three or fewer investment properties, "medium" experience is four to nine, and "high" experience is ten or more. The sum of all three data series presented in Figure 4 produces the total count of flipper purchases shown in Figure 3.

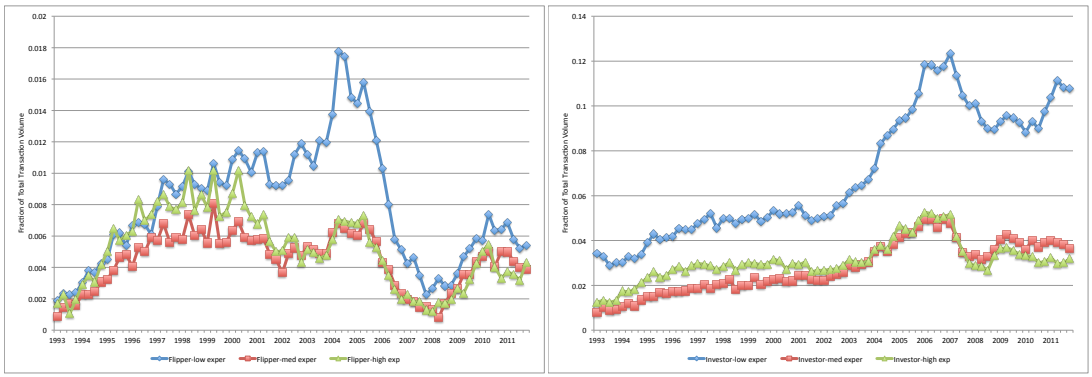


Figure 4: Investor transactions over time by type: The figure plots investor purchase by year and quarter as a fraction of total transaction volume. "Low" experience means the investor transacted three or fewer investment properties, "medium" experience is four to nine, and "high" experience is ten or more. The data cover five counties in the Los Angeles area (Los Angeles, Orange, Riverside, San Bernardino, and Ventura).

Figure 4 illustrates that the dynamics of flipper activity depends on experience. The purchase activity by more experienced flippers is relatively constant over the study period, actually peaking in the colder market period of the mid-1990s. This pattern of activity is consistent with the view that the more experienced flippers tend to operate as middlemen, looking for opportunities to buy from motivated sellers with higher holding costs than their own, opportunities that are just as (or perhaps more) likely to arise in cold versus hot market conditions.

The purchase activity by inexperienced investors is more highly pro-cyclical, rising from a very small percentage of the overall market in the early-mid 1990s to almost two percent of the market in 2004-2006. Looking at other investments in the right figure shows a similar pattern, with transactions by inexperienced investors peaking around 12 percent of the total market in 2006. This pattern of activity is consistent with the view that many inexperienced investors were drawn into the market during the boom period. While this measure of activity is not enough to establish the motives of these flippers, the timing of their purchases is certainly consistent with a view that they are seeking to make a quick speculative gain on the basis of market appreciation.

It is worth noting at the outset that our definition of flipper experience is far from perfect. In particular, our measure of experience is based on activity over the full study period. Thus,

many of the flippers that we categorize as inexperienced may, in fact, ultimately become more experienced if they continue to flip homes after our study period ends. Moreover, survival in the flipping business is likely to be non-random, with more profitable flippers being more likely to survive long enough in the business to reach the higher experience categories. In our analysis below, we will explicitly address these and other issues that arise due to our definition of flipper experience.

A final aspect of flipper purchase activity that is important to describe at the outset of our analysis is the heterogeneity in the attributes of homes purchased by flippers of each type. To this end, Table 2 summarizes some basic characteristics of the homes purchases by flippers of each type.

Type, experience	Year Built	Square Feet	Year Purchase	Properties (N)
Flipper, low	1965.2	1532.4	2000.6	31,414
sd	22.7	614.8	5.5	
Flipper, medium	1960.7	1438.7	2000.8	16,759
sd	23.3	567.1	5.5	
Flipper, High	1959.8	1358.9	2000.3	19,170
sd	23.2	492.5	5.1	
Investor, low	1969.6	1587.5	2001.6	267,761
sd	21.3	638.6	6.9	
Investor, medium	1967.6	1482.5	2002.0	99,085
sd	21.8	572.5	6.5	
Investor, high	1964.8	1423.2	2001.2	105,156
sd	22.3	525.1	6.4	

Table 2: The table shows house-level summary statistics by type of investor for data that cover five counties in the Los Angeles area (Los Angeles, Orange, Riverside, San Bernardino, and Ventura). Standard deviations are shown below the mean. "Low" experience means the investor transacted three or fewer investment properties, "medium" experience is four to nine, and "high" experience is ten or more.

As the table makes clear, flippers, especially experienced flippers, generally purchase properties that are somewhat older and smaller than the homes that sell at least twice during our study period. The research design that we present below for estimating the sources of flipper returns is motivated in large part by the very real possibility that flippers may systematically purchase older homes or "fixer-uppers" that can benefit from substantial renovations or improvements before being re-sold. We also take additional steps to ensure that we compare the sources of returns for flippers for comparable houses.

2.5 Flipper Holding Times

Before turning to our analysis of the sources of flipper returns, we present a final descriptive characterization of the heterogeneous behavior of flippers at each experience level. Table 3 reports the fraction of homes sold by flippers of each type within 1-4 years of the purchase. The table reports these statistics for our main study period of 1993-2008 and separately for purchases made in the hot market period of 2000-2006. To measure holding periods of up to four years, it is, of course, necessary to restrict attention to homes that were purchased at least four years from the end of the sample in 2012.

			1993-2008		
Type, experience	One Year	Two Years	Three Years	Four or More Years	Properties (N)
Flipper, low	0.582	0.418			25,475
Flipper, medium	0.712	0.288			13,485
Flipper, High	0.714	0.286			16,140
Investor, low	0.141	0.135	0.094	0.630	172,088
Investor, medium	0.173	0.139	0.093	0.596	72,046
Investor, high	0.191	0.133	0.096	0.580	85,905
			2000-2006		
Type, experience	One Year	Two Years	Three Years	Four or More Years	Properties (N)
Flipper, low	0.573	0.427			16,388
Flipper, medium	0.674	0.326			7,518
Flipper, High	0.646	0.354			8,305
Investor, low	0.158	0.145	0.100	0.597	93,748
Investor, medium	0.179	0.147	0.098	0.576	41,576
Investor, high	0.188	0.144	0.103	0.565	46,042

Table 3: The table reports the fraction of the homes purchased by investors of different types sold with 1, 2, 3, and 4 years, respectively, in the Los Angeles area (Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties). "Low" experience means the investor transacted three or fewer investment properties, "medium" experience is four to nine, and "high" experience is ten or more.

The figures reported in Table 3 show that flippers of all types hold a significant fraction of the properties that they purchase for more than four years. This may reflect the fact that these investors intend to hold some properties as rental units.

Table 3 also reveals significant heterogeneity in holding periods by both flipper type and market conditions. Experienced flippers, in particular those in category Flipper 4, are much more likely to re-sell homes after very short holding periods, selling 71 percent within one year. This pattern is consistent with the notion that experienced investors purchase many homes with the intent to put them immediately back on the market and that these experienced flippers serve the economic function of middlemen, seeking to buy cheaply from motivated sellers and re-sell quickly. The proportion is lower during the hot market of 2000-2006, indicating a difference in strategy: more willingness to hold during the price appreciation, but more of a middleman function during the cold market.

By contrast, the figures for inexperienced flippers are qualitatively very distinct. The least experienced flippers, for example, sell only 57 percent of their purchases within a year of purchase. This pattern of behavior is more consistent with a strategy of buying properties with the intention of capturing market appreciation, a strategy which, of course, requires a reasonable holding period.

3 The Sources of Flipper Returns - Baseline Results

We know examine the sources for nominal returns for investors of different volume types and for different types of investment properties.

3.1 A Conceptual Framework

To frame the empirical analysis, it is helpful to present a conceptual discussion that highlights the potential economic roles of flippers as middlemen and speculators.

3.1.1 Flippers as Middlemen

Housing markets are a classic example of a thin market for high-valued durable goods and, as a result, the home-selling problem is generally modeled in a search theoretic framework.[11] When selling a home, a household lists the property for sale and waits for offers from buyers to arrive, determining its reservation price (i.e., minimum acceptable offer) as a function of market conditions and its motivation to sell or holding costs. In general, holding costs for comparable properties vary across sellers depending on how quickly they need to relocate, their consumption value from residing in the house (if they continue to do so), and their borrowing costs.

Flippers who purchase a property with plans to immediately put the house back on the market face an analogous home-selling problem to that of other home-owners. As a result, flippers will be able to profitably bid above the seller's reservation price only when their holding costs are lower than that of the seller. The holding costs of flippers will generally be governed by their borrowing costs or, more generally, their cost of capital.

Because flippers do not receive consumption value from residing in the home, their holding costs will generally be greater than those of a large fraction of sellers who can continue to reside in their home while waiting for offers to arrive and face little pressure to sell quickly. A motivated seller, however, may have a holding cost that exceeds those of flippers if, for example, the seller needs to relocate to a new city or sell a house quickly to settle a

[11] For example, see Goetzmann and Peng (2006).

divorce.[12] When transaction costs are sufficiently low, a flipper's maximum bid will exceed the reservation price of sufficiently motivated sellers, and flippers will be able to purchase the property with the intention to immediately re-list it for sale, waiting more patiently than the existing home-owner for a strong offer to arrive.

The economic function of flippers that buy properties from especially motivated sellers, hold them for a short period, and then sell them to a buyer that places a sufficiently high value on the property is that of a middleman. When flippers operate as middlemen, motivated sellers are dynamically matched to future buyers that place a higher value on the property (on average) than those who the seller would have sold to in the absence of flippers. In this capacity, flippers provide liquidity to the market, essentially providing a price floor that is a function of their cost of capital and market conditions, and their presence generally improves the economic efficiency of the market.

3.1.2 Flippers as Speculators

The theoretical finance literature supports (at least) two broad rationales for the existence of speculators in the housing market. Most obviously, efficient market theory admits an economic role for speculators that have access to better information than the broad set of agents participating in a market. Given the decentralized nature of the housing market, with many individuals taking part in the home buying or selling process only a handful of times during their lives, it is straightforward that some market professionals might be especially well-informed or be able to process information in a sophisticated way that generates arbitrage opportunities. In the classic theory of efficient markets, speculators, acting on the basis of their superior information, serve to align prices more closely with market fundamentals, generally improving the efficiency of the market (Fama (1965)).

Modern finance theory admits a wider range of strategies for speculators and a more ambiguous understanding of their impact on welfare and efficiency.[13] A starting point for much of modern finance theory is the presence of a set of naïve market actors, noise traders, who are subject to expectations and sentiments that are not justified by information about market fundamentals. By following simple strategies, such as chasing trends, or by sticking to rules of thumb, noise traders can create distortions between prices and market fundamentals.

In this setting, potential arbitrageurs face multiple risks. Even if they are aware that prices have temporarily deviated from fundamentals, there is a risk that they may deviate further

[12]Springer (1996) finds that distressed sellers deal more quickly and sell for less than other sellers. Glower, Haurin, and Hendershott (1998) find that when a seller takes a new job, she sells faster than average, indicating a higher holding cost.

[13]See Shleifer and Summers (1990), Barberis and Thaler (2003) and Shiller (2003) for summaries of this literature.

in the short-run (depending on the beliefs and activity of the noise traders) before eventually falling back in line with fundamentals. It is not always optimal, therefore, for arbitrageurs to simply take a short position on any observed market deviations from fundamentals.

In fact, it can be optimal to pursue a much wider range of strategies. If, for example, noise traders engage in positive feedback trading - i.e., have a tendency to extrapolate or to chase the trend, it can be optimal for rational speculators to jump on the bandwagon (DeLong, Shleifer, Summers, and Waldmann (1990)). By buying as noise traders begin to get interested in a market, speculators actually fuel the positive feedback trading that motivates the noise traders. And, by selling as the market nears a peak, speculators speed the return of the market to the fundamentals. In this case, rational speculators take advantage of the noise traders by strategically selling before the noise traders realize the bubble is about to burst. In this way, the welfare consequences of the existence of speculators need not be positive. To the extent that their actions fuel bubbles and increase volatility in the market, speculators tend to decrease welfare and market efficiency.

The strategies used by these distinct types of investors directly influence when and where they operate. Because flippers generally do not reside in the property while holding it, they will only purchase properties when their expected returns, whether achieved by buying low from motivated sellers or speculating on market appreciation, exceed their expected holding and transactions costs. For middlemen, opportunities to buy may occur under any market conditions, provided they are able to identify especially motivated sellers (those with higher holding costs than their own). Speculators will require expected market appreciation to be sufficiently high to justify their purchases and, therefore, will be active in only those times and places where conditions are right.

3.2 Measuring the Sources of Investor Returns - Research Design

Having documented time series pattern of purchase activity by investors and experiences, we turn next to an analysis of the sources of their returns. At the outset, it is important to note several key limitations that shape the interpretation of the results of our analysis. In particular, we do not observe whether a home is rented to a tenant during a holding period, any transactions costs that a investor might pay while buying and selling a house, and the borrowing costs that a investor faces when procuring a mortgage in order to purchase a property. Thus, we will not be able to calculate the actual profit that a investor earns on each investment.

Instead, we will focus only on the components of the returns that are associated directly with the purchase, holding, and sale of the property. In particular, we seek to identify (i) the discount that investors get (relative to the average sales price in the market in the

corresponding period at the time of purchase), (ii) the market return that they earn over the period that they hold the property and (iii) the premium that they get at the time of sale (again relative to the average sales price in the market at the time). By measuring these sources of investor returns, we seek to categorize investors on the basis of their motivation and strategy to identify whether they appear to be operating as middlemen or speculators.

An important complicating factor is that investors may systematically make physical improvements to the properties that they purchase, improvements which are unobserved in our data set for the reasons mentioned in Section 2. The concern is that a naïve analysis of the sources of investor returns from buying, holding, and selling a property might wind up counting money that investors invested in improving a property as part of their return.

To address this problem, we develop a research design that aims to uncover the sources of investor returns from buying, holding, and selling a property in the (potential) presence of unobserved investment. The method is based on a repeat sales index which we first review.

Case and Shiller (1987) introduced the repeat sales regression to generate a price index:

$$log(p_{it}) = \alpha_t + \gamma_i + \varepsilon_{it} \tag{1}$$

In equation 1, α_t are quarter fixed effects and γ_i are house-level fixed effects. Exponentiating the estimated time fixed effects gives the price index for each quarter, which can be normalized to 1 in any quarter. This framework requires that quality is constant for each house across sales. Additionally, it assumes that the market evolves homogeneously across different regions of a metropolitan area.

We modify this framework by first introducing controls for whether the buyer or seller is a investor of each type. In equation (2), b_{kit} is a dummy for whether the buyer is a investor of type $k = \{1, 2, 3, 4, 5, 6\}$ and s_{kit} is a dummy equaling one if a investor of type k is the seller. (There are two types of properties–flips and other invvestments–and three levels of experience, which generates six types.) This estimated coefficients related to investor activity will provide estimates of the discount that investors get when buying (should $\hat{\beta}_{1k} < 0$) and the premium they command when selling (should $\hat{\beta}_{2k} > 0$), provided that house quality is constant over time. If, however, investors purchase houses and then invest heavily to improve them before putting them back on the market, these parameter estimates will be biased. In particular, we would expect β_{1k} to be negative because the true house quality in this period would be less than the estimated quality. Similarly, β_{2k} would likely be positive because the true quality in this period would be greater than the quality estimated. The researcher may, therefore, infer that investors are buying at a discount and selling at a premium when they

are simply investing more than the average homeowner.

$$log(p_{it}) = \alpha_t + \gamma_i + \beta_{1k} b_{kit} + \beta_{2k} s_{kit} + \varepsilon_{it} \tag{2}$$

Because of this concern, we adapt this framework to control for the possibility of unobserved investment in the property by the investor by estimating

$$log(p_{it}) = \alpha_t + \gamma_i + \beta_{1k} b_{kit} + \beta_{2k} s_{kit} + \beta_{3k} a_{kit} + \varepsilon_{it}. \tag{3}$$

where we introduce a_{kit}, which is equal to one if, in any previous period, we see a investor of type k purchase house i. This variable, therefore, controls for any improvements made by the investor that extend beyond average homeowner investment since β_{3k} captures the change in house quality between when the investor purchased and sold the home. We also add a dummy variable for sales that occur after a permitted improvement is made. This is the specification we estimate to compute the price index that appeared in Figure 1.

In the standard repeat sales framework, a house only helps to identify the time series of market appreciation when it sells at least twice; otherwise it can only identify its corresponding house fixed effect. However, to identify the coefficients corresponding to sources of investor returns and investment, β_{1k}, β_{2k} and β_{3k} in equation 3 homes must sell at least four times, with at least one non-investor to non-investor transaction before and after a investor buys and sells the house. To see why, consider Figure 5, which gives two examples of houses that sell four times, at instances A, B, C and then D. Suppose that at A both transacting parties are non-investors; at B the house is sold to a investor by the non-investor; at C the investor sells the house to a non-investor; and at D it is sold to a non-investor by the non-investor. The observation before the investor buys is used to identify the original house quality and the observation after the investor sells is used to identify the new house quality. The two panels differ in terms of the inference one would make about the existence of unobserved investment in each home. The left panel shows a investor who buys below market price in period B and is able to sell above market price in C without making any improvements. The right panel, on the other hand, gives an example where the investor makes improvements, which can be seen by noting that the price at D continues to stay above its expected price, conditional on the price at A. If we did not account for this improvement, it would appear that the investor sold the house for above market value when in fact he sold it for exactly market value.

Several important features of this research design are worth noting. First, because our estimates of the sources of investor returns will be based on houses that have sold at least four times during the sample period and fit this ABCD structure, then by construction, the

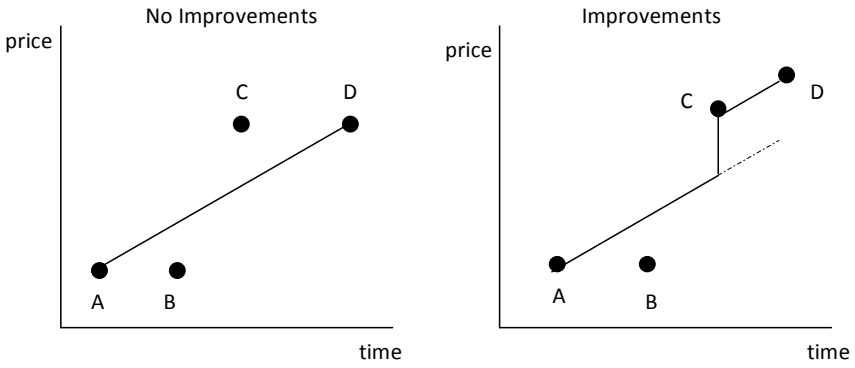


Figure 5: The left panel depicts a case in which the investor did not make improvements between periods B and C and the right panel provides an example in which the investor did.

period of time that the previous owner held a property before selling to a investor is limited (as the sale at point A must be within the study period). This excludes a set of houses that may have been neglected over a long period of time by an owner (i.e., "fixer-uppers") from contributing to our estimates of the sources of investor returns.While investors, especially those seeking to make significant physical improvements, may in fact target such homes for purchase, they will not generally be the ones that identify the sources of returns given our research design.[14]

A related concern is that investor improvements may be underestimated if these improvements depreciate significantly under the care of the next home-owner, that is, between C and D. Of course, once again by construction, the length of time between when a investor sells the house and when the house is re-sold by the subsequent buyer is limited by the fact that the sale at point D needs to take place within the study period. This provides a limited window for any physical improvement made by the investor to have depreciated between points C and D.

In the analysis that follows, we report results for two slight adjustments to the specification shown in equation 3. First, we include a series of dummy variables for how many times we have seen a given property previously transacted in the study period. In general, sellers make some home improvements at the time of a sale so that a house will show well. Thus, we include these additional sales number dummy variables in order to make sure that we do not systematically overstate the performance of homes that meet the ABCD structure simply because they sell at least four times during the study period.

[14]We drop any purchases from banks or firms that might be associated with a foreclosure. We do this because of concerns that these homes may have been systematically run-down by the previously owners or vandalized, leading to large real declines in house quality between sales at points A and B, even if the time period between points A and B is short.

Secondly, as shown in Table 2, investors (especially experienced investors) tend to purchase homes that are slightly older and smaller than the average homes that are sold in the market. Therefore, to ensure that we are comparing apples to apples, we report results for a second specification of equation 3 that interacts the three key investor variables with de-meaned measures of housing attributes, reporting the investor coefficients at the mean attributes of the homes sold in the study period. This ensures that all comparisons of sources of returns are done for the same type of property, even though investors with different levels of experience purchase properties that are somewhat heterogeneous.

Finally, it is worth stressing that while only flipped houses that sell at least four times and meet the ABCD structure will be helpful in identifying the three key investor coefficients in equation 3, all of the counts presented in the paper are based on the full set of homes purchased by investors. This is important because the set of homes that fit the ABCD structure will systematically result in a investor purchase and sale closer to the middle of the study period (so that at least one sale can occur before and after the investor's holding period).

3.3 The Sources of Flipper Returns - Baseline Results

We now provide estimates of the sources of flippers' returns using the above research design. Our baseline results are presented in Table 4 which presents estimates of equation 3 when flipper and investor experience types are summarized using all years between 1988 and 2012, as well as conditioning on the investment property transactions occurring during the 1990s and 2000s. As mentioned above, for each sample period, results are presented for a basic specification and for one that interacts the key flipper variables with de-meaned housing attributes to ensure that the estimates are reported for comparable houses.

Specification (1) does not include the controls or ABCD structure. The estimates indicate that flippers purchase at a discount of 16 percent (s.e. 0.2 percent) and sell at a premium of 7.5 percent (s.e. 0.2 percent). That is, they purchase the house for approximately 16 percent less than its expected market price and sell 7.5 percent above expected market price. Investors (excluding flips) buy at much smaller discounts of 1.8 and sell at premia of 1.8 percent. Apparently, investors of different types are following different strategies.

The remaining specifications control for unobserved investment as described above, and the estimates change slightly. Specification (2) implies that flippers purchase homes at a discount of about 12.9 percent over the full sample period and earn a premium of 4.3 percent when they sell the property after controlling for potentially unobserved investment. Investors buy at a discount of 2.9 percent and sell at a premium of 2.0 percent (s.e. 0.3 percent for each). When the mean-differenced value of house characteristics are interacted with the

	(1) All	(2) ABCD	(3) ABCD	(4) ABCD	(5) ABCD	(6) ABCD
flip_buy	-0.162***	-0.129***	-0.119***	-0.119***		
	(0.00212)	(0.00400)	(0.00419)	(0.00419)		
flip_sale	0.0756***	0.0529***	0.0436***	0.0437***		
	(0.00174)	(0.00339)	(0.00356)	(0.00356)		
investor_buy	-0.0180***	-0.0289***	-0.0263***			
	(0.00131)	(0.00269)	(0.00296)			
investor_sale	0.0186***	0.0197***	0.0143***			
	(0.00130)	(0.00267)	(0.00296)			
investor_quick_buy				-0.0318***		
				(0.00514)		
investor_quick_sale				0.0386***		
				(0.00487)		
investor_long_buy				-0.0244***		
				(0.00323)		
investor_long_sale				0.00525		
				(0.00328)		
flip_buy_1990s					-0.207***	
					(0.00717)	
flip_sale_1990s					0.0312***	
					(0.00575)	
investor_quick_buy_1990s					-0.0971***	
					(0.0140)	
investor_quick_sale_1990s					-0.0356***	
					(0.0107)	
investor_long_buy_1990s					-0.0496***	
					(0.00454)	
investor_long_sale_1990s					-0.0288***	
					(0.00420)	
flip_buy_2000s						-0.0515***
						(0.00436)
flip_sale_2000s						0.0514***
						(0.00367)
investor_quick_buy_2000s						-0.00976*
						(0.00519)
investor_quick_sale_2000s						0.0576***
						(0.00521)
investor_long_buy_2000s						0.00291
						(0.00372)
investor_long_sale_2000s						0.0321***
						(0.00424)
post_inv_sale		-0.0112***	-0.0122***	-0.0125***	-0.0202***	-0.00637**
		(0.00286)	(0.00286)	(0.00286)	(0.00280)	(0.00261)
post_flip_sale		-0.0119***	-0.0123***	-0.0120***	-0.00894**	0.00349
		(0.00410)	(0.00409)	(0.00409)	(0.00378)	(0.00369)
post_permit		0.0940***	0.0941***	0.0941***	0.0941***	0.0940***
		(0.0151)	(0.0151)	(0.0151)	(0.0151)	(0.0151)
investor_buy_other		-0.0328***	-0.0328***	-0.0328***	-0.0317***	-0.0321***
		(0.00114)	(0.00114)	(0.00114)	(0.00114)	(0.00115)
trans #2		0.0307***	0.0307***	0.0306***	0.0315***	0.0299***
		(0.000739)	(0.000739)	(0.000739)	(0.000738)	(0.000737)
trans #3		0.0485***	0.0485***	0.0483***	0.0511***	0.0487***
		(0.00117)	(0.00117)	(0.00118)	(0.00117)	(0.00117)
trans #4		0.0625***	0.0625***	0.0622***	0.0658***	0.0626***
		(0.00166)	(0.00166)	(0.00166)	(0.00164)	(0.00165)
trans #5+		0.0740***	0.0741***	0.0737***	0.0786***	0.0735***
		(0.00238)	(0.00238)	(0.00238)	(0.00236)	(0.00237)
Interact House Characteristics			Y	Y	Y	Y
Observations	4,141,201	3,515,846	3,515,846	3,515,846	3,515,846	3,515,846
R-squared	0.951	0.954	0.954	0.954	0.954	0.954

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: The table gives estimates of equation 3 for all flippers regardless of experience. Standard errors in parentheses. Interacting house characteristics indicates that the mean house characteristics for the sample are subtracted from individual house characteristics and these values are interacted with the flipper dummies. An indicator variable for the first sale sale is omitted.

flipper dummies to account for potential differences in the types of homes purchased by flippers, the magnitude of these coefficients changes very little, as shown in the third column. Specification (4) separates investment properties held for less than two year from those held longer than two years. The short-tenure properties show a discount-premium pattern more like flips, though still at a much smaller magnitude.

Specifications (5) and (6), respectively, separately estimate the 1990s and 2000s. The 1990s were a cold market period characterized by lower transaction volume and declining or flat housing prices. In general, flippers purchase homes at a much steeper discount, 20.7 percent (s.e. 0.7 percent), and still sell at a premium, 3.1 percent (s.e. 0.6 percent), during this period. This is consistent with the idea that flippers make their return by operating as middlemen during the cold market period, buying low and selling at a premium, relative to the average sales price in the market at the time. Investors also purchase at a greater discount of 9.7 percent, but do not earn a premium. This could be consistent with these types of properties being used as rentals.

In the hot market conditions of the 2000s, flippers have the potential to make returns by purchasing houses at times and in locations where expected market appreciation is high. Thus, as the parameter estimates in Table 4 show, flippers on average do not get a particularly low price, a discount of now only 5.1 percent (s.e. 0.4 percent), when buying.

The coefficients on *post-flipper -sale* reported in the first column suggest that flippers are not investing in a house's value. The coefficients related to the order of sale reported in the lower half of the table suggest, however, that these results may understate to some extent the actual improvements that flippers make. These coefficients show a clear monotonic pattern of improvements, with all houses that sell multiple times typically selling at an increasing premium relative to market prices on later sales. Houses that sell four or five times, which flipped homes are more likely to be, typically generate a premium that is about 7 percent higher than the expected market price. Thus, some of the investment that flippers make in the properties that they buy and re-sell quickly is being captured by the inclusion of these control variables. Furthermore, properties issued permits show relative premia on the order of 9.4 percent. As investment does not make up a sizable portion of flipper returns and is not the focus of the paper, in the subsequent tables we suppress the estimates of coefficients corresponding to it for exposition sake.

We now investigate the differential sources of returns across flipper experience levels, using the same three categories defined above in Section 2.4. Table 5 presents parameter estimates for a set of specifications that correspond directly to those reported in Table 4, but that allow the coefficients related to flipper discount, premium and investment to vary by flipper experience. The sale order dummy variables are included in the specifications reported in

Table 5, but the parameter estimates (which are similar to those reported in Table 4) are not reported for ease of exposition. There is a clear heterogeneity in the sources of returns across experience types. Looking across flipper types, it is clear that while all flippers buy relatively cheaply, more experienced flippers buy at a deeper discount relative to expected market prices. For the sample period as a whole in column (1), the most experienced flippers get a discount at purchase of approximately 29 percent (s.e. 0.8 percent) and this discount is over 30 percent in the cold market period (column 2). Steep discounts at the time of purchase are consistent with these experienced flippers operating as middlemen, buying cheaply and operating during any market conditions. Inexperienced flippers, on the other hand, generally do not buy at much of a discount, especially in hot market conditions. This, again, is a consistent with the idea that they are generally seeking profit as speculators rather than middlemen. Non-flip investors show less difference by expeienc type, although the most experienced sell at higher premia.

There remains concern about the distinction of investor types by ex-post property counts; perhaps the most experienced investors are learning by doing. However, Specification (4) shows that the more experienced investors fare no worse on their first properties than on subsequent properties. This is additional evidence that these investors are different types, following different strategies.

Using the results from the estimates of the specifications reported in Table 5, we can report the source of a flipper's return for each flipper type: breaking this into the fraction that stems from buying cheaply, selling high, and simply earning the market return during the holding period. These results are in Table 6. We include estimates of flipper rates of return based on time held, market growth, and the residuals. Again, it is important to emphasize, that these estimates of sources are *nominal returns* and do not account for flippers' transaction or holding costs, meaning actual profits are almost certainly smaller.

Table 6 further highlights the distinction between flipper types and provides strong evidence that some investors act as speculators while others operate as middlemen. First, there is a large disparity in time held. Experienced flippers quickly re-sell their houses while less-experienced investors hold them almost twice as long. Second, less-experienced flippers do not buy at an especially low price and, as a result, their (nominal) rate of return is primarily driven by overall market growth: roughly half of their return stems from market growth. Experienced flippers, on the other hand, earn most of their return by buying at prices below average market prices (purchasing cheaply generates 63 percent of their return) and quickly re-selling so that only 18 percent of their return stems from overall market growth. Taken together, the evidence on purchase activity, holding times, and sources of returns paints a very consistent picture: experienced flippers generally act as middlemen and inexperienced

	(1)	(2) 1990s	(3) 2000s	(4)
flip_buy1	-0.0839***			-0.0840***
	(0.00423)			(0.00423)
flip_sale1	0.0225***			0.0225***
	(0.00551)			(0.00551)
flip_buy2	-0.171***			-0.166***
	(0.00751)			(0.00826)
flip_sale2	0.0544**			0.0414*
	(0.0223)			(0.0228)
flip_buy3	-0.288***			-0.286***
	(0.00803)			(0.00811)
flip_sale3	0.0327			0.0268
	(0.0337)			(0.0330)
investor_buy1	-0.0292***			-0.0292***
	(0.00334)			(0.00334)
investor_sale1	0.0257***			0.0258***
	(0.00587)			(0.00587)
investor_buy2	-0.0306***			-0.0290***
	(0.00534)			(0.00608)
investor_sale2	0.0342***			0.0373***
	(0.0122)			(0.0128)
investor_buy3	-0.0321***			-0.0326***
	(0.00472)			(0.00483)
investor_sale3	0.0629***			0.0636***
	(0.00927)			(0.00932)
flip_buy1_decade		-0.143***	-0.0373***	
		(0.009)	(0.004)	
flip_sale1_decade		0.0452***	0.0212***	
		(0.011)	(0.006)	
flip_buy2_decade		-0.249***	-0.0836***	
		(0.012)	(0.009)	
flip_sale2_decade		0.0608	0.0443*	
		(0.047)	(0.023)	
flip_buy3_decade		-0.313***	-0.205***	
		(0.011)	(0.011)	
flip_sale3_decade		-0.0658	0.0541*	
		(0.072)	(0.029)	
investor_buy1_decade		-0.0452***	-0.0118***	
		(0.005)	(0.004)	
investor_sale1_decade		-0.0214**	0.0460***	
		(0.010)	(0.007)	
investor_buy2_decade		-0.0595***	-0.00357	
		(0.009)	(0.006)	
investor_sale2_decade		-0.0380**	0.0601***	
		(0.019)	(0.016)	
investor_buy3_decade		-0.0472***	-0.00878	
		(0.007)	(0.006)	
investor_sale3_decade		-0.0364**	0.105***	
		(0.017)	(0.010)	
investor_buy2_1st				-0.00559
				(0.0120)
investor_buy3_1st				0.0118
				(0.0190)
investor_sale2_1st				-0.0289
				(0.0403)
investor_sale3_1st				-0.0616
				(0.0807)
flip_buy2_1st				-0.0272
				(0.0184)
flip_buy3_1st				-0.0299
				(0.0408)
flip_sale2_1st				0.160*
				(0.0861)
flip_sale3_1st				0.202
				(0.303)

*** p<0.01, ** p<0.05, * p<0.1

Table 5: The table gives estimates of equation 3 when the coefficients associated with flipper activity are estimated separately by type. Low experience is 1-3 properties, medium is 4-9 properties, and high is 10 or more. Standard errors in parentheses. All specifications use the ABCD design with 3,515,846 observations, and interact house characteristics indicates that the mean house characteristics for the sample are subtracted from individual house characteristics and these values are interacted with the flipper dummies. Estimates of the investment coefficients, which also vary by flipper type, and the sale number dummy variables are suppressed for expositional sake.

Type, experience	Nominal Return	Buyer Discount	Seller Premium	Market Growth	Quarters Held	Properties (N)
Flipper, low	0.230	-0.084	0.023	0.096	3.52	25,475
Flipper, medium	0.412	-0.171	0.054	0.069	2.86	13,485
Flipper, high	0.543	-0.288	0.033	0.067	2.86	16,140
Investor, low	0.046	-0.029	0.026	0.176	20.11	172,088
Investor, medium	0.053	-0.031	0.034	0.211	20.71	72,046
Investor, high	0.060	-0.032	0.063	0.240	22.46	85,905

Table 6: The table shows the sources of returns by property and investor type. The discounts, premiums, and market growth are calculated from specification (2) of Table 5 and quarters held is simply the mean number of quarters held. The nominal rate of return is generated by dividing the mean total return (premium - discount + market growth) by the mean years held.

flippers as speculators in the Los Angeles housing market over our study period.

For investment properties, more experienced investors tend to hold longer, earn more from appreciation, and sell at a larger premium than less experienced flippers. Thus, within each type of property investment class, the more experienced investors display different strategies than the more novice investors.

Table 7 further emphasizes the point. Vertical panel A displays three specifications of equation 3 which allows the β parameters to vary by the properties' holding times; the first specification estimates over the entire period, while the second and third separately estimate the 1990s and 2000s. Within each type of property–flips and non-flip investments–and within each decade, those held for brief periods are purchased at more substantial discounts. Sales premia are slightly larger for longer-hold properties, though the differences are not as large as the differences in discounts.

The final set of repeat-sales specifications are shown in the B and C vertical panels of Table 7. Panel B allows the investors' buy and sell coefficients to vary by entry year (the year of the invetors' first observed purchase). Flippers and investors who entered in the 1990s buy at larger discounts than those who enter in the 2000s, even when comparing properties purchased in the 2000s. Panel C then interacts the experience categories with entry times. Early entries occur in the before 1999, middle entries between 1999 and 2002, and late entries between 2003 and 2006. This demonstrates that the results showing differences by experience level are not artifacts of the differences between early entrants (with more time to accumulate properties) and late entrants. Even late entry investors who are high volume investors earn larger gross returns, primarily by purchasing at greater discounts.

	(A1)	(A2)	(A3)		(B)		(C)
flip_buy_1yr	-0.189***			flip_buy_ent99_1990s	-0.224***	flip_buy_early1	-0.108***
	(0.00467)				(0.00770)		(0.00699)
flip_buy_2yr	-0.0358***			flip_buy_ent99_2000s	-0.0808***	flip_buy_early2	-0.183***
	(0.00504)				(0.00655)		(0.00937)
flip_sale_1yr	0.0160*			flip_buy_ent00_1990s	-0.164***	flip_buy_early3	-0.292***
	(0.00832)				(0.0177)		(0.00876)
flip_sale_2yr	0.0585***			flip_buy_ent00_2000s	-0.125***	flip_sale_early1	0.0188***
	(0.00563)				(0.0101)		(0.00636)
investor_buy_1yr	-0.0826***			flip_buy_ent02	-0.0548***	flip_sale_early2	0.0543**
	(0.00800)				(0.00828)		(0.0252)
investor_buy_2yr	-0.00308			flip_buy_ent04	-0.0223***	flip_sale_early3	0.0417
	(0.00545)				(0.00708)		(0.0355)
investor_buy_3yr	-0.00880*			flip_buy_ent06	-0.0486***	flip_buy_mid1	-0.0782***
	(0.00451)				(0.0116)		(0.00684)
investor_buy_4yr	-0.0182***			flip_sale_ent99_1990s	0.0359***	flip_buy_mid2	-0.170***
	(0.00580)				(0.00609)		(0.0145)
investor_buy_5yr	-0.0294***			flip_sale_ent99_2000s	0.0377***	flip_buy_mid3	-0.275***
	(0.00433)				(0.00408)		(0.0205)
investor_sale_1yr	-0.00883			flip_sale_ent00_1990s	0.0308	flip_sale_mid1	0.0276*
	(0.00728)				(0.0275)		(0.0167)
investor_sale_2yr	0.0374***			flip_sale_ent00_2000s	0.0715***	flip_sale_mid2	0.0616
	(0.00542)				(0.0191)		(0.0585)
investor_sale_3yr	0.0233***			flip_sale_ent02	0.0375**	flip_sale_mid3	-0.0283
	(0.00496)				(0.0168)		(0.113)
investor_sale_4yr	0.0220***			flip_sale_ent04	0.0429***	flip_buy_late1	-0.0409***
	(0.00618)				(0.0120)		(0.00632)
investor_sale_5yr	0.00330			flip_sale_ent06	0.0890***	flip_buy_late2	-0.0435***
	(0.00401)				(0.0105)		(0.0165)
flip_buy_1yr_hold_1990s		-0.277***	-0.103***	investor_buy_ent99_1990s	-0.0524***	flip_buy_late3	-0.134**
		(0.00724)	(0.00535)		(0.00480)		(0.0564)
flip_buy_2yr_hold_1990s		-0.0652***	-0.00144	investor_buy_ent99_2000s	-0.00234	flip_sale_late1	0.0390***
		(0.0117)	(0.00523)		(0.00479)		(0.0132)
flip_sale_1yr_hold_1990s		-0.0398	0.0401***	investor_buy_ent00_1990s	-0.0552***	flip_sale_late2	-0.0232
		(0.0257)	(0.00803)		(0.0102)		(0.0700)
flip_sale_2yr_hold_1990s		0.0764***	0.0635***	investor_buy_ent00_2000s	-0.0214***	flip_sale_late3	0.0454***
		(0.0114)	(0.00626)		(0.00761)		(0.00559)
investor_buy_1yr_hold_1990s		-0.201***	-0.0500***	investor_buy_ent02	-0.00286	investor_buy_early1	-0.0389***
		(0.0266)	(0.00776)		(0.00598)		(0.00581)
investor_buy_2yr_hold_1990s		-0.0373***	0.0167***	investor_buy_ent04	0.00364	investor_buy_early2	-0.0360***
		(0.0140)	(0.00550)		(0.00542)		(0.00683)
investor_buy_3yr_hold_1990s		-0.0351***	0.0104**	investor_buy_ent06	-0.0260***	investor_buy_early3	-0.0309***
		(0.00900)	(0.00486)		(0.00846)		(0.00487)
investor_buy_4yr_hold_1990s		-0.0447***	0.00457	investor_sale_ent99_1990s	-0.0231***	investor_sale_early1	-0.0129
		(0.00980)	(0.00662)		(0.00432)		(0.0188)
investor_buy_5yr_hold_1990s		-0.0548***	0.00454	investor_sale_ent99_2000s	0.0347***	investor_sale_early2	0.0349*
		(0.00544)	(0.00613)		(0.00378)		(0.0178)
investor_sale_1yr_hold_1990s		-0.0892***	0.0186**	investor_sale_ent00_1990s	-0.0472**	investor_sale_early3	0.0659***
		(0.0128)	(0.00845)		(0.0193)		(0.00993)
investor_sale_2yr_hold_1990s		-0.0129	0.0637***	investor_sale_ent00_2000s	0.0851***	investor_buy_mid1	-0.0231***
		(0.00870)	(0.00644)		(0.0202)		(0.00495)
investor_sale_3yr_hold_1990s		-0.0135**	0.0477***	investor_sale_ent02	-0.00215	investor_buy_mid2	-0.0227**
		(0.00675)	(0.00661)		(0.0126)		(0.00952)
investor_sale_4yr_hold_1990s		-0.0151*	0.0450***	investor_sale_ent04	0.0174	investor_buy_mid3	-0.0324**
		(0.00918)	(0.00795)		(0.0130)		(0.0164)
investor_sale_5yr_hold_1990s		-0.0332***	0.0327***	investor_sale_ent06	0.0686***	investor_sale_mid1	-0.0104
		(0.00561)	(0.00524)		(0.00927)		(0.0126)
						investor_sale_mid2	0.0265
							(0.0191)
						investor_sale_mid3	0.0672**
							(0.0262)
						investor_buy_late1	-0.0144***
							(0.00478)
						investor_buy_late2	-0.000151
							(0.0140)
						investor_buy_late3	-0.0960
							(0.0606)
						investor_sale_late1	0.0453***
							(0.00750)
						investor_sale_late2	0.0492*
							(0.0271)
						investor_sale_late3	0.103*
							(0.0592)
Constant	11.86***	11.85***	11.83***	Constant	11.85***	Constant	11.86***
	(0.00483)	(0.00475)	(0.00472)		(0.00514)		(0.00482)

Table 7: The table shows, in vertical panel A, the sources of returns by the time the property was held, in years. Vertical panel B shows returns by entry year, with early-entry investors (before 2001) split in 1990s and 2000. Vertical panel C shows returns by entry time interacted with experience as measured by total properties transacted.

4 How Well-Informed Are Speculators?

The evidence presented so far establishes that a substantial number of amateur speculators entered the market in the recent housing boom and that their entry into a submarket was associated with price bubbles over the next several years. In this subsection of the paper, we examine the quality of information with which speculators act. The question is whether speculators transmit valuable information to the market or instead act without any special knowledge about market fundamentals. The latter case offers essentially no scope for them to improve market efficiency and, therefore, serves as a key indicator regarding the economic implications of their activity in the market.

While some might take the inexperience of the speculators in the data as *prima facie* evidence that they are not especially well informed, we offer a more formal analysis of their behavior in this subsection.[15] In particular, we present evidence from the timing of purchases and sales by speculators as the Los Angeles market neared and went over its peak in 2006 that suggests that speculators failed to anticipate the market's peak in any way. That speculators could not anticipate the peak makes it difficult to rationalize the timing and location of their activity as being driven by superior information and instead makes it much more likely that the causation runs in the opposite direction – that their substantial presence in a market helped to fuel the run-up in housing prices.[16]

For the analysis in this subsection, we construct a sample of all homes purchased by speculators, regardless of whether they sold the homes within two years. If speculators had anticipated the downturn in housing, they should have curtailed their purchasing activity in advance of the market's peak. As Figure 6 shows, however, speculators did not reduce their buying activity ahead of the market's decline. During the housing boom speculator activity increased from well under 3 percent of all purchases at the start of 2002 to more than 4 percent by 2005. While the rate of speculator purchases declined slightly from these 2005 levels, at the market's peak in early 2006, they were still responsible for 4 percent of all purchases, well above their historical average. Given the time involved in both buying and selling properties, had they anticipated the market slowdown, they certainly should have curtailed their buying activity much sooner and more extensively by early 2006.

While Figure 6 suggests that speculators did not anticipate the market's peak, a con-

[15] Other researchers (e.g. Greenwood and Nagel (2009)) have found that inexperienced traders engage in the type of trend chasing behavior exhibited here. There is also a multitude of evidence of this phenomenon from lab and retail investor survey settings. See, for example, Smith, Suchanek, and Williams (1988), Haruvy, Lahav, and Noussair (2007) or Vissing-Jorgensen (2003).

[16] Our conclusion that speculators helped fuel the bubble is consistent with and complements the evidence presented in Chinco and Mayer (2012) who develop a research design that makes use of data from multiple MSAs to identify the impact of long-distance investors on metropolitan price bubbles.

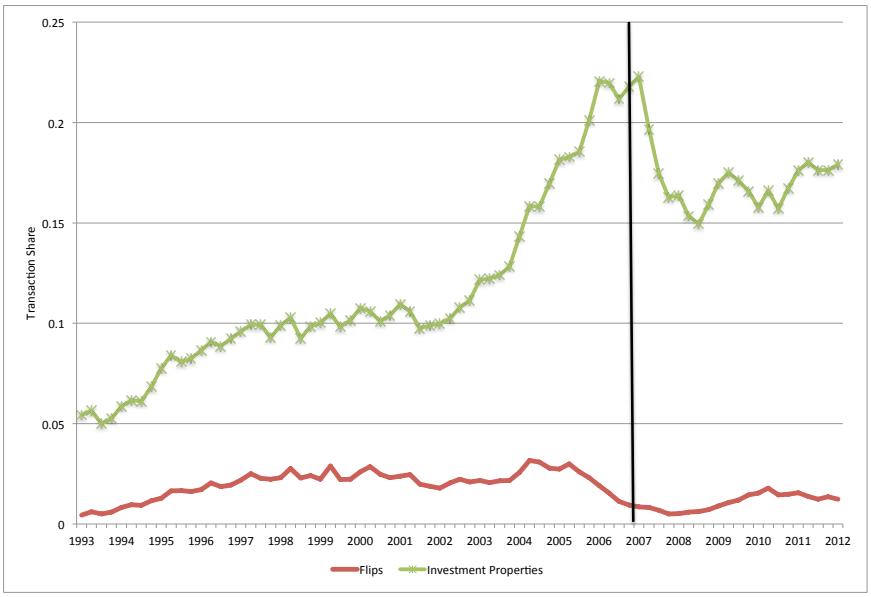


Figure 6: The figure displays the percent of total purchases made by speculators over time as in Figure 3. The vertical band reflects the market's peak.

founding factor is that many of them might not have been putting much of their own money at risk. If banks were making mortgage loans without requiring these investors to contribute much of a downpayment, they may simply have been gambling with the bank's money and, consequently, had little to lose should it turn out that they bought too late in the boom. To investigate this possibility, we examined the average combined LTV for all mortgages held by speculators on the properties that they purchased in the boom. While the average LTV did rise for speculators in the boom (as it did for traditional home buyers), it remained below 80 percent at the peak, a rate that was below that of traditional homebuyers. Thus, speculators were putting a significant amount of their own money at risk and certainly had a financial incentive to stop making new purchases ahead of the peak.

The dynamics of speculator selling activity provides even stronger evidence that they did not anticipate the market peak. Figure 7 shows the fraction of homes purchased by speculators in each quarter that were sold within one and two years from that quarter, respectively. Recall that the market peaked in the second quarter of 2006. Following the market peak, not only did prices began to decline rapidly, but transaction volume slowed considerably, making it difficult to unload any remaining inventory.

The doted line indicates that the fraction of flips sold within one year (versus two) did rise as the market near its peak. However, it is important to note that this is conditioning on having sold the property within two years. Looking at the non-flip investment properties, Figure 7 shows that the fraction sold within one year declined, and t=within two years only increased marginally (after the peak). Thus, some properties the were purchased intended to

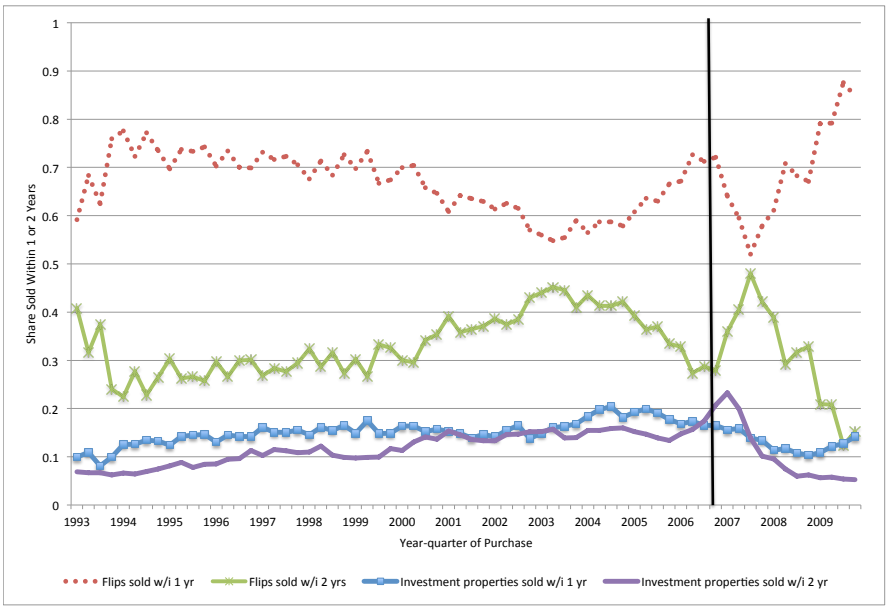


Figure 7: The figure displays the percent of homes bought in any quarter that were sold within one or two years after that quarter. The grey vertical band reflects the market's peak.

be flips became investment properties (by our designations) once they could not be unloaded within two years. (Notice that flip activity peaks earlier than investment activity in Figure 3.) These patterns exhibit just the opposite of what especially well-informed agents should have been doing! If speculators had anticipated the market peak, we would have expected them to have sold a much greater percentage of the homes that they purchased in that quarter of 2004, for example, within two years in order to avoid holding inventory as the market peaked.

The evidence on selling activity is more compelling than that on purchase activity because speculators stood to lose even more of their own money by continuing to hold homes that they purchased in 2004 and 2005 past the market peak. Not only did they stand to lose the 20-plus percent that they put down on these properties at the time of purchase, but also all of the gains that they had accumulated through the substantial market appreciation in the final years of the boom. Simply put, these investors lost a tremendous amount of their own equity by failing to anticipate the market peak.

Taken together, the evidence presented here regarding the their activity near, at, and following the peak, paints a clear picture that speculators did not have any better information about Los Angeles housing price dynamics than traditional home buyers, consistent with the notion that many were novices participating in real estate speculation for only the first or second time.

The fact that speculators do not appear especially well-informed or sophisticated strongly suggests that the positive relationship between their purchase activity and local price bub-

bles, documented in Section **??**, is not attributable to any special ability on their part to anticipate where and when short-term gains were available. Instead, it is much more likely that the causation runs the other way: that speculators helped to fuel local housing bubbles. By amplifying price volatility without transmitting any meaningful information to the market, the impact of this speculative activity is also very likely to have a negative effect on social welfare in the market. We know of no economic theory that implies that uninformed speculation might be welfare-enhancing. Instead, the presence of excess trading by uninformed agents (e.g., noise traders) often serves as a catalyst for excess market volatility in many theoretical models of speculation.

Finally, it is worth emphasizing that our tests for the quality of speculator information do not directly indicate whether speculators behaved rationally in the housing boom. Returns in a financial market during any historical period provide only a single ex post realization of the range of outcomes that might have been anticipated and, thus, it is generally difficult to use returns to gauge whether market participants behaved rationally from an ex ante perspective. Regardless of their rationality, knowing whether speculators had access to superior information provides the key to understanding their likely impact on the market and, thus, helps to inform our understanding of the role that played in the bubble of the 2000s.

5 Contagion of Speculative Fever

The foregoing results indicate that there are investors of different types apparently following different investment strategies and playing different roles in the market. We close by asking a deeper question: *why* do these investors begin investing? There are surely many channels of influence to an individual that could affect his/her decision to become an investor. Our final set of analyses highlights one in particular which can be identified by exploiting the spatial nature of real estate investing: that investors show a propensity to emulate the activity they can observe in their home neighborhoods. As such, the following is an investigation of the presence of contagion effects.

5.1 Spatial Match of Investing Activity

Using the designations of at-risk tenures, second-homes, and flips, and their dates and locations, we conduct spatial matches to create measures of nearby investment activity that a person may observe in his/her neighborhood. Using latitude and longitude information, we match all at-risk tenures to (1) flipped properties and (2) investors' residences. A "match" occurs when a property Y is within a distance ring of D of the center property, X, with each

home forming the center of its own circle.

The two separate matches are each designed to reflect a particular information diffusion mechanism. The flipped property match is spatially linked to an at-risk home by the property location, with the flip's sale date being the relevant timing. Flips which occur at a time outside the at-risk tenure are not counted as matches. The intuition for this property-level match is that a person who is at-risk of becoming a real estate investor may observe properties being flipped in his/her neighborhood and may consider entering real estate investing themselves. For the property match, we choose only the more selective "flips" designation, since a person is more likely to notice the more frequent transactions in a flip than a property being held as an investment for an extended period of time.[17]

For the second type of match, investors' homes (and not the properties they transact) are matched spatially to at-risk homes, with the investor's entry date the relevant timing. The rationale for this type of match is a more typical social interactions story: a person gets information, suggestion, and encouragement from one's neighbors. With the investor-to-at risk investor match, we are testing for "herd" behavior, since the potential for influence comes through neighbors and not observations of properties.

Table 8 displays the overlap in these measures. Because of the difference in interpretation of the underlying mechanisms, we conduct analyses of these two types of treatments, with a joint treatment as a robustness check.

Note that the same individual property or person may appear multiple times in the adjacency matrix. For example, for three homes next to one another, A, B, and C, an investor in home A will be counted as a potential influence on both of his neighbors, B and C.

[17]A person may observe information from "quick sales" as well, but we view this as a conservative classification of the treatment. We have tried to be conservative in the labeling of investors, preferring to label, for example, John Doe and John A. Doe as separate individuals, though in reality they may be the same person. Similarly, we require flips to come from names we observe to have at least two short-tenure properties (quicksales), although some individuals with one short-tenure property may have been speculating. Thus we believe we have, if anything, underreported the number of investor transactions. However, it is not clear which direction this may bias the hazard regression results, since underreporting will be present on both the left- and right-hand sides. If mislabeling is purely random measurement error, such as might come from misspelled names, then if anything results would be attenuated. We were most concerned about false positives (especially if they systematically occurred in high-transaction volume neighborhoods) leading to an incorrect rejection of the null hypothesis of no contagion. If all investors come from the same data generating process, and some are accurately labeled as investor whereas others are mislabeled as non-investors, the regression is comparing investors to a mix of non-investors and investors, leading to attenuatedor at least a noisier–estimate. However, on the right-hand side, we may be undercounting the number of flips an at-risk investor observes; this could lead to an upward bias in the point estimate. Thus we believe our estimate is conservative, but we cannot rule out the potential for upward bias.

Table 8: Overlap in Measures of Investing Activity

Non-investors

Flipped properties ↓	Investor's residences →	0	1	≥2	Total
0	Count	635,244	353,851	388,464	1,377,559
	row pct	46.11	25.69	28.20	100.00
	col pct	82.38	70.30	47.04	65.59
1	Count	106,494	106,668	219,117	432,279
	row pct	24.64	24.68	50.69	100.00
	col pct	13.81	21.19	26.53	20.58
≥2	Count	29,400	42,795	218,241	290,436
	row pct	10.12	14.73	75.14	100.00
	col pct	3.81	8.50	26.43	13.83
Total	Count	771,138	503,314	825,822	2,100,274
	row pct	36.72	23.96	39.32	100.00
	col pct	100.00	100.00	100.00	100.00

Investors

Flipped properties ↓	Investor's residences →	0	1	≥2	Total
0	Count	32,695	20,492	28,134	81,321
	row pct	40.20	25.20	34.60	100.00
	col pct	74.50	65.33	40.84	56.42
1	Count	7,460	7,313	18,287	33,060
	row pct	22.57	22.12	55.31	100.00
	col pct	17.00	23.31	26.54	22.94
≥2	Count	3,728	3,562	22,472	29,762
	row pct	12.53	11.97	75.51	100.00
	col pct	8.50	11.36	32.62	20.65
Total	Count	43,883	31,367	68,893	144,143
	row pct	30.44	21.76	47.79	100.00
	col pct	100.00	100.00	100.00	100.00

5.2 Research Design

We want to examine the extent to which real estate investing behavior diffuses spatially. That is, we want to compare a treated at-risk tenure (one with investing/investor behavior occurring in its neighborhood), to a control with with no nearby investing, and measure their respective propensities to become real estate investors.

Of course, one may be concerned that because people choose their neighborhoods, they are sorting into areas with similar people, and any spatial correlation would be attributable to a selection effect, possibly unobserved. We propose a research design to address this concern. Using our spatial match, we split the treatment into inner and outer rings of activity. We will measure the effect of an inner ring–a hyperlocal effect–conditioning on a larger rings. This technique is illustrated in Figure 8.

This design is an appeal to the notion that search frictions are present in a characteristically thin market such as housing. While one may be able to choose a neighborhood, one is limited from choosing exact locations by the homes listed for sale when one is searching. Thus, while sorting may happen at a broader neighborhood level, search frictions impede it from happening at a block-by-block level. In practice, we will measure the effect of activity within 0.10 of a mile, conditioning on 0.30, 0.50, and/or 1.0 mile rings, as well as ZIP code dummies.

Interpreting only the hyperlocal effect as causal is conservative if influence can occur outside the innermost ring. For example, a potential investor may interact with her neighbor residing several blocks away at a local shop or park, where they talk about the neighbor's experience in real estate investing. We attribute influence from this farther-away neighbor to possible sorting and regard it as a control, though in the scenario, the effect is actually causal. Hence we believe our estimates to be lower bounds of the effect of the true mechanism.

The research design is valid if there is no block-by-block sorting. We examine this through robustness checks in which we measure the inner and outer rings to be most similar on a number of observables. As an initial check, Table 9 below displays a summary of differences between the innermost (0.10 mile) and 0.10 to 0.30 mile rings in a number of attributes. One can see that inner/outer ring differences are slight when compare to metro wide variation. For all attributes, the 95th percentile–the homes with the largest differences between the 0.10 and 0.30 mile rings–display differences well below the metro wide standard deviation.

5.3 Results

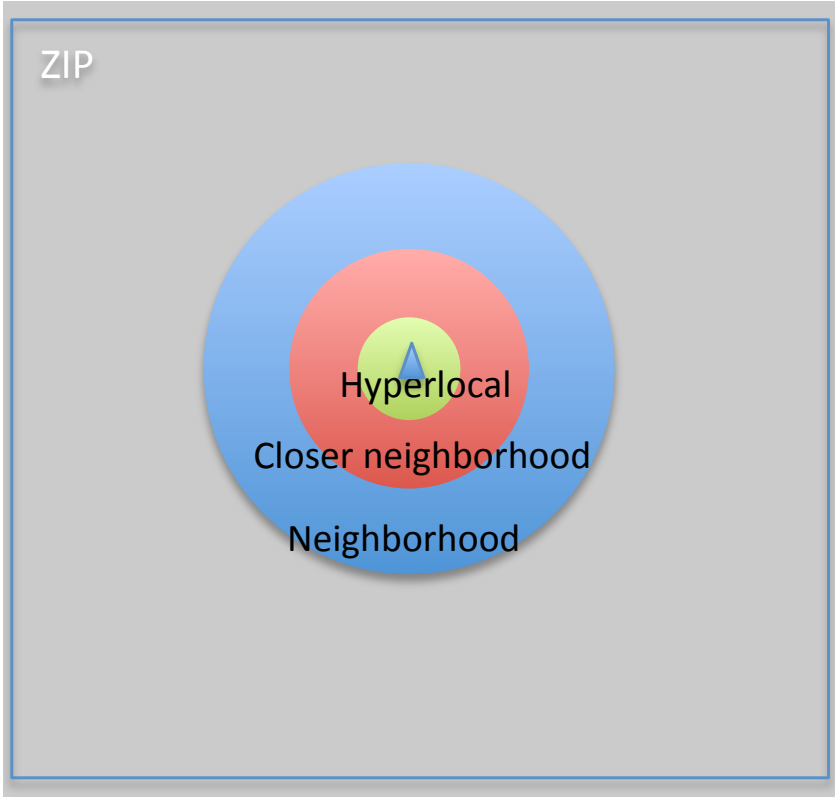
Given the similarity in the investment measures, and to avoid an unwieldy number of results, we focus discussion on the entry of individuals to investing behavior. Entry is defined as

Table 9: Absolute Differences in Home Attributes Between <0.1 mile and 0.1-0.3 mile Rings

	Living Area (sqf)	No. Bedrooms	Year Built	Pct Equity (1-Initial LTV)	Value ($000s)	Income ($000s)	Nonwhite
Metro-Wide SD	633	0.91	21.12	0.28	137.29	138.41	0.50
Differences $x_{i,0.1} - x_{i,0.1-0.3}$							
mean	2	0.00	-0.02	0.00	-0.24	-0.22	0.00
p1	-500	-0.77	-20.00	-0.12	-135.35	-56.48	-0.27
p5	-309	-0.48	-9.99	-0.07	-64.92	-27.64	-0.15
p10	-228	-0.35	-6.30	-0.05	-41.42	-18.85	-0.11
p25	-113	-0.17	-2.26	-0.03	-16.22	-9.58	-0.05
p50	-17	-0.01	-0.08	0.00	-1.80	-2.28	0.00
p75	91	0.16	2.28	0.02	11.72	5.81	0.05
p90	247	0.36	6.65	0.06	39.83	18.43	0.11
p95	380	0.53	10.24	0.08	70.05	31.60	0.15
p99	735	0.93	19.00	0.16	170.84	84.38	0.27
Absolute Diffs $\lvert x_{i,0.1} - x_{i,0.1-0.3}\rvert$							
mean	151	0.23	4.05	0.04	27.96	14.14	0.07
p1	2	0.00	0.00	0.00	0.20	0.14	0.00
p5	9	0.01	0.14	0.00	1.00	0.70	0.00
p10	18	0.03	0.27	0.00	2.02	1.41	0.01
p25	46	0.08	0.82	0.01	5.47	3.62	0.02
p50	104	0.17	2.27	0.03	14.11	8.07	0.05
p75	203	0.31	5.35	0.05	33.33	15.83	0.09
p90	339	0.50	10.11	0.08	67.22	29.29	0.15
p95	452	0.65	14.05	0.10	99.94	43.41	0.20
p99	765	1.01	23.55	0.18	200.81	98.23	0.34

NOTES: The statistics reported are for the distribution of $d_i = |x_{i,0.1} - x_{i,0.1-0.3}|$, i.e. the absolute difference between the inner ring (< 0.1 mi) and outer ring (0.1-0.3 mi) averages for each house i.

Figure 8: Illustration of Inner/Outer Ring Research Design



the first of either second home investment behavior or flipping. The investment activity is measured by counts of flips or counts of investors within given rings. The relevant entry date is the purchase of the first second-home/flipped property. We then focus on two types of treatment, one at the person level and one at the property level. At the property level is flipping activity, with the sale of the flip being the relevant date and the property location the relevant spatial designation. At the person level is and investor with investment activity of either type, with the investor's first entry to investing the relevant date and the investor's home location the relevant spatial designation. That is, we investigate two potential treatments: the neighborhood (structures) and the neighbors themselves. We note that results for different designations of investing activity, when conducted separately, have yielded qualitatively and quantitatively very similar conclusions.

5.3.1 Summary Statistics

We begin by presenting simple differences in means in Table 10. Nearby activity is measured at the 0.10 mile ring, and there is a panel for each type of treatment effect (flipped properties in Panel A, investors' homes in Panel B). The at-risk tenures are split into those who become investors and this who do not, presented in three-year intervals. In all years, investors have

more investing activity occurring in their neighborhoods, evidenced by differences in means and in the frequency of zeros; that is, the differences in means are not being driven by a few with large a pockets of activity.

We further divide investors into those who have already entered and those who will enter in the future; that is, the investors who are present as at-risk tenures in the interval but do not enter as investors in the interval or beforehand. Note that those who have yet to invest have nearby activity more similar to non-investors. This suggests that these are not permanently different neighborhoods or individuals, and that we can leverage temporal as well as spatial variation to identify the effect of nearby influence.

5.3.2 Baseline Specifications

Table 10 is illustrative, but not a formal test. We now turn to regressions exploiting our inner/outer ring research design.

Our level of observation is the monthly at-risk tenure, which we define as an active tenure in which the owner has not yet engaged in investing activity (of any type). An at-risk tenure is ended by sale of the property (inferred move-out) or entry into investing activity. Our primary specification is a linear probability hazard regression. In each monthly observation, the at-risk tenure may be ended by entry to investing (an indicator variable outcome); we measure the extent to which recent nearby investing activity (measured by counts of flips/investors nearby) is correlated with such entry. We focus on the period 2000-2007, which bookends the period of house price appreciation and the increase in investing activity.

In this hazard specification, there is both spatial and temporal variation in the level of housing activity. Thus, we can identify an effect by comparing two at-risk tenures, one with investors neighbors and one without, or by comparing the propensity of an at-risk individual to enter when there has been recent investing activity to a period when there was not.

We note from the outset that entry is an uncommon event. Over the entire period of 2000-2007, the average monthly entry rate was 0.07 percent.

Before proceeding, a note on nomenclature. The explanatory variables are expressed as "wiXX_t", where "wi" stands for "within," the XX is the distance ring in hundredths of a mile, and t refers to the length of time. For example, wi10_1 refers to activity within 1/10 of a mile of the at-risk tenure, occurring within the last year (12 months up to and including the current month). The rings are defined inclusively, so that any activity in the inner ring is also measured in the outer ring. Thus, coefficients can be interpreted as the additional impact of the inner ring beyond its average impact of being included in the outer ring.

Table 11 reports results from our main specifications. It includes results from each type of treatment, flips and investors (i.e. properties and people). Coefficient estimates are followed

Table 10: Summaries of Nearby Investment Activity, by Investor Behavior

Panel A: Match of Flipped *Properties*

Tenure active in:	Group		N	Mean	SD	Pct with 0	Pct with 1	Pct with 2 or more
1998-2000	Non-investors		1,065,268	0.28	0.80	0.815	0.135	0.050
	Investors, all		85,264	0.39	1.02	0.765	0.156	0.079
	-by entry year	≤2000	48,489	0.46	1.12	0.733	0.172	0.096
		>2000	36,775	0.30	0.88	0.808	0.136	0.057
2001-2003	Non-investors		1,137,680	0.31	0.80	0.790	0.153	0.057
	Investors, all		90,580	0.40	0.96	0.750	0.169	0.081
	-by entry year	≤2003	51,768	0.46	1.03	0.719	0.184	0.096
		>2003	38,812	0.32	0.86	0.791	0.147	0.062
2004-2006	Non-investors		1,110,717	0.38	0.86	0.750	0.176	0.074
	Investors, all		90,256	0.48	1.03	0.708	0.193	0.100
	-by entry year	≤2006	63,434	0.51	1.07	0.694	0.200	0.107
		>2006	26,822	0.42	0.95	0.740	0.177	0.083
2007-2009	Non-investors		1,085,946	0.14	0.43	0.884	0.099	0.018
	Investors, all		84,134	0.18	0.51	0.856	0.119	0.026
	-by entry year	≤2009	66,968	0.20	0.53	0.845	0.127	0.028
		>2009	17,166	0.13	0.43	0.896	0.088	0.017

Panel B: Match of Other Investors' *primary residences*

Tenure active in:	Group		N	Mean	SD	Pct with 0	Pct with 1	Pct with 2 or more
1998-2000	Non-investors		1,065,268	0.67	1.33	0.633	0.226	0.141
	Investors, all		85,264	0.79	1.53	0.606	0.226	0.168
	-by entry year	≤2000	48,489	0.89	1.66	0.576	0.232	0.192
		>2000	36,775	0.65	1.35	0.646	0.219	0.135
2001-2003	Non-investors		1,137,680	0.75	1.38	0.594	0.243	0.163
	Investors, all		90,580	0.86	1.59	0.573	0.239	0.188
	-by entry year	≤2003	51,768	0.95	1.70	0.545	0.245	0.210
		>2003	38,812	0.74	1.44	0.610	0.231	0.159
2004-2006	Non-investors		1,110,717	0.99	1.70	0.514	0.262	0.224
	Investors, all		90,256	1.16	2.00	0.483	0.258	0.259
	-by entry year	≤2006	63,434	1.21	2.05	0.471	0.259	0.270
		>2006	26,822	1.05	1.89	0.512	0.254	0.234
2007-2009	Non-investors		1,085,946	0.68	1.23	0.608	0.243	0.149
	Investors, all		84,134	0.79	1.43	0.574	0.249	0.177
	-by entry year	≤2009	66,968	0.83	1.46	0.559	0.256	0.186
		>2009	17,166	0.66	1.28	0.635	0.223	0.142

NOTES: Each panel reports the flipping activity within a 0.1 mile radius of the at-risk tenure (a primary residence). The at-risk tenures are split into non-investors, who are never identified to engage in flipping/investment activity, and those that do, who are subdivided by time of entry.

by hazard ratios, the change in propensity to enter attributable to the explanatory variable(s).

In column 1, we see there is a positive and significant effect of activity within 0.10 mile on the propensity to enter as a real estate investor in a given month. Measured as a percentage increase in the baseline hazard, having a flipped property in one's immediate neighborhood increases the propensity to enter in a given month by 17 percent, while having an investor neighbor increases the propensity by nearly 12 percent.

Column 2 utilizes our inner/outer ring reach design, adding a ring for activity within 0.30 mile. Controlling for the broader neighborhood reduces the coefficient somewhat, but the propensity effects are of similar magnitude. Column 3 adds additional rings, while columns 4 and 5, respectively, add year-quarter and ZIP code dummies. None of these substantially changes the estimated effect. Column 6 uses a dummy variable for the inner ring activity instead of a count; there is little impact on the estimates, suggesting that the presence of investing activity is important and that results were not driven by few neighborhoods with a large amount of activity.

Columns 7 and 8 widen the "inner" ring to larger radii. The effect size drops considerably, suggesting that the effect gets more diffuse as the neighborhood widens. Since one is less likely to interact with neighbors and observe properties farther away, we see the distance attenuation of the estimate as evidence that an information mechanism is underlying these results.

We also note that in all specifications, the effect of inner-ring activity within the past year is larger than the effect of activity one to two years ago. Thus, the effect attenuates over time as well as over distance. We view this timing as further evidence of the existence of an information mechanism–that herd behavior is occurring.[18]

Henceforth we use specification 5 as our baseline. Robustness checks appear in the appendix. Our robustness checks include the sensitivity of the results to inner/out ring sorting, the designation of the at-risk tenure as an owner occupied property, and the joint versus separate treatment of flips versus investor neighbors.

Table 12 examines how the effect size changes over time by running the hazard regressions separately for three year intervals. The hazard ratios are also conducted separately, since the baseline entry rate changes over time. Despite an increase in the baseline rate, the effect of flip activity (Panel A) within 0.10 is strongest during the periods of largest house price appreciation; the effect size roughly tracks with the price cycle. The effect of a nearby investor (Panel B) is more constant over the time period.

[18]Recall that in Table 10, yet-to-be investors had nearby activity similar to non-investors.

Table 11: Linear Probability Hazard Models, 2000-2007

Panel A: Match of Flipped *Properties*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
wi10_1	0.000110***	5.01e-05***	7.03e-05***	7.81e-05***	7.48e-05***			
	(7.61e-06)	(8.58e-06)	(8.62e-06)	(8.65e-06)	(8.65e-06)			
wi10_2	3.88e-05***	5.56e-05***	3.63e-05***	2.14e-05**	2.09e-05**			
	(7.77e-06)	(8.75e-06)	(8.81e-06)	(8.84e-06)	(8.84e-06)			
wi30_1		5.01e-05***	1.84e-05***	1.68e-05***	1.62e-05***	1.94e-05***		
		(3.22e-06)	(3.59e-06)	(3.63e-06)	(3.63e-06)	(3.58e-06)		
wi30_2		-2.14e-05***	5.72e-06	4.56e-06	2.60e-06	4.49e-06		
		(3.19e-06)	(3.60e-06)	(3.63e-06)	(3.63e-06)	(3.57e-06)		
wi100_1			2.12e-05***	2.60e-06***	-8.32e-06***	-8.47e-06***	-7.51e-06***	-1.02e-05***
			(9.09e-07)	(9.74e-07)	(1.02e-06)	(1.02e-06)	(9.76e-07)	(1.17e-06)
wi100_2			-1.87e-05***	-3.06e-05***	-2.78e-05***	-2.79e-05***	-2.80e-05***	-2.88e-05***
			(8.78e-07)	(9.31e-07)	(9.57e-07)	(9.55e-07)	(9.08e-07)	(1.12e-06)
d_wi10_1						8.66e-05***		
						(1.05e-05)		
d_wi10_2						1.83e-05*		
						(1.07e-05)		
wi20_1							3.57e-05***	
							(4.94e-06)	
wi20_2							2.45e-05***	
							(4.96e-06)	
wi50_1								1.67e-05***
								(2.40e-06)
wi50_2								7.35e-06***
								(2.40e-06)
Constant	0.000641***	0.000628***	0.000613***	0.000744***	0.000347***	-0.000364***	-0.000146***	-3.62e-05
	(2.59e-06)	(2.99e-06)	(3.65e-06)	(4.82e-06)	(4.16e-05)	(4.36e-05)	(2.75e-05)	(2.70e-05)
ZIP dummies				Y	Y	Y	Y	Y
Year-qtr dummies				-	Y	Y	Y	Y
Joint Est		0.0001003	0.0001098					
		(0.00000)	(0.00000)					
Inner Ring hazard ratio	0.1714218	0.0798355	0.1145676	0.1273422	0.121987	0.1412741	0.0466574	0.027217
	(0.01203)	(0.01367)	(0.01405)	(0.01411)	(0.01411)	(0.01712)	(0.00876)	(0.00391)
Joint hazard ratio		0.1596992	0.1790879	0.1589791	0.1347567	0.1590885	0.0450795	0.0106014
		(0.01233)	(0.01272)	(0.01281)	(0.01283)	(0.01585)	(0.00782)	(0.00318)
Observations	109,450,800	109,450,800	109,450,800	109,450,800	109,450,800	109,450,800	109,450,800	109,450,800

Panel B: Match of Investors' *Residences*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
wi10_1	7.42e-05***	4.33e-05***	7.04e-05***	7.94e-05***	8.15e-05***			
	(4.63e-06)	(5.29e-06)	(5.46e-06)	(5.49e-06)	(5.49e-06)			
wi10_2	-9.85e-06**	3.79e-05***	7.25e-06	-3.03e-07	-1.02e-06			
	(4.66e-06)	(5.36e-06)	(5.62e-06)	(5.65e-06)	(5.65e-06)			
wi30_1		2.96e-05***	1.23e-05***	1.38e-05***	1.47e-05***	2.37e-05***		
		(1.97e-06)	(2.70e-06)	(2.71e-06)	(2.71e-06)	(2.65e-06)		
wi30_2		-3.89e-05***	-2.38e-06	-9.23e-07	-4.02e-07	1.95e-06		
		(1.95e-06)	(2.75e-06)	(2.77e-06)	(2.77e-06)	(2.65e-06)		
wi50_1			1.74e-05***	9.67e-07	-1.33e-05***	-1.44e-05***	-1.12e-05***	-2.15e-06*
			(1.51e-06)	(1.55e-06)	(1.58e-06)	(1.58e-06)	(1.33e-06)	(1.17e-06)
wi50_2			-2.87e-05***	-3.70e-05***	-3.81e-05***	-3.68e-05***	-3.98e-05***	-3.40e-05***
			(1.51e-06)	(1.54e-06)	(1.56e-06)	(1.54e-06)	(1.29e-06)	(1.13e-06)
d_wi10_1						7.21e-05***		
						(7.29e-06)		
d_wi10_2						-2.89e-05***		
						(7.47e-06)		
wi20_1							3.71e-05***	
							(3.28e-06)	
wi20_2							2.12e-05***	
							(3.34e-06)	
Constant	0.000637***	0.000640***	0.000645***	0.000717***	-4.13e-05	0.00112***	1.50e-05	-2.15e-05
	(2.76e-06)	(3.44e-06)	(3.89e-06)	(4.50e-06)	(4.56e-05)	(0.000209)	(3.01e-05)	(1.41e-05)
ZIP dummies	-	-	-	Y	Y	Y	Y	Y
Year-qtr dummies	-	-	-	-	Y	Y	Y	Y
Joint Est		0.000073	0.0001001					
		(0.00000)	(0.00000)					
Inner Ring hazard ratio	0.1165349	0.0676678	0.1091704	0.1230915	0.126226	0.1154361	0.057621	
	(0.00743)	(0.00826)	(0.00845)	(0.00848)	(0.00849)	(0.01124)	(0.00510)	
Joint hazard ratio		0.1139622	0.1551212	0.1460248	0.128423	0.1293907	0.0402948	-0.0033286
		(0.00743)	(0.00773)	(0.00777)	(0.00779)	(0.01057)	(0.00458)	(0.00182)
Observations	109,869,535	109,869,535	109,869,535	109,869,535	109,869,535	109,869,535	109,869,535	109,869,535

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: All specifications include 109,868,535 tenure-month observations, within which there are 2,182,550 separate tenures. Standard errors are clustered at the tenure level. "Joint Est" refers to the total effect of a flipped property or investor entry, i.e. the sum of the inner and outer rings. The hazard ratio is the ratio of the coefficient to the baseline propensity, i.e. the constant from a regression with the activity rings but no dummies.

Table 12: Linear Probability Hazard Regression Results, Triennially, 1998-2009

Panel A: Flipped *properties* as explanatory variables.

	(1)	(2)	(3)	(4)
	1998-2000	2001-03	2004-06	2007-09
Entries	19,843	24,707	33,835	7,012
At-Risk Tenures	34,369,831	41,386,520	41,705,428	37,580,962
Entry Rate	0.00058	0.00060	0.00081	0.00019

	(1)	(2)	(3)	(4)
VARIABLES	sumy	sumy	sumy	sumy
wi10_1	3.14e-05**	3.49e-05***	0.000113***	4.83e-05***
	(1.56e-05)	(1.31e-05)	(1.42e-05)	(1.85e-05)
wi10_2	3.98e-05**	3.49e-05**	1.43e-05	1.20e-05
	(1.86e-05)	(1.49e-05)	(1.48e-05)	(1.23e-05)
wi30_1	1.41e-05**	1.25e-05**	1.91e-05***	1.03e-05
	(6.49e-06)	(5.76e-06)	(5.87e-06)	(7.45e-06)
wi30_2	8.68e-06	2.49e-06	-3.37e-07	7.28e-06
	(7.53e-06)	(6.00e-06)	(6.22e-06)	(4.96e-06)
wi100_1	-1.02e-05***	-1.41e-05***	-1.29e-05***	2.51e-07
	(1.84e-06)	(1.70e-06)	(1.72e-06)	(2.17e-06)
wi100_2	-7.11e-06***	-1.20e-05***	-4.76e-05***	-1.10e-05***
	(1.94e-06)	(1.54e-06)	(1.76e-06)	(1.35e-06)
Constant	0.000508***	0.000518***	0.000843***	0.000610***
	(1.52e-05)	(1.31e-05)	(1.54e-05)	(1.62e-05)
Inner Ring hazard ratio	0.06031	0.06052	0.14332	0.50283
	(0.02995)	(0.02271)	(0.01803)	(0.19316)
Joint hazard ratio	0.06786	0.05769	0.15114	0.61233
	(0.02715)	(0.02059)	(0.01650)	(0.17931)
Observations	34,389,674	41,411,227	41,739,263	37,587,974
ZIP dummies	Y	Y	Y	Y
Year-qtr dummies	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: Investors' *primary residences* as explanatory variables.

	(1)	(2)	(3)	(4)
	1998-2000	2001-03	2004-06	2007-09
wi10_1	6.56e-05***	6.67e-05***	0.000103***	3.73e-05***
	(1.01e-05)	(8.95e-06)	(8.72e-06)	(9.39e-06)
wi10_2	6.50e-06	2.34e-05**	-2.42e-05***	1.19e-05
	(1.12e-05)	(9.90e-06)	(9.13e-06)	(8.73e-06)
wi30_1	4.72e-06	9.86e-06**	2.14e-05***	8.89e-06*
	(5.13e-06)	(4.42e-06)	(4.27e-06)	(4.76e-06)
wi30_2	1.92e-05***	-8.12e-06*	6.97e-07	6.48e-06
	(5.66e-06)	(4.90e-06)	(4.48e-06)	(4.23e-06)
wi50_1	-1.89e-05***	-2.19e-05***	-1.82e-05***	-1.68e-05***
	(2.98e-06)	(2.58e-06)	(2.51e-06)	(2.76e-06)
wi50_2	-1.71e-05***	-1.91e-05***	-5.93e-05***	-1.58e-05***
	(3.16e-06)	(2.78e-06)	(2.57e-06)	(2.39e-06)
Constant	0.000514***	0.000505***	0.000811***	0.000644***
	(1.54e-05)	(1.25e-05)	(1.50e-05)	(1.55e-05)
Inner Ring hazard ratio	0.11895	0.11142	0.12182	0.08226
	(0.01831)	(0.01492)	(0.01024)	(0.02061)
Joint hazard ratio	0.09319	0.09134	0.12559	0.06490
	(0.01676)	(0.01372)	(0.00938)	(0.01885)
Observations	34,454,494	41,526,947	41,932,953	37,723,539
ZIP dummies	Y	Y	Y	Y
Year-qtr dummies	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

NOTES: The outcome is whether the at-risk homeowner enters the investment market; i.e. begins to engage in either flipping or investing activity. The notation'wiX0_t' refers to the flipping activity within X tenths of a mile t year(s) ago. For instance, wi30_2 refers to activity within 0.3 mile 1-2 years ago. Standard errors are clustered at the property tenure level. All specifications include time and ZIP code fixed effects.

Table 13: Nearby Investing Influence and Subsequent Amateurism

	(1) Property Count (OLS)	(2) Property Count (Poisson)	(3) Career Length (OLS)	(4) Prop. Hold Time (OLS)
Inv N'hbor wi 0.10 mi	-0.160***	-0.0908***	-50.72***	130.5***
	-0.0265	-0.00452	-11.47	(7.149)
Flipped Prop wi 0.10 mi	-0.137***	-0.0542***	-53.21***	114.0***
	-0.0367	-0.00639	-15.91	(9.798)
$prop\_count = 1$				565.3***
				(10.80)
$prop\_count = 2$				102.1***
				(9.605)
$prop\_count = 3$				163.5***
				(10.44)
$prop\_count = 4$				132.5***
				(11.25)
$prop\_count \in [5, 9]$				93.98***
				(8.101)
Observations	173,455	173,455	173,440	245,788
R-squared	0.059		0.12	0.069

NOTES: Contains entry year, home value and home equity controls. The excluded property count category is 10 or more properties.

5.4 Influence and Investor Success

The results of the previous subsection demonstrated that an individual is more likely to become an investor if there is investing activity–either properties being flipped or neighbors becoming investors–in their own neighborhood. In this subsection we analyze whether and how nearby investing activity is associated with success as an investor. In particular, we examine whether investors with nearby activity at the time of their entry are more likely to become of the more or less experienced type.

Table 13 shows that investors subject to influence at time of entry were more likely to exhibit amateurish behavior. Columns (1) and (2) show via OLS and Poisson regressions, respectively, that influence at entry leads to a slightly lower volume of properties over the investor's career, about one-sixth fewer properties on average. Column (3) shows that influenced entrants had shorter careers, as measured by time between first and last property purchase. Finally, and perhaps most significantly, influenced entrants show a propensity to hold their properties longer by about four months on average for each form of influence. This is in addition to the property hold time differences owing to differences in experience/property volume, which are themselves significant. Recall that the repeat sales results in Tables 5 and 7 showed that lower property volumes and longer hold times were associated with inferior returns relative to the market.

Following the analysis of section 4 on whether investors are acting on superior information, Table 14 examines whether influenced entrants who purchased properties late in were more likely to hold that property past the price peak, controlling for experience type in the form of property counts. The table shows four linear probability models. The first excludes measure

	(1) 05-06	(2) 05-06	(3) 05-06	(4) 04-06
Inv N'hbor wi 0.10 mi		0.0361***	0.0414***	0.0386***
		(0.00347)	(0.00346)	(0.00279)
Flipped Prop wi 0.10 mi		0.0356***	0.0414***	0.0345***
		(0.00471)	(0.00469)	(0.00380)
$prop\_count = 1$	0.119***	0.111***	0.256***	0.127***
	(0.00352)	(0.00357)	(0.00553)	(0.00276)
$prop\_count = 2$	-0.0863***	-0.0911***	0.0264***	-0.0802***
	(0.00382)	(0.00383)	(0.00516)	(0.00291)
$prop\_count = 3$	-0.0688***	-0.0729***	0.0235***	-0.0540***
	(0.00449)	(0.00450)	(0.00537)	(0.00344)
$prop\_count = 4$	-0.0549***	-0.0586***	0.0196***	-0.0368***
	(0.00520)	(0.00520)	(0.00576)	(0.00399)
$prop\_count \in [5, 9]$	-0.0283***	-0.0307***	0.0178***	-0.0189***
	(0.00378)	(0.00378)	(0.00417)	(0.00289)
Entry year controls			Y	
Constant	0.713***	0.708***	0.728***	0.543***
	(0.00242)	(0.00243)	(0.00275)	(0.00184)
Observations	119,699	119,699	119,699	228,014

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Likelihood of Holding Property Past Price Peak, Purchases 2005-2006

of entry influence, shooing that investors buying their only property late in the cycle were more likely (by about 16 percent increase to baseline probability) to hold it past the price peak. Column (2) adds the spatial measures of influence: influenced entrants were about five percent more likely to hold their property past the optimal selling time. The effect remains even when adding entry-year controls, or expanding the purchase window to include 2004 (columns (3) and (4), respectively).

Finally, Table 15 displays the estimates from a specification of equation 3 that adds interactions of the investor's entry influence in the inner ring neighborhood with the purchase and sale dummies. For instance, the discount on a purchase by an investor without any nearby influence is measured by β_{buy} while a purchase by an investor who entered following flips in his inner neighborhood is measured by $\beta_{buy} + \beta_{buy,flip}$. This measures whether the influenced investors are earning inferior, similar, or superior returns on their properties relative to the uninfluenced investors.

Column 1 displays the estimates from the main repeat sale specification with one dummy each for flipper and investor purchases and sales. This shows that influence flipper entrys are buying at inferior discounts, though those with investor neighbors are also selling at better premia. The subsequent columns add controls for experience (number of properties), property holding time, and entry year. With these as conditioning variables, the influenced-interaction coefficients attenuate and in most cases lose statistical significance. Therefore we do not argue that influence investors fare worse than their amateur peers, conditioning on their more frequent amateurism which was established in Table 13.

	(1)	(2)	(3)	(4)
investor_buy_iwi10		0.00319	0.00294	0.000101
		(0.00623)	(0.00615)	(0.00623)
investor_sale_iwi10		0.00438	0.0193	0.00980
		(0.0128)	(0.0122)	(0.0127)
investor_buy_fwi10		0.00775	0.00657	0.00390
		(0.00873)	(0.00867)	(0.00878)
investor_sale_fwi10		0.0131	0.0249	0.0152
		(0.0182)	(0.0181)	(0.0181)
flip_buy_iwi10	0.0321*	0.0129	0.0194	0.0215
	(0.0169)	(0.0163)	(0.0162)	(0.0165)
flip_sale_iwi10	0.0265*	0.0446***	0.0466***	0.0221
	(0.0136)	(0.0135)	(0.0135)	(0.0146)
flip_buy_fwi10	0.0504**	0.0417*	0.0404*	0.0315
	(0.0245)	(0.0232)	(0.0237)	(0.0242)
flip_sale_fwi10	0.00246	0.0172	0.0153	-0.00305
	(0.0188)	(0.0189)	(0.0187)	(0.0197)
Experience		X		
Hold time			X	
Entry Year				X
Observations	3,515,846	3,515,846	3,515,846	3,515,846

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15: The table shows the coefficient estimates of interactions of investor's entry influence with the investor purchase and sale dummies in a specification of the repeat sales framework in equation 3. All other coefficients from the regression are suppressed.

6 Conclusion

Making use of a large transactions database and a novel research design, this paper provides the first comprehensive study of intermediaries (middlemen and speculators) in the housing market: identifying their activity, their sources of the returns and apparent strategy, the quality of their information with and the extent to which their activity is a potential driver of local price dynamics.

A main contribution of our analysis is a detailed characterization of the role that speculators played in Los Angeles' recent housing bubble. In particular, we document substantial entry by amateur speculators at the height of the boom, entry that was strongly associated with sharp short-term increases and intermediate-term declines in local housing prices. Their collective inexperience and complete inability to anticipate the market peak by either curtailing their purchases or selling their inventory suggests that these speculators were not acting with superior information, but were instead simply betting that the boom would continue for a while longer. The lack of any special informational advantage provides indirect evidence that their substantial purchases and holdings actually caused local housing bubbles rather than reflected superior information about where such short-term gains were available.

Our analysis goes beyond a detailed re-telling of the role of speculation in the recent boom and bust. By examining the behavior of intermediaries over a 20-year period, we also

identify real estate investors clearly operating in the role of middlemen. In this capacity, we document investors buying homes at prices well below market value and quickly re-selling after short holding periods at, or above, market value. These middlemen operate in all market conditions and, if anything, are more active during busts, when the liquidity they provide to the market is likely to be especially valuable.

In this way, our analysis suggests that the impact of real estate investors on the market – especially whether their activity increases or decreases social welfare – likely depends critically on the market cycle. In busts, middlemen almost certainly help to stabilize the market, effectively putting a floor on price declines and providing liquidity for many homeowners who may be desperate to sell quickly following economic shocks. In booms, rampant speculation may have a de-stabilizing role that significantly amplifies price volatility. Even well-informed speculators may have deleterious effects on the market if they use their informational advantage to fuel and ride the bubble as in DeLong, Shleifer, Summers, and Waldmann (1990). But if they are no better informed than traditional homeowners (if most indeed are traditional homeowners rather than real estate professionals), it is essentially impossible to rationalize their activity from the perspective of market efficiency. In fact, we know of no theoretical model in which uninformed speculation improves social welfare.

Taken together, our results suggest that substantial care should be taken in regulating the behavior of short-term investors in the real estate market. In busts, restricting investor activity may significantly harm the functioning of the market. The FHA's 2010 reversal of their 2006 restrictions on financing for homes that were quickly re-sold suggests that they may have come to this realization several years into the recent bust. In booms, however, substantial increases in investor activity, especially by amateur investors, may fuel speculative bubbles, which have important negative consequences for the real economy. While regulating investor behavior as a function of the market cycle may be difficult, other policy tools may be available in the future. For example, by tracking investor activity as in our paper and Haughwout, Lee, Tracy, and van der Klaauw (2011), it may be possible to generate real-time measures of speculative activity based on data from housing transactions and mortgages. Such measures might provide an indication that a speculative bubble was underway in a given market, providing the just the kind of warning that was not available during the bubble of the 2000s.

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A Robustness

A.1 Robustness of Contagion Results

Tables 16 through 19 contain robustness checks of our main specifications. Tables 16 and 17 impose a stricter standard on the inner/outer ring method, subsetting the data to tenures that exhibit the least amount of difference between the 0-0.10 mile and 0.10-0.30 mile rings in a number of property and purchaser attributes. This checks whether the results are subject to hyperlocal sorting, in violation of our research design assumptions. Table 16 uses tenures below the median inner/outer difference (hence using half the data with the most similarity).

Table 17 uses tenures with differences smaller than 1/10 of the metro-wide standard deviation in the attribute.

Effect sizes are marginally smaller when limiting the data to at-risk tenures with the least differences between rings, ranging from 5-12 percent instead of 10 to 17. This suggests that some sorting may still be occurring, even at the block level. However, even at this most conservative estimate, the effect sizes are still significant and economically meaningful.

Table 18 checks the sensitivity of our results to our ability to identify at-risk tenures in the data. We have inferred whether the purchaser of the home was at-risk (i.e. present in the home). The data contain two sources additional information on whether the property was owner-occupied. First, the HMDA data match includes a flag for whether loan application was for an owner-occupied home; column (2) uses only at-risk tenures that contain the owner-occupied flag in the HMDA match. Second, the assessor data match includes information on the owner's home mailing address; when this is the same as the property address, the home is owner-occupied. Column (3) uses only at-risk tenures with this owner occupied flag. Note that because the assessor data comes from 2011, only tenures that persist into this assessment year will be included, hence limiting the data to later purchases. Column (1) uses both measures.

Table 18 shows that limiting to these more stringent definition of an at-risk home does not affect our results; the effect sizes are very similar to Table 11. The apparent exception is in column (3), where there is sample selection induced by the assessor data owner-occupied flag. Under this sample selection the results are more comparable to Table 12, columns (4).

Our last robustness check examines whether there are actually two separate effects in play. Table 8 showed that there was some overlap between the two measures of investing activity, and one might be concerned that our analyses on one type of activity is simply picking up the other. Table 19 enters both flipped properties and investor neighbors' residences as separate explanatory variables, so that any effect size is conditioning on the other type of activity (in the inner and outer rings). While the correlation in the measures attenuates the estimates slightly, effects of each measure are separately important, statistically significant and still of an economically meaningful magnitude. The specifications in Table 19 allows for the joint estimate of the two effects; an at-risk tenure observing both a neighbor entering and a nearby property flipping is about 20 percent more likely to enter the investor market herself.

Table 16: Regression Results for Properties Below the Median Difference in Each Attribute

Attribute	(1) value	(2) initial equity	(3) income	(4) race(pct nonwhite)	(5) size(sqft)	(6) no. beds	(7) year built
Entries	36,465	35,210	35,275	35,314	36,051	35,235	33,615
At-Risk Tenures	57,803,566	53,702,685	52,300,315	52,071,606	53,351,601	54,271,407	54,507,063
Entry rate	0.000631	0.000656	0.000674	0.000678	0.000676	0.000649	0.000617

Panel A: Flipped *properties* as explanatory variables.

Attribute	(1) value	(2) initial equity	(3) income	(4) race(pct nonwhite)	(5) size(sqft)	(6) no. beds	(7) year built
wi10_1	4.16e-05***	5.59e-05***	5.60e-05***	6.73e-05***	5.02e-05***	4.32e-05***	7.26e-05***
	(1.20e-05)	(1.19e-05)	(1.24e-05)	(1.17e-05)	(1.26e-05)	(1.27e-05)	(1.21e-05)
wi10_2	8.30e-07	2.23e-05*	1.63e-05	1.16e-05	2.33e-05*	5.88e-06	1.67e-05
	(1.20e-05)	(1.21e-05)	(1.26e-05)	(1.19e-05)	(1.29e-05)	(1.30e-05)	(1.25e-05)
wi30_1	1.49e-05***	2.19e-05***	2.50e-05***	1.50e-05***	1.55e-05***	2.17e-05***	1.64e-05***
	(4.72e-06)	(5.07e-06)	(5.03e-06)	(5.04e-06)	(5.05e-06)	(5.14e-06)	(5.05e-06)
wi30_2	9.62e-07	4.88e-06	-1.82e-06	3.85e-06	-1.78e-06	2.86e-06	9.26e-06*
	(4.72e-06)	(5.04e-06)	(4.98e-06)	(5.02e-06)	(5.08e-06)	(5.13e-06)	(5.07e-06)
wi100_1	-7.52e-06***	-9.76e-06***	-1.10e-05***	-8.04e-06***	-8.59e-06***	-1.02e-05***	-8.54e-06***
	(1.32e-06)	(1.42e-06)	(1.42e-06)	(1.43e-06)	(1.42e-06)	(1.43e-06)	(1.43e-06)
wi100_2	-2.32e-05***	-2.82e-05***	-2.84e-05***	-2.80e-05***	-2.80e-05***	-2.79e-05***	-3.05e-05***
	(1.25e-06)	(1.32e-06)	(1.33e-06)	(1.33e-06)	(1.32e-06)	(1.33e-06)	(1.36e-06)
Constant	0.000134***	-0.000320***	0.000327***	-2.43e-05	-0.000278***	-0.000170***	-0.000252***
	(3.41e-05)	(6.20e-05)	(4.14e-05)	(4.82e-05)	(4.23e-05)	(4.48e-05)	(4.87e-05)
Observations	57,840,031	53,737,895	52,335,590	52,106,920	53,387,652	54,306,642	54,540,678

Panel B: Investors' *primary residences* as explanatory variables.

Attribute	(1) value	(2) initial equity	(3) income	(4) race(pct nonwhite)	(5) size(sqft)	(6) no. beds	(7) year built
wi10_1	3.25e-05***	8.43e-05***	6.89e-05***	7.74e-05***	5.47e-05***	6.31e-05***	8.07e-05***
	(7.72e-06)	(7.71e-06)	(7.98e-06)	(7.57e-06)	(8.30e-06)	(8.15e-06)	(7.63e-06)
wi10_2	-2.67e-05***	-1.07e-06	-8.74e-06	-8.61e-06	-1.79e-05**	-1.41e-05*	-5.16e-06
	(7.95e-06)	(7.95e-06)	(8.16e-06)	(7.72e-06)	(8.44e-06)	(8.39e-06)	(7.89e-06)
wi30_1	1.46e-05***	1.48e-05***	1.57e-05***	1.44e-05***	1.94e-05***	1.33e-05***	1.38e-05***
	(3.64e-06)	(3.76e-06)	(3.81e-06)	(3.82e-06)	(3.89e-06)	(3.82e-06)	(3.75e-06)
wi30_2	-1.71e-06	-2.53e-08	-2.82e-06	-9.04e-07	-1.42e-06	-2.13e-06	3.87e-06
	(3.71e-06)	(3.85e-06)	(3.90e-06)	(3.87e-06)	(3.95e-06)	(3.92e-06)	(3.80e-06)
wi50_1	-1.33e-05***	-1.63e-05***	-1.79e-05***	-1.36e-05***	-1.71e-05***	-1.48e-05***	-1.12e-05***
	(2.12e-06)	(2.22e-06)	(2.23e-06)	(2.26e-06)	(2.28e-06)	(2.24e-06)	(2.20e-06)
wi50_2	-3.35e-05***	-3.53e-05***	-3.86e-05***	-3.65e-05***	-3.98e-05***	-3.81e-05***	-4.01e-05***
	(2.13e-06)	(2.19e-06)	(2.24e-06)	(2.22e-06)	(2.25e-06)	(2.21e-06)	(2.16e-06)
Constant	-0.000140*	-0.000247***	-5.39e-06	4.24e-05	6.06e-05	0.000134**	-1.08e-05
	(8.20e-05)	(7.42e-05)	(5.13e-05)	(7.30e-05)	(4.58e-05)	(5.85e-05)	(3.61e-05)
Inner Ring hazard ratio	0.05263	0.13267	0.10383	0.11955	0.08190	0.09838	0.13418
	(0.01248)	(0.01211)	(0.01194)	(0.01146)	(0.01241)	(0.01267)	(0.01267)
Observations	58,062,732	53,937,856	52,553,742	52,301,538	53,602,003	54,508,915	54,741,633

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

NOTES: The specifications exclude at risk tenures in which $d_i > med(d_i)$, where d_i is defined as in Table (**??**).

Table 17: Regression Results for Properties With Difference Less Than One-Tenth Standard Deviation in Each Attribute

	value	initial equity	income	race(pct nonwhite)	size(sqft)	no. beds	year built
Entries	32,654	32,972	44,724	30,054	20,216	17,353	28,487
At-Risk Tenures	51,719,342	50,333,478	66,917,651	44,256,497	29,764,065	26,997,770	46,567,080
Entry rate	0.000631	0.000655	0.000668	0.000679	0.000679	0.000643	0.000612

Panel A: Flipped *properties* as explanatory variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Attribute	value	initial equity	income	race(pct nonwhite)	size(sqft)	no. beds	year built
wi10_1	4.07e-05***	5.01e-05***	6.41e-05***	6.83e-05***	5.17e-05***	3.67e-05**	6.87e-05***
	(1.26e-05)	(1.22e-05)	(1.09e-05)	(1.26e-05)	(1.70e-05)	(1.82e-05)	(1.30e-05)
wi10_2	1.81e-06	2.11e-05*	1.77e-05	1.81e-05	2.21e-05	2.31e-05	2.48e-05*
	(1.26e-05)	(1.25e-05)	(1.12e-05)	(1.28e-05)	(1.74e-05)	(1.87e-05)	(1.34e-05)
wi30_1	1.25e-05**	2.40e-05***	2.24e-05***	1.30e-05**	1.39e-05**	1.78e-05**	1.63e-05***
	(4.95e-06)	(5.23e-06)	(4.48e-06)	(5.43e-06)	(6.74e-06)	(7.21e-06)	(5.44e-06)
wi30_2	9.57e-07	7.28e-06	1.07e-06	3.91e-06	2.95e-06	3.31e-07	5.45e-06
	(4.98e-06)	(5.21e-06)	(4.45e-06)	(5.44e-06)	(6.72e-06)	(7.17e-06)	(5.44e-06)
wi100_1	-7.36e-06***	-1.04e-05***	-1.01e-05***	-8.17e-06***	-8.52e-06***	-9.97e-06***	-8.45e-06***
	(1.38e-06)	(1.45e-06)	(1.27e-06)	(1.55e-06)	(1.88e-06)	(2.02e-06)	(1.55e-06)
wi100_2	-2.24e-05***	-2.81e-05***	-2.92e-05***	-2.76e-05***	-2.75e-05***	-2.71e-05***	-3.07e-05***
	(1.31e-06)	(1.36e-06)	(1.18e-06)	(1.44e-06)	(1.76e-06)	(1.86e-06)	(1.48e-06)
Constant	0.000240***	-0.000340***	0.000187***	-0.000858***	-0.000141**	4.36e-05	-0.000121**
	(3.59e-05)	(5.71e-05)	(4.17e-05)	(7.79e-05)	(5.57e-05)	(5.75e-05)	(4.70e-05)
Inner Ring hazard ratio	0.07063	0.08268	0.10263	0.10954	0.08141	0.06076	0.11974
	(0.02192)	(0.02021)	(0.01749)	(0.02023)	(0.02671)	(0.03018)	(0.02276)
Observations	51,823,245	50,480,381	67,063,769	44,358,587	29,826,526	27,055,383	46,664,737

Panel B: Investors' *primary residences* as explanatory variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Attribute	value	initial equity	income	race(pct nonwhite)	size(sqft)	no. beds	year built
wi10_1	2.36e-05***	8.28e-05***	7.21e-05***	7.80e-05***	5.96e-05***	6.23e-05***	8.28e-05***
	(8.17e-06)	(7.96e-06)	(7.01e-06)	(8.18e-06)	(1.12e-05)	(1.17e-05)	(8.20e-06)
wi10_2	-2.26e-05***	-7.57e-07	-8.29e-06	-1.36e-05	-1.67e-05	-1.74e-05	-6.60e-06
	(8.41e-06)	(8.14e-06)	(7.17e-06)	(8.35e-06)	(1.14e-05)	(1.19e-05)	(8.47e-06)
wi30_1	1.78e-05***	1.51e-05***	1.60e-05***	1.49e-05***	1.36e-05***	1.49e-05***	1.35e-05***
	(3.85e-06)	(3.88e-06)	(3.39e-06)	(4.14e-06)	(5.21e-06)	(5.41e-06)	(4.05e-06)
wi30_2	-5.03e-06	1.36e-07	6.46e-07	2.02e-06	-1.84e-07	-6.30e-06	1.86e-06
	(3.91e-06)	(3.97e-06)	(3.45e-06)	(4.20e-06)	(5.30e-06)	(5.47e-06)	(4.09e-06)
wi50_1	-1.54e-05***	-1.61e-05***	-1.65e-05***	-1.47e-05***	-1.68e-05***	-1.50e-05***	-1.09e-05***
	(2.23e-06)	(2.29e-06)	(1.99e-06)	(2.43e-06)	(3.06e-06)	(3.16e-06)	(2.38e-06)
wi50_2	-3.13e-05***	-3.54e-05***	-4.07e-05***	-3.66e-05***	-4.11e-05***	-3.70e-05***	-4.11e-05***
	(2.25e-06)	(2.26e-06)	(1.97e-06)	(2.40e-06)	(3.02e-06)	(3.11e-06)	(2.33e-06)
Constant	-8.38e-05	-0.000218***	6.36e-05	-5.39e-05	-0.000120*	8.67e-05	-5.30e-05
	(8.16e-05)	(8.14e-05)	(4.97e-05)	(5.12e-05)	(6.45e-05)	(5.58e-05)	(3.81e-05)
Inner Ring hazard ratio	0.03813	0.13051	0.10925	0.11886	0.08848	0.09793	0.13822
	(0.01317)	(0.01251)	(0.01060)	(0.01242)	(0.01664)	(0.01842)	(0.01367)
Observations	52,020,597	50,666,975	67,335,235	44,526,983	29,944,873	27,153,919	46,834,735
R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

NOTES: The specifications exclude at risk tenures in which $d_i > 0.1 * \sigma_x$, where d_i is defined as in Table (**??**), and σ_x is the metro-wide standard deviation in the attribute.

Table 18: Regression Results for Properties With Owner-Occupied Designations

	(1)	(2)	(3)
Owner-occ flag:	HMDA or Assessor	HMDA	Assessor
Entries	48,031	39,402	8,629
At-Risk Tenures	76,720,651	56,280,249	20,440,402
Entry rate	0.000626	0.000700	0.000422

Panel A: Flipped *properties* as explanatory variables.

	(1)	(2)	(3)
Owner-occ flag:	HMDA or Assessor	HMDA	Assessor
wi10_1	6.66e-05***	6.91e-05***	3.56e-05**
	(1.04e-05)	(1.27e-05)	(1.65e-05)
wi10_2	2.71e-05**	3.42e-05**	1.27e-05
	(1.08e-05)	(1.35e-05)	(1.67e-05)
wi30_1	1.81e-05***	2.12e-05***	9.55e-06
	(4.33e-06)	(5.36e-06)	(6.82e-06)
wi30_2	5.72e-06	7.86e-06	1.40e-06
	(4.32e-06)	(5.50e-06)	(6.44e-06)
wi100_1	-6.29e-06***	-7.29e-06***	-4.85e-06**
	(1.20e-06)	(1.46e-06)	(1.94e-06)
wi100_2	-2.36e-05***	-2.26e-05***	-1.44e-05***
	(1.12e-06)	(1.37e-06)	(1.80e-06)
Constant	-3.65e-05	-0.000232***	0.000208***
	(6.53e-05)	(7.03e-05)	(4.93e-05)
Inner Ring hazard ratio	0.11870	0.11110	0.09305
	(0.01848)	(0.02037)	(0.04335)
Observations	76,768,682	56,319,651	20,449,031

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: Investors' *primary residences* as explanatory variables.

	(1)	(2)	(3)
Owner-occ flag:	HMDA or Assessor	HMDA	Assessor
wi10_1	7.21e-05***	7.87e-05***	3.20e-05***
	(6.60e-06)	(8.15e-06)	(1.02e-05)
wi10_2	5.45e-06	7.94e-06	9.14e-06
	(6.76e-06)	(8.44e-06)	(1.07e-05)
wi30_1	1.53e-05***	1.62e-05***	1.23e-05**
	(3.17e-06)	(3.92e-06)	(5.03e-06)
wi30_2	-3.96e-06	-4.15e-06	-4.05e-06
	(3.26e-06)	(4.10e-06)	(5.03e-06)
wi50_1	-1.05e-05***	-1.11e-05***	-9.62e-06***
	(1.84e-06)	(2.28e-06)	(2.89e-06)
wi50_2	-3.03e-05***	-2.94e-05***	-1.83e-05***
	(1.83e-06)	(2.28e-06)	(2.88e-06)
Constant	-0.000123***	-0.000111***	-3.04e-05
	(2.70e-05)	(2.74e-05)	(7.56e-05)
Inner Ring hazard ratio	0.12202	0.12054	0.07946
	(0.01116)	(0.01248)	(0.02539)

Table 19: Linear Probability Hazard Regression Results for Both Measures of Investing Activity

	(1)	(2)	(3)	(4)
iwi10_1	6.50e-05***	6.78e-05***	5.72e-05***	6.01e-05***
	(5.57e-06)	(5.57e-06)	(5.58e-06)	(5.59e-06)
fwi10_1	4.94e-05***	4.61e-05***	5.94e-05***	5.53e-05***
	(8.70e-06)	(8.71e-06)	(8.73e-06)	(8.74e-06)
iwi10_2	1.28e-06	8.60e-07	6.00e-06	4.39e-06
	(5.69e-06)	(5.70e-06)	(5.72e-06)	(5.72e-06)
fwi10_2	2.91e-05***	3.15e-05***	1.45e-05	1.53e-05*
	(8.90e-06)	(8.91e-06)	(8.92e-06)	(8.93e-06)
iwi30_1	1.16e-05***	1.17e-05***	9.83e-06***	9.85e-06***
	(2.74e-06)	(2.74e-06)	(2.75e-06)	(2.75e-06)
iwi30_2	-3.47e-06	-3.43e-06	-5.62e-06**	-5.72e-06**
	(2.79e-06)	(2.79e-06)	(2.80e-06)	(2.80e-06)
fwi30_1	1.91e-05***	2.18e-05***	1.77e-05***	2.06e-05***
	(3.65e-06)	(3.65e-06)	(3.67e-06)	(3.68e-06)
fwi30_2	8.74e-06**	1.04e-05***	7.43e-06**	9.11e-06**
	(3.66e-06)	(3.66e-06)	(3.68e-06)	(3.68e-06)
iwi50_1	7.28e-06***	-1.13e-06	4.03e-06**	-7.21e-06***
	(1.56e-06)	(1.57e-06)	(1.59e-06)	(1.61e-06)
iwi50_2	-2.87e-05***	-3.01e-05***	-2.25e-05***	-2.45e-05***
	(1.57e-06)	(1.59e-06)	(1.59e-06)	(1.61e-06)
fwi100_1	1.97e-05***	1.46e-05***	2.12e-06**	-6.38e-06***
	(9.30e-07)	(9.59e-07)	(9.93e-07)	(1.03e-06)
fwi100_2	-1.18e-05***	-7.70e-06***	-2.45e-05***	-2.07e-05***
	(9.10e-07)	(9.30e-07)	(9.68e-07)	(9.85e-07)
Constant	0.000623***	0.000657***	0.000751***	-0.00000
	(4.13e-06)	(4.28e-06)	(5.33e-06)	(2.46e-06)
Inner Ring Hazard Ratio				
Inv. Neighbor Residence	0.10426	0.10879	0.09174	0.09640
	(0.00894)	(0.00895)	(0.00896)	(0.00896)
Flipped Property	0.07933	0.07404	0.09531	0.08882
	(0.01397)	(0.01397)	(0.01402)	(0.01402)
Both	0.18360	0.18283	0.18705	0.18522
	(0.01583)	(0.01585)	(0.01589)	(0.01591)
Joint Hazard Ratio				
Inv. Neighbor Residence	0.13455	0.12577	0.11398	0.10062
	(0.00817)	(0.00818)	(0.00819)	(0.00820)
Flipped Property	0.14153	0.13250	0.12709	0.11164
	(0.01264)	(0.01266)	(0.01271)	(0.01273)
Both	0.27608	0.25826	0.24107	0.21226
	(0.01432)	(0.01437)	(0.01442)	(0.01446)
ZIP dummies			Y	Y
Year-qtr dummies		Y		Y
Observations	109,239,642	109,239,642	109,239,642	109,239,642

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

NOTES: The outcome is whether the at-risk homeowner enters the investment market; i.e. begins to engage in either flipping or investing activity. The notation'wiX0_t' refers to the flipping activity of type Z ($Z = f$ for flipped properties, $Z = i$ for investor residences) within X tenths of a mile t year(s) ago. For instance, iwi30_2 refers to a neighbor entering as an investor within 0.3 mile 1-2 years ago. Standard errors are clustered at the property tenure level.