

# Wall Street and the Housing Bubble

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March 2013

## Abstract

We analyze whether mid-level managers in securitized finance were aware of the housing bubble and a looming crisis in 2004-2006 using their personal home transaction data. To the extent that the practice of securitization may have led to lax screening of subprime borrowers, we find that the average person in our sample did not expect it to lead to problems in the wider housing market. 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 Codes: G01, G20, G21, G23, G24*

*Appendices available online*

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The authors thank Vu Chau, Kevin Chen, Andrew Cheong, Tiffany Cheung, Alex Chi, Andrea Chu, Wenjing Cui, Christine Feng, Kelly Funderburk, Elisa Garcia, Holly Gwizdz, Jisoo Han, Bret Herzig, Ben Huang, Julu Katticaran, Olivia Kim, Eileen Lee, Yao Lu, Shinan Ma, Amy Sun, Stephen Wang, and Daniel Zhao for excellent research assistance. The authors are also grateful to Malcolm Baker, Nick Barberis, Roland Benabou, Harrison Hong, Atif Mian, Adair Morse, Uday Rajan, Amit Seru, and seminar participants at Columbia University, Dartmouth College, the Federal Reserve Bank of Philadelphia, Harvard Business School, 2012 NBER Behavioral Finance Meeting, 2012 NBER Summer Institute, Northwestern University, Stanford University, University of California-Berkeley, University of Michigan, University of Pennsylvania-Wharton, and University of Southern California for helpful discussion and comments.

The recent financial crisis has spurred a large literature studying whether poorly designed incentives led Wall Street to take excessive risks in the housing market, leading to disastrous consequences. The key friction in this narrative is that agents on Wall Street did not have incentives appropriately aligned with outside stakeholders such as shareholders (Bebchuk, Cohen, and Spamann, 2010; Bhagat and Bolton, 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).

A comparatively smaller literature emphasizes the role of distorted beliefs about house prices. The theoretical literature emphasizes that over-optimistic beliefs about house prices may have arisen due to behavioral biases and cognitive dissonance (Barberis, 2012; Benabou, 2011; Burnside, Eichenbaum, and Rebelo, 2011; Gennaioli, Shleifer and Vishny, 2011, 2012) or money illusion (Brunnermeier and Julliard, 2008). The empirical debate about whether fundamentals were driving house prices unfolded in real time (Himmelberg, Mayer, and Sinai, 2005; Mayer, 2006; Shiller, 2006, 2007; Smith and Smith, 2006), with subsequent anecdotal evidence of biased beliefs from Lewis (2011) and systematic evidence about sentiment from Soo (2013). Anecdotally, many people believed that house prices would never fall at a national level, and perhaps over-extrapolated house prices based on past trends.

The focus of these two literatures has remained distinct in many ways. In particular, a sustained focus in the incentives literature has accumulated evidence that the practice of securitizing mortgages in the originate-to-distribute model contributed towards lax screening of subprime borrowers (Agarwal and Ben-David, 2012; Berndt and Gupta, 2009; Demyanyk and Van Hemert, 2011; Jiang, Nelson and Vytlačil, 2011; Keys et al., 2009, 2010, 2012; Mian and Sufi, 2009; Piskorski, Seru and Witkin, 2013; Purnanandam, 2011; Rajan, Seru and Vig, 2012). On the other hand, the beliefs literature has emphasized that, as a whole, the housing market is prone to distorted beliefs due to specific features such as the long history of rising national house prices (Shiller, 2007). These two issues are not mutually exclusive (Cole, Kanz, and Klapper, 2012), and in fact are very much related, in that distorted beliefs about the wider housing market 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 would be exacerbated if lenders were buoyed by expectations that prices in overall house markets would never fall. An expanded narrative that incorporates an additional role for beliefs about overall housing markets, while neither

contradicting nor supporting existing evidence of bad incentives in screening borrowers, nevertheless may help us provide a complete account of the magnitude of the overall housing boom and bust.

To establish whether beliefs played a role in the development of the housing bubble and crash, we test a simple hypothesis: that people involved in the mortgage securitization business, who were arguably at the nexus of bad incentives, were fully aware during the boom that housing markets were overvalued and that a large-scale crisis was likely and imminent. This hypothesis, which we term the full-awareness hypothesis, has been debated in the academic literature examining incentives among executives (Bebchuk, Cohen, and Spamann, 2010; Bhagat and Bolton, 2011; Fahlenbrach and Stulz, 2011). This hypothesis also substantially informs discourse and policy, which often conflates weakened incentives to screen subprime borrowers with the idea that Wall Street was fully aware that there an impending across-the-board crisis yet took no corrective action owing to a “heads I win, tails you lose” system. For example, in its 2011 report commissioned by Congress, the Financial Crisis Inquiry Commission writes that “*Alarm bells were clanging inside financial institutions...Many knowledgeable executives saw trouble and managed to avoid the train wreck.*” Public discourse about lawsuits alleging awareness of problems in the subprime borrower market also links these two issues. In its coverage of the release of internal documents and emails relating to *China Development Industrial Bank vs. Morgan Stanley* (2013), the *New York Times* writes that “*...the documents suggest a pattern of behavior larger than this one deal: people across the bank understood that the American housing market was in trouble.*”<sup>1</sup>

Despite its simplicity, disagreement about whether Wall Street was fully aware of broad-based problems in housing has remained relatively unresolved, owing to the difficulty in disentangling behavior motivated by beliefs from behavior motivated by job incentives. This paper confronts this challenge by studying the individual home purchase behavior of Wall Street mid-level managers who worked directly in the mortgage securitization business. The evidence unearthed by lawsuits suggests that mid-level managers in securitization may be a significant group in which there was systematic awareness of problems in housing markets. E-mails deriding securitized mortgage instruments as garbage are rarely from C-suite-level executives, but rather are from CDO traders,

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<sup>1</sup> “Financial Crisis Suit Suggests Bad Behavior at Morgan Stanley,” Jesse Eisinger, *The New York Times* contributor, ProPublica.org, January 23, 2013.

whose job is to understand the pricing of these instruments at the center of the crisis (Coval, Jurek and Stafford, 2009).<sup>2</sup>

We argue that individual home transaction behavior reveals information about whether these employees believed there were problems in housing markets, as a home typically exposes its owner to substantial house price risk. Even employees in the financial industry, despite their relatively high incomes, should have maximum incentives to make informed home-transaction decisions on their own accounts, particularly for mid-level managers.

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, whom we refer to collectively as securitization agents, comprise vice presidents, senior vice presidents, managing directors, and other non-executives who work at major investment houses and boutique firms. Using the Lexis-Nexis 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 the home transactions of these securitization agents to those of plausibly uninformed control groups, which arguably had no private information about housing and securitization markets, and compare how securitization agents fared in housing against these groups. We test for two forms of awareness. Under the null hypothesis that securitization agents were aware of serious problems and that a large crash was imminent, they may have attempted to time the housing market. A necessary condition for this strong form of “market timing” awareness is to observe home-owning securitization agents divest homes before the bust in 2007-2009. Given the difficulties of timing the market, however, awareness of a bubble might appear in a weaker, “cautious” form of awareness, where securitization agents knew enough to be cautious of housing markets and avoided 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 the 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

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<sup>2</sup> 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).

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 through second home purchases and swaps into more expensive homes. This difference is not explained by differences in financing terms such as interest rates, or refinancing activity, 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.

Our analysis presents evidence that is broadly inconsistent with systematic awareness of broad-based problems in housing among mid-level managers in securitized finance based on a revealed beliefs approach. However, a home purchase provides a consumption stream that may not be easily found in the rental market, and thus may reflect a consumption motive in addition to beliefs about the future path of asset prices. Despite this, our analysis can be interpreted as testing for whether agents believed income shocks from their jobs in mortgage securitization were permanent. In particular, it is difficult to rationalize why securitization agents endowed with income risk tied to housing would purchase additional second homes and swap into larger homes in 2005 if they simultaneously anticipated an imminent broad-based collapse in housing markets. We also find little evidence that securitization agents were conservative in the value-to-income ratios of their purchases, and that homes purchased in 2004-2006 were among those most aggressively sold in 2007-2009, relative to both control groups. This suggests that securitization agents overestimated the persistence of their incomes and that any consumption stream in these houses was short-lived.

We stress that our conclusions do not contradict the existing evidence that bad incentives caused loan officers and securitization agents to relax lending standards in the subprime borrower market. Our securitization agents are not subprime borrowers themselves. Rather, our evidence is a first step in an expanded view of the crisis that incorporates a role for both incentives and beliefs. In particular, if Wall Street was complicit in relaxing lending standards in the subprime borrower market, our evidence suggests they did so without expecting it to lead to a wider crash in housing markets. This distinction has important implications for post-crisis policy reform and future research. Regulators and academia should devote more attention to understanding whether agents working in the securitization finance industry had *ex ante* distorted beliefs or whether these beliefs only seem distorted *ex post* (Foote, Gerardi and Willen, 2012; Gerardi, et al. 2008). Our evidence suggests that certain groups of agents – those living in bubblier areas, working on the sell side, or at firms with greater exposure to subprime mortgages – may have been particularly subject to potential sources of belief distortions, such as job environments that foster group think, cognitive dissonance, or other sources of over-optimism. 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, 2012).

## **1. Empirical Hypothesis**

The aim of our analysis is to examine whether Wall Street employees anticipated the 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 2000-2011. Of these areas, Los Angeles had the most dramatic boom and bust cycle, with house prices increasing by over 170% from 2000 to a peak in 2006 and then crashing down by over 40% from the end of 2006 through the end of 2011. New York also experienced a boom/bust cycle, with prices increasing by over 110% from 2000-2006 and then dropping by over 20% through 2011. Over the composite 20 metropolitan areas, prices rose by 100% from 2000-2006 and fell by over 30% through 2011. Despite the differences in magnitudes, the cycles across different regions experienced rapid price expansions in 2004-2006, 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 crisis. As such, we focus on understanding the beliefs of mid-

level managers in the securitization business across these boom and bust periods, whom we collectively refer to as securitization agents. In practice, our mid-level managers are investors and issuers attending the 2006 *American Securitization Forum*, a large industry conference, and are mostly Vice Presidents, Senior Vice Presidents, and Managing Directors at investment banks, commercial banks, hedge funds, mortgage lenders, and other financial companies. These agents 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 mid-level 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 suggests 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, mid-level managers were very close to the housing markets. There is a growing notion that perhaps mid-level managers knew about the problems in the housing markets even if C-level executives did not – for example, Joseph Cassano of AIG FP or Fabrice Tourre of Goldman Sachs. Documents and emails suggesting that managers knew of problems in housing, released during investigations and lawsuits such as *China Development Industrial Bank v. Morgan Stanley* (2013), are from mid-level Vice Presidents and Managing Directors rather than C-suite executives.<sup>3</sup>

We use a revealed belief approach based on people’s personal home transactions. A home is typically a significant portion of a household’s balance sheet. As our data will confirm later, this is true even for the mid-level 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, even if they are subject to poorly designed incentives on the job.<sup>4</sup> This is a key feature that allows us to isolate their beliefs from their job incentives.<sup>5</sup>

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<sup>3</sup> In another example, evidence provided by Dexia against Deutsche Bank in *Dexia v. Deutsche Bank* (2013) includes a 2005 parody of “Ice, Ice Baby” written by a trader with lyrics such as “CDO, Oh baby...print, even if the housing bubble looms.”

<sup>4</sup> Home transactions are also more informative of individuals’ beliefs than buying and selling of their companies’ stocks, which is contaminated by potential signaling effects of disloyalty and lack of confidence to their bosses and colleagues.

<sup>5</sup> A subtle issue for our analysis is that poorly designed incentives can distort beliefs among agents (Cole, Kanz, and Klapper, 2012). 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

Our general strategy focuses on testing whether securitization agents were more aware of the housing bubble 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 three 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 2007-2009 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, particularly in avoiding purchases of second homes and moves into more expensive homes. 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 – by avoiding purchases of primary homes, second homes, and avoiding moves into more expensive houses - during the bubble period of 2004-2006.

Our third test focuses on the net trading performance of observed transactions to see whether securitization agents’ observed transactions improved or hurt their financial performance. We benchmark their observed strategy against a static buy-and-hold strategy and compare whether securitization agents did better against their benchmark than control groups. This final test sheds

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interaction, with the cause of unawareness being poorly designed incentives. However, our tests do not distinguish between specific reasons for unawareness.



light on whether agents benefitted overall through other potential types of actions associated with awareness, for example, by “riding the bubble” (Brunnermeier and Nagel, 2005).<sup>6</sup>

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 lawyers practicing outside of real estate law. Although differences or non-differences 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.

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 the housing bubble relative to equity analysts and lawyers in three possible forms:*

- A. *(market timing form) Securitization agents who were homeowners were more likely to divest homes and down-size homes in 2004-2006.*

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<sup>6</sup> One worry is that homeowners may hedge house price risk in ways that we do not observe. However, there has been a general lack of interest in markets created to hedge house price risk, which in turn also creates difficulties in hedging such risk. 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.” Shorting homebuilding stocks and real estate investment trusts also leaves substantial basis risk.

- B. *(cautious form) Securitization agents who were non-homeowners were less likely to acquire homes in 2004-2006.*
- C. *(performance) Overall, securitization agents had better performance after controlling for their initial holdings of homes at the beginning of 2000.*

As a practical matter, we operationalize tests of (A) and (B) by considering a basic framework for agent choices described in the next section and testing for differences in the intensity of certain types of choices through time.

A nuanced issue in our analysis is that securitization agents received large bonuses during the bubble period. Large income shocks might have induced them to acquire homes despite their awareness of the bubble. The housing finance literature (e.g., Yao and Zhang, 2005; Cocco, 2005; Ortalo-Magne and Rady, 2006) provides models to analyze individuals' home purchase decisions in the presence of income shocks, credit constraints, and life-cycle and investment portfolio considerations. To the extent that large bonuses received by securitization agents during the bubble period relaxed their credit constraints by allowing them to afford the down payments of home purchases, one might interpret their home purchases during the period as a reflection of relaxed credit constraints rather than as expectations of future house prices.

The equity analyst control group should partially control for such shocks, given that they also work in the finance industry. To explore this issue further, we use the insight that, to the extent that a home provides a utility stream over time and there are moving costs, a household should choose an optimal size based on its expected permanent income rather than current income. We analyze indicators such as the value-to-income ratios of purchases by the securitization group to trace out beliefs about permanent income, if not house prices directly. Under the full awareness hypothesis, securitization agents should have realized that their current incomes were unlikely to persist, and purchased homes with more conservative value-to-income ratios than control groups. We also test whether securitization agents "lived happily ever after" by testing whether homes purchased during 2004-2006 were held for significant periods of time. If home purchase behavior during the boom period was driven by 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.

## **2. Data and Empirical Framework**

### **2.1. 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, Nevada, from January 29, 2006 through February 1, 2006. This list is publicly available via the ASF website.<sup>7</sup> 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 1760 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 the largest financial institutions such as Lehman Brothers and Citigroup. We screen out people who work for credit card, student loan, auto, and other finance companies primarily involved in the non-mortgage securitization business, and also use any available information in LinkedIn to screen out people working in non-mortgage securitization segments. We also use LinkedIn to collect any background information about each person that will be helpful in locating them within the Lexis/Nexis database. Lexis/Nexis 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 Table 1, Panel A and also Appendix A in more detail. Chief among these are that they worked in the securitization business but in a non-housing segment such as credit card loans, or that they have a very common name that cannot be uniquely identified in Lexis-Nexis. 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 mortgage terms, when

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<sup>7</sup> As of this writing, this list appears to be no longer available on the web. The authors have copies of the webpages available.

available.<sup>8</sup> Lexis/Nexis 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.<sup>9</sup>

Our sample of equity analysts consists of analysts who covered companies during 2006 that were members of the S&P 500 anytime 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 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.<sup>10</sup> 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 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 Lexis/Nexis to obtain 400 lawyers matched on age and location to our securitization sample.<sup>11</sup>

## 2.2. 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

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<sup>8</sup> 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.

<sup>9</sup> 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.

<sup>10</sup> Our references for SIC codes is CRSP, so a company needs to have a valid CRSP-I/B/E/S link.

<sup>11</sup> 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 Lexis-Nexis more easily than other groups.

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:

- A) Purchase an additional house (“buy a second home”),
- B) Sell a house and buy a more expensive house (“swap up”),
- C) Sell a house and buy a less expensive house (“swap down”),
- D) Divest a home but remain a homeowner (“divest a second home”),
- E) 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 non-homeowners buying first homes, or homeowners buying second homes.<sup>12</sup> 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 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.<sup>13</sup>

### 2.3. 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.<sup>14</sup> 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 non-homeowners at the beginning of the year. An important feature of our data is that we observe not only transaction activity but also transaction

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<sup>12</sup> 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 Appendix A.

<sup>13</sup> When classifying transactions in 2010, we use information collected on purchases and sales in 2011 to avoid over-classifying divestitures and first-home/second-home purchases and underclassifying swaps in the final year of data.

<sup>14</sup> 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.

*inactivity*, due to the comprehensiveness of the public records tracked by Lexis/Nexis. 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.<sup>15</sup>

## 2.4 Income data

We are able to observe income in the year they purchase 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 and 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 mortgages in HMDA of the same amount in the purchase year with the same census tract as the property. If we 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.<sup>16</sup>

## 3. Descriptive Statistics

Table 1, Panel A 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 46, respectively. Chi-square tests of homogeneity fail to reject the hypothesis that the distributions presented in Panel B are the same.

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<sup>15</sup> A complication in this calculation is that, in a given year, a person may make multiple transactions. As a result, the number of non-homeowners 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 non-homeowners,” who are eligible for buying a first home during a year, to be the group of non-homeowners 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. Appendix A contains a detailed description of adjustments.

<sup>16</sup> 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.<sup>16</sup> 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.

Our sample features people from 176 distinct firms, of which we are able to match 65 as publicly traded companies in CRSP during the 2007-2008 period. Our sample is tilted towards 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), and 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 Appendix B.

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,” “Built a team of 3 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.”

Table 2, Panel A breaks down the number of properties owned over 2000-2010. Our data spans 674 properties owned by securitization agents during the 2000-2010 period, 604 by equity analysts, and 609 by lawyers. Of these, the majority was bought during the same period, while roughly 40% of total properties were sold during this period.<sup>17</sup>

Figure 2 presents a map of properties in our sample. The New York combined statistical area (roughly the NJ-NY-CT tri-state metro area plus Pike County, PA) 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. Table B2 in Appendix B presents the geographical distribution in detail, while Tables B3 and B4 report further summary statistics on how purchases and sales are distributed through time, and how these purchases and sales were classified.

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<sup>17</sup> There are a small number of properties for which we have no purchase date. A missing purchase price reflects missing data, which we deal with below. There are a substantial number of properties with either no sale date or a sale date after December 31, 2010; these are homes that were still owned as of that date.

Table 2, Panel B summarizes mortgage information. For the securitization sample, we have mortgage information for 327 purchases out of 437 we observe from 2000-2010. Of these, we are able to match 200 to HMDA, an unconditional success rate of 58%; for the equity analyst and lawyer groups, this rate is 53% and 57%, respectively. 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 2006 dollars adjusted using the Consumer Price Index (CPI) All Items series as of the end of December 2006.

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, would not be included.<sup>18</sup>

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 non-purchasers). Additionally, our analysis does not represent income of the same people over repeat purchases. 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).<sup>19</sup> Our securitization agents received income shocks from the pre-boom to the boom period, with average income rising by \$92K, over 38% of average pre-boom income. Equity analysts also received income shocks, with average income at purchase rising by \$51K, although this is a smaller fraction of pre-boom income, 16%. 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.

## 4. Empirical Results

### 4.1. Were securitization agents more aware of the bubble?

We first examine whether securitization agents divested houses in advance of the housing crash. Figure 3, Panel A plots the divestitures per person per year for each group through time. The

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<sup>18</sup> 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 4.4.

<sup>19</sup> 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.



divestiture intensities for the securitization agent sample are, if anything, lower than those of equity analysts and lawyers in years before 2007. 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.<sup>20</sup>

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 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 OLS:

$$E[\#Divestitures_{it}|HO_{it-1} = 1] \\ = \alpha_t + \beta_t \times Securitization_i + \sum_{j=1}^7 \delta_j Age_j(i, t) + \lambda MultiHO_{it-1}. \quad (1)$$

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 Table 1, Panel B, 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 the regression easily interpretable as a difference in means. 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, as divesting a home is one of their possible choices.<sup>21</sup>

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<sup>20</sup> 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 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.

<sup>21</sup> 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 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 308). 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 non-homeowners each year with age information. For example,

The coefficients  $\beta_t$  are the difference in average annual divestitures per person within the homeowner category across samples, adjusted for these age and multi-homeownership factors, and are our coefficients of interest, with  $\beta_t > 0$  during the 2004-2006 period suggesting evidence of market timing. 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 4.2.7. Overall, however, there is little evidence that suggests 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 non-homeowners among 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 the behavior of second home purchases and swap-ups into more expensive houses. Results for first-home purchases are reported in Appendix B, Table B6 and do not reveal significant differences; if anything, there are more first home purchases for securitization agents than equity analysts, particularly in 2006.

Figure 3, Panel B 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  $t$ . 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% 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 (Table B7 in 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

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when estimating (1) for the securitization agent and equity sample, the number of people observed in 2000 is 415 (220 plus 195).

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.

## 4.2. Second home purchases and swap-ups

**4.2.1. 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 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:

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

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

where  $\gamma_j$  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 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.

**4.2.2. 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:

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

$$= \alpha_{s(t)} + \beta_{s(t)} \times Securitization_i + \sum_{j=1}^7 \delta_j Age_j(i, t) + \lambda MultiHO_{it-1}, \quad (3)$$

where  $PropNYC_{it-1}$  is an indicator for whether person  $i$  owns property in the New York metro area at the end of year  $t-1$ . Results are reported in Columns 2 and 3 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% 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.

**4.2.3. Differences-in-differences across locations.** Comparing columns 2 and 4 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 not pronounced.

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

$$\begin{aligned}
 E[\#BuySecondOrSwapUp_{it} | HO_{it-1} = 1, (PropSoCA_{it-1} = 1 \text{ or } PropNYC_{it-1} = 1)] \\
 = \alpha_{s(t)} + \gamma_{s(t)} PropSoCA_{it-1} + \delta_{s(t)} Securitization_i \\
 + \beta_{s(t)} (Securitization_i \times PropSoCA_{it-1}) + \sum_{j=1}^7 \delta_j Age_j(i, t) + \lambda MultiHO_{it-1}, \quad (4)
 \end{aligned}$$

where  $PropSoCA_{it-1}$  is an indicator for whether person  $i$  owns property in the Southern California region at the end of year  $t-1$ .<sup>22</sup> We perform this exercise both with the number of second home purchases and swap ups on the left hand side (Column 6 of Table 6) as well as just second home purchases (Column 7). 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? 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.<sup>23</sup>

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<sup>22</sup> 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  $t-1$ .

<sup>23</sup> 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.

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, and cuts against the full-awareness hypothesis while also suggesting a potential role for distorted beliefs. 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 8 and 9 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.

**4.2.4. Financing.** One concern is that differences in purchase behavior are driven by differential financing terms. Figure 4, Panel A 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 speculate in the housing market by purchasing homes with very little equity and thus bear very little downside. Figure 4, Panel B plots the median loan-to-value (LTV) ratio at purchase, and shows that it holds steady near the unconditional median of 80% throughout the sample period. The median LTV ratios of the marginal second home and swap-up purchases are also very close to 80% through time. Overall, we see little evidence that securitization agents purchased more homes with lower 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 from other homes during the boom period. We collect data from Lexis/Nexis regarding all refinances (pure refinances, second mortgages, home equity loans, and home equity lines of credit) and the amount refinanced. The annual number of refinances per homeowner is plotted in Figure 4, Panel C. Overall, we see little evidence that the refinance intensity rose in 2004-2006. Refinancing intensity exhibits a negative co-movement with national benchmark mortgage interest rates. As interest rates fell from 2000 through 2003, the intensity of refinances rose dramatically. Refinance intensity was relatively low in 2004 and 2005 and fell when interest rates rose in 2006. Refinance intensity rose in 2009 when interest rates fell in response to the crisis. Appendix B shows that the

average securitization agent who refinanced did not extract more equity from their home(s) relative to equity analysts prior to 2006, and paid down significant amounts of debt in 2006 and 2007.

**4.2.5. Non-recourse states.** Securitization agents with knowledge of the bubble and crash may have chosen to buy extra homes in non-recourse states, also limiting their financial exposure. In Appendix B, we check whether purchases among securitization agents were differentially concentrated within non-recourse states rather than recourse states relative to equity analysts. 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 in non-recourse states, particularly when equity is negative. Conditional on whether a person already has a home in a non-recourse state, we find no evidence of a higher marginal intensity for securitization agents to purchase second homes or swap up into more expensive homes in non-recourse states than equity analysts.

**4.2.6. Type of property.** One concern is that home purchases are purely motivated by consumption. In 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 consumption purposes. We discuss the consumption motive more in Section 4.4.

**4.2.7. 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 0.069 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.<sup>24</sup> In 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

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<sup>24</sup> We examine the LinkedIn profiles of each of our securitization agents and 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 Appendix A.

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 market timing 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.

### **4.3. 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 performance based on the relative differences in the location and timing of their sales and purchases from the beginning of our sample onwards 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 onwards, 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 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 self-financed 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 then compute the value-weighted average dollar performance for each group by taking the weighted average of the performance index across individuals, weighting by the initial value of each

individual's portfolio. 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 and heteroskedasticity-robust standard errors. Intuitively, this methodology is a "difference-in-difference" where the first difference is over the buy-and-hold performance and the second difference compares the securitization agents' value-weighted performance with that of the control group.

Table 7, Panel A 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, while Figure 5 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 2000q1.

In fact, the securitization group experienced significantly worse gross returns than the equity analyst group, a difference of 4.5% 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%), the remaining difference of 2.74% quantifies the net trading underperformance of the securitization group, a difference which is statistically significant at the 5% level.<sup>25</sup> 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 still negative.<sup>26</sup> In summary, the observed trading behavior of securitization agents hurt their portfolio performance.

We also compare 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. Table 8, Panel A compares the performance of sell-side agents (issuers) with agents from the buy side (investors). Of the 379 securitization agents reporting age information, 161 work on the sell side and 239 work on the buy side. Evidently, sell-side analysts performed much more poorly

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<sup>25</sup> 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 given a typical loan-to-value ratio of 0.8.

<sup>26</sup> We have also experimented with different initial dates for the performance evaluation. For starting dates between 2000q1 and 2004q4, results are very similar. Differences between the two groups when using a starting date of 2005q4 and 2006q4 manifest mostly in the gross return, since the bulk of homes had been purchased by then.



compared to their buy-side peers, with a performance index 6% lower, a difference that is statistically significant at the 5% level.

Table 8, Panel B compares the performance of 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. Low-performing companies include Lehman Brothers and Countrywide. Better-performing firms include BB&T, Wells Fargo, and Blackrock. The results show that people working at poorly-performing firms did worse in their own housing portfolios than people working at better-performing firms, both in their performance index and in gross returns through the crisis period. 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.

#### **4.4. Consumption and income shocks**

One concern is that equity analysts are not a sufficient control for the effect of income shocks that securitization agents received during the boom period. Although they worked for similar financial firms, better-performing segments may have been rewarded more, consistent with the evidence in Table 3. Income shocks may be large enough as to make cautiousness in beliefs difficult to detect by analyzing only the timing of home transactions.

We explore two more tests to isolate whether agents exhibited any cautiousness. First, we examine whether the securitization sample was less aggressive than other groups in terms of the value-to-income ratio of their purchases in order to trace out beliefs about income. *Ceteris paribus*, if securitization agents expected their income shocks to be transitory but uninformed equity analysts did not, we should observe securitization agents purchase homes at lower value-to-income ratios, where current income is in the denominator.

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.<sup>27</sup> Table 9 tabulates the mean and median VTI for each group in each of the three periods. 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

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<sup>27</sup> 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.

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.<sup>28</sup>

One caveat to analyzing the value-to-income ratio is that our measures of income are likely downward biased, as noted in Section 3. Because our analysis focuses on the comparing the change in value-to-income across groups, the change in VTI will be mis-measured if the bias in underreporting income itself varies across time. In Appendix B, we also examine whether there were differential patterns of selling during the bust across our groups within the subsample of purchasers during the 2004-2006 period. If purchasers during this period divested their houses during the housing bust, this would cut against the hypothesis that securitization agents bought houses during the boom for the consumption stream despite knowing that there would be a crash in housing markets, since the consumption stream was short-lived. 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. As discussed in Section 4.2.7, 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.

## 5. Conclusion

We find little systematic evidence that the average securitization agent exhibited awareness of problems in overall house markets and anticipated a broad-based the crash earlier than most. They neither managed to time the market nor exercised caution, relative to equity analysts and non-real estate lawyers. Our evidence suggests that certain groups of agents may have been particularly subject to potential sources of belief distortions. Agents living in bubblier areas may have been particularly influenced by stronger sentiment in those regions, while those working on the sell side and firms with particularly high exposure to housing may have been influenced by factors such as

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<sup>28</sup> Including the mark-to-market value of other existing homes at the time of purchase, computed using the method described in Section 4.3, to form a portfolio value-to-income ratio at purchase yields similar results, which we report in Appendix B. We focus on the purchase value-to-income ratio to ensure any results or non-results are being driven by the data rather than the additional assumptions required in computing the mark-to-market value of each house.

group think. Such firms may even find it optimal to hire agents prone to over-optimism due to the lower cost of incentivizing them. Overall, our analysis suggests the need for more research into the role of beliefs in the crisis in addition to incentives.

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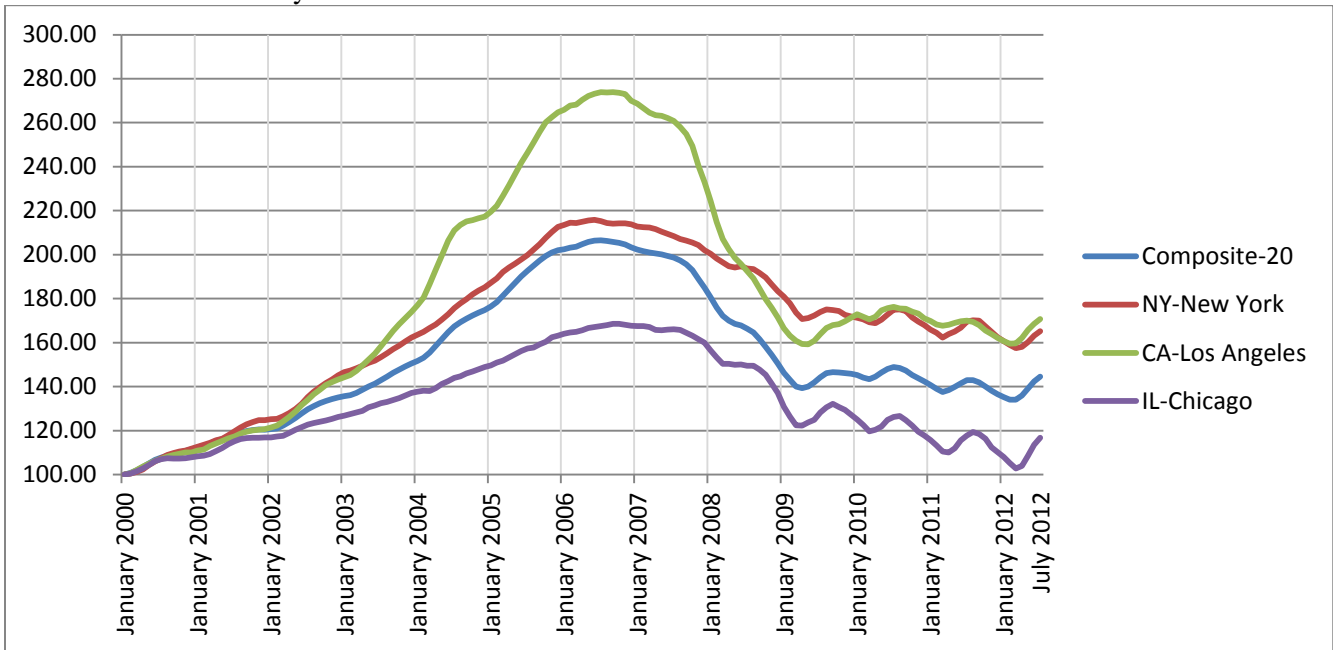
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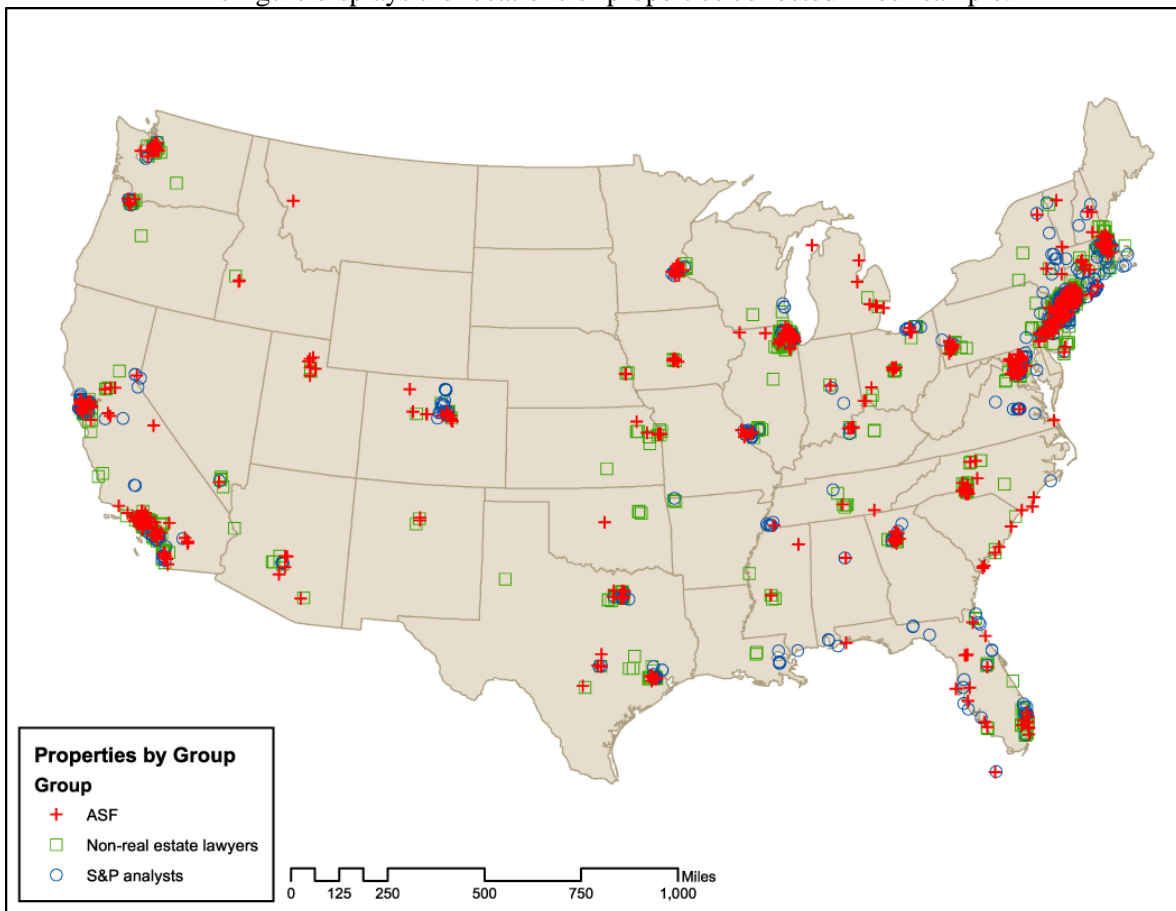
**Figure 1: Home Price Indices**

This figure plots the Case-Shiller non-seasonally-adjusted home price indices from January 2000 through July 2012. Values for January 2000 are normalized to 100.



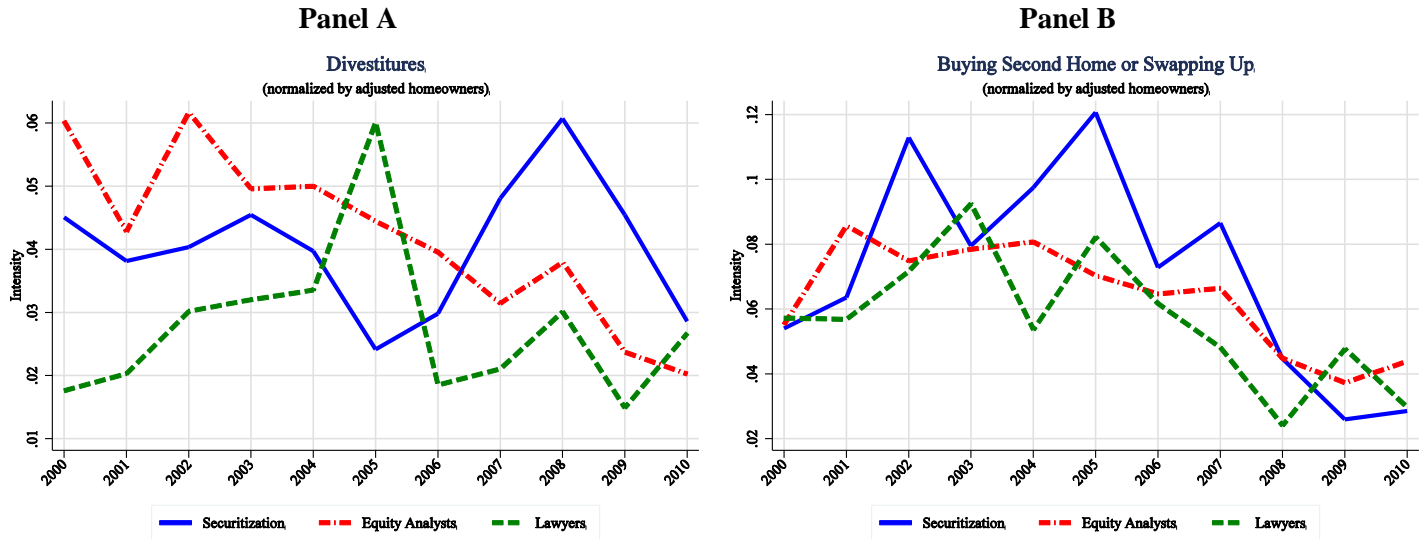
**Figure 2: Property Locations**

This figure displays the locations of properties collected in our sample.



**Figure 3: Transaction Intensities**

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.



**Figure 4: Financing**

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. Panel C plots the intensity of refinancing, defined as the number of refinances per homeowner, for securitization agents through time, as well as annual average national benchmark 30-year jumbo and conforming interest rates from BankRate.

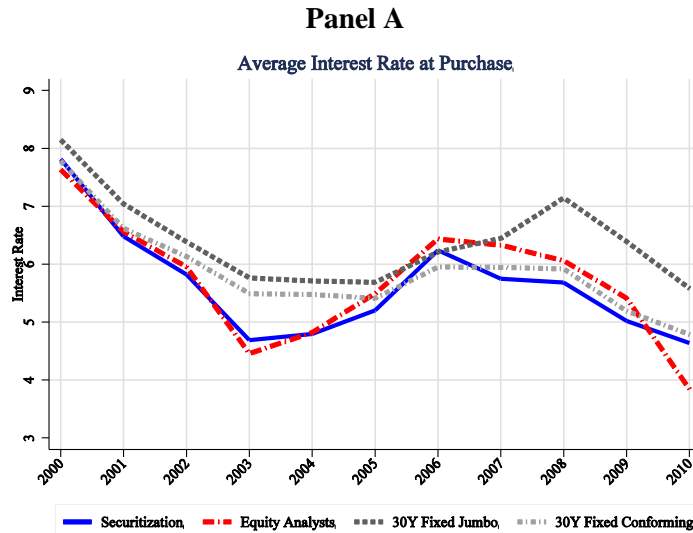


Figure 4, continued

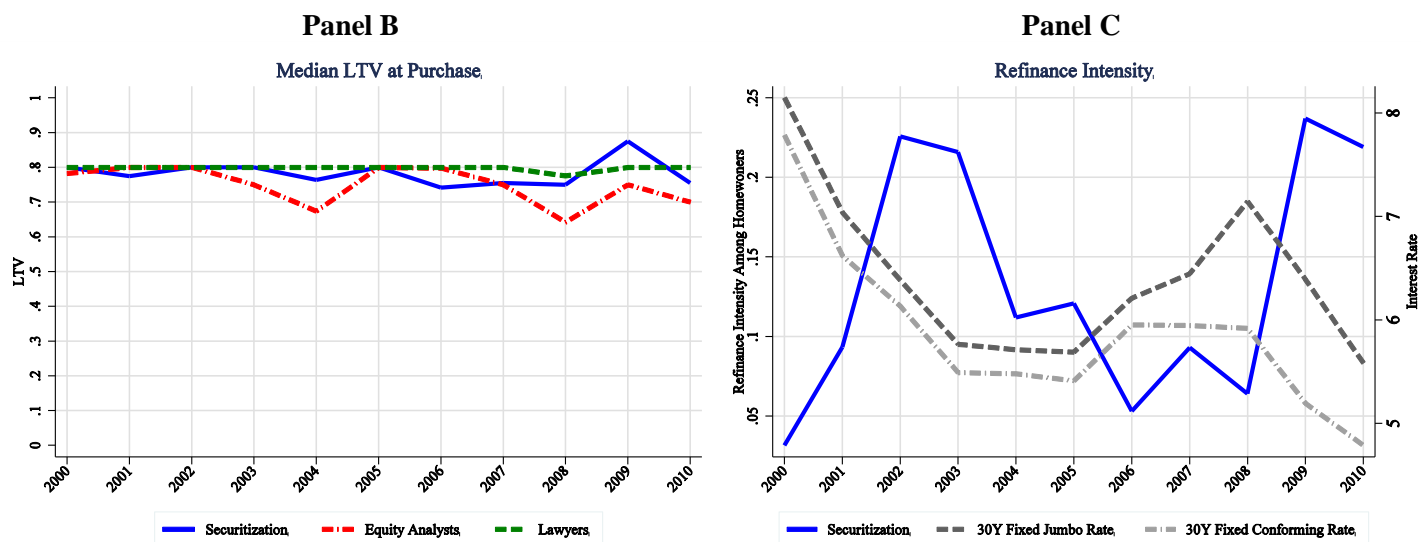
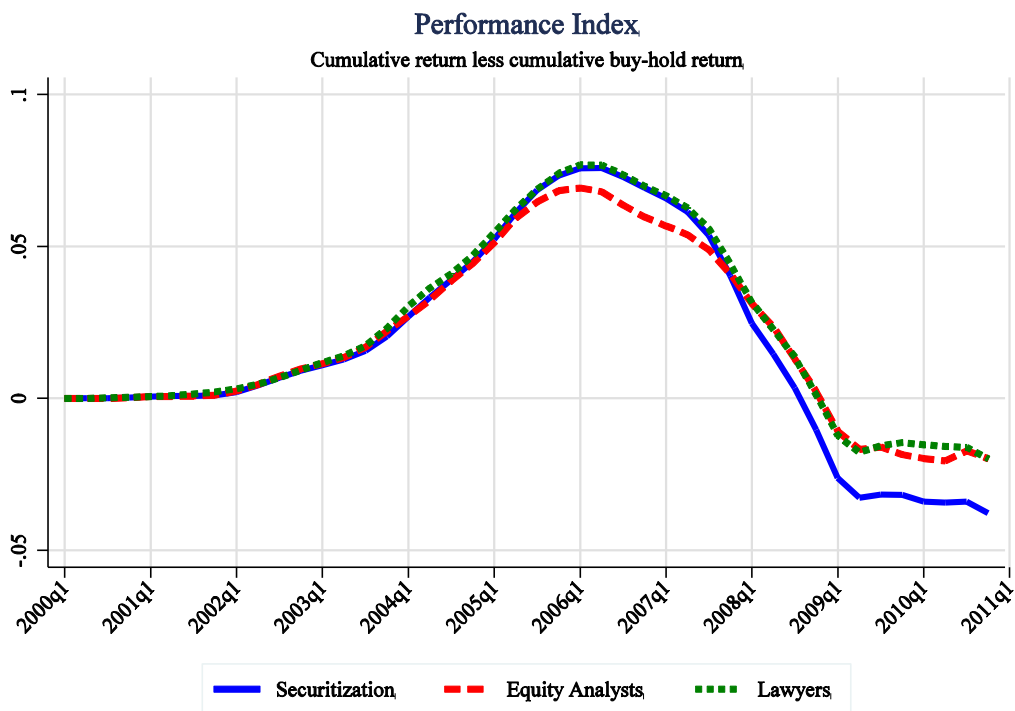


Figure 5: Trading Performance Indices

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 2000q1 is taken as the initial quarter, for each group.





**Table 1: People**

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.

**Panel A: Number of People**

Sample	Securitization	Equity Analysts	Lawyers
<b>Number of names</b>	<b>613</b>	<b>469</b>	<b>406</b>
Not mid-level manager	13	N/A	N/A
Not housing	94	N/A	N/A
Not found in public records	29	16	3
Multiple found in public records	50	27	3
International	27	25	0
Deceased	0	1	0
<b>People in sample</b>	<b>400</b>	<b>400</b>	<b>400</b>
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

**Panel B: 2011 Age Distribution**

Age	Securitization	Equity Analysts	Lawyers
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
Chi-Square Test of Homogeneity with Sctzn Sample	N/A	10.92	10.67
Homogeneity Test, p-value	N/A	0.14	0.15
Median age	45	44	46

**Table 2: Properties**

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

**Panel A: Total Properties, Purchases and Sales**

	Securitization	Equity Analysts	Lawyers
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	1032.38	485.62
Number of homes with no purchase date	81	112	101
Total sales, 2000-2010	266	207	171
with sale price	238	172	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**

	Securitization	Equity Analysts	Lawyers
Purchases, 2000-2010	437	368	355
with mortgage info	327	247	257
mean, median LTV	0.72 / 0.79	0.71 / 0.75	0.73 / 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 # HMDA mortgage applications per match	2.41	2.62	2.46
Median # HMDA mortgage applications per match	1	1	1

**Table 3: Income**

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 per person for each period. Dollar amounts are in December 2006 CPI-adjusted thousands. Row A tests whether the boom minus pre-boom difference in averages was positive by projecting person-level income onto an indicator for the boom period in a two-period unbalanced panel of person-level income. Row B tests whether the difference-in-difference is significant across groups. Standard errors are clustered at the person level. \*/\*\*/\*\* denotes significant at the 10%, 5%, and 1% levels, respectively.

		<b>Income</b>		
		Sctzn.	Equity Analysts	Lawyers
<b>Pre-Boom period (2000-2003)</b>	Mean	246.4	360.4	170.4
	Median	180.9	224.7	148.7
	SD	266.8	335.4	114.8
	People	83	72	70
<b>Boom period (2004-2006)</b>	Mean	338.8	418.0	174.0
	Median	210	246.4	131.8
	SD	513.8	501.9	116.4
	People	89	58	68
<b>Bust period (2007-2010)</b>	Mean	369.2	476.1	231.9
	Median	205.8	308.0	151.4
	SD	489.2	433.4	258.6
	People	68	56	54
A) Boom-PreBoom	Point Est.	92.36	57.62	3.678
	t-stat	[1.68]*	[0.76]	[0.19]
	N	172	130	138
	R2	0.012	0.005	0.000
B) DID	Point Est.		34.75	88.68
	Sctzn. minus	t-stat	[0.37]	[1.53]
	Control	N	302	310
		R2	0.021	0.047

**Table 4: Divesting Houses**

The first three columns tabulate the number of divestitures per homeowner for each group, by year. Z-statistics from a two-sample test of differences in proportions 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. \*/\*\*/\*\* represents statistically significant at the 10%, 5%, and 1% levels, respectively.

Year	Divestitures per person			Regression-Adjusted Difference	
	Securitization	Equity Analysts	Lawyers	Sctzn. minus:	
				Equity Analysts	Lawyers
2000	0.045	0.060 [-0.67]	0.018 [1.67]*	-0.0117 [-0.50]	0.0262 [1.59]
2001	0.038	0.043 [-0.25]	0.020 [1.16]	0.00260 [0.14]	0.0188 [1.22]
2002	0.040	0.062 [-0.94]	0.030 [0.62]	-0.0109 [-0.48]	0.0117 [0.71]
2003	0.045	0.050 [-0.21]	0.032 [0.78]	0.00118 [0.059]	0.0191 [1.10]
2004	0.040	0.050 [-0.58]	0.034 [0.39]	-0.00648 [-0.36]	0.00389 [0.24]
2005	0.024	0.044 [-1.26]	0.060 [-1.80]*	-0.0137 [-0.85]	-0.0329 [-1.69]*
2006	0.030	0.040 [-0.61]	0.019 [0.92]	-0.00724 [-0.44]	0.00950 [0.75]
2007	0.048	0.031 [1.03]	0.021 [1.89]*	0.0227 [1.40]	0.0249 [1.66]*
2008	0.061	0.038 [1.28]	0.030 [1.88]*	0.0256 [1.44]	0.0253 [1.50]
2009	0.045	0.024 [1.45]	0.015 [2.17]**	0.0290 [1.91]*	0.0314 [2.09]**
2010	0.029	0.020 [0.59]	0.027 [0.13]	0.0117 [0.79]	0.00130 [0.086]
			Multi-homeowner?	0.0632 [7.71]***	0.0657 [8.14]***
			Age Indicators?	Y	Y
			N	5739	6149
			R-Squared	0.022	0.026
			People	633	675

**Table 5: Buying a Second Home or Swapping Up**

The first three columns tabulate the number of second home/swap up purchases per homeowner for each group, by year. Z-statistics from a two-sample test of differences in proportions 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. \*/\*\*/\*\* represents statistically significant at the 10%, 5%, and 1% levels, respectively.

Year	Second home/swap up purchases per person			Regression-Adjusted Difference	
	Securitization	Equity Analysts	Lawyers	Equity Analysts	Lawyers
2000	0.054	0.055	0.057	0.0144	-0.0110
		[-0.05]	[-0.15]	[0.66]	[-0.56]
2001	0.064	0.086	0.057	0.00639	0.0126
		[-0.86]	[0.31]	[0.27]	[0.65]
2002	0.113	0.075	0.072	0.0652	0.0467
		[1.38]	[1.62]	[2.65]***	[2.11]**
2003	0.080	0.079	0.093	0.0237	-0.00756
		[0.04]	[-0.50]	[0.99]	[-0.33]
2004	0.097	0.081	0.054	0.0339	0.0349
		[0.65]	[1.78]*	[1.45]	[1.54]
2005	0.121	0.070	0.082	0.0685	0.0366
		[1.94]*	[1.49]	[2.96]***	[1.62]
2006	0.073	0.065	0.062	0.0286	0.00232
		[0.36]	[0.53]	[1.37]	[0.12]
2007	0.087	0.066	0.048	0.0372	0.0307
		[0.86]	[1.78]*	[1.72]*	[1.50]
2008	0.045	0.045	0.024	0.0170	0.0133
		[-0.01]	[1.44]	[1.02]	[0.91]
2009	0.026	0.037	0.048	0.00615	-0.0231
		[-0.79]	[-1.40]	[0.41]	[-1.48]
2010	0.029	0.044	0.030	-0.00161	-0.00203
		[-1.02]	[-0.08]	[-0.10]	[-0.14]
			Multi-homeowner?	0.246	0.262
				[19.8]***	[18.0]***
			Age Indicators?	Y	Y
			N	5739	6149
			R-Squared	0.183	0.202
			People	633	675

**Table 6: Robustness**

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 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 report differences where we condition the sample to homeowners in the New York City area. Columns 4-5 report differences where the sample is conditioned to homeowners in the Southern California. Columns 6 and 7 report difference-in-differences estimates of the effect of securitization agents minus equity analysts in Southern California minus New York City. Columns 8 and 9 report differences between securitization agents in Southern California and New York. Standard errors clustered at the person level are reported below in brackets. \*/\*\*/\*\* represents statistically significant at the 10%, 5%, and 1% levels, respectively.

	Firm Effects	NYC Homeowners		S.CA Homeowners		Diff in Diff, S.CA-NYC		Within Securitization	
	Sctzn. Minus	Securitization minus:		Securitization minus:		Sctzn-Eq.Analysts, $\beta(s(t))$		S.CA minus NYC	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	Equity Analysts	Equity Analysts	Lawyers	Equity Analysts	Lawyers	Second Home or Swap Up	Second Home Only	Second Home or Swap Up	Second Home Only
2000-2001	0.00583 [0.22]	0.0102 [0.39]	-0.0157 [-0.61]	0.0666 [0.73]	0.000837 [0.016]	0.0174 [0.17]	-0.0821 [-0.91]	0.0554 [1.13]	-0.0138 [-0.49]
2002-2003	0.0924 [2.81]***	0.0508 [1.78]*	-0.0211 [-0.64]	0.0425 [0.35]	0.0243 [0.39]	-0.160 [-1.02]	-0.109 [-0.89]	0.0587 [0.88]	0.0602 [0.89]
2004-2005	0.0246 [0.76]	0.0550 [2.04]**	0.0194 [0.64]	0.218 [4.15]***	0.0564 [1.30]	0.113 [2.03]**	0.103 [2.16]**	0.0670 [1.54]	0.0843 [2.09]**
2006-2007	0.0857 [2.46]**	0.0193 [0.74]	-0.00379 [-0.14]	0.00608 [0.10]	-0.0392 [-0.93]	-0.0755 [-1.07]	-0.0468 [-0.69]	-0.00780 [-0.24]	-0.00210 [-0.067]
2008-2009	0.0344 [1.47]	0.0130 [0.70]	-0.0166 [-0.69]	0.0789 [1.62]	-0.103 [-2.38]**	0.0512 [1.20]	0.0338 [1.04]	-0.0253 [-0.79]	-0.0162 [-0.59]
2010	0.00728 [0.25]	-0.0404 [-1.94]*	-0.0491 [-1.76]*	0.0260 [0.26]	-0.0443 [-0.86]	0.126 [2.25]**	0.0976 [1.97]*	0.0413 [0.94]	0.0416 [0.94]
Multi-HO?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Age Indicators?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm Effects?	Y	N	N	N	N	N	N	N	N
N	1876	1868	1478	373	581	2183	2183	999	999
R-Squared	0.179	0.122	0.174	0.215	0.280	0.149	0.098	0.191	0.119
People	214	234	179	52	74	279	279	130	130

**Table 7: Performance Index**

Panel A presents summary statistics for the performance index. 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 robust standard errors reported in brackets. \*\*\*/\*\*\* denotes statistically significant at the 10%, 5% and 1% levels, respectively.

**Panel A: Summary Statistics**

	Securitization		Equity Analysts		Lawyers	
	2000q1	2010q4	2000q1	2010q4	2000q1	2010q4
Number of properties per person	0.603 (0.693)	1.020 (0.766)	0.590 (0.799)	0.993 (0.809)	0.652 (0.727)	1.095 (0.817)
Value of properties	236.8 (390.2)	751.2 (893.8)	308.2 (568.7)	992.2 (1210.1)	191.1 (282.0)	522.6 (522.4)
Cash account	848.0 (874.7)	689.2 (975.4)	1159.7 (1090.6)	988.0 (1005.6)	470.3 (461.9)	375.1 (529.5)
Portfolio value	1084.8 (1035.9)	1440.4 (1586.0)	1467.9 (1214.1)	1980.2 (1661.3)	661.4 (548.9)	897.7 (829.1)
Number of people	400		400		400	

**Panel B: Performance, 2000q1-2010q4**

	Means and Std. Devs.			Reg. Adj. Differences	
				Sctzn. minus:	
	Sctzn.	Equity Analysts	Lawyers	Equity Analysts	Lawyers
Return	0.328 (0.197)	0.349 (0.169)	0.357 (0.221)	-0.0445 [-2.63]***	-0.0266 [-1.08]
Buy-and-hold return	0.366 (0.120)	0.369 (0.116)	0.377 (0.140)	-0.0171 [-1.72]*	-0.00848 [-0.75]
Performance index	-0.0378 (0.147)	-0.0199 (0.113)	-0.0198 (0.145)	-0.0274 [-2.19]**	-0.0181 [-1.02]
Return, 2006q4-2010q4	-0.0736 (0.108)	-0.0457 (0.0936)	-0.0814 (0.115)	-0.0225 [-2.68]***	0.00404 [0.44]
N	400	400	400	766	770
R-squared on perf. index				0.033	0.034

**Table 8: Within-Securitization Performance Index**

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 robust standard errors reported in brackets. \*\*\*/\*\*\* denotes statistically significant at the 10%, 5% and 1% levels, respectively.

**Panel A: Sell-side vs. Buy-side**

	Means and SDs		Reg.Adj Diff.
	Sell-side	Buy-side	Sell-Buy
Return	0.275 (0.184)	0.361 (0.198)	-0.0915 [-3.01]***
Buy-and-hold return	0.347 (0.118)	0.377 (0.120)	-0.0315 [-2.17]**
Performance index	-0.0727 (0.168)	-0.0162 (0.127)	-0.0601 [-2.44]**
Return, 2006q4-2010q4	-0.0985 (0.118)	-0.0583 (0.0990)	-0.0391 [-2.95]***
N	161	239	379
R-squared on perf. index			0.080

**Panel B: Worst and Best Performing Firms**

	Means and Std. Devs.		Reg.Adj Diff.
	Worst	Best	Worst-Best
Return	0.269 (0.159)	0.337 (0.193)	-0.0567 [-1.76]*
Buy-and-hold return	0.347 (0.135)	0.350 (0.103)	0.0112 [0.49]
Performance index	-0.0783 (0.158)	-0.0134 (0.138)	-0.0679 [-2.29]**
Return, 2006q4-2010q4	-0.0957 (0.0977)	-0.0619 (0.102)	-0.0433 [-2.61]***
N	103	77	174
R-squared on perf. index			0.102



**Table 9: Value-to-Income**

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 A tests whether the boom minus pre-boom difference in averages was positive by projecting person-level income onto an indicator for the boom period in a two-period panel of person-level income. Row B tests whether the difference in difference is significant across groups. Standard errors are clustered at the person level. \*/\*\*/\*\* denotes significant at the 10%, 5%, and 1% levels, respectively.

		VTI		
		Sctzn.	Equity Analysts	Lawyers
<b>Pre-Boom period (2000-2003)</b>	Mean	3.2	2.9	2.9
	Median	3.1	2.7	2.5
	SD	1.3	1.5	1.2
	People	65	60	49
<b>Boom period (2004-2006)</b>	Mean	3.4	3.1	3.3
	Median	3.0	2.8	3.2
	SD	2.0	1.7	1.7
	People	73	45	46
<b>Bust period (2007-2010)</b>	Mean	3.1	3.1	2.8
	Median	3.0	3.1	2.8
	SD	1.2	1.4	1.3
	People	55	51	40
A) Boom-PreBoom	Point Est.	0.268	0.175	0.400
	t-stat	[0.94]	[0.57]	[1.37]
	N	138	105	95
	R2	0.006	0.003	0.019
B) DID Sctzn. minus Control	Point Est.		0.0927	-0.132
	t-stat		[0.22]	[-0.32]
	N		243	233
	R2		0.015	0.015