Wall Street and the Housing Bubble[†]

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We analyze whether midlevel managers in securitized finance were aware of a large-scale housing bubble and a looming crisis in 2004–2006 using their personal home transaction data. We find that the average person in our sample neither timed the market nor were cautious in their home transactions, and did not exhibit awareness of problems in overall housing markets. Certain groups of securitization agents were particularly aggressive in increasing their exposure to housing during this period, suggesting the need to expand the incentives-based view of the crisis to incorporate a role for beliefs. (JEL D14, D83, E32, E44, G01, G21, R31)

Did Wall Street foresee the recent crash of the US housing bubble? Given the role played by Wall Street in facilitating the credit expansion that precipitated the housing market boom, understanding this question is important for systematically understanding the causes of the worst financial crisis since the Great Depression. With the benefit of hindsight, many find it hard to imagine that Wall Street missed seeing large-scale problems in housing markets before others. For example, the Financial Crisis Inquiry Commission wrote in its report that, in the years preceding the collapse, "Alarm bells were clanging inside financial institutions" (Financial Crisis Inquiry Commission 2011). If Wall Street was aware that the process of securitization was generating a national housing bubble that would lead to a deep financial crisis yet proceeded to securitize mortgage loans of dubious quality, this would reveal far more severe incentive problems on Wall Street than many have recognized—and confirm many of the worst fears underlying outrage from the public and policymakers. On the other hand, if Wall Street employees involved in securitization systematically missed seeing the housing bubble, despite having better information

than others, this raises fundamental questions regarding how Wall Street employees process information and form their beliefs.

In this paper, we examine this issue by studying personal home transactions of Wall Street employees. We test the simple hypothesis that they were fully aware during the boom that a large-scale housing market crisis was likely and imminent, which we term the "full awareness" hypothesis, by examining whether they avoided losses in their own homes. We focus on midlevel employees in the mortgage securitization business, such as traders, as they are a natural focal point for potential awareness of problems in the mortgage market.[1]

Because a home typically exposes its owner to substantial house price risk, midlevel employees in the financial industry, even with relatively high incomes, should have maximum incentives to make informed home-transaction decisions on their own accounts. Individual home transactions thus reveal beliefs regarding their own housing markets in isolation of any distortions arising from job incentives. Although our hypothesis concerns whether these employees were fully aware of an imminent crisis because of their superior information set, our methodology allows us to ask broad questions about their beliefs. Were those involved with mortgage securitization pessimistic about housing markets? Or were they as optimistic, or even more optimistic, than other groups?

Indeed, a growing theoretical literature emphasizes that distortions in beliefs about house prices may have affected the development of the crisis. An environment where households neglect risk and yet demand safe assets may have endogenously fostered the very financial innovation that enabled house prices to rise with credit expansion, subsequently sparking the crisis (Gennaioli, Shleifer, and Vishny 2012, 2013). Once prices started rising, wishful thinking among agents in the financial sector may have led to contagious overoptimism, collective willful blindness, and groupthink (Benabou 2013), an effect which may be exacerbated by cognitive dissonance (Barberis 2013). To enhance liquidity, widely used near-riskless debt securities may have been designed to reduce any agent's incentive to acquire information about risk, thus disarming the financial system's self-correction mechanisms (Dang, Gorton, and Holmström 2012). During the prime years of the housing boom, the empirical literature surveying the housing market had emphasized the possibility of distorted beliefs influencing house prices (Himmelberg, Mayer, and Sinai 2005; Mayer 2006; Shiller 2006, 2007; Smith and Smith 2006), potentially arising out of contagious social dynamics (Burnside, Eichenbaum, and Rebelo 2011) or biases such as money illusion (Brunnermeier and Julliard 2008; Piazzesi and Schneider 2008). While anecdotal evidence of biased beliefs has surfaced after the crisis,[2] relatively few studies since the crisis have studied beliefs, with a few exceptions

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[1] E-mails unearthed during civil lawsuits deriding securitized mortgage instruments as garbage are rarely from C-suite-level executives, but rather are from those involved in the issuance of collateralized debt obligations (CDOs), whose job is to understand the pricing of these instruments at the center of the crisis (Coval, Jurek, and Stafford 2009). See, for example, e-mails and instant messages documented in *China Development Industrial Bank v. Morgan Stanley* (2013); *Dexia v. Deutsche Bank* (2013); *Federal Housing Finance Agency v. J.P. Morgan Chase* (2011); and *People of the State of New York v. J.P. Morgan Chase* (2012).

[2] For example, Lewis (2011, p. 89) suggests via anecdotes that prominent Wall Street traders did not believe house prices could fall everywhere in the country at once. In the August 2007 earnings call for American International Group (AIG), Joseph Cassano, who was involved with AIG Financial Products, says "it is hard for us with [sic], and without being flippant, to even see a scenario within any kind of realm of reason that would see us losing $1 in any of those [residential mortgage CDO] transactions." (American International Group 2007).

(Chinco and Mayer 2012; Foote, Gerardi, and Willen 2012; Gerardi et al. 2008; Glaeser 2013; Soo 2013). In particular, there is scant empirical evidence regarding the role played by the beliefs of Wall Street employees.

We sample a group of securitization investors and issuers from a publicly available list of conference attendees of the 2006 American Securitization Forum, the largest industry conference. These investors and issuers, to whom we refer collectively as securitization agents, comprise vice presidents, senior vice presidents, managing directors, and other nonexecutives who work at major investment houses and boutique firms. Using the LexisNexis Public Records database, which aggregates information available from public records (such as deed transfers, property tax assessment records, and other public address records), we are able to collect the personal home transaction history of these securitization agents.

We compare how securitization agents fared in housing against control groups who arguably had no private information about housing and securitization markets. We test for two forms of full awareness. First, securitization agents may have attempted to time their own housing market. A necessary condition for this strong form of "market timing" awareness is to observe homeowning securitization agents divest homes before the bust in 2007–2009. Given the difficulties of timing the market, however, awareness of a housing bubble might appear in a weaker, "cautious" form, whereby securitization agents knew enough to avoid increasing their housing exposure during the bubble period of 2004–2006.

We construct two uninformed control groups. The first control group consists of S&P 500 equity analysts who do not cover homebuilding companies. Due to their work outside securitization and housing markets, they were less likely to be informed about the housing bubble than securitization agents, yet are nonetheless a self-selected group of agents who work for a similar set of finance firms. A nuanced issue for our analysis is that securitization agents received large bonuses during the bubble years, which may motivate them to buy houses despite any potential awareness of the housing bubble. By working for similar finance firms, equity analysts arguably also experienced income shocks. Our second control group consists of a random sample of lawyers who did not specialize in real estate law. This control group serves as a benchmark for a wealthy segment of the general population and helps us understand the broader question of whether securitization agents exhibited awareness relative to the public.

Our analysis shows little evidence of securitization agents' awareness of a housing bubble and impending crash in their own home transactions. Securitization agents neither managed to time the market nor exhibited cautiousness in their home transactions. They increased, rather than decreased, their housing exposure during the boom period, particularly through second home purchases and swaps of existing homes into more expensive homes. This difference is not explained by differences in financing terms such as interest rates or financing, and is more pronounced in the relatively bubblier Southern California region compared to the New York metro region. Our securitization agents' overall home portfolio performance was significantly worse than that of control groups. Agents working on the sell side and for firms which had poor stock price performance through the crisis did particularly poorly themselves.

Housing provides a consumption stream for which there may be poor substitutes in the rental market. Much of our analysis focuses on second home purchases and

swaps into more expensive homes on the premise that the timing of their purchases may better capture beliefs about housing markets than the timing of first home purchases, which may be driven by the life cycle. Even second home purchases, however, may contain a consumption motive, as homes in general may be "status," or Veblen, goods. We test whether securitization agents perceived their high current income during the housing boom was transitory by examining whether the value of their purchases was conservative relative to their current income, a test premised on the idea that home transactions trace out beliefs about expected permanent income jointly with beliefs about future home prices. Using stated incomes from mortgage application data, we find little evidence that their purchases were more conservative than that of control groups, although this data is noisy. We also find that homes purchased in 2004–2006 were aggressively sold in 2007–2009, relative to both control groups, suggesting that securitization agents overestimated the persistence of their incomes.

Our analysis complements the large literature in the aftermath of the crisis studying whether poorly designed incentives led Wall Street to take excessive risks in the housing market, leading to disastrous consequences.[3] The literature has accumulated ample evidence that the practice of securitizing mortgages in the originate-to-distribute model contributed toward lax screening of subprime borrowers (Agarwal and Ben-David 2012; Berndt and Gupta 2009; Demyanyk and Van Hemert 2011; Jiang, Nelson, and Vytlacil 2014; Keys et al. 2009, 2010; Keys, Seru, and Vig 2012; Mian and Sufi 2009; Piskorski, Seru, and Witkin 2013; Purnanandam 2011; Rajan, Seru, and Vig forthcoming). It is important to note that the roles played by beliefs and incentives are not mutually exclusive (Cole, Kanz, and Klapper forthcoming), and in fact are very much related in that distorted beliefs about overall housing markets and bad incentives to lend to unqualified borrowers are two forces which may interact and reinforce each other. For example, any weakened incentives to screen subprime borrowers and securitize mortgage loans pooled across the country would be exacerbated if lenders and security originators were buoyed by expectations that prices in overall house markets would never fall.

We caution that our analysis does not isolate the beliefs of securitization agents about subprime housing markets, as they are not subprime borrowers themselves. Furthermore, although we employ indirect tests to examine whether securitization agents' home purchases were hedged, we do not observe the entire household balance sheet and thus cannot rule out that they mitigated their overall housing exposure through other means such as shorting housing stocks. Overall, however, our analysis presents evidence that is inconsistent with systematic awareness of broad-based problems in housing among midlevel managers in securitized finance. Our analysis does leave open the possibility that even by rationally processing all information available to securitization agents, one might not have been able to identify the housing bubble. Nevertheless, the aggressiveness of certain groups in increasing their home exposure suggests a role for belief distortions.

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[3] The key friction in this narrative is that agents on Wall Street did not have incentives appropriately aligned with outside stakeholders such as shareholders (see, e.g., the debate in Bebchuk, Cohen, and Spamann 2010; Bhagat and Bolton 2011; Cziraki 2013; Fahlenbrach and Stulz 2011), or other stakeholders such as creditors, taxpayers, and society at large (Acharya et al. 2010; Bolton, Mehran, and Shapiro 2011; Edmans and Liu 2011; Rajan 2006, 2010).
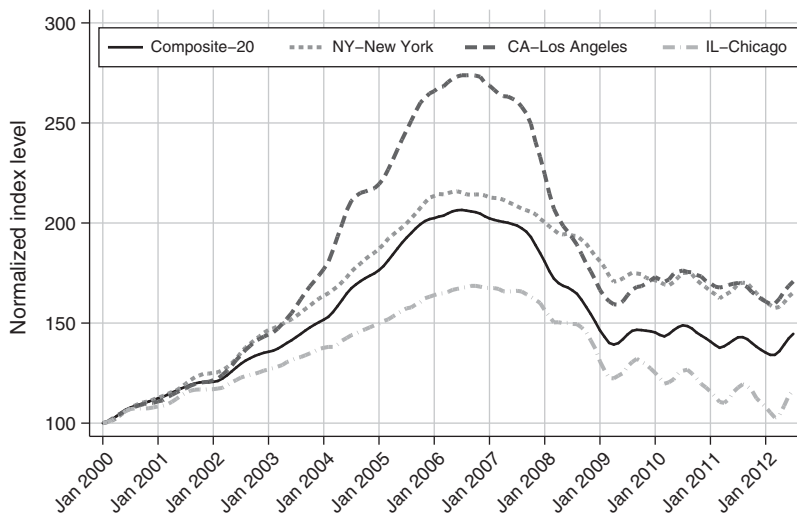
Figure 1. Home Price Indices

Notes: This figure plots the Case-Shiller nonseasonally adjusted home price indices from January 2000 to July 2012. Values for January 2000 are normalized to 100.

I. Empirical Hypothesis

The aim of our analysis is to examine whether Wall Street employees anticipated a broad-based housing bubble and crash. Figure 1 depicts the Case-Shiller house price indices for the composite-20 metropolitan areas as well as New York, Chicago, and Los Angeles from 2000 to 2011. Of these areas, Los Angeles had the most dramatic boom and bust cycle, with house prices increasing by over 170 percent from 2000 to a peak in 2006 and then crashing down by over 40 percent from the end of 2006 through the end of 2011. New York also experienced a boom/bust cycle, with prices increasing by over 110 percent from 2000 to 2006 and then dropping by over 20 percent through 2011. Over the composite 20 metropolitan areas, prices rose by 100 percent from 2000 to 2006 and fell by over 30 percent through 2011. Despite the differences in magnitudes, the cycles across different regions experienced rapid price expansions from 2004 to 2006, which we define as a bubble period in our analysis, the beginning of a decline in 2007, followed by steep falls in 2008.

The practice of securitizing mortgages has been widely recognized as one of the important enablers in the development of the housing bubble. As such, we focus on understanding the beliefs of midlevel managers in the securitization business across these boom and bust periods, to whom we collectively refer as securitization agents. In practice, our midlevel managers are mostly vice presidents, senior vice presidents, and managing directors at investment banks, commercial banks, hedge funds, mortgage lenders, and other financial companies. These managers buy and sell tranches of securitized mortgages and are largely responsible for understanding the pricing of these instruments and the correlation of the underlying securities.

There are several reasons to analyze the beliefs of midlevel managers rather than C-level executives. First, they made many important business decisions for their firms. The 2012 "London Whale" risk-management failure of JP Morgan Chase illustrates

that, if anything, CEO Jamie Dimon realized relatively late that traders had accumulated significant exposure to specific CDS positions which subsequently resulted in outsized losses. Second, midlevel managers were very close to the housing markets. There is a growing notion that perhaps those outside of the top-level C-suite—for example, Joseph Cassano of AIG Financial Products, or Fabrice Tourre of Goldman Sachs—knew about the problems in the housing markets even if C-level executives did not.

We use a revealed belief approach based on people's personal home transactions.[4] A home is typically a significant portion of a household's balance sheet. As our data will confirm later, this is likely true even for the midlevel securitization agents in our sample. To the extent that homeowners have thick skin in their homes, they have maximum incentives to acquire information and make informed buying and selling decisions. This is a key feature that allows us to isolate their beliefs, separately from any distortionary effects related to job incentives.[5]

Our general strategy focuses on testing whether securitization agents were more aware of the imminent housing market crash compared to plausibly unaware counterfactual control groups. This strategy relies on the cross-sectional variation in home purchase and sale behavior across these groups during the boom and bust periods. We have four primary tests. We first test for awareness in a strong "market timing" form. Under this strong form, securitization agents knew about the bubble so well that they were able to time the housing markets better than others. This implies that securitization agents who were homeowners anticipated the house price crash in the 2007–2009 period and reduced their exposures to housing markets by either divesting homes or downsizing homes in the bubble period of 2004–2006.

Market timing is a strong form of awareness for two reasons. First, the cost of moving out of one's home, especially the primary residence, is high, and may prevent securitization agents from actively timing the house price crash. Second, even if securitization agents knew about the presence of a housing bubble, they might not be able to precisely time the crash of house prices. While these caveats reduce the power of using the securitization agents' home divestiture behavior to detect their awareness of the bubble, it is useful to note that the cost of moving out of second homes is relatively low and should not prevent the securitization agents from divesting their second homes.

More importantly, the cost of moving and inability to time the crash should not prevent securitization agents from avoiding home purchases if they were indeed aware of problems in housing. This consideration motivates our second empirical test for a weaker, "cautious" form of awareness, which posits that securitization agents knew enough to avoid increasing their housing exposure during the bubble period of 2004–2006. We focus on purchases of second homes and swaps of existing homes into more expensive homes instead of first home purchases, since the timing of first home purchases is arguably motivated by necessary consumption related to the life cycle rather than beliefs about housing.

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[4] Home transactions are more informative of individuals' beliefs than buying and selling of their companies' stocks, which is contaminated by potential effects from loyalty (Cohen 2009).

[5] A subtle issue for our analysis is that poorly designed incentives can distort beliefs among agents (Cole, Kanz, and Klapper forthcoming). Our analysis is informative about this hypothesis in the following way. If agents exhibited beliefs consistent with awareness of the bubble, this would be inconsistent with the hypothesis of this interaction, as their beliefs would be aligned with their presumably bad incentives. Evidence of unawareness would be consistent with this interaction, with the cause of unawareness being poorly designed incentives. However, our tests do not distinguish between specific reasons for unawareness.

Our third test focuses on the net trading performance to see whether securitization agents' observed transactions as a whole improved or hurt their financial performance. We benchmark their observed strategy against a static buy-and-hold strategy and compare whether securitization agents' portfolios did better against their benchmark than control groups' portfolios during the 2000–2010 period. This test sheds light on whether agents exhibited awareness through more complex strategies. For example, agents could have tried to "ride the bubble" by buying as prices rose and selling near the peak (Brunnermeier and Nagel 2004). Although our test only spans one boom and bust, our cross section allows us to test whether the group, on average, anticipated this particular housing crash.

Although our analysis of cautiousness removes first home purchases, even purchases of second homes and swaps into expensive homes are plausibly related to a consumption motive, particularly as homes in general may be "status," or Veblen, goods. This motivates our fourth test, which is based on the idea that securitization agents' home transactions jointly trace out beliefs about permanent income and house prices, as their human capital is tied to housing. Awareness of an impending large-scale housing crash would have led either to reduced expectations of permanent income or awareness that bonuses during the boom were transitory, and thus to less expensive purchases relative to their current incomes. We test whether the value-to-income ratio of securitization agents' purchases during the boom fell, relative to unaware control groups, where current income is in the denominator.[6] We also test whether homes purchased by securitization agents during the boom were held for significant periods of time. If fully aware securitization agents purchased homes during the boom for consumption, these homes should be held for significant periods of time (Sinai and Souleles 2005), or else a significant discount rate would be required to justify these purchases.

Economic determinants of home transaction behavior other than beliefs could drive cross-sectional differences between securitization agents and potential control groups. First, the level of risk aversion may vary, particularly if the age profile varies across career groups. Second, there may be career selection and life-cycle effects. Different careers may have different optimal points of purchasing housing not obtainable in the rental market due to career risk and different life-cycle patterns in when to have children. Third, heterogeneity in wealth levels and income shocks may drive home purchase behavior. Less wealthy people may be less likely to purchase a home due to credit constraints, and credit-constrained agents may be more likely to purchase a home after a positive income shock.

To address these issues, we construct two uninformed control groups. The first group is a sample of equity analysts covering S&P 500 companies in 2006, excluding major homebuilders. The assumption is that, being a self-selected group of agents who work for similar finance companies, they face similar ex ante career risks and have similar risk aversion and life-cycle profiles. They also received some forms of income shocks during the housing boom, as finance companies generally performed very well over this period. We also construct a second control group comprised of

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[6] For example, large bonuses during the boom may have led securitization agents to purchase homes, particularly if they were previously credit constrained (Yao and Zhang 2005; Cocco 2005; Ortalo-Magne and Rady 2006), although awareness that bonuses were transitory would lead to more conservative purchases relative to their current income.

lawyers practicing outside of real estate law. Although differences or similarities between these two groups may be less ascribable to beliefs due to heterogeneity, this exercise tests for awareness among securitization agents relative to a benchmark group of wealthy, high-income people in the general population.

Another worry is that awareness of problems in housing markets may not have manifested itself as cautious or market-timing behavior if securitization agents were more pessimistic about tail risk probabilities (rather than the conditional expectation of prices) and had laid off most of the tail risk on lenders. This narrative is particularly relevant for the public debate as many CDOs were constructed and priced as if there was little tail risk (Coval, Jurek, and Stafford 2009). We investigate this issue by further examining the loan-to-value of purchases of securitization agents versus those of control groups, as well as whether they purchased with more intensity in nonrecourse states to minimize the consequences of any potential defaults. We also examine whether sell-side securitization agents' housing portfolios outperformed that of buy-side agents' to address the role of this narrative in the public debate.

Taken together, we test the following hypothesis regarding whether securitization agents were aware of the housing bubble:

HYPOTHESIS (Full Awareness): *Securitization agents exhibited more awareness of a broad-based housing bubble relative to equity analysts and lawyers in four possible forms:*

  (i) (*Market timing form*)
      Securitization agents were more likely to divest homes and downsize homes in 2004–2006.

  (ii) (*Cautious form*)
      Securitization agents were less likely to acquire second homes or move into more expensive homes in 2004–2006.

  (iii) (*Performance*)
      Overall, securitization agents had better performance after controlling for their initial holdings of homes at the beginning of 2000.

  (iv) (*Conservative consumption*)
      Relative to their current income, any purchases made by securitization agents during the boom were more conservative.

We emphasize that securitization agents are likely not subprime borrowers themselves, and thus our analysis does not isolate the beliefs of securitization agents about subprime mortgage markets. A limitation of our analysis is that we do not observe the entire household balance sheet, and thus do not see whether they took other steps to short the housing market. Several considerations are reassuring. First, directly shorting the housing market is notoriously difficult. Shiller (2008) documents that repeated attempts to create markets to hedge house price risk have failed to attract liquidity, pointing out that the "near absence of derivatives markets for real estate … is a striking anomaly." Second, shorting homebuilding stocks and real

estate investment trusts also leaves substantial basis risk with any home investments. Third, shorting stocks requires borrowing stocks, which is costly, and exposes short sellers to recall risk (D'Avolio 2002) and the risk of running out of capital if prices appreciate (Mitchell, Pulvino, and Stafford 2002).

II. Data and Empirical Framework

A. *Data Collection*

We begin by collecting names of people working in the securitization business as of 2006. To do so, we obtain the list of registrants at the 2006 American Securitization Forum's (ASF) securitization industry conference, hosted that year in Las Vegas, NV, from January 29, 2006 to February 1, 2006. This list is publicly available via the ASF website.[7] The ASF is the major industry trade group focusing on securitization. It published an industry journal and has hosted the "ASF 20XX" conference every year since 2004. The conference in 2006 featured 1,760 registered attendees and over 30 lead sponsors, ranging from every major US investment bank (e.g., Goldman Sachs) to large commercial banks such as Wells Fargo, to international investment banks such as UBS, to monoline insurance companies such as MBIA.

We construct a sample of 400 securitization agents by randomly sampling names from the conference registration list and collecting their information from our data sources until we have 400 agents with data. We make sure to oversample people at the most prominent institutions associated with the financial crisis by attempting to collect information for all people associated with those firms.[8] We screen out people who work for credit card, student loan, auto, and other finance companies primarily involved in the nonmortgage securitization business, and also use any available information in LinkedIn to screen out people working in nonmortgage securitization segments of diversified financial firms. We also use LinkedIn to collect any background information about each person that will be helpful in locating them within the LexisNexis database. LexisNexis aggregates information available from public records, such as deed transfers, property tax assessment records, and other public address records to person-level reports and provides detailed information about property transactions for each person.

There are a number of reasons that a person we selected from the registration list may not appear in our final sample, as described in panel A of Table 1 and also online Appendix A in more detail. Chief among these are that they worked in the securitization business but in a nonhousing segment such as credit card loans, or that they have a very common name that cannot be uniquely identified in LexisNexis. All told, we sample 613 names to obtain 400 securitization agents in sample.

For each person in our sample, we collect data for all properties ever owned, including the location, the date the property was bought and sold, the transaction price, and

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[7] As of this writing, this list is no longer available on the web. The authors have copies of the websites available.
[8] The companies we oversample are AIG, Bank of America, Bear Stearns, Citigroup, Countrywide, JP Morgan Chase, Lehman Brothers, Merrill Lynch, Morgan Stanley, Washington Mutual, Wachovia, Barclays, Deutsche Bank, HSBC, UBS, Credit Suisse, and Mellon Bank.

TABLE 1—PEOPLE

Sample	Securitization	Equity analysts	Lawyers
Panel A. Number of people			
Number of names	613	469	406
Not midlevel manager	13	—	—
Not housing	94	—	—
Not found in public records	29	16	3
Multiple found in public records	50	27	3
International	27	25	0
Deceased	0	1	0
People in sample	400	400	400
Person found, but no homes owned	58	82	42
People who sold all properties before 2000	3	1	0
People who only own homes beginning after 2010	3	4	3
People in sample owning at least one home, 2000–2010	336	313	355
Unconditional rate of homeownership	0.84	0.78	0.89

Age	Securitization	Equity analysts	Lawyers
Panel B. 2011 Age distribution			
30 and under	0.53%	0.26%	0.26%
31 to 35	6.60%	6.46%	5.37%
36 to 40	16.09%	21.96%	15.86%
41 to 45	27.97%	32.56%	24.04%
46 to 50	23.48%	18.60%	19.69%
51 to 55	13.72%	10.08%	18.16%
56 to 60	6.07%	4.13%	10.74%
Over 60	5.54%	5.94%	5.88%
Total with age data	379	387	391
Missing age data	21	13	9
χ^2 test of homogeneity with Sctzn sample	—	10.92	10.67
Homogeneity test, *p*-value	—	0.14	0.15
Median age	45	44	47

Notes: This table lists the number of people for which we gathered information in each of three samples: securitization agents, equity analysts, and lawyers. Panel A tabulates the number of names we searched for and reasons for why a name may not be in our sample. Panel B shows the age distribution of people in our sample.

mortgage terms, when available.[9] LexisNexis contains records for individuals who never own property, since it also tracks other public records, and we record these individuals as not having ever owned property. We also collect data about any refinances undertaken during the sample period. Our data collection began in May 2011 and we thus have all transactions for all people we collect through this date. Our analysis focuses on the period 2000–2010, the last full year we have data.[10]

Our sample of equity analysts consists of analysts who covered companies during 2006 that were members of the S&P 500 any time in 2006, excluding homebuilding companies. These people worked in the finance industry but were less directly exposed to housing, where the securitization market was most active. We download the names of analysts covering any company in the S&P 500 during 2006 outside

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[9] If we do not find a record of a person selling a given property, we verify that the person still owns the property through the property tax assessment records. In cases where the property tax assessment indicates the house has been sold to a new owner, or if the deed record does not contain a transaction price, we use the sale date and sale price from the property tax assessment, when available.

[10] We collect data for all transactions we observe, even if they are after 2010. This mitigates any bias associated with misclassifying the purpose of transactions, as we discuss below. To ease data collection requirements, we skip properties sold well before 2000, as they are never owned during the 2000–2010 period and are thus immaterial for our analysis.

of SIC codes 152, 153, and 154 from I/B/E/S. These SIC codes correspond to homebuilding companies such as Toll Brothers, DR Horton, and Pulte Homes.[11] There are 2,978 analysts, from which we randomly sample 469 names to obtain 400 equity analysts with information in our sample.

To construct our sample of lawyers, we select a set of lawyers for each person in our securitization sample from the *Martindale-Hubbell Law Directory*, an annual national directory of lawyers which has been published since 1868, matched on age and the work location of the lawyer. We provide details in online Appendix A. This matching is not available for equity analysts given the information we have available ex ante in our sampling. We have 406 total names that we search for within LexisNexis to obtain 400 lawyers matched on age and location to our securitization sample.[12]

B. *Classifying Home Purchases and Sales*

Our starting point for understanding home purchase behavior is a broad framework to categorize the purpose of a transaction for a given person. We think of person i at any time t as either being a current homeowner, or not. If she is not a current homeowner, she may purchase a house and become a homeowner (which we refer to generically as "buying a first home"). Note that one may have been a homeowner at some point in history and still "buy a first home" if one is currently not a homeowner. If a person is currently a homeowner, she may do one of the following:

  (i) Purchase an additional house ("buy a second home").

 (ii) Sell a house and buy a more expensive house ("swap up").

 (ii) Sell a house and buy a less expensive house ("swap down").

 (iv) Divest a home but remain a homeowner ("divest a second home").

  (v) Divest a home and not remain a homeowner ("divest last home").

To operationalize this classification of transactions, we define a pair of purchase and sale transactions by the same person within a six-month period as a swap—either a swap up or a swap down based on the purchase and sale prices of the properties. If either the purchase or sale price is missing, we classify the swap generically as a "swap with no price information."

The purchases that are not swaps are either nonhomeowners buying first homes or homeowners buying second homes.[13] We use the term "second" to mean any home in addition to the person's existing home(s). Divestitures are classified similarly: among sales that are not involved in swaps, if a person sells a home and still owns at

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[11] Our references for SIC codes is CRSP, so a company needs to have a valid CRSP-I/B/E/S link.

[12] The success rate for collecting information about lawyers is much higher because the *Martindale-Hubbell Law Directory* provides detailed information about each lawyer, allowing us to pinpoint the name in LexisNexis more easily than other groups.

[13] If a home is on record for an individual, but the home does not have a purchase date, we assume the owner had the home at the beginning of our sample, January 2000. We provide more details of our classification in online Appendix A.

least one home, we say she is divesting a second home; if she has no home remaining, we say the person is divesting her last home.[14]

C. *Transaction Intensities*

Our main analysis centers on the annual intensity of each transaction type—that is, the number of transactions per person per time period.[15] We focus on an annual frequency to avoid time periods with no transactions. Formally, the intensity of one type of transaction in year t in a sample group is defined as the number of transactions of that type in year t divided by the number of people eligible to make that type of transaction at the beginning of year t:

$$Intensity_t = \frac{\# \ Transactions_t}{\# \ people \ eligible \ for \ the \ transaction_t}.$$

For example, the intensity of buying a first home is determined by the number of first home purchases during the year divided by the number of nonhomeowners at the beginning of the year. An important feature of our data is that we observe not only transaction activity but also transaction *inactivity*, due to the comprehensiveness of the public records tracked by LexisNexis. This allows us to test the hypothesis that one group was more cautious (i.e., bought less) than other groups, as we can normalize the number of transactions by the total number of people who could have made that transaction, instead of the number of people who made the transaction.[16]

D. *Income Data*

We are able to observe income in the purchase year of a home for a subset of people by matching information we observe about the year of their purchase, their mortgage amount, and property location with the information provided in the 2000–2010 Home Mortgage Disclosure Act (HMDA) mortgage application data. The HMDA dataset contains information on the income relied on by the originating institution to underwrite the loan. Although most identifying information—such as the borrower's name, exact date of origination, property address, and zip code—is not provided, the data provides the mortgage amount (up to the thousands) as well as the census tract of the property. We match purchases with all originated mortgages in HMDA of the same amount in the purchase year with the same census tract as the property. If we

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[14] When classifying transactions in 2010, we use information collected on purchases and sales in 2011 to avoid overclassifying divestitures and first-home/second-home purchases and underclassifying swaps in the final year of data.

[15] We focus on the intensity of transactions rather than the probability of an eligible person making a given transaction because the latter discards information about a person making multiple transactions of one type in one year. However, focusing instead on probabilities yields nearly identical results.

[16] A complication in this calculation is that, in a given year, a person may make multiple transactions. As a result, the number of nonhomeowners at the beginning of the year does not fully represent the number of people eligible for buying a first home during the year, because, for instance, a homeowner may sell her home in February and then buy another home in September. To account for such possibilities, we define "adjusted nonhomeowners," who are eligible for buying a first home during a year, to be the group of nonhomeowners at the beginning of the year plus individuals who divest their last homes in the first half of the year. We similarly adjust the number of homeowners and multiple homeowners. Online Appendix A contains a detailed description of adjustments.

successfully find a match, we take the stated income on the HMDA application as the income of our person at the time the purchase was made.[17]

III. Descriptive Statistics

Panel A of Table 1 presents the number of people in each sample. Our groups of interest each have 400 people by construction. Panel B presents the age distribution for each group. The median ages in 2011 for the securitization agent, equity analyst, and lawyer samples are 45, 44, and 47, respectively. χ^2 tests of homogeneity fail to reject the hypothesis that the distributions presented in panel B of Table 1 are the same.

Our sample features people from 176 distinct firms, of which we are able to match 65 as publicly traded companies in CRSP. Our sample is tilted toward people working at major firms due to our oversampling of those firms. The most prominent companies in our sample are: Wells Fargo (27 people), Washington Mutual (23), Citigroup (16), JP Morgan Chase (14), AIG (12), Countrywide, Deutsche Bank, Merrill Lynch, UBS, and Lehman Brothers (9 each). The most common position titles are Vice President (87), Senior or Executive Vice President (58), and Managing Director (39). In addition to the large firms, a number of regional lenders such as BB&T, smaller mortgage originators such as Fremont General and Thornburg Mortgage, and buy-side investors such as hedge funds and investment firms are present as well. Additional details about the people in our securitization sample are provided in Table B1 in online Appendix B.[18]

Panel A of Table 2 breaks down the number of properties owned over the 2000–2010 period. Our data spans 674 properties owned by securitization agents, 604 by equity analysts, and 609 by lawyers during the 2000–2010 period. Of these, the majority were bought during the same period, while roughly 40 percent of total properties were sold during this period.[19]

Online Appendix B maps the geographical distribution of properties in our sample. The New York combined statistical area (roughly the New Jersey-New York-Connecticut tri-state metro area plus Pike County, Pennsylvania) is the most prominent metro area, followed by Southern California (Los Angeles plus San Diego). Both equity analysts and securitization agents are concentrated in New York, with a slightly higher concentration for equity analysts. Online Appendix B also contains details about how purchases and sales are distributed through time, and how these purchases and sales were classified.

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[17] One concern is that, even given an exact mortgage amount (e.g., $300k), census tract, and purchase year, there may be multiple matches within HMDA. The average number of matches per purchase is roughly three, and the median match is unique. Given the economically motivated construction of census tracts, we average income over all matches in HMDA as the income for that purchase. One can repeat the analysis using only unique matches, which reduces our sample by slightly less than half, and obtain qualitatively similar results that are more influenced by a small number of observations at the tail ends of the distribution.

[18] Our reading suggests that many of these agents were involved in forecasting, modeling, and pricing cash flows of mortgage-backed paper. As an example, one person in our group lists their job title in LinkedIn as "Mortgage Backed Securities Trader, Wells Fargo," with job responsibilities including "Head of asset-backed trading group for nonprime mortgage and home equity mortgage products," and "Built a team of three traders with responsibility for all aspects of secondary marketing of these products, including setting pricing levels, monthly mark-to-market of outstanding pipeline/warehouse, and all asset sales."

[19] There are a substantial number of properties with either no sale date or a sale date after December 31, 2010; these are homes which were still owned as of that date.

TABLE 2—PROPERTIES

	Securitization	Equity analysts	Lawyers
Panel A. Total properties, purchases, and sales			
Total properties ever owned, 2000–2010	674	604	609
Total purchases, 2000–2010	437	368	355
with purchase price	392	318	306
average purchase price	761.67	1,032.38	485.62
Number of homes with no purchase date	81	112	101
Total sales, 2000–2010	266	207	171
with sale price	238	181	145
average sale price	633.74	794.76	446.37
Number of homes with no sale date or sold after Dec. 31, 2010	408	397	438
Panel B. Mortgage applications			
Purchases, 2000–2010	437	368	355
with mortgage information	328	247	257
mean, median LTV	0.72/0.79	0.71/0.75	0.77/0.80
with income from HMDA match	253	196	203
income at purchase, property average	350.01	408.74	191.32
People purchasing, 2000–2010	274	242	243
with income from any HMDA match	191	153	167
Average number of HMDA mortgage applications per match	2.41	2.62	2.46
Median number of HMDA mortgage applications per match	1	1	1

Notes: This table provides summary statistics for properties owned any time over the 2000–2010 period. Dollar amounts are reported in December 2006 CPI-adjusted real thousands. Panel A presents the fraction of people owning more than one address over the 2000–2010 period. Panel B presents summary statistics for our matching process with mortgage applications.

Panel B of Table 2 summarizes mortgage information. For the securitization sample, we have mortgage information for 328 purchases out of 437 we observe from 2000 to 2010. Of these, we are able to match 253 to HMDA, a conditional success rate of 77 percent; for both the equity analyst and lawyer groups, this rate is 79 percent. Over the entire 2000–2010 period, the average income at purchase was $350k for the securitization sample, $409k for the equity analyst sample, and $191k for the lawyers. All income figures are reported in real December 2006 dollars adjusted using the Consumer Price Index (CPI) All Items series.

One concern is that these numbers appear a bit too "small" relative to what is commonly perceived as finance industry pay. The income reported in HMDA represents income used by the bank to underwrite the loan, which may often include only taxable income provided by the mortgage applicant and is thus likely downward biased. Forms of compensation not taxable during the year, such as employee stock option grants, may not be included.[20]

Even if this reporting issue were not present, observed income levels are not unbiased representations of the true distribution of underlying income because we only observe income at purchase, and not income in other years (nor for nonpurchasers). As a descriptive exercise, however, Table 3 breaks down average income observed at purchase into three bins, corresponding to the pre-housing boom (2000–2003), housing boom (2004–2006), and housing bust (2007–2010).[21] Our securitization

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[20] If the amount of underreporting varies across time, the bias becomes problematic for our analysis comparing average value-to-income ratios at purchase across groups and time. We discuss this in Section IVD.

[21] Because we are interested in average income per person, we first average within person over purchases to obtain a person-level average income for the period before averaging over people in each period.

TABLE 3—INCOME

			Income	
		Sctzn.	Equity analysts	Lawyers
Preboom period	Mean	246.4	360.4	170.4
(2000–2003)	Median	180.9	224.7	148.7
	SD	266.8	335.4	114.8
	People	83	72	70
Boom period	Mean	338.8	418.0	174.0
(2004–2006)	Median	210	246.4	131.8
	SD	513.8	501.9	116.4
	People	89	58	68
Bust period	Mean	369.2	476.1	231.9
(2007–2010)	Median	205.8	308.0	151.4
	SD	489.2	433.4	258.6
	People	68	56	54
1. Boom − preboom	Point est.	92.36	57.62	3.68
	t-stat	[1.68]*	[0.76]	[0.19]
	Observations	172	130	138
	R^2	0.012	0.005	0.000
2. DID	Point est.		34.75	88.68
Sctzn. minus	t-stat		[0.37]	[1.53]
Control	Observations		302	310
	R^2		0.021	0.047

Notes: This table presents average income in three periods for each group. We first average income from purchases observed within each person-period before averaging across people to obtain an average income for each period. Dollar amounts are in December 2006 CPI-adjusted thousands. Row 1 tests whether the boom minus preboom difference in averages was zero by projecting person-level income onto an indicator for the boom period in a two-period unbalanced panel of person-level income. Row 2 tests whether the difference-in-difference is significant across groups. Standard errors are clustered at the person level.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

agents received income shocks from the preboom to the boom period, with average income rising by \$92k, over 37 percent of average preboom income. Equity analysts also received income shocks, with average income at purchase rising by \$57k, although this is a smaller fraction of preboom income, 16 percent. These results are roughly consistent with our initial hypothesis that the two finance industry groups received positive income shocks, although securitization agents received a slightly larger average shock.

IV. Empirical Results

A. *Were Securitization Agents More Aware of the Bubble?*

We first examine whether securitization agents divested houses in advance of the housing crash. Panel A of Figure 2 plots the divestitures per person per year for each group through time. The divestiture intensities for the securitization agent sample are, if anything, lower than those of equity analysts and lawyers in years before 2007.
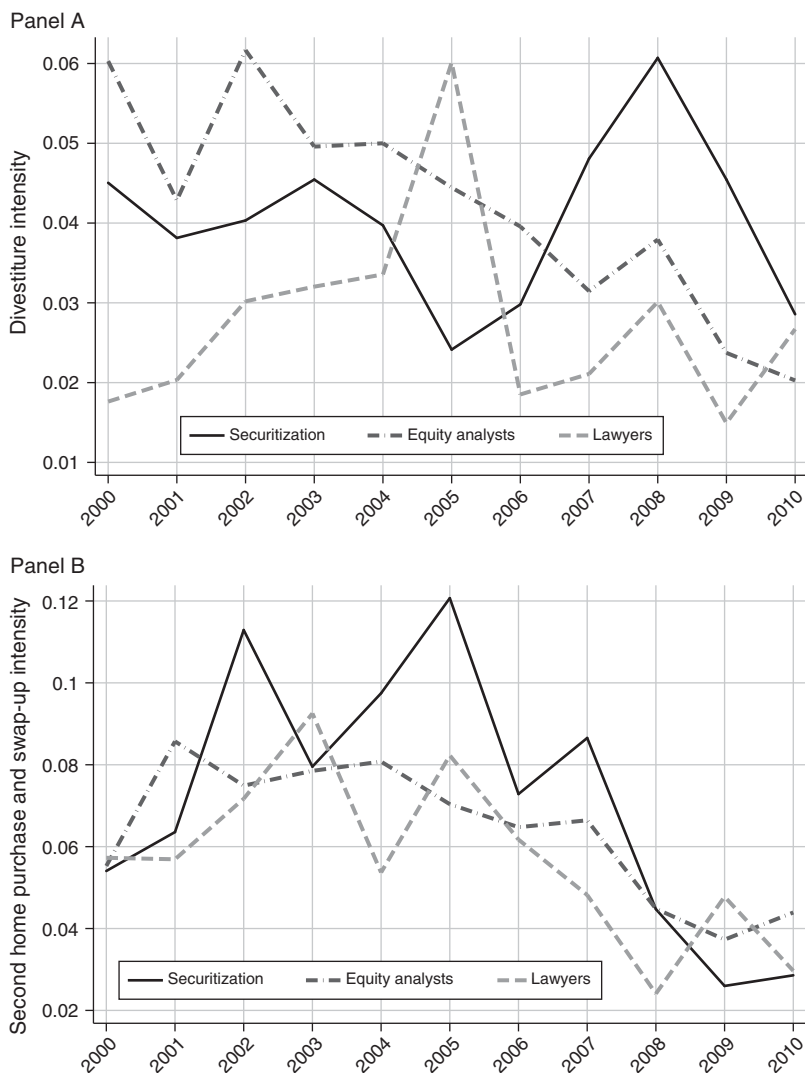
Panel A

Panel B

FIGURE 2. TRANSACTION INTENSITIES

Notes: Panel A plots the intensity of divestitures through time, defined as the number of divestitures per adjusted homeowner each year, for each group. Panel B plots the intensity of second home purchases and swap-ups.

Compared to equity analysts, the divestiture intensity for securitization agents is lower every year from 2003–2006, and slightly higher during the bust period, 2007–2009.[22]

To account for heterogeneity in the age and multi-homeownership profiles of each group, we compute regression-adjusted differences in intensities. We do this by constructing a strongly balanced person-year panel that tracks the number of

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[22] The raw number of divestitures each year may be read off by multiplying the intensity in a given year from Table 4 by the number of homeowners in that year given by Table B5 in online Appendix B. For example, in 2008, there were 19 divestitures (0.061 times 313) in the securitization sample. In contrast to our regression-adjusted differences, we do not condition on having age information when reporting these raw intensities.

divestitures each year for each person, including zero if no divestiture was observed. We then estimate the following equation for each pairing of the securitization group with a control group using ordinary least squares (OLS):

$$(1) \qquad E\left[\#Divestitures_{it}|HO_{it-1} = 1\right]$$

$$= \alpha_t + \beta_t \times Securitization_i + \sum_{j=1}^{7} \delta_j Age_j(i, t) + \lambda MultiHO_{it-1}.$$

The variable $\#Divestitures_{it}$ is the number of divestitures for individual i in year t; $Securitization_i$ is an indicator for whether individual i is part of our securitization agent sample; $Age_j(i, t)$ is an indicator for whether individual i is part of age group j in year t (where eight age brackets are defined according to panel B of Table 1, and one age group is excluded); $MultiHO_{it-1}$ represents whether individual i was also a multi-homeowner at the end of year $t - 1$; and HO_{it-1} is an indicator for whether individual i was a homeowner at the end of year $t - 1$. We use indicators for age brackets instead of a polynomial specification for age as it makes coefficients easily interpretable as average group effects. In each year t, we condition the sample such that only the adjusted homeowners as of the end of year $t - 1$ (i.e., those who started year t as homeowners or became a homeowner during year t, so that $HO_{it-1} = 1$) are included in the estimation. We cluster standard errors by person. The effective sample size is the number of homeowners during the 2000–2010 period.[23]

The coefficients β_t are the difference in average annual divestitures per person within the homeowner category across samples, adjusted for average group effects captured by age and multi-homeownership indicators, and are our coefficients of interest, with $\beta_t > 0$ during the 2004–2006 period suggesting evidence of market timing.[24] Table 4 presents these regression-adjusted differences. Consistent with the raw divestiture intensities, these differences are very small during the boom period; point estimates are negative compared to equity analysts. There is weak evidence that securitization agents had a slightly higher intensity of divestiture in 2007 and 2008. This could be consistent with a form of market timing such as riding the bubble, but also consistent with divestitures related to job losses, a point which we return to in Section IVB.7. Overall, however, there is little evidence that suggests

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[23] The effective sample size (number of people contributing to the variation) of this estimation will be the total number of people who we ever observed as adjusted homeowners during the 2000–2010 period for whom we have age information across these two groups. This may be read off from the last row of online Appendix Table B5, panel B. For example, when estimating equation (1) for the securitization sample and the equity analyst sample, the number of people will be 633 (328 plus 305). The number of homeowners contributing to the variation each year may similarly be read off from the same table, which lists the number of homeowners and nonhomeowners each year with age information. For example, when estimating (1) for the securitization agent and equity sample, the number of people contributing variation in 2000 is 415 (220 plus 195).

[24] We estimate equation (1) using OLS to maintain the simplest interpretation of β_t. In the absence of covariates, β_t would be equivalent to average marginal effects estimated from nonlinear limited dependent variable models (e.g., a Poisson model), because $Securitization_i$ is binary. One alternative method of estimating equation (1) would be to replace the left-hand side variable with an indicator for whether a person divested and interpret β_t as the probability of a person divesting, making equation (1) a linear probability model and the corresponding nonlinear model a logit or probit model. Online Appendix B reports results average marginal effects estimated from such a logit model, analogous to results in Tables 4 and 5. Results are nearly identical. Angrist and Pischke (2009) discuss the relative merits of OLS as a robust approximation (in the minimum mean-squared error sense) to the conditional expectation function versus these nonlinear methods.

TABLE 4—DIVESTING HOUSES

	Divestitures per person			Regression-adjusted difference Sctzn. minus:	
Year	Securitization	Equity analysts	Lawyers	Equity analysts	Lawyers
2000	0.045	0.060 [−0.67]	0.018 [1.67]*	−0.012 [−0.50]	0.026 [1.59]
2001	0.038	0.043 [−0.25]	0.020 [1.16]	0.003 [0.14]	0.019 [1.22]
2002	0.040	0.062 [−0.94]	0.030 [0.62]	−0.011 [−0.48]	0.012 [0.71]
2003	0.045	0.050 [−0.21]	0.032 [0.78]	0.001 [0.06]	0.019 [1.10]
2004	0.040	0.050 [−0.58]	0.034 [0.39]	−0.006 [−0.36]	0.004 [0.24]
2005	0.024	0.044 [−1.26]	0.060 [−1.80]*	−0.014 [−0.85]	−0.033 [−1.69]*
2006	0.030	0.040 [−0.61]	0.019 [0.92]	−0.007 [−0.44]	0.009 [0.75]
2007	0.048	0.031 [1.03]	0.021 [1.89]*	0.023 [1.40]	0.025 [1.66]*
2008	0.061	0.038 [1.28]	0.030 [1.88]*	0.026 [1.44]	0.025 [1.50]
2009	0.045	0.024 [1.45]	0.015 [2.17]**	0.029 [1.91]*	0.031 [2.09]**
2010	0.029	0.020 [0.59]	0.027 [0.13]	0.012 [0.79]	0.001 [0.09]
		Multi-homeowner?		0.063 [7.71]***	0.066 [8.14]***
		Age indicators?		Yes	Yes
		Observations		5,739	6,149
		R^2		0.022	0.026
		People		633	675

Notes: The first three columns tabulate the number of divestitures per homeowner for each group, by year. *t*-statistics from a two-sample test of differences in means with the securitization sample are reported each group-year for the two control groups. The next two columns report regression-adjusted differences in the number of divestitures per person each year, where we control for the eight age groups defined in Table 1—as well as an indicator for whether someone is a multi-homeowner at the start of the year, and the sample period is 2000–2010. The number of people in-sample each year is the number of homeowners at the beginning of each year for the two groups that are compared. *t*-statistics computed from person-clustered standard errors are reported in brackets below each difference.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

people in our securitization agent sample sold homes more aggressively prior to the peak of the housing bubble relative to either equity analysts or lawyers.

We next examine whether securitization agents were cautious in purchasing homes in 2004–2006. This cautiousness alternative emphasizes that securitization agents knew about the bubble, but that the optimal response was to avoid purchasing homes given the difficulty in timing the crash. We focus on second home purchases and swap-ups into more expensive houses by homeowners. Results for first-home purchases by nonhomeowners are reported in online Appendix B and do

TABLE 5—BUYING A SECOND HOME OR SWAPPING UP

| Year | Second home/swap-up purchases per person | | | Regression-adjusted difference Sctzn. minus: | |
	Securitization	Equity analysts	Lawyers	Equity analysts	Lawyers
2000	0.054	0.055 [−0.05]	0.057 [−0.15]	0.014 [0.66]	−0.011 [−0.56]
2001	0.064	0.086 [−0.86]	0.057 [0.31]	0.006 [0.27]	0.013 [0.65]
2002	0.113	0.075 [1.38]	0.072 [1.62]	0.065 [2.65]***	0.047 [2.11]**
2003	0.080	0.079 [0.04]	0.093 [−0.50]	0.024 [0.99]	−0.008 [−0.33]
2004	0.097	0.081 [0.65]	0.054 [1.78]*	0.034 [1.45]	0.035 [1.54]
2005	0.121	0.070 [1.94]*	0.082 [1.49]	0.068 [2.96]***	0.037 [1.62]
2006	0.073	0.065 [0.36]	0.062 [0.53]	0.029 [1.37]	0.002 [0.12]
2007	0.087	0.066 [0.86]	0.048 [1.78]*	0.037 [1.72]*	0.031 [1.50]
2008	0.045	0.045 [−0.01]	0.024 [1.44]	0.017 [1.02]	0.013 [0.91]
2009	0.026	0.037 [−0.79]	0.048 [−1.40]	0.006 [0.41]	−0.023 [−1.48]
2010	0.029	0.044 [−1.02]	0.030 [−0.08]	−0.002 [−0.10]	−0.002 [−0.14]
		Multi-homeowner?		0.246 [19.83]***	0.262 [18.04]***
		Age indicators?		Yes	Yes
		Observations		5,739	6,149
		R^2		0.183	0.202
		People		633	675

Notes: The first three columns tabulate the number of second home/swap-up purchases per homeowner for each group, by year. *t*-statistics from a two-sample test of differences in means with the securitization sample are reported each group-year other than the securitization group. The next two columns report regression-adjusted differences in the number of second home/swap-up purchases per person each year, where we control for the eight age groups defined in Table 1—as well as an indicator for whether someone is a multi-homeowner at the start of the year. The number of people in-sample each year is the number of homeowners at the beginning of each year for the two groups that are compared, and the sample period is 2000–2010. *t*-statistics computed from person-clustered standard errors are reported in brackets below each difference.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

not reveal significant differences; if anything, there are more first home purchases by nonhomeowning securitization agents than equity analysts.

Panel B of Figure 2 plots the raw intensity of second home purchases and swap-ups through time, while Table 5 presents regression-adjusted differences. The regression-adjusted differences are computed using a specification analogous to equation (1) where we replace the left-hand side variable with the number of second home purchases plus swap-up transactions for individual *i* during year *t*, again conditioning

the sample to adjusted homeowners as of the end of year $t - 1$. Contrary to what would be suggested by the full awareness hypothesis, we observe $\beta_t > 0$ consistently throughout the 2004–2006 period, with statistically significant differences with the equity analyst group at the 1 percent level in the 2005 period. Pooling intensities every other year reveals positive and statistically significant differences in the 2002–2003, 2004–2005, and 2006–2007 periods (reported in online Appendix B). Economically, the intensity of second home purchase and swap-up activity was 0.07 homes per person higher in 2005 for securitization agents than equity analysts. This suggests that securitization agents were aggressively increasing, not decreasing, their exposure to housing during this period. We now explore this issue in more detail.

B. *Second Home and Swap-Up Purchases*

1. Firm-Specific Effects: We exploit the fact that we observe 78 securitization agents and 136 equity analysts working at a common set of 19 firms to remove company-specific effects. For this test and for other subsample tests, we pool together intensities every other year (2000–2001, 2002–2003, and so forth) to mitigate the concern that our results are driven by spurious differences between a small number of transactions we may observe during a single year when we condition the sample tightly. We estimate the following equation:

$$(2) \quad E[\#BuySecondOrSwapUp_{it} | HO_{it-1} = 1]$$

$$= \gamma_k + \alpha_{s(t)} + \beta_{s(t)} \times Securitization_i + \sum_{j=1}^{7} \delta_j Age_j(i, t)$$

$$+ \lambda MultiHO_{it-1},$$

where γ_k represents company-specific effects and $s(t) = 0$ if $t = 2000$ or 2001, $s(t) = 1$ if $t = 2002$ or 2003, and so forth. The first column of panel A of Table 6 reports the results and shows that, within this subsample, purchase intensities for second homes and swap-ups are higher for securitization agents in the 2002–2003 and 2006–2007 periods, even controlling for firm effects.

2. Location Effects: Heterogeneity in property locations is a concern, since the magnitude of the housing bubble was very heterogeneous across areas, as shown previously in Figure 1. Although our sample of lawyers is location-matched with our securitization agents, equity analysts are relatively more concentrated in the New York metro area. If securitization agents lived in areas where it was cheaper or easier to purchase a second home or swap up, this location effect may drive our previous results. To check whether this is the case, we condition the sample of homeowners each year to those who own property in the New York metro region at the end of the previous year, and estimate the following model:

$$(3) \quad E[\#BuySecondOrSwapUp_{it} | HO_{it-1} = 1, PropNYC_{it-1} = 1]$$

$$= \alpha_{s(t)} + \beta_{s(t)} \times Securitization_i + \sum_{j=1}^{7} \delta_j Age_j(i, t) + \lambda MultiHO_{it-1},$$

TABLE 6—ROBUSTNESS

Year	Firm effects	New York City homeowners		Southern California homeowners	
	Sctzn. minus:	Securitization minus:		Securitization minus:	
	Equity analysts (1)	Equity analysts (2)	Lawyers (3)	Equity analysts (4)	Lawyers (5)
Panel A. Firm and location effects					
2000–2001	0.006	0.010	−0.016	0.067	0.001
	[0.22]	[0.39]	[−0.61]	[0.73]	[0.02]
2002–2003	0.092	0.051	−0.021	0.043	0.024
	[2.81]***	[1.78]*	[−0.64]	[0.35]	[0.39]
2004–2005	0.025	0.055	0.019	0.218	0.056
	[0.76]	[2.04]**	[0.64]	[4.15]***	[1.30]
2006–2007	0.086	0.019	−0.004	0.006	−0.039
	[2.46]**	[0.74]	[−0.14]	[0.10]	[−0.93]
2008–2009	0.034	0.013	−0.017	0.079	−0.103
	[1.47]	[0.70]	[−0.69]	[1.62]	[−2.38]**
2010	0.007	−0.040	−0.049	0.026	−0.044
	[0.25]	[−1.94]*	[−1.76]*	[0.26]	[−0.86]
Multi-homeowner indicator?	Yes	Yes	Yes	Yes	Yes
Age indicators?	Yes	Yes	Yes	Yes	Yes
Firm effects?	Yes	No	No	No	No
Observations	1,876	1,868	1,478	373	581
R^2	0.179	0.122	0.174	0.215	0.280
People	214	234	179	52	74

(*Continued*)

where $PropNYC_{it-1}$ is an indicator for whether person i owns property in the New York combined statistical area at the end of year $t-1$. Results are reported in columns 2 and 3 of panel A of Table 6. We find that, even within this smaller subsample, securitization agents were more aggressive with purchases of second homes and swap-ups in 2004–2005 relative to equity analysts, an effect that is statistically significant at the 5 percent level. In columns 4 and 5, we repeat this exercise for people who live in Southern California, our second most represented metro region and find similar behavior results, although the sample size is smaller than in the New York metro area.

3. **Difference-in-Differences across Locations:** Comparing columns 2 and 4 of panel A of Table 6, the difference in intensities between securitization agents and equity analysts is larger in Southern California than New York. Given that Southern California had a much larger boom-bust cycle than New York, this suggests that securitization agents were even less aware of the bubble in areas where the bubble was very pronounced relative to areas where the bubble was less pronounced.

To further test this insight, we focus on the relative difference between securitization agents and equity analysts in Southern California with that in New York by estimating

$$(4) \quad E\left[\#BuySecondOrSwapUp_{it} \mid HO_{it-1} = 1, (PropSoCA_{it-1} = 1 \, or \, PropNYC_{it-1} = 1)\right]$$

$$= \alpha_{s(t)} + \gamma_{s(t)} PropSoCA_{it-1} + \delta_{s(t)} Securitization_i$$

$$+ \beta_{s(t)} (Securitization_i \times PropSoCA_{it-1}) + \sum_{j=1}^{7} \delta_j Age_j(i, t) + \lambda MultiHO_{it-1},$$

TABLE 6—ROBUSTNESS (*Continued*)

| | Diff-in-diff, Southern California − New York City | | Within securitization | |
| | Sctzn − eq. analysts, $\beta(s(t))$ | | Southern California − New York City | |
Year	Second home or swap-up (1)	Second home only (2)	Second home or swap-up (3)	Second home only (4)
Panel B. Cross-location differences				
2000–2001	0.017	−0.082	0.055	−0.014
	[0.17]	[−0.91]	[1.13]	[−0.49]
2002–2003	−0.160	−0.109	0.059	0.060
	[−1.02]	[−0.89]	[0.88]	[0.89]
2004–2005	0.113	0.103	0.067	0.084
	[2.03]**	[2.16]**	[1.54]	[2.09]**
2006–2007	−0.076	−0.047	−0.008	−0.002
	[−1.07]	[−0.69]	[−0.24]	[−0.07]
2008–2009	0.051	0.034	−0.025	−0.016
	[1.20]	[1.04]	[−0.79]	[−0.59]
2010	0.126	0.098	0.041	0.042
	[2.25]**	[1.97]*	[0.94]	[0.94]
Multi-homeowner?	Yes	Yes	Yes	Yes
Age indicators?	Yes	Yes	Yes	Yes
Firm effects?	No	No	No	No
Observations	2,183	2,183	999	999
R^2	0.149	0.098	0.191	0.119
People	279	279	130	130

Notes: We report the regression-adjusted differences in the annual intensity of a second home purchase or swap-up, where we pool together intensities every other year in our sample, as in equations (2) through (4). Column 1 of Panel A compares the intensity of securitization agents versus equity analysts among the sample of people who work at common firms, and includes firm effects. Columns 2–3 of panel A report differences where we condition the sample to homeowners in the New York City area. Columns 4–5 of panel A report differences where the sample is conditioned to homeowners in the Southern California. Columns 1 and 2 of panel B report difference-in-differences estimates of the effect of securitization agents minus equity analysts in Southern California minus New York City. Columns 3 and 4 of panel B report differences between securitization agents in Southern California and New York. Standard errors clustered at the person-level are reported below in brackets.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

where $PropSoCA_{it-1}$ is an indicator for whether person i owns property in the Southern California region at the end of year $t − 1$.[25] We perform this exercise both with the number of second home purchases and swap-ups on the left-hand side (column 1 of panel B, Table 6) as well as just second home purchases (column 2 of panel B, Table 6). The thought experiment is the following. Suppose Southern California begins to look bubbly in the 2004–2005 period, relative to New York. Allowing for differences between the New York and Southern California regions (through the $\gamma_{s(t)}$ coefficients) and between securitization agents and equity analysts (through the $\delta_{s(t)}$ coefficients), do securitization agents in Southern California react more or less cautiously compared to those in New York during that time period?

[25] To conservatively avoid an ex ante classification bias in either direction, we discard a handful of observations where people own property in both New York and Southern California at the end of year $t − 1$.

Evidence of $\beta_{s(t)} < 0$ during 2004–2005 would suggest that securitization agents living in areas which experienced larger boom/bust cycles were more alerted than their counterparts in regions with more moderate cycles.[26]

In fact, the aggressiveness of securitization agents relative to equity analysts is more pronounced in Southern California than in New York. This suggests that securitization agents living in areas which experienced larger boom/bust cycles were potentially even more optimistic about house prices than otherwise. To mitigate the concern that there are relatively fewer equity analysts in Southern California, and to demonstrate that these results are driven by differences across areas, columns 3 and 4 of panel B of Table 6 estimate only the single-difference between Southern California and New York within securitization agents and shows results consistent with the difference-in-differences.

4. Financing: One concern is that differences in purchase behavior are driven by differential financing terms. Panel A of Figure 3 plots the average interest rate at purchase for each year and each group. On average, the interest rates observed at purchase between the two groups are very similar and experienced overall time variation similar to that of national benchmark rates.

A second concern is that securitization agents with knowledge of the bubble and crash may have financed the purchase of their homes very differently. Securitization agents may have been aware of tail risks yet laid off these risks to lenders in their purchases. Panel B of Figure 3 plots the median loan-to-value (LTV) ratio at purchase—including any second lien mortgages recorded on or within 14 days of the purchase—and shows that it holds steady near the unconditional median of 80 percent throughout the sample period. The median LTV ratios of the marginal second home and swap-up purchases are also very close to 80 percent through time. Overall, we see little evidence that securitization agents purchased more homes with different financial exposure than equity analysts.

A third financing-related concern is that securitization agents with knowledge of the bubble and crash may have reduced their house price exposure by refinancing and withdrawing equity after purchase during the boom period. Although this would lower the direct financial exposure to home prices, it would significantly increase leverage and the expected cost of bankruptcy, as second lien mortgages—including home equity lines of credit (HELOCs)—are often loans where lenders have recourse to a borrower's nonhome assets and where borrowers face personal liability in the event of default. This can be true even in states which are more generally considered nonrecourse states due to the protections afforded to mortgages directly connected with purchase money.[27] Consistent with this, Lee, Mayer, and Tracy (2012) find that many borrowers continue to pay their second lien mortgages (including HELOCs) even when their first mortgage is in default. An increase in debt through second lien mortgages and HELOCs could thus also be consistent with significant optimism

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[26] There were insufficient observations in the Arizona/Nevada/Florida regions to conduct this type of test. We chose New York and Southern California both because New York experienced a much more moderate bubble than Southern California, but also because of practical considerations given how many observations we have.

[27] The most notable example is California. Ghent and Kudlyak (2011) classify California as a nonrecourse state. However, California courts have held in numerous cases such as *Union Bank v Wendland* (1976) that only loans connected to financing the purchase price of a home are protected from deficiency judgments.
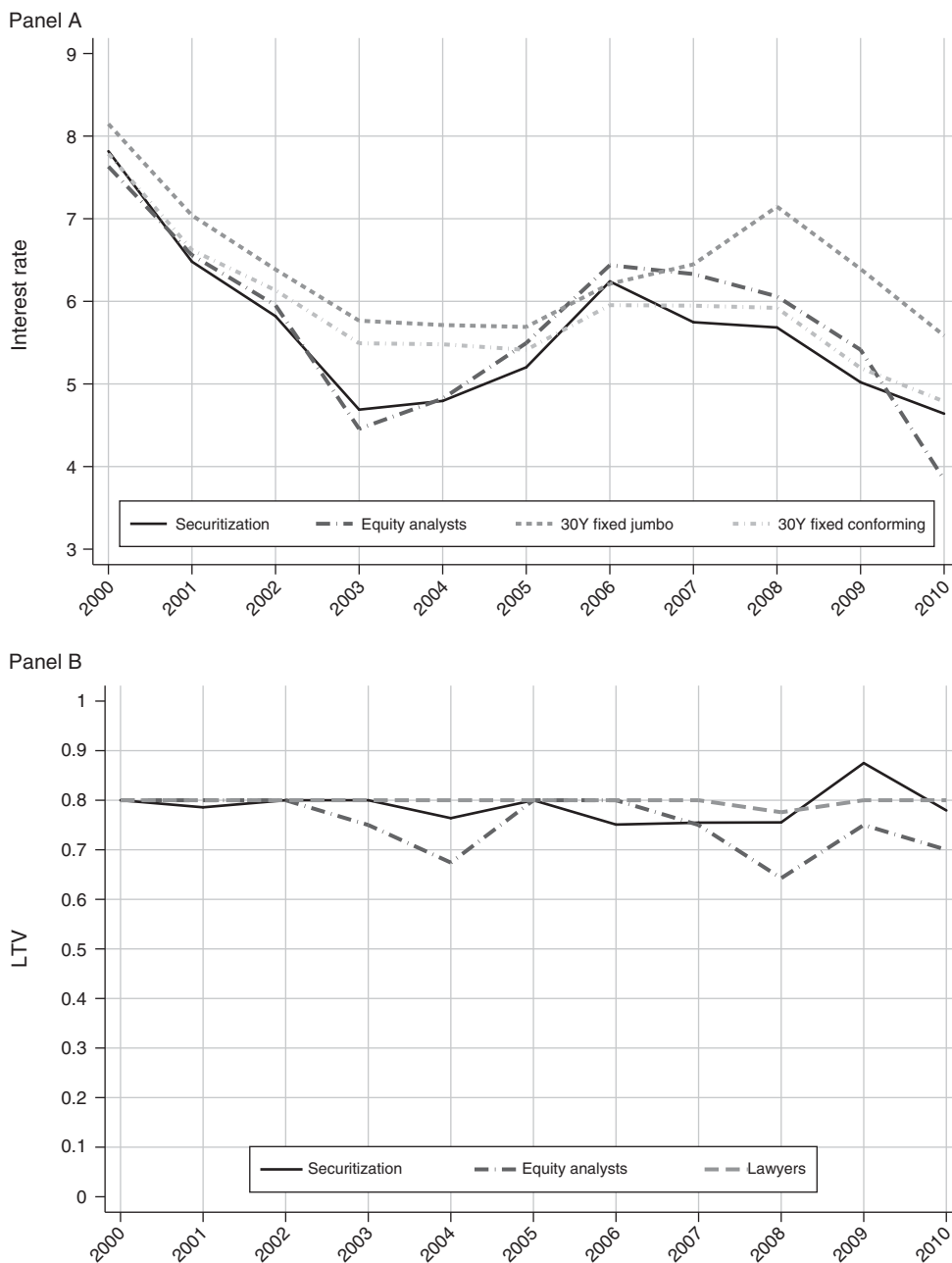
Panel A

Panel B

FIGURE 3. FINANCING

Notes: Panel A plots the average interest rate at purchase for securitization and equity analyst groups, as well as average annual national benchmark 30-year jumbo and conforming interest rates from BankRate. Panel B plots the median loan-to-value observed at purchase.

about home prices and a belief that default is not likely. In online Appendix B, we show that the average change in debt resulting from refinancing is similar across groups during our sample period.

5. Default risk: To directly examine beliefs about the likelihood of default, we test whether second home and swap-up purchases among securitization agents were differentially concentrated within nonrecourse states rather than recourse states relative to equity analysts in online Appendix B. Awareness of tail risks would likely lead agents to purchase in nonrecourse states as it reduces the expected cost of default. Ghent and Kudlyak (2011) classify states based on lender friendliness and whether it is practical for lenders to obtain deficiency judgments and find that borrowers are substantially more likely to default on first mortgages in nonrecourse states, particularly when equity is negative. Conditional on whether a person already has a home in a nonrecourse state, we find little evidence of a higher marginal intensity for securitization agents to purchase second homes or swap up into more expensive homes in nonrecourse states than equity analysts.

6. Type of property: In online Appendix B, we provide evidence that, conditional on a second home purchase, the type of home (single-family or condominium) is significantly more likely to be a condominium for securitization agents relative to equity analysts, even though they are no more likely to be farther away. This suggests that they are potentially condominiums purchased to rent rather than for a pure consumption motive.

7. Job switches: The higher number of divestitures in 2007 and 2008 may suggest market timing, with securitization agents divesting homes earlier than others. On the one hand, this difference is small relative to the difference in intensity of second home and swap-up purchases. For example, between securitization agents and equity analysts, the difference in divestiture intensity is 0.026 per homeowner in 2008 while the difference in second home/swap-up intensity is 0.068 per homeowner in 2005. We explore this issue further by using Bayes' rule to decompose the divestiture intensity into the intensity among those who experience job losses (job-losers), the intensity among those who do not experience job losses (no-job-losers), and the rate of job loss.[28] In online Appendix B, we provide evidence which suggests that securitization agent job-losers were more likely than equity analyst job-losers to divest a home, despite significant job losses among both groups. In contrast, there is a smaller difference in divestiture intensities between securitization agent no-job-losers and equity analyst no-job-losers. Since both the initial difference in divestiture intensities and the total absolute number of divestitures are small, one caveat to this result is that this decomposition is over a small sample, so that this holds only qualitatively. On the other hand, results for total sales yield statistically significant differences between the two groups of job-losers, while no differences for no-job-losers. Under the full awareness hypothesis, we should have expected to see differences between securitization agents and equity analysts in both job-loser and no-job-loser groups, rather than only in the job-loser group.

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[28] We examine the LinkedIn profiles of each of our securitization agents and define years in which a person switches jobs as the last year of employment within an employer on a person's resume. We provide details in online Appendix A.

C. *Net Trading Performance*

We next systematically analyze which groups fared better during this episode by comparing their trading performance. Our strategy is to compare their portfolio performance based on the relative differences in the location and timing of their sales and purchases from the beginning of our sample onward to see whether trades subsequent to this date helped or hurt each group on average.

Our thought experiment is the following: if agents follow a self-financing strategy from 2000 onward, where the available investments are houses in different zip codes and a risk-free asset, how did their observed performance compare with that of a hypothetical buy-and-hold strategy? We sketch the assumptions for this exercise here and provide full details in online Appendix B. First, we assume time flows quarterly, and we mark the value of each house up or down every quarter from its actual observed purchase price and date in accordance with quarterly zip-code level home price indices from Case-Shiller when possible. Second, we assume that agents each purchase an initial supply of houses at the beginning of 2000 equal to whichever houses they are observed to own at that time. Third, agents have access to a cash account which earns the risk-free rate, and we endow each agent with enough cash to finance the entirety of their future purchases to abstract away from differences in leverage. This last assumption errs on the side of conservatism in isolating performance differences arising from the timing of home purchases.

We compute both the return from the observed strategy and the return from a counterfactual buy-and-hold strategy, where agents purchase their initial set of houses and then subsequently never trade. We denote the difference between the returns of these two strategies as the performance index for each individual, which captures whether trading subsequent to the initial date helped or hurt the individual relative to a simple buy-and-hold strategy.

We test for value-weighted differences in performance by projecting the performance index onto an indicator for the securitization group and indicators for the age categorizations using ordinary least squares in the cross section of individuals, with sampling weights equal to their initial wealth. Intuitively, this methodology is a value-weighted difference-in-differences where the first difference compares observed performance with buy-and-hold performance and the second difference compares this first difference for securitization agents with that of the control group.

Panel A of Table 7 presents summary statistics for our exercise, while panel B tabulates the value-weighted average return, buy-and-hold return, and performance index per person for each group, as well as the regression-adjusted differences. Figure 4 illustrates the comparative evolution of the performance indices. What is apparent is that all groups, including securitization agents, were worse off at the end of 2010 relative to a buy-and-hold strategy that began in 2000:I.

In fact, the securitization group's portfolio experienced significantly worse gross returns than the equity analyst group, a difference of 4.5 percent on a regression-adjusted basis. Although part of this is due to a difference in the buy-and-hold return across the two groups (1.7 percent), the remaining difference of 2.7 percent quantifies the net trading underperformance of the securitization group,
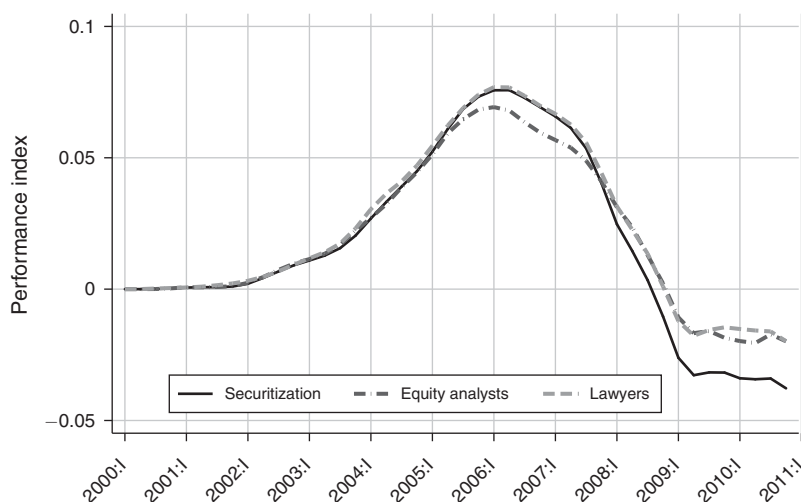
FIGURE 4. TRADING PERFORMANCE INDICES

Notes: This figure plots the average performance index, defined as the initial-wealth-weighted average difference between the cumulative return on the self-financed trading strategy and the buy-and-hold return of the initial stock of houses, where 2000:I is taken as the initial quarter, for each group.

TABLE 7—PERFORMANCE INDEX

	Securitization		Equity analysts		Lawyers	
	2000:I	2010:IV	2000:I	2010:IV	2000:I	2010:IV
Panel A. Summary statistics						
Number of properties per person	0.603	1.020	0.590	0.993	0.652	1.095
	(0.693)	(0.766)	(0.799)	(0.809)	(0.727)	(0.817)
Value of properties	236.8	751.2	308.2	992.2	191.1	522.6
	(390.2)	(893.8)	(568.7)	(1,210.1)	(282.0)	(522.4)
Cash account	848.0	689.2	1,159.7	988.0	470.3	375.1
	(874.7)	(975.4)	(1,090.6)	(1,005.6)	(461.9)	(529.5)
Portfolio value	1,084.8	1,440.4	1,467.9	1,980.2	661.4	897.7
	(1,035.9)	(1,586.0)	(1,214.1)	(1,661.3)	(548.9)	(829.1)
Housing portfolio weight	0.256	0.542	0.245	0.506	0.322	0.599
	(0.316)	(0.314)	(0.327)	(0.335)	(0.345)	(0.291)
Number of people	400		400		400	

(*Continued*)

a difference which is statistically significant at the 5 percent level.[29] In particular, the gross return during the 2007–2010 bust period for the securitization group was particularly poor. Differences with the lawyer group were more modest, although

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[29] In interpreting this magnitude, it is worth recalling that our performance evaluation fully collateralizes all purchases and endows agents with large amount of cash, so that this difference likely significantly understates the true difference in portfolio performance across the two groups. For example, housing forms only a 25 percent portfolio weight for securitization agents in the first period of our calibration, rising to 54 percent in the last period, both of which are quite conservative. In online Appendix B, we present an alternative calibration where we halve the amount of cash given to each agent, so that the initial portfolio weight on housing is 51 percent, rising to 111 percent in the final period. This produces larger magnitudes while not affecting statistical inference.

TABLE 7—PERFORMANCE INDEX (*Continued*)

| | Means and SDs | | | Regression-adjusted differences | |
| | | | | Sctzn. minus: | |
	Sctzn.	Equity analysts	Lawyers	Equity analysts	Lawyers
Panel B. Performance, 2000:I–2010:IV					
Return	0.328	0.349	0.357	−0.045	−0.027
	(0.197)	(0.169)	(0.221)	[−2.63]***	[−1.08]
Buy-and-hold return	0.366	0.369	0.377	−0.017	−0.008
	(0.120)	(0.116)	(0.140)	[−1.72]*	[−0.75]
Performance index	−0.0378	−0.0199	−0.0198	−0.027	−0.018
	(0.147)	(0.113)	(0.145)	[−2.19]**	[−1.02]
Return, 2006:IV–2010:IV	−0.0736	−0.0457	−0.0814	−0.022	0.004
	(0.108)	(0.0936)	(0.115)	[−2.68]***	[0.44]
Observations	400	400	400	766	770
R^2 on performance index				0.033	0.034

Notes: Panel A presents summary statistics for the performance index exercise. Averages per person are reported while standard deviations are reported below in parentheses. Dollar amounts are in nominal thousands. Panel B reports average performance and regression-adjusted differences in performance weighted by the initial portfolio value. Regression-adjusted differences are the coefficient on an indicator for the securitization group in a person-level cross-sectional regression of the dependent variable indicated in first column of the row on a securitization group indicator and indicators for age controls, with samplings weights equal to the initial portfolio value and heteroskedasticity-robust standard errors reported in brackets.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

still negative.[30] In summary, the observed trading behavior of securitization agents hurt their portfolio performance.

We also compare portfolios of groups of agents within our securitization group to further isolate the full awareness hypothesis. One salient view is that those who were selling mortgage-backed securities and CDOs knew that the asset fundamentals were worse than their ratings suggested, which suggests that they may have anticipated problems in the wider housing market earlier than others. Panel A of Table 8 compares the performance of sell-side agents (issuers) with agents from the buy side (investors). Of the 400 securitization agents, 161 work on the sell side and 239 work on the buy side. Evidently, sell-side analysts' portfolios performed more poorly compared to their buy-side peers, with a performance index 6 percent lower, a difference that is statistically significant at the 5 percent level.

Panel B of Table 8 compares the performance of housing portfolios belonging to people working at firms who performed well during the crisis and those who did not. The idea is to test whether people whose firms did poorly anticipated the wider crisis and were able to escape the broad-based fall in home prices themselves. We hand-match our list of companies to CRSP and sort them into terciles of buy-and-hold stock performance from July 2007 through December 2008, the period over which a significant portion of the crisis develops. Poorly performing companies include Lehman Brothers and Countrywide. Better performing firms include BB&T,

[30]We have also experimented with different initial dates for the performance evaluation. For starting dates between 2000:I and 2004:IV, results are very similar. Differences between the two groups when using a starting date of 2005:IV and 2006:IV manifest mostly in the gross return, since the bulk of homes had been purchased by then.

<center>Table 8—Within-Securitization Performance Index</center>

	Means and SDs		Regression-adjusted differences
	Sell-side	Buy-side	Sell-buy
Panel A. Sell-side versus buy-side			
Return	0.275	0.361	−0.091
	(0.183)	(0.199)	[−3.01]***
Buy-and-hold return	0.347	0.377	−0.032
	(0.118)	(0.120)	[−2.20]**
Performance index	−0.0721	−0.0161	−0.060
	(0.168)	(0.128)	[−2.43]**
Return, 2006:IV–2010:IV	−0.0972	−0.0588	−0.038
	(0.119)	(0.0985)	[−2.84]***
Observations	161	239	379
R^2 on performance index			0.080

	Means and SDs		Regression-adjusted differences
	Worst	Best	Worst-best
Panel B. Worst and best performing firms			
Return	0.269	0.336	−0.056
	(0.158)	(0.191)	[−1.75]*
Buy-and-hold return	0.347	0.349	0.012
	(0.134)	(0.102)	[0.52]
Performance index	−0.0773	−0.0129	−0.067
	(0.158)	(0.136)	[−2.30]**
Return, 2006:IV–2010:IV	−0.0937	−0.0586	−0.044
	(0.0988)	(0.103)	[−2.65]***
Observations	103	77	174
R^2 on performance index			0.102

Notes: This table reports average performance and regression-adjusted differences in performance within subgroups of the securitization sample, weighted by the initial portfolio value. Regression-adjusted differences are the coefficient on an indicator for the securitization group in a person-level cross-sectional regression of the dependent variable indicated in first column of the row on a securitization group indicator and indicators for age controls, with samplings weights equal to the initial portfolio value and heteroskedasticity-robust standard errors reported in brackets.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Wells Fargo, and Blackrock. The results suggest that the housing portfolios of people working at poorly performing firms did worse than those of people working at better performing firms, although the smaller size is smaller. Overall, if fully aware agents were attempting to *ride the bubble*, they missed the peak, leading not only to sharply negative returns, but also worse performance relative to other groups.

D. *Consumption and Income Shocks*

We examine the consumption component of housing and whether securitization agents perceived that their high current income during the housing boom was transitory by testing whether the value-to-income (VTI) ratios of their purchases were more conservative than that of control groups. If securitization agents understood that income shocks during the boom were transitory, we should observe lower value-to-income ratios at purchase for them relative to control groups.

TABLE 9—VALUE-TO-INCOME

		Sctzn.	Equity analysts	Lawyers
Preboom period	Mean	3.2	2.9	2.9
(2000–2003)	Median	3.1	2.7	2.5
	SD	1.3	1.5	1.2
	People	65	60	49
Boom period	Mean	3.4	3.1	3.3
(2004–2006)	Median	3.0	2.8	3.2
	SD	2.0	1.7	1.7
	People	73	45	46
Bust period	Mean	3.1	3.1	2.8
(2007–2010)	Median	3.0	3.1	2.8
	SD	1.2	1.4	1.3
	People	55	51	40
1. Boom − preboom	Point estimate	0.268	0.175	0.400
	t-stat	[0.94]	[0.57]	[1.37]
	Observations	138	105	95
	R^2	0.006	0.003	0.019
2. DID	Point estimate		0.093	−0.132
Sctzn. minus	t-stat		[0.22]	[−0.32]
Control	Observations		243	233
	R^2		0.015	0.015

Notes: This table presents average value-to-income (VTI) at purchase in three periods for each group. We first average VTI from purchases observed within each person-period before averaging across people to obtain an average VTI per purchaser for each period. Row 1 tests whether the boom minus preboom difference in averages was zero by projecting person-level income onto an indicator for the boom period in a two-period panel of person-level income. Row 2 tests whether the difference in difference is significant across groups. Standard errors are clustered at the person level.

*** Significant at the 1 percent level.
 ** Significant at the 5 percent level.
  * Significant at the 10 percent level.

We compute the value-to-income (VTI) ratio for the subsample of purchases where we have both income data from HMDA and an observed purchase price.[31] Table 9 tabulates the mean and median VTI for each group in preboom, boom, and bust periods. From preboom to boom, the average VTI for purchasers in the securitization sample increased from 3.2 to 3.4; the median showed a slight decrease from 3.1 to 3.0, suggesting there are some purchasers who purchased homes at a very large VTI ratio, even after trimming out those with very low incomes. The average VTI among equity analyst purchasers increased from 2.9 to 3.1, while the median increased from 2.7 to 2.8. Overall, the evidence does not display any strong pattern consistent with the hypothesis that the securitization agents were more conservative in their VTI ratios when purchasing homes.[32]

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[31] Due to the nature of VTI as a ratio, we require a minimum nominal reported income of $100k in the year of purchase to avoid drawing conclusions based on possible extreme tails overly influencing our analysis.

[32] Including the mark-to-market value of other existing homes at the time of purchase, computed using the method described in Section IVC, to form a portfolio value-to-income ratio at purchase yields similar results, which we report in online Appendix B. We focus on the purchase value-to-income ratio to ensure any results or nonresults are being driven by the data rather than the additional assumptions required in computing the mark-to-market value of each house.

One caveat to analyzing the value-to-income ratio is that our measures of income are likely downward biased, as noted in Section III. Because our analysis focuses on comparing the change in value-to-income across groups, the change in VTI will be mismeasured if the bias in underreporting income itself varies across time. In online Appendix B, we also examine whether there were differential patterns of selling during the bust across our groups within the subsample of purchases during the 2004–2006 period. We find that, in the prime crisis years (2007 and 2008), sales of 2004–2006 properties per purchaser were much higher for securitization agents than equity analysts and lawyers, making any consumption stream short-lived. As discussed in Section IVB.7, differences in divestiture and sale intensities during this period are related to a higher intensity among securitization job-losers relative to equity analyst job-losers. This suggests that securitization agents had based earlier purchase decisions on overoptimistic projections of permanent income relative to equity analysts.

V. Conclusion

We find little systematic evidence that the average securitization agent exhibited awareness through their home transactions of problems in overall house markets and anticipated a broad-based crash earlier than others. Although we do not observe each household's entire balance sheet, we believe our results provide a useful starting point for understanding the role of beliefs leading to the recent crisis. Other consumption and investment patterns of Wall Street traders may yield additional useful observations on this role. Understanding how incentives interact with beliefs is also one area which might bear substantial fruit. Our evidence that some groups of agents were particularly aggressive in increasing exposure to housing suggests that job environments that foster groupthink, cognitive dissonance, or other sources of overoptimism are of particular concern. Changing the compensation contracts of Wall Street agents alone, for example through increased restricted stock holdings or more shareholder say on pay, may be insufficient to prevent the next financial market crisis (Bolton, Scheinkman, and Xiong 2006; Cheng, Hong, and Scheinkman forthcoming). The whole financial system may benefit from having securities that incentivize information acquisition about tail-risk states. Given the crucial role of the financial sector in intermediating capital across the economy, systematic analysis of the macroeconomic implications of the belief dynamics of Wall Street employees is needed. We leave these important questions for future research.

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