Ten Years of Evidence:
Was Fraud a Force in the Financial Crisis?

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This article takes stock of ten years of academic research by synthesizing the large literature regarding the various players in RMBS securitization at the center of the U.S. housing and financial crisis. Underwriting banks facilitated wide-scale mortgage fraud by knowingly misreporting key loan characteristics underlying mortgage-backed securities. Under the cover of complexity, credit rating agencies catered to investment banks by issuing increasingly inflated ratings on both RMBS and CDOs. Originators who engaged in mortgage fraud gained market share as did CDO managers who catered to underwriters by accepting the lowest-quality MBS collateral. Appraisal targeting and inflated appraisals were the norm. RMBS and CDO prices indicate that the marginal AAA investor was unaware of pervasive mortgage fraud and rating inflation, but these factors were strongly related to future deal performance. The supply of fraudulent credit was not uniform, but clustered in certain geographic regions and zip codes. As these dubious originators extended credit to those who could not afford the loans, the credit expansion led to house price booms and subsequent crashes in zip codes in proportion to their dubious and subprime credit exposure. Overall, there is substantial evidence that conflicts of interest, misreporting, and fraud were focal features of the financial crisis.

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Ten years after the financial crisis, there is still a lack of consensus on the causes of the financial crisis. Considerable research supports the originate-to-distribute view, which claims the housing market was fueled by a breakdown in securitization. However, there are differences within this view, other crisis views, and an overall lack of clarity as to how the academic findings piece together. The purpose of this article is to summarize and synthesize this research and draw the most logical conclusions from empirical evidence regarding the forces leading up to the financial crisis.

Through researching various aspects of the financial crisis for the last decade and presenting results at universities and conferences, my coauthors and I have noticed that many academics are quite skeptical—even repulsed—when factors like 'misreporting' and 'fraud' are mentioned in relation to the crisis. On the other hand, many industry participants recognize 'misreporting', 'conflicts of interest', and even 'fraud' as important features of the financial crisis. Nevertheless, despite our skeptical tendencies, most academics are open to facts, reason, and evidence, and priors have been slowly shifting over the last decade. Significant academic research has emerged that, when considered together, suggests conflicts of interest, misreporting, and outright fraud were not sideshows, but central features of the crisis.

Non-agency residential mortgage-backed securities ('RMBS') grew nearly threefold from one trillion to $2.7 trillion between 2003 and 2007, and collateralized debt obligations ('CDO') grew even faster from nearly $300 billion to $1.1 trillion.[2] However, this growth was misdirected. Approximately 85% of RMBS and CDOs issued were initially rated AAA, but by the summer of 2007 these securities began to experience extensive rating downgrades and collateral values collapsed. Prices for AAA-rated RMBS issued in 2007 declined by more than 70% by 2009 and recovered to only approximately half of their original price by 2013.[3] Why did this happen?

[2] Calculations from data provided by the Securities Industry and Financial Markets Association (SIFMA).
[3] Calculations from Markit ABX indices.

Although it is commonly thought that 'originate-to-distribute' loans received little scrutiny, the securitization system included many checks and balances to ensure standards and incentives were properly maintained across all of the system's stakeholders. For example, loans were appraised by independent appraisers and issued by originators that presumably valued their reputation and future business with underwriters. Underwriters, who were staking their investment bank's reputation and future business on producing high-performing securitized products, conducted internal analysis and hired external due diligence providers to evaluate the quality of the loans they sought to securitize. Pools of loans packaged into RMBS and CDO securities were further analyzed and rated by the most reputable and independent rating agencies in the world.

Even though each participant played important and distinct roles, they all faced a similar conflict of interest. If a company chose to maintain high standards for loan quality and risk assessment, they could lose business to competitors with less stringent standards. Additionally, either directly or indirectly, each participant depended on new deal flow sourced from the underwriting investment bank for future business. For example, credit rating agencies marketed and promised an independent assessment of credit risk but ultimately depended on underwriters for rating revenue. Meanwhile, underwriters could make more profit by packaging bad collateral and selling it as a quality security with a AAA rating than they could from selling good collateral. This creates a conflict within the investment bank since the sale of questionable securities might be extremely profitable in the short-run but could tarnish the bank's long-run reputation. Nevertheless, business is filled with potential conflicts of interest, and securitization participants, including the rating agencies and underwriters, have long developed standards and policies to prevent compromising standards in favor of business interests.[4] Therefore, whether the various players in the securitization chain fell prey to the relevant

[4] For example, as will be further discussed, S&P had a detailed 'Code' that laid out safeguards against engaging in conflicts of interest including "objectivity, integrity and independence."

conflicts of interest is ultimately an empirical question. The academic research summarized below is without citations that are left for more detailed descriptions in the body of the text.

By comparing loan characteristics reported to investors with other independent sources, many academic papers highlight the presence of widespread mortgage misreporting in non-agency RMBS across all major underwriters. Across the universe of non-agency RMBS, 48% of loans had at least one of three forms of misreporting (appraisal, second-lien, or owner occupancy misrepresentations), but this does not include income, debt, and other forms of misreporting that have been shown to be quite prevalent in studies using individual bank data. As part of the U.S. Department of Justice settlements with 11 banks, the banks confirmed both the details of such fraud and that such deficiencies were widely known within the company. Underwriters relied on internal valuation models and paid external due diligence providers to independently assess whether loans met underwriting guidelines, but then waived deficient loans into MBS securitized pools anyway. This data was more detailed than that provided by academics and allowed underwriters to recognize in real-time that the representations of RMBS collateral disclosed to the public were massively incorrect. Banks committed fraud by falsely and knowingly misrepresenting material deal characteristics to the public. Consistent with this evidence, banks have now paid $137 billion in public legal settlements for their role in underwriting and originating fraudulent securities.

Both RMBS and CDO credit ratings became increasingly optimistic from 2003 to 2007. These ratings were partially obtained by out-of-model adjustments and unrealistic assumptions. The competitive dynamics of the market in a setting where complexity adds ambiguity facilitated what has been coined a 'race-to-the-bottom' where rating agencies competed to give out laxer ratings. Rating agencies made adjustments beyond their models merely to match their competitor's rating, and these adjustments led to worse performance. Without the adjustments, a 'AAA' rating would have been 'BBB', completely altering the economics of the CDOs. In addition to offering adjustments on

individual deals, the rating agencies used models that were purposely generous. The lower-rated RMBS tranches were packaged into CDOs that were then rated under the unjustifiable assumption, either conceptually or analytically, that the underlying tranches of RMBS were almost uncorrelated—the default correlation was on average between 0.01 and 0.02. Rating agencies issued inflated ratings to cater to underwriters trying to maintain market share while fraudulently presenting their ratings to the public as independent and objective.

Loan originators focused on generating volume rather than ensuring quality. In the process, they knowingly issued loans to many borrowers with risk characteristics that did not meet underwriting guidelines. The originators that committed the most fraud experienced the most rapid growth in market share until 2006, when early loan defaults led to their collapse. Appraisals were supposed to be independent, but 45% of appraisals exactly targeted purchase prices.

Traditionally with private label securitization, sophisticated investors in lower-level tranches might be capable of monitoring the performance of underlying assets. However, the advent of ABS CDOs allowed the lower-level tranches of MBS to be re-packaged and then re-rated, making analysis more difficult. In the creation of CDOs, collateral managers that accepted the worse quality MBS tranches were rewarded by underwriters with more future business. CDOs of CDOs ('CDO^2'), hybrid CDOs, and synthetic CDOs allowed the leftover tranches to be re-packaged and re-rated.

Consistent with this description, no fraud indicators were priced into MBS tranches, indicating that the marginal investor was unaware of the hidden risk. Common 'AAA' investors (i.e. pension funds, insurance companies, and mutual funds) purchased tranches primarily based on credit rating and were not provided the same private due diligence data possessed by underwriters. Banks also engaged in rating arbitrage and long-short strategies within their trading departments, and in holding less regulatory capital. After it was clear to insiders in early 2007 that the market would collapse, underwriters sold a record volume of structured securities in the first half of 2007. Banks took CDS

derivative bets to profit from the impending collapse of BBB RMBS collateral, but also held inventory from their securitization activities which subsequently resulted in large losses.

While assessing the ensuing liquidity crisis is outside the scope of this analysis, it is clear and fundamental to note the timing of events: the banking crisis was not a random event, but followed a collapse in trust in the structured products market. It is natural that a market which relied on ratings would freeze once a wide array of market participants realized that not only were the ratings off, but that banks would be forced to recognize losses due to their structured finance holdings as well.

What led to the massive rise and fall in house prices? The flip-side of packaging loans for borrowers who previously would not have received financing is a large shift in credit supply that led to a shift in the housing demand curve. The geographic distribution of the rise and fall of real estate valuations closely maps to areas with higher securitization activities, and even more explicitly to zip codes where fraudulent originators had large market share. Zip codes with large amounts of fraud experienced a 32% house price bust, whereas zip codes with low levels of misreporting only experienced a 5% house price correction. This large distortion in house prices induced a fundamental misallocation of resources that proved costly in its contribution to the housing and economic collapse.

Overall, the evidence builds a very cohesive argument that the financial crisis likely would not have occurred without the dubious features of non-agency MBS and CDOs. First, the massive wave of structured products was profitable to banks mostly through the alchemy of turning extremely poor loans into largely AAA paper. Although it is difficult to assess magnitude, it is safe to say that the private mortgage-related securitization market would have been drastically smaller without this alchemy, as it was pre- and post-crisis. Second, without the excess lending supply, there would have been no massive housing bubble. Indeed, only modest swings in housing prices occurred in areas with little mortgage fraud.

Our findings also map to a broader historical narrative that often finds conflicts of interest, misreporting, and fraud are related to historical periods of excess. Famous bubbles like the 1719-1720 South Sea Bubble, the Mississippi Bubble of 1719-1720, the Railroad Bubble, the Roaring 1920s Stock Market, the Dot-Com Boom, and the 2007-2009 Financial Crisis all contained substantial evidence of false accounting, price manipulation, collusion, and fraud—each in more sophisticated and nuanced variants than previous patterns. Akerlof and Romer (1993) lay out a framework for the distorting effects of fraud facilitated boom and bust cycles. In the run-up to the U.S. savings and loans (S&L) crisis of 1986-1989, developers and bankers extracted rents from banks by making large non-recourse construction loans on properties with poor fundamental prospects. Much like the financial crisis, the by-product of the S&L loans was a commercial real estate boom and bust that led to a banking crisis in the form of failure and liquidation of S&Ls.

In the aftermath of the S&L crisis of 1986-1989, over 2,000 bankers went to jail, whereas the 2007-2009 financial crisis saw only one person convicted of defrauding a bank. Large civil penalties were levied against banks for their role in facilitating fraud, predicated on both economic theory and DOJ policy that firms would efficiently doll out labor market consequences to individual actors. However, there is no systematic evidence of labor market discipline for the employees engaged in RMBS underwriting or even for those who signed fraudulent RMBS loan documents.

The goal in writing this paper is to increase awareness of the costs of fraud. I realize that not all of the connections made between academic papers here provide a clean causal or experimental setting. In a world with incomplete information, it is impossible to document the full magnitude of effects that are imprecisely measured. More research is needed to further understand certain aspects of the crisis. Despite these limitations, the depth and strength of the evidence speak to a consistent and cohesive narrative that conflicts of interest, misreporting, and fraud were central and economically important features of the financial crisis. Given that these forces of market distortion are strongly alive

in our marketplace today, I also hope that awareness of these issues will encourage new research into what Zingales (2015) calls the 'rent-seeking' dimension of finance, so that the unforeseen costs of such activities can be mitigated.

1. Background and Securitization Conflicts of Interest

1.1. A Quantitative Assessment of Financial Crisis Books and Articles

Much of the public narrative on the crisis seems to have been painted by books written by former finance practitioners. These books have varying themes but often spend considerable time describing questionable dealings. To track the theme of books more quantitatively, information was collected on books that mentioned the financial crisis and had a high number of reader reviews on Amazon as of the summer of 2018. Further filtering led to 77 leading books on the financial crisis.[5] The usage of "fraud," "corruption," "conflicts of interest," and "misreporting," (and related variants of such words) is measured in these articles.

Figure 1 displays graphically the usage of such 'fraud-related' words in books by journalists and academics. Interestingly, there is considerable usage of such words in many books by practitioners, particularly those with a background in finance and economics (in blue). Among the most popular books written by academics that use fraud-related words are Akerlof and Shiller (2010, 2015), Roubini and Mihm (2011), and Mian and Sufi (2015). Books written by academics in finance and economics appear to have the lowest usage of such terms. Over 69% (26) of books written by finance practitioners have a high usage of these words as compared to only 43% (eight) books written by academics. This quantitative assessment demonstrating less frequent usage of fraud-related words by

[5] These were books that appeared on Amazon's best seller rankings for books that mention financial crisis. The list was further filtered to exclude books not cited on Google scholar and other books that were not available through the University of Texas Library. A listing of the books ranked by their reviews on Amazon and their total usage of the fraud-related words is shown in the Internet Appendix Table A1.

finance academics is consistent with a summary of leading early books on the financial crisis by Lo (2012), where he also discussed the larger role of illicit financial dealings in practitioner accounts.

Nevertheless, one can see an incentive for the media and practitioners to sensationalize the importance of nefarious activities. A common narrative from many practitioners suggests that there were a number of questionable activities and bad policies occurring prior to the crisis, and that the confluence of such behavior resulted in the crisis. These anecdotes are often piecemeal and qualitative; therefore, it is difficult to assess whether they are dramatic stories meant to sell movies and books, or if related accounts can fit into a systematic narrative. Careful academic research is necessary to draw the correct implications for the future.

How does the trend look for academic research about financial crises? We searched for articles that contain at least ten usages of terms related to the financial crisis and the players in securitization,[6] resulting in 217 articles published between January 2005 and September 2018 in the following top three Finance (The Journal of Finance, The Review of Financial Studies, and the Journal of Financial Economics) or top three Economics journals (American Economic Review, Journal of Political Economy, Quarterly Journal of Economics). The results are summarized in the right side of Figure 2. Overall, approximately 31% of empirical finance papers have fraud-related words in their top 1,000 words. Approximately 20% of theoretical finance papers have fraud-related words in their top 1,000 words, and less than ten percent of theoretical economics articles. The most common fraud-related word used in empirical finance is "misreporting," whereas "conflicts of interest" is used more widely in theoretical finance and economics. Overall, it appears that some empirical finance articles place a larger weight on themes related to fraud.[7] Let us now turn to the specific background of this evidence.

[6] Specifically, the article had to contain at least ten usages of one of the following words, "financial crisis," "crisis," "recession," "subprime crisis," "subprime," "credit rating," "CDO," "downturn," "mortgage-backed," "RMBS," "mortgage," "misreporting," and "mispricing."

[7] Many papers describe the mechanics of the banking crisis and not the forces leading up the crisis. When discussing reasons for the lower rate of theory papers with fraud, a respected theorist told me that modeling fraud would be simple

1.2. AAA structured products

AAA-rated corporate bonds are extremely rare; currently, only Microsoft and Johnson & Johnson command such a rating. Consistent with this rare feat, the default probability on a AAA-rated corporate bond over a five-year period is one in 10,000.[8] Ratings for structured products, however, were remarkably different. Nearly 88% of RMBS capital issuances were initially rated AAA prior to June 2007 [Begley and Purnanandam (2017)]. Yet these securities experienced a significant collapse in value during the financial crisis. The Markit ABX indices, which track the prices of AAA-rated and BBB-rated tranches, indicate that AAA-rated RMBS issued in 2007 experienced a 75% price decline, and rebounded to only half their original value by the end of 2013. AAA-rated tranches in 2006 performed better, but still experienced drastic declines. BBB-rated tranches from 2006 and 2007 vintages experienced a 90% decline from their initial price and never recovered. These lower-rated tranches of RMBS were the building block for most AAA-rated CDOs. How were these products created, and what does the research say about them?

1.3. Conflicts of Interests and Potential Compromises in the Securitization Chain

The heart of this analysis will outline the main players in the creation of structured products and how each agent had an intended role to assure quality of the securities.

Exhibit 1 shows the major players involved in the creation of securitized products. The 'originate-to-distribute' view [Keys, Mukherjee, Seru, and Vig (2010), Purnanandam (2011), Keys, Seru, and Vig (2012), and Rajan, Seru, and Vig (2015)] is that the focus was on loan origination and sale, and the system malfunctioned in such a way that lower-quality loans were increasingly securitized. One implication of this literature is that the culprit is "lax screening", or that "originating banks did not expend resources in screening their borrowers" [Purnanandam (2011)] and performed little

and hence unlikely to generate any surprising implications that would lead to publication. Internet Appendix Figure A1 summarizes this information graphically and Table A1 shows the usage in articles grouped by players in the financial crisis.

[8] Moody's historical Aaa corporate default rate for the five-year frequencies is 0.099% as of the end of 2016.

Exhibit 1: Roles and Conflicts in Securitization Chain

Securitization Chain	Intended Role	Potential Conflict
Underwriter	Stake reputation on quality	Profits with more and lower-quality loans
Rating Agency	Independently certify risk	Paid by Underwriter
Originators	Issue high-quality loans	Paid on volume
Appraisers	Independently assess house value	Depend on Originator for future business
Collateral Managers	Stake reputation on performance	Depend on the Underwriter for future deal flow

examination of the loans [Brunnermeier (2009)]. However, further research has made it clear that this version of the originate-to-distribute view is unfortunately too simple. We now know through the Financial Crisis Inquiry Report [FCIC (2011)] and Department of Justice Statement of Facts from settlements with many banks that underwriters performed extensive internal analysis and paid for extensive loan-level external due diligence.

A related misperception regarding 'lax screening' in securitization is that it did not include checks and balances. As shown in Exhibit 1, every major participant in the securitization system had both an intended role as well as checks and balances in place to ensure that they did their job properly. Prior to being securitized, a loan could be analyzed in various forms by a loan origination officer, an appraiser, an underwriting bank, an independent credit rating agency, and a CDO collateral manager. Each player had checks and balances. For example, appraisers supplied independent house valuations subjected to best appraisal practices. Underwriters would leverage internal and external Automated Valuation Models (AVM) to check the accuracy of such appraisals.

Even though most parties appear as separate entities, the underwriter paid all parties either directly or indirectly. For instance, independent appraisers were hired by loan officers/originators.

Originators were incentivized to ensure accurate appraisals to minimize the possibility that underwriters might kick their loans out of the RMBS pool. However, if underwriters had the ability to negotiate better pricing on these loans by passing such misrepresentations through to the investors, then it shifted the incentives faced by both the originators and appraisers. The incentives of credit rating agencies were similar but on a higher profile scale. Rating agencies marketed their independence and high reputation but depended on investment banks for new deal flow. Thus, it is evident that even though each member of the securitization chain had a system of checks and balances, the potential conflicts of interest were quite similar; each needed to please the underwriting bank or the entity reporting to the underwriter to receive new business. It is important to note that most businesses and individuals face potential conflicts of interest. Ultimately, whether the various players along the securitization chain fell prey to those conflicts of interest or maintained the standards they claimed to represent is an empirical question and there is now a substantial literature examining these issues.

2. Major Players and engagement in questionable activities.

I now examine the roles of the players in a potential order of decreasing importance in the securitization chain: underwriters, credit rating agencies, originators, appraisers, and CDO managers.

2.1. Underwriters

2.1.1 What is the evidence of mortgage fraud?

RMBS prospectuses list key asset quality features such as FICO credit scores, loan-to-value ratios, borrower debt-to-income, second-lien percentages, and owner occupancy status. For example, most prospectuses state the percentage of loans with a combined loan-to-value greater than 100 percent. Of course, most RMBS were stated to have zero loans that were underwater. However, there is now considerable evidence that many of the most important fields in RMBS prospectuses were incorrect by large magnitudes, especially for loans where the true value of the house was lower than

the original loan balance. One reason these misrepresentations matter is that credit rating agencies used these loan characteristics as important inputs in their rating models, and a RMBS security could receive a considerably higher rating with such misrepresentations.

Academic evidence on this issue started by showing misrepresentation at certain banks or geographic regions. Ben-David (2011) finds evidence of inflated appraisals and 'cash back' deals in highly-levered deals in the Chicago area. Garmaise (2015) finds that borrowers at a large bank who report unverified assets slightly above round number thresholds are more than twice as likely to default, consistent with asset misrepresentation.

Piskorski, Seru, and Witkin (2015) and Griffin and Maturana (2016a) were the first studies to examine loan-level misreporting using data on the entire space of non-agency RMBS underwriting between 2002 and 2007 across all major underwriters. Even though the studies used completely different data and methodologies, they reached very similar conclusions on the widespread nature of second-lien and owner-occupancy misreporting.

Second-lien misreporting occurs when a first-lien loan has an undisclosed second-lien, leading to higher combined loan-to-value ratios than disclosed to investors. Such higher debt levels result in significantly higher default risk. The papers find that loans with undisclosed second-liens amounted to approximately 10% of all non-agency loans, with the same originator often underwriting both the first and second lien loan, and led to a 70 to 97% increase in loan default probability. Keys, Mukherjee, Seru, and Vig (2010) and Keys, Seru, and Vig (2012) find that default rates increase dramatically around the 620 FICO cutoff often used to determine loan securitization eligibility. Griffin and Maturana (2016a) find that second-lien misreporting jumps dramatically around these cutoffs, indicating that the misreporting was facilitated by securitization.

Additionally, both Piskorski, Seru, and Witkin (2015) and Griffin and Maturana (2016a) find owner occupancy misreporting in approximately seven percent of non-agency loans. Elul and Tilson

(2016) also find rampant owner occupancy fraud in agency loans.

Griffin and Maturana (2016a) examine appraisal fraud by comparing appraised home values to a statistical value estimated by an AVM commonly used by banks. They find that appraisals contain substantial bias and that AVMs are substantially more accurate than appraisals. Overall, they show that 48.8% of loans in non-agency RMBS securitizations have some form of appraisal, second-lien, or owner occupancy fraud and that fraud was similarly present in both full and low-documentation loans. This number represents a lower bound on misreporting since their analysis does not include other forms of misreporting such as income, asset, or FICO score.

Academic evidence suggests that these other forms of misreporting were also quite prevalent. Jiang, Nelson, and Vytlacil (2014) find evidence of income falsification at a large bank with higher prevalence in low-documentation loans and loans issued by brokers. Ambrose, Conklin, and Yoshida (2016) find that income misreporting in low-documentation loans is primarily driven by individuals with W-2s, whose income could have been easily verified. Jiang, Nelson, and Vytlacil (2014) find that in low-documentation loans, low-income borrowers over-represented income by 20 to 25% and at a different bank Ambrose, Conklin, and Yoshida (2016) estimate 7 to 13%. Mian and Sufi (2017) show that certain zip codes have large deviations in self-reported HMDA income on mortgage applications as compared to income reported to the IRS and that these income deviations also correlate with second-lien misreporting identified by Piskorski, Seru, and Witkin (2015).

The combined value of public settlements of such mortgage frauds against underwriting banks is now over $137 billion.[9] This number is a conservative lower bound since private settlements are typically undisclosed. The U.S Department of Justice has fined at least 11 major banks (before acquisitions) for mortgage fraud, which encompasses more than 4,500 RMBS. The market value balance of these securities is over 70% of the RMBS universe in SIFMA. The settlements are

[9] Calculations are shown and overviewed in Griffin, Kruger, and Maturana (2018a).

accompanied by detailed Statements of Facts from extensive forensic analysis of bank documents. First, the statements acknowledge that the banks engaged in numerous types of RMBS violations, including: (a) sampling only small sets of loans in due diligence and then ignoring the implications of this due diligence for the entire pool; (b) waiving through loans that did not meet underwriting guidelines; (c) ignoring information from AVM models indicating that appraisals were inflated and that prospectus statements on loan-to-value ratios were widely violated; (d) insufficiently disclosing and misreporting income; (e) failing to report second liens; and (f) misrepresenting owner occupancy status. Second, the statements acknowledge and provide detailed evidence indicating that the fraudulent activities were common and pervasive across various areas of the bank and escalated in the later years of the 2004-2007 housing boom. These settlements confirm academic evidence, but also indicate that the problems were considerably broader than those discussed in academic work.

2.1.2 Did underwriters know that the securities they represented had rampant misrepresentations?

The Statements of Facts from the DOJ RMBS settlements acknowledge that underwriting banks received detailed due diligence information and that some of this information was disseminated widely within the bank. The Financial Crisis Inquiry Report (2011) also shows that many loans analyzed by third-party due diligence providers, the largest of which was Clayton Holdings, did not meet underwriting guidelines. Thus, both sources acknowledge that the problems were two-fold: a) pretending that the problems identified in the samples of loans (often 10% of a loan pool) were only confined to the sample and not extrapolated to the entire pool, and b) ignoring due diligence information and waiving loans that didn't meet guidelines into the pools. These facts demonstrate that the underwriter possessed detailed reports revealing that the information they were providing in the RMBS prospectuses, prospectus supplements, and loan-level data provided to trustees and investors was materially incorrect. The pattern seems to satisfy the legal definition of *fraud*,[10] as the false

[10] https://www.fbi.gov/resources/library/mortgage-fraud-reports

statements were a) material to deal performance, b) important to rating agencies and investors, c) widely known to be false by the banks, and d) purposefully concealed, leading to extra profit to the banks.

Additionally, the patterns for misreported low-quality assets found in RMBS are also present, perhaps more severely, in CDOs and synthetic CDOs. Faltin-Traeger and Mayer (2012) find that underwriting banks intentionally allowed poorer quality RMBS tranches to be used in CDOs and synthetic CDOs. The securitizations of these lower RMBS tranches was important for the economics of the structured finance market, as it allowed a high proportion of collateral with low ratings to be sold as AAA collateral.

Evidence indicates that there was a second form of fraud which is subtler and more difficult to assess, but perhaps more economically damaging. Structured products were marketed and sold to investors with ratings as the main risk feature. Did banks know that ratings were tremendously overstated? In addition to providing false information that were main inputs and directly inflated credit agency ratings, underwriters also used their market power to influence ratings as discussed below.

2.2. Credit Rating Agencies

2.2.1 Did credit rating agencies cater to underwriters?

Credit ratings are of crucial importance as summarized by Coval, Jurek, and Stafford (2009):

> "From its beginnings, the market for structured securities evolved as a 'rated' market, in which the risk of tranches was assessed by credit rating agencies. […] By having these new securities rated, the issuers created an illusion of comparability with existing 'single-name' securities. This provided access to a large pool of potential buyers for what otherwise would have been perceived as very complex derivative securities."

A central feature of the originate-to-distribute view is that the incentive system in credit ratings broke down. This feature is articulated clearly by Gorton (2010) in his critique of the view as follows:

"Somehow, the structures would have to have been fooled into not increasing the credit enhancement to reflect this decline. This has never been systematically examined […] The evidence to date is consistent with a quarter century of securitization working very well. The assertions of the originate-to-distribute view simply are not consistent with what we know."

With the passing of time, this has now been extensively examined. Research indicates that both RMBS and CDO credit ratings became increasingly inflated over time and that this inflation can be linked to the competitive structure of the industry. Ashcraft, Goldsmith-Pinkham, and Vickery (2011) find that RMBS ratings became more inflated, particularly from 2005 to 2007. They find that a simple model with loan-level features available to the credit rating agencies and historical parameters not only contains incremental information beyond credit ratings but is also able to predict future default and rating performance better than the actual credit ratings.

For a sample of ABS CDOs comprised mostly of lower tranches of RMBS, Griffin and Tang (2012) also find that credit rating agencies became more aggressive in their ratings from 2004 to 2007, and that they did so by making increasingly optimistic out-of-model adjustments that decreased rating accuracy. These out-of-model adjustments are economically large, with AAA ratings amounting to only BBB ratings without the adjustments.[11]

But why did credit ratings become increasingly optimistic over time? A common narrative told by former credit rating employees, as well as other practitioner books [Lowenstein (2010), Kolb (2010), Engel and McCoy (2011)], is that credit rating agencies capitulated to conflicts of interest and competed to give underwriting investment banks the most optimistic credit rating. While competition in many spaces might lead to better products, with credit ratings the competition to 'shop' for ratings [Benmelech and Dlugosz (2010)] can create what is known as the 'race-to-the-bottom' phenomena

[11] Additionally, Griffin and Tang (2012) find one obvious but important error in the credit rating agency's own modeling, as they modeled AAA deals with a less conservative AA default rate prior to April 2007.

[Golan, Parlour, and Rajan (2011)], where long-run quality deteriorates. Bolton, Freixas, and Shapiro (2012) and Sangiorgi and Spatt (2017a) model how competition between credit rating agencies, and the ability for banks to engage in credit rating 'shopping', creates the incentive to 'cater' to the bank and leads to rating inflation with the catering increasing in complexity.[12]

Griffin, Nickerson, and Tang (2013) find evidence of catering and a race-to-the-bottom leading to rating inflation in the interactions between Moody's and S&P in their CDO credit ratings. Both rating agencies have very different models; however, they agree on AAA ratings 93% of the time. When one rating agency's model issues a AA rating, but their competitor's model gives a AAA rating, that particular agency often issues positive adjustments to match their competitor's rating. Adjustments are harmful to future rating performance, and when forced to downgrade in the credit crisis, the credit rating agencies revert back to their models and undo these adjustments. This demonstrates that they were made at issuance to match competition. The rating inflation is not random. Instead, Moody's and S&P make upward adjustments to their credit rating model to match their competitor's rating, consistent with a 'race-to-the-bottom' effect of competitive catering to the investment bank.

He, Qian, and Strahan (2011, 2012) show that large underwriters were able to receive AAA ratings on larger tranche sizes that subsequently underperformed, indicating that investment banks used their market power with rating agencies to secure inflated ratings. Efing and Hau (2015) find that rating agencies issue more favorable ratings to those banks from which they receive more rating business. Also consistent with conflicts of interest in CDOs, Griffin and Tang (2011) show that S&P is systematically more favorable in their main assumptions at issuance than in their surveillance department, which is not as sensitive to business concerns.

[12] Sangiorgi and Spatt (2017b) summarizes the competing theories and empirical work in credit rating agencies.

Cornaggia, Cornaggia, and Hund (2017) demonstrate that across asset classes, ratings are considerably less accurate both within and before the financial crisis in the areas with more complexity. This finding is consistent with the intuition that asset spaces with more complexity have more room for subjectivity in parameter assumptions that can lead to the opportunity for more rating inflation.

Most of the evidence indicates that conflicts of interest and catering played a role in inflating structured finance credit ratings and that the issued increased with complexity. Were these problems on a deal-by-deal basis, or could the inherent over-optimistic nature of the models themselves been related to business concerns? Kedia, Rajgopal, and Zhou (2014) find that after Moody's went public in 2000, both their corporate and structured finance ratings become more favorable relative to S&P's.[13] Nickerson and Griffin (2017) show that the pre-crisis default correlation assumption used by both rating agencies for CDOs range between 0.01 to 0.02 and that parameters estimated using pre-crisis data and reasonable methodologies suggest higher correlation assumptions should have been used. This number seems especially low once one considers that most diversification benefits are captured within the underlying RMBS loan pool. Overall, even though the majority of academic studies focus on cross-sectional variation across deals, business concerns also seem to be likely culprits for the deterioration in RMBS and CDO ratings over time.

2.2.2 Did credit rating agencies commit fraud?

In February 2015, the DOJ and state DOJ partners secured a $1.5 billion settlement from S&P.[14] Included in the agreed-upon Statement of Facts is detailed evidence that business concerns interfered with and influenced the methodological choices made in modeling. S&P had an internal code and other public statements which clarified the independent and objective nature of their ratings

[13] With corporate bond ratings, Becker and Milbourn (2011) find evidence that an increase in competition through the entrance of Fitch leads to more catering.

[14] Griffin and Integra FEC worked as financial consulting experts for the federal and some state DOJs on this case for over four years, but only publicly released facts will be discussed here.

and safeguards against conflicts of interest. The 'Code' states, "In all analytic processes, Ratings Services must preserve the objectivity, integrity and independence of its ratings. In particular, the fact that Ratings Services receives a fee from the issuer must not be a factor in the decision to rate an issuer or in the analysis and the rating opinion." The rating agencies noted their independence, objectivity, and rating accuracy to the marketplace, yet the empirical evidence discussed above, along with the DOJ Statement of Facts, shows that this was clearly false.

A related argument that I have often heard in seminars regarding rating agencies is that since the investment banks knew and created the instruments, and were paying for the ratings, there was nothing wrong with the actions of the rating agencies. This argument misses the point of the legitimate use of ratings. Ratings are used by uninformed parties such as pension funds, insurance companies, and smaller banks who do not have access to underlying data, nor the expertise to evaluate the securities. Mutual funds and insurance managers might reach for yield [Becker and Ivashina (2015)] and not care as much regarding the underlying credit risk since investors and taxpayers who rely on the rating bear this risk. Inflated ratings can also allow banks to reduce risk-weighted assets and hence required capital (regulatory arbitrage), which later resulted in costly bailouts.

2.2.3 What would have happened if the credit rating agencies had reported truthfully?

One must wonder what the counterfactual would have been had the credit rating agencies not issued inflated ratings. Most of the AAA-rated tranches of CDOs and CDO^2s relied on almost uncorrelated asset assumptions and increasingly favorable adjustments. Griffin and Tang (2012) show that without credit rating 'adjustments', AAA ratings would have been BBB. Buyers of lower-level securitization tranches typically analyze the collateral, but by putting the tranches into CDOs only the underlying RMBS ratings mattered for the CDO rating. Without CDOs and inflated ratings, the

economics would have changed drastically and it seems likely that much of securitization would have been uneconomic with correctly priced spreads.[15]

2.2.4 What was the role between credit rating agencies and banks?

The role of credit rating agencies in the crisis also highlights issues regarding their interactions with banks. Underwriters featured these credit ratings front and center of prospectuses, and yet possessed considerable evidence regarding the rating process that was not widely known to investors. First, since underwriting banks used the main models used by the rating agencies, did extensive internal modeling, and pressured the rating agencies for higher ratings as discussed above [Efing and Hau (2015)], they had ample reason to know that the assessment of the rating agencies was incorrect. Consistent with this observation, Jiang, Wang, and Wang (2018) shows that issuers who employed more former and senior credit rating employees were able to issue more inflated ratings.

Second, as discussed above, underwriters possessed widespread evidence that many pieces of MBS data were incorrect. Since these loan fields such as LTVs and debt-to-income were key predictors of MBS default rates [Ashcraft, Goldsmith-Pinkham, and Vickery (2011)] and fed directly into credit rating agencies' models (which banks commonly possessed), the banks had strong reason to know that ratings were off. Stated differently, given that misreporting fraud existed, a second form of fraud closely followed because it was well-known to banks that RMBS ratings relied on key loan features that were misrepresented. Additionally, CDOs which took the lower RMBS tranches were even more sensitive to these forms of misrepresentation. If this form of loan misrepresentation was not known to credit rating agencies, did this remove culpability for ratings agencies? No, because the credit rating agencies still submitted to pressure from banks and catered for higher ratings.

[15] See Coval, Jurek and Stafford (2009) for a discussion of the economics of structured products with credit ratings.

2.3. Originators

As previously discussed, underwriters collaborated closely with originators and the forms of misreporting that the underwriter passed along started with origination activities. I will add a few additional pieces of evidence regarding the role of the originators in facilitating mortgage fraud.

Did originators just allow lax screening, or knowingly misreport key loan features? Piskorski, Seru, and Witkin (2015) show that lenders who issued first-lien loans disclosed as having no second-lien knew that such loans were in fact encumbered. Griffin and Maturana (2016a) find that the first-lien lender was the same as the second-lien lender two-thirds of the time.

Why were these originators incentivized to knowingly misreport if the underwriters would examine their loans and catch their misreporting? It seems that the underwriters were using their due diligence information to obtain better pricing on the loans [FCIC (2011)], but they were obviously not penalizing the originators fully for these loan impediments as fraudulent originators expanded their activities from 2003 to 2006 [Griffin and Maturana (2016a)]. Arentsen, Mauer, Rosenlund, Zhang, and Zhao (2015) find that originators allocated riskier subprime mortgages to pools after CDS contracts were written on the pool.

Interestingly, there were economically large differences in fraud across originators. Griffin and Maturana (2016a) discover that the originators with higher levels of second-lien misreporting had much higher default rates, even after controlling for all loan-level and known fraud characteristics. Additionally, Griffin and Maturana (2016b) find that originators who were in the top third of second-lien misreporting, which they label 'dubious', also likely engaged in full doc and income misreporting. Their measure of dubious origination practices aggregated at the zip code level is correlated with Mian and Sufi (2017)'s measure of income overstatement. Kruger and Maturana (2018) discover that mean appraisal bias varies considerably across loan officers and mortgage brokers, suggesting that the extent to which originators pushed for inflated appraisals varied within firms.

Another form of fraud that has received considerable attention in the press and in the FCIC (2011) report, but less consideration in academic research, is predatory lending. Agarwal, Amromin, Ben-David, Chomsisengphet, and Evanoff (2014) examine a pilot anti-predatory lending program that was rolled out in certain Chicago-area zip codes. Interestingly, they show that the origination volumes of licensed lenders subject to the rule declined by 61% following the rule passage. Many lenders entirely exited the affected areas, indicating that it was uneconomic for them to operate in an area where they could not engage in predatory lending. Agarwal, Amromin, Ben-David, Chomsisengphet, and Evanoff (2018) find evidence of originators steering clients into more expensive mortgage products even though they qualified for less expensive products. This behavior especially targeted women and Hispanic borrowers.

Overall, the evidence indicates considerable variation in fraud across originators; I will later discuss how the geographic variation of these fraudulent practices relates to real estate prices.

2.4. Appraisers

As alluded to regarding the discussion of appraisal bias in the context of misrepresentations by banks, there is widespread evidence of appraisal bias [Ben-David (2011), Carrillo (2013), Agarwal, Ben-David, and Yao (2015), Cho and Megbolugbe (1996), and Calem, Lambie-Hanson, and Nakamura (2015), and Griffin and Maturana (2016a)].

Demiroglu and James (2018) propose that that any form of appraisal bias is simply a natural by-product of a system where appraisers make random errors rather than targeting appraisals to help a loan reach a certain threshold. Although they provide simulation evidence to support their claim, Kruger and Maturana (2018) demonstrate that with properly calibrated simulations, random errors do not explain appraisal inflation. Using additional data from New Century unfunded loans, they also show that very few loans were rejected because of insufficient appraisal values. Despite guidance from the appraisal standard board saying that appraisers may consider, but cannot target, transaction prices

in their appraisals, they find that 45% of purchase loans *exactly* equal the appraisal values, which is confirmed by Conklin, Coulson, Diop, and Le (2018). Griffin and Maturana (2016a) and Kruger and Maturana (2018) show much larger upward appraisal bias occurred at round-number loan-to-value ratio thresholds such as 80, and default rates also spike at these thresholds, which is consistent with the appraisers targeting their numbers to please originators.

Kruger and Maturana (2018) show that there is considerable variation in appraisal bias across appraisers, indicating that not all appraisers were conflicted. Nevertheless, the industry structure seems to be set against honest appraisers. Agarwal, Song, and Yao (2017) demonstrate that appraisers receive less repeat business when they appraise a property below the contract price and Conklin, Coulson, Diop, and Le (2018) show that appraisal targeting is more common in areas with higher competition, consistent with the 'race-to-the-bottom' phenomena previously discussed with rating agencies.

2.5. Collateral Managers

The economics of structured finance consisted of selling AAA collateral and repackaging the lower tranches into CDOs [Coval, Jurek, and Stafford (2009)], and then the lower tranches of ABS CDOs into other CDOs. A part of this CDO creation was an additional certification by independent collateral managers with proven track records. Chernenko (2017) tests the 'front-men' narrative that these managers were not independent from the underwriter. Consistent with this narrative, he finds that collateral managers who took on the poorest quality of collateral were more likely to be from standalone shops, and these managers would receive more future deals from underwriters. Those collateral managers who took higher quality collateral were more likely to be from firms with other lines of business who seemed more concerned about reputational risk.

2.6. Individual Borrowers and the Public More Generally

Let us next answer to what extent individual house buyers were involved in fraud. Ambrose, Conklin, and Yoshida (2016) find that income misreporting was borrower-led and Griffin and

Maturana (2016a) show owner occupancy misreporting was driven by borrowers. Furthermore, Ben-David (2011) shows that financially constrained home buyers took on mortgages at artificially inflated transaction prices to obtain cash back.[16] Individuals also engaged in speculation [Chinco and Mayer (2016), Adelino, Schoar, and Severino (2016), Gao, Sockin, and Xiong (2018)]. Mian and Sufi (2018) showed that the speculation was concentrated in a small set of speculators and flippers.

Although only a relatively small set of individuals were engaged in questionable activities, the costs were born by individual consumers quite broadly, particularly those in areas where the housing crisis was most severe. Individuals were subject to the cost of fraud through wild swings in house prices, as well as the adverse economic effects of the crisis in the form of foreclosure [Mian, Sufi, and Trebbi (2015), Mian and Sufi (2016)], unemployment (Mian and Sufi (2014)], and reduced household consumption [Mian and Sufi (2013)], all coming through the housing channel. Agarwal, Amromin, Ben-David, Chomsisengphet, and Evanoff (2014) also demonstrate how individuals were victims of predatory lending. Of course, many individuals bought houses at inflated prices and were forced into foreclosure due to the fluctuations in prices. An additional important form of loss came through losses in investment portfolios, including pension and mutual funds, and the tax burden due to fraudulent security losses to public entities, subsequent banking bailouts, and the broader economic effects of the crisis.

2.7. Investors

2.7.1 Were investors informed/aware of security misrepresentations?

An argument that I have heard on many occasions is that investors should have known that RMBS and CDO securities had serious issues because they traded at higher yields. The added spread could have been due to illiquidity differences which is a central feature of recent academic research,

[16] Note that these papers do not argue that borrowers were unaware of the misreporting. Because of the due diligence process, originators and underwriters should have been largely aware of these forms of misreporting.

but even if one assumes the higher spreads for RMBS and CDOs were all risk, the argument ignores economic magnitudes. Even if the extra 10 to 50 basis points of RMBS and CDO spreads were all risk, the spread differences were not at all commiserate with the previously discussed large amount of mis-rating in CDOs and RMBS, the extent of the fraud in the securities, and orders of magnitude off from the ultimate extremely poor performance that reflected these factors. Piskorski, Seru, and Witkin (2015) use the cross-section of yields and second-lien misreporting to demonstrate that the effects of misreporting were not reflected in MBS yields, indicating that the investors were unaware of the mispricing. Kruger and Maturana (2018) show that appraisal bias was also not reflected in RMBS yields. He, Qian, and Strahan (2016) confirm that important credit rating information regarding split ratings was not reflected in AAA RMBS yields. Jiang, Wang, and Wang (2018) find that investors for AAA-rated RMBS were unaware of rating inflation related to investment bank and credit rating agency affiliations. They find that yields on lower tranches were informative of future performance tranches, but this is largely consistent with sophisticated investors pricing these securities on their way into CDOs. Overall, there is considerable evidence that AAA RMBS investors were uninformed of fraud, as well as its implications for publicly available credit ratings.

Cordell, Huang, and Williams (2011) indicate that lower tranches of CDOs were largely securitized into other CDOs and CDO^2s, demonstrating market focus on catering to the informationally insensitive AAA-buyer. Faltin-Traeger and Mayer (2012) analyze the construction of CDOs and find that the lower RMBS tranches entering CDOs and especially synthetic CDOs underperform, even controlling for observable deal characteristics. They note that the implication of this finding is that the informational asymmetries were such that the buyers could not have analyzed these securities based on observable characteristics.

2.7.2 Who bought the securities?

Final investors for AAA structured finance securities largely consisted of insurance companies, mutual funds, pension funds/endowments, and banks themselves. Although there is to our knowledge no publicly available precise ledger of the breakdown in ownership across groups of investors, Krishnamurthy (2008) and Acharya and Richardson (2009) cite numbers compiled by Lehman brothers from various sources.[17] According to these calculations, non-agency AAA MBS and CDOs were often held by banks (22.4%), investors overseas (21.7%), GSEs/FHLB (14.6%), broker/dealers (10.9%), money managers (10.7%), insurance companies (10.7%), financial guarantors (4.7%), hedge funds and REITs (2.9%), and others (3.1%).

Merrill, Nadauld, and Strahan (2017) find that insurance companies, particularly those that were under-funded, increased their holdings of non-agency ABS. Chernenko, Hanson, and Sunderam (2016) demonstrate that over $52 billion in non-traditional securitizations were held by mutual funds. They find larger weightings for more inexperienced managers, particularly those that incurred low previous losses.

2.8. Incentives within Banks

2.8.1 Were banks simply over-optimistic on housing? Why did banks lose so much money?

A major question regarding the crisis still remains: Why did banks lose so much money from their RMBS activities? Some people infer from these losses that banks were unaware of problems in housing or simply optimistic on housing. However, this ignores the wide-scale evidence of mortgage fraud and rating inflation, and the previously discussed evidence from DOJ settlements that such

[17] The $2.2 Trillion in holdings seem useful but do not appear to be complete. For example, Griffin, Lowery, and Saretto (2014) use data of issuances from Bloomberg and find $7.85 Trillion in structured products in non-agency MBS ($4.96 Trillion), home equity ABS ($2.23), and CDOs ($0.659 Trillion) issued between 2000 and 2010, but with most of the issuance between 2003 to 2007. The numbers above also seem missing categories such as Pension funds. For example, data collected by the author show that most pension funds were holding AAA RMBS positions.

information was widely known within banks.[18] It seems unlikely that underwriting banks could see all the data on poor loans and mounting defaults and still be bullish on housing. Internal communications that have now been made public seem to support this view. For example, Fabrice Tourre, a former Goldman Sachs trader, stated on January 23, 2007: "The whole building is about to collapse anytime now ... Only potential survivor, the fabulous Fab ... standing in the middle of all these complex, highly leveraged, exotic trades he created without necessarily understanding all of the implications of those monstrosities!!!"

Was the increase in supply due to optimistic lender expectations? The academic paper that is commonly pointed to regarding evidence for overly optimistic banker beliefs is Cheng, Raina, and Xiong (2014) which examines housing expenditures by those at a 2006 Securitization forum. They find that these participants have similar first and second home purchases as others in the finance industry which they interpret as implying that those involved with securitization were also overly optimistic about house prices. Although their findings are thought-provoking, there are several interpretations of this finding. Their sample is mostly lower and mid-level people involved in both mortgage and non-mortgage securitization on both the buy and sell side. Importantly, most of these employees were not part of the higher echelons of mortgage underwriting groups at banks who would have had intimate knowledge of the aggregate effect of fraudulent securitization and its impact on housing. Employees with large excess incomes might still prefer to consume housing by riding the bubble [Brunnermeier and Nagel (2004)], short housing through derivatives at the appropriate time, or believe that one's local geographic region would be immune to such effects.[19] Given these limitations, the paper does not allow us to know the beliefs held regarding subprime and other securitized housing by those at major underwriting banks.

[18] A summary of such evidence is found in Internet Appendix C of Griffin, Kruger, and Maturana (2018a).
[19] New York, where most of the underwriters were located, did not experience the wild fluctuations present in the 'sand states.'

In areas of elastic housing supply, house price increases are muted because of the availability of new housing land as discussed by Mian and Sufi (2009) and Saiz (2010). Mian and Sufi (2009) and Griffin, Kruger, and Maturana (2018b) find that in areas of elastic housing supply, the credit channels are unrelated to 2003-2006 house price growth, but there is plenty of lending growth. Lending is unrelated to price growth, but related to increased speculation and transaction volume in 2003-2006 as well as larger price declines during the 2007-2010 house price bust. Inconsistent with overoptimistic expectations on behalf of bankers, fraudulent originators continued to lend in the desert areas where there was no reasonable expectation of a housing boom.

We now know from the FCIC (2011) and practitioner accounts [Lewis (2010) and McLean and Nocera (2010)] that many major banks were actually short on subprime housing through the lower tranches of RMBS. They were running long-short strategies within the bank where they would short subprime by purchasing CDS protection on lower subprime MBS tranches that would go into synthetic CDOs. The banks funded such positions through creation of these securities and some holdings of long AAA positions in super-senior CDOs.

Faltin-Traeger and Mayer (2012) find evidence consistent with these accounts by analyzing the underlying assets going into CDOs and synthetic CDOs. First, they find that lower RMBS tranches that ended up in CDOs had higher yields and underperformed other RMBS. Second, they found that the synthetic CDOs that were shorted in CDS contracts performed even worse. This is consistent with the underwriters letting the structuring of these securities be picked by people that wished to short such securities. Since the underwriters played a large role in structuring these securities and were often running funds that invested in such securities, the poor performance, even after controlling for observable characteristics, is consistent with them designing the securities to fail. The idea was that when housing deteriorated, banks would make large profits from the defaults of the CDS positions and then unwind the 'super-senior' AAA positions after the CDS bets paid off [FCIC (2011)].

However, the rapid deterioration of RMBS caused these long-short strategies to backfire as the AAA positions took large losses faster than anticipated and before the banks could sell these positions.

Fahlenbrach, Prilmeier, and Stulz (2012) find that banks that relied on more short-term funding and leverage and experienced rapid growth in the run-up performed worse in the crisis. Erel, Nadauld, and Stulz (2014) examine competing explanations for why banks lost so much by exploiting cross-sectional differences within the bank. They find empirical support that losses were related to the ongoing structured finance activities of the bank. Banks with the largest structured product desks lost the most capital. It takes time to move structured products and creation requires substantial inventory. Banks were unsuccessful at moving all RMBS-related collateral off their desks as prices fell quickly.

It seems likely that even though banks had large short bets and plans to unwind such positions, they did not anticipate the speed to which the securitization market would implode.

2.8.2 Why would banks burn their reputation?

An underwriter stakes their reputation and future business on the performance of the securities. The underwriter faces a potential conflict of interest: they could make more money now by misrepresenting poor quality securities as good, but this would cost them future business. In the traditional model of reputation, future profits from not misrepresenting and maintaining high reputation are greater than those from misrepresenting and an underwriter would never want to burn their reputation by producing low-quality securities [Booth and Smith (1986) and Chemmanur and Fulghieri (1994)]. This is best summed up by the famous Goldman Sachs Partner, Gus Levy: "We're greedy, but long-term greedy, not short-term greedy" [Endlich (1999)].

Yet, at least some of the worst-performing securities were produced by some of the most reputable banks. Was this anecdotal or systematic? Griffin, Lowery, and Saretto (2014) show that with a sample of 14,315 deals and $10.1 trillion dollars of structured products, deals underwritten by the banks with the best pre-crisis reputations performed worse than those underwritten by less reputable

banks. This holds true within the non-agency MBS, asset-backed securities (ABS), and CDO market. They find that the RMBS (CDOs) underwritten by high reputation underwriters experienced principal losses on average of 30% (75%) by 2010. These findings do not seem to be due to idiosyncrasies within the types of products securitized. This is evidenced by the fact that performance differences hold true even when controlling for vintages and detailed collateral type. Furthermore, this finding was not driven by the failures of Bear Stearns or Lehman Brothers.

There are now several models which demonstrate theoretically that the conventional wisdom related to reputation does not always hold true. Mathis, McAndrews, and Rochet (2009) and Fulghieri, Strobl, and Xia (2014) argue that rating agencies may strategically build and then later burn their reputation. Griffin, Lowery, and Saretto (2014) show theoretically that while the conventional view may hold within simple vanilla securities such as corporate bonds, the incentives shift with complex securities like structured products. With complex structured products, the most important features that predict future performance are default correlation and asset quality which only investors with detailed access to loan-level information and considerable sophistication can estimate. For non-informed investors, the true quality of these features will likely only be estimated when a crisis occurs. Consistent with this possibility, Piskorski, Seru, and Witkin (2015) fail to find lower levels of bank misreporting for banks with better-perceived reputation. Because of this feature, the current profits today from misrepresenting securities may exceed the benefit of maintaining a consistently high reputation in the future. It can be profitable for an underwriting firm to burn their reputation even in the absence of any agency conflicts within the firm, though the effects would likely be magnified in the presence of additional within-firm agency conflicts.

There is also a related debate as to what role short-term CEO incentives and poor governance played in the crisis.[20] Interestingly, widespread fraud by major banks could be consistent under either possible scenario. There could be an agency conflict and bank executives could be acting in their own short-term interest at the expense of shareholders, or executives could believe they are maximizing shareholder wealth through fraud, if they viewed the potential future fines as small.

2.8.3 Were responsible employees disciplined?

Employees working within structured products departments of banks had access to great amounts of valuable information regarding the true quality of the securities. The executives in the structured products group were incentivized by large annual bonuses based on the upfront fees generated from these securitizations. Griffin, Kruger, and Maturana (2018a) examine what happened to RMBS employees within the banks after the financial crisis and after banks had paid large fines for fraudulent activities. Compared to other people that worked in securitization or other parts of the banks, there was no internal or external punishment for participating in RMBS origination. This held true even for senior employees that signed deal documents that were subsequently part of DOJ settlements. These employees were also promoted at similar rates as well. A likely interpretation of these facts is that upper management did not enact labor market discipline on these employees because their actions were not inconsistent with the directions of upper management. Given that individuals were also not prosecuted criminally or civilly means that there were little direct costs to employees that engaged in fraudulent behavior.

[20] For example, Beltratti and Stulz (2012) find that shareholder friendly boards did not perform better in the crisis and Fahlenbrach and Stulz (2011) find that banks with more short-term cash relative to stock compensation did not outperform. Kolasinski and Yang (2018) use a measure of CEO compensation including equity and option vesting schedules and find that firms with CEOs with compensation packages which allowed them to cash out sooner had more exposure to subprime and higher stock returns 2007, but lost more in the crisis and experienced larger fines for subprime-related fraud.

2.9. The Government

A common question that I have received in talks regarding the role of fraud in the crisis is how this narrative fits with the narrative that government policy caused the crisis. Common versions blame expansionary monetary policy, government deregulation, the expansion of shadow banking, or affordable housing policies caused by the Community Reinvestment Act.[21] It is worthwhile to note many of these narratives involve laws and events in earlier periods. These events may have set the regulatory climate for the mortgage system to develop, but obviously none of these laws required or even encouraged banks to commit mortgage fraud. Given the widespread evidence of mortgage fraud from 2002 to 2007 among the various financial crisis players, the enforcement actions by the SEC, the CFTC, DOJ, FBI, quasi-regulatory agencies, and state law enforcement appear substantially delayed and insufficient. This could have been due to insufficient resources, ability to navigate the scope and complexity, or political will to tangle with banks. The political economy dynamics may be relevant as Countrywide thought them important enough to give favored mortgage rates to members of congress, lobbyists, and senior Fannie Mae employees.[22] The government housing agencies were not passive players in the financial crisis as they increasingly securitized riskier loans in agency MBS and fueled large bonuses by earning a credit spread on holding $300 billion in non-agency loans [Frame, Fuster, Tracy, and Vickery (2015)]. Any narrative regarding the financial crisis must be able to explain wide cross-sectional variation in house prices. Despite a voluminous literature, none of these pure policy narratives have (to my knowledge) been related to cross-sectional variation in house prices, although it is possible that these effects could provide the background or amplify fraud effects. The relation between mortgage fraud and the cross-section of house prices will be discussed below.

[21] Some relevant papers are Keys, Mukherjee, Seru, and Vig (2010) that finds that more highly regulated banks issued worse quality loans. Agarwal, Benmelech, Bergman, and Seru (2012) show that banks undergoing reviews around regulatory dates for the community reinvestment act engaged in riskier lending.
[22] Committee on Oversight and Government Reform (2009).

3. Did Fraudulent Practices Fuel House Prices?

The financial crisis relates to a more general debate regarding the importance of conflicts of interest and financial fraud. A conventional view accepts that fraud increases during boom times and is revealed during busts. Financial booms make people more trusting and busts make people wary, but dubious activity is conventionally accepted as a simple by-product of the cycle [Povel, Singh, and Winton (2007)]. Additionally, although the press focused considerable attention on the role of conflicts of interest and fraud in the 1998-2000 dot-com period, past academic research on the role of analysts and IPO activity [as summarized by Mehran and Stulz (2007)] largely finds these issues to be economically small. In contrast, a more radical view suggests that financial fraud magnifies the cycle and can at least partially fuel a boom and bust [Akerlof and Romer (1993)].[23] Which view is a more adequate description of the 2007-2009 financial crisis?

Did the costs of the misaligned securitization cause distortive effects on house prices? Mian and Sufi (2009) argue that excess credit supply fueled demand for housing. They show that subprime zip codes experienced large growth in mortgage credit and that this growth in credit was decoupled from income growth. Nadauld and Sherlund (2013) find evidence that the increase in securitization caused the increase in subprime lending. They even find evidence that a change in Standard & Poor's treatment of mortgage origination in certain states affected the relative supply of mortgage lending in those states, suggesting that securitization activities were not simply responding to increased demand but driving prices. Di Maggio and Kermani (2017) show a causal link between the relaxation of anti-predatory lending laws and credit expansion and house prices. Mian and Sufi (2018) also construct a new measure of securitization lending supply and find a causal link to prices.

[23] Akerlof and Romer (1993) argue that financial fraud exacerbated four crises (Chile, the U.S. savings and loan crisis, Dallas real estate, and junk bonds). They argue that harmful price distortions are likely considerably larger than the amounts gained from fraudulent activity.

Adelino, Schoar, and Severino (2016) argue that Mian and Sufi's (2009) finding of home price increases in subprime areas can be explained by cross-sectional differences in income growth as measured by HMDA income self-reported by borrowers on loan applications. However, Mian and Sufi (2016) show that this 'income growth' was in fact just extensive income misreporting by correlating the difference in reported HMDA income and IRS income growth to other measures of misreporting. Adelino, Schoar, and Severino (2016) argue more for an investor demand-driven housing price explanation by noting that the increase in non-agency credit was not concentrated just in subprime zip codes. However, this is not necessarily inconsistent with the supply-side view.

As previously discussed, there were widespread differences in fraudulent mortgage origination practices across originators. Origination practices also varied geographically and underpin the empirical framework to determine whether originators who engaged in large amounts of misreporting distorted home prices.

To illustrate the potential impact of mortgage fraud, I use data for the state with the most mortgage originations, California, and sort all zip codes into 20 bins based on the level of origination from fraudulent originators. As shown in Figure 3, there is a strong and nearly monotonic relation between the percent of fraudulent origination in the zip code from 2003 to 2006 and the strength of the 2007 to 2010 home price bust. California zip codes with more than 15% fraudulent origination experience home price decreases of 44.6% on average, whereas zip codes with less than 3% fraudulent originators only experience 5.4% price decreases.

Does this relation hold more broadly? Griffin and Maturana (2016b) examine the relationship between fraud and home prices as illustrated above more generally and show that the distortive effects of securitization are strongly related to and even caused by fraudulent activity. They also demonstrate that the distortive effects of dubious origination practices were not limited to subprime zip codes, but were also present in high-income zip codes, as well as zip codes with inelastic credit supply. They find

that zip codes with large concentrations of dubious originators experienced 75% larger home price increases and 90% larger subsequent declines. Through a variety of tests, including regulatory regimes, the paper argues that the effect was largely causal. This is not to say that there could not have been other channels at work in the crisis.

Chinco and Mayer (2016), Adelino, Schoar, and Severino (2016), and Gao, Sockin, and Xiong (2018) all show various measures of speculation as explaining cross-sectional variation in returns. Theories also call for investors to over-extrapolate past house price growth [Glaeser and Nathanson (2017), and DeFusco, Nathanson, and Zwick (2017)], or for investors to experience a more general shift in housing beliefs [Kaplan, Mitman, Violante (2017)].

One reason the papers obtained varying views may be that some focus on the variation at the MSA level, whereas others focus on zip code variation, boom or bust, and differences in construction and comparisons. Griffin, Kruger, and Maturana (2018b) perform extensive horse-races between different variants of the credit-supply and speculation measures for both the boom and bust by constructing all variables at the zip code level as of 2002. Two credit supply measures, subprime share and dubious origination practices, stand out for being systematically related to both house price increases during the boom and house price decreases during the bust. Surprisingly, none of the speculative demand proxies that have been widely used in the above literature are consistently related to within-MSA house price variation in both the boom and bust.

Griffin, Kruger, and Maturana (2018b) perform a simple but interesting counterfactual by examining house price fluctuations in the boom and bust in zip codes with varying levels of misreporting and fraudulent activity. The zip codes with high worse originator share experienced house price growth of 61% during 2003-2006, but prices only rose 25% in zip codes with low worse originator share. During the 2007-2010 bust, zip codes with a large share of dubious credit fell 32% compared to only 5% in zip codes with low levels of fraudulent credit. These results are not explained

by speculation, house price elasticity, or other measures. An implication is that without fraudulent lending many loans that were uneconomic would not have been made and there may not have been a housing crash.

Overall, there seem to be two conceptual channels in which fraudulent credit supply facilitated house price movements. The first is the variation of fraudulent lending practices across originating banks. The second is the fueling of securitization directly through subprime credit. These two effects fit tightly with the discussion in the previous section regarding the severe problems in mortgage misreporting and with credit rating inflation more generally, and yet also are strongly empirically linked to the house price growth and bust.

4. Conclusion

A careful examination of the empirical academic evidence indicates that conflicts of interest, misreporting, and fraud were central features of the securitization chain leading up to the financial crisis. The academic evidence shows that the issues were widespread across most firms engaged in underwriting, credit rating, originating, appraising, and managing CDOs. The compromises facilitated massive amounts of securitization. Within origination practices there was large cross-sectional variation in the extent of fraudulent practices and these practices, along with subprime lending more generally, strongly predict zip code level variation in both the 2003-2006 boom and 2007 -2010 bust.

Given that securitized products caused a massive and costly dislocation in housing prices in the run-up, subsequent economic recession, and near banking meltdown in the collapse, the unintended consequences of such practices can be far costlier than gains from the initial activity. While it would be difficult to estimate the total profits made from securitization in the pre-crisis boom, the entire combined revenue of Standard & Poor's and Moody's from 2003 to 2007 was $37 billion,

whereas the total cost of the financial crisis is estimated to be over $22 trillion[24] or approximately 600 times that amount. Despite being difficult to detect and quantify, financial economists should not ignore the potential costs of conflicts of interest and fraud to our financial system.

Given that the statute of limitations had already passed on many legal claims by the time the specific evidences of fraud were made public in the Financial Crisis Inquiry Report (2011), and that the $137 billion fines paid by banks led to no detectable labor market discipline of the responsible employees, policy makers may need to reconsider enforcement, statute of limitations length, and fines. Tougher punishments and more resources for the legal system may be necessary in a world of increasing financial complexity that makes detection more difficult and costly. Since regulators have historically been largely unable to identify schemes ex-ante, increased enforcement and larger penalties may create better forward-looking incentives. Forensic financial research may also be able to detect questionable activity in its early stages, when the cumulative spillover costs of fraud can hopefully be limited.

[24] As calculated from a 2013 report by the United States Government Accountability Office.

References

Acharya, V. V. and M. P. Richardson. 2009. Causes of the Financial Crisis. *Critical Review,* 21(2,3):195-210.

Adelino, M., A. Schoar, and F. Severino. 2016. Loan originations and defaults in the Mortgage Crisis: The role of the middle class. *Review of Financial Studies* 29(7):1635-70.

Agarwal, S., E. Benmelech, N. Bergman, and A. Seru. 2012. Did the Community Reinvestment Act (CRA) Lead to Risky Lending? NBER Working Paper.

Agarwal, S., G. Amromin, I. Ben-David, S. Chomsisengphet, and D. Evanoff. 2014. Predatory lending and the subprime crisis. *Journal of Financial Economics* 113(1):29-52.

Agarwal, S., G. Amromin, I. Ben-David, S. Chomsisengphet, and D. Evanoff. 2018. Predatory lending and Hidden Risk. Working Paper.

Agarwal, S., I. Ben-David, and V. Yao. 2015. Collateral valuation and borrower financial constraints: Evidence from the residential real estate market. *Management Science* 61(9):2220-40.

Agarwal, S., C. Song, and V. Yao. 2017. Relational contracts, reputational concerns, and appraiser behavior: Evidence from the housing market. Working Paper.

Akerlof, G., and P. Romer. 1993. Looting – The economic underworld of bankruptcy for profit. *Brookings Papers on Economic Activity* 24(2):1-73.

Akerlof, G. and R. Shiller. 2010. *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism.* Princeton, NJ: Princeton University Press.

Akerlof, G. and R. Shiller. 2015. *Phishing for Phools: The Economics of Manipulation and Deception.*. Princeton, NJ: Princeton University Press.

Ambrose, B. W., J. Conklin, and J. Yoshida. 2016. Credit rationing, income exaggeration, and adverse selection in the mortgage market. *Journal of Finance* 71(6):2637-85.

Arentsen, E., D.C. Mauer, B. Rosenlund, H.H. Zhang, and F. Zhao. 2015. Subprime mortgage defaults and credit default swaps. *The Journal of Finance*, 70(2):689-731

Ashcraft, A., P. Goldsmith-Pinkham, and J. Vickery. 2011. MBS ratings and the mortgage credit boom. FRB of New York Staff Report 449. Federal Crisis Inquiry.

Becker, B. and T. Milbourn. 2011. How did increased competition affect credit ratings? *Journal of Financial Economics* 101(3):493-514.

Becker, B. and V. Ivashina. 2015. Reaching for yield in the bond market. *Journal of Finance* 70(5):1863-1902.

Begley, T., and A. Purnanandam. 2017. Design of financial securities: Empirical evidence from private-label RMBS Deals. *Review of Financial Studies* 30(1):120-61.

Beltratti, A. and R. Stulz. 2012. The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics* 105(1):1-17.

Ben-David, I. 2011. Financial constraints and inflated home prices during the real estate boom. *American Economic Journal: Applied Economics* 3(3):55-87.

Benmelech, E., & J. Dlugosz. 2010. The credit rating crisis. NBER Macroeconomics Annual, 24(1):161-208.

Bolton, P., X. Freixas, and J. Shapiro. 2012. The credit ratings game. *Journal of Finance* 67(1):85-111.

Booth, J. R., and R. L. Smith II. 1986. Capital raising, underwriting and the certification hypothesis *Journal of Financial Economics* 15(1-2):261-81.

Brunnermeier, M. K. 2009. Deciphering the Liquidity and Credit Crunch 2007-2008. *Journal of Economic Perspectives,* 23 (1): 77-100.

Brunnermeier, M. K. and S. Nagel. 2004. Hedge Funds and the Technology Bubble. *Journal of Finance,* 59: 2013-2040.

Calem, P. S., L. Lambie-Hanson, and L. I. Nakamura. 2015. Information losses in home purchase appraisals. Working Paper.

Carrillo, P. E. 2013. Testing for fraud in the residential mortgage market: How much did early-payment-defaults overpay for housing? *Journal of Real Estate Finance and Economics* 47(1):36-64.

Chemmanur, T., and P. Fulghieri. 1994. Investment bank reputation, information production, and financial intermediation. *Journal of Finance* 49(1):57-79.

Cheng, I., S. Raina, and W. Xiong. 2014. Wall Street and the Housing Bubble. *American Economic Review*, 104 (9): 2797-2829.

Chernenko, S. 2017. The front men of Wall Street: The role of CDO collateral managers in the CDO boom and bust. *Journal of Finance* 72(5):1893-1936.

Chernenko, S., S. G. Hanson, and A. Sunderam. 2016. Who neglects risk? Investor experience and the credit boom. *Journal of Financial Economics* 122(2):248-69.

Chinco, A., and C. Mayer. 2016. Misinformed speculators and mispricing in the housing market. *Review of Financial Studies* 29(2):486-522.

Cho, M., and I. F. Megbolugbe. 1996. An empirical analysis of property appraisal and mortgage redlining. *Journal of Real Estate Finance and Economics* 13(1):45-55.

Committee on Oversight and Government Reform. 2009. Friends of Angelo: Countrywide's Systematic and Successful Effort to Buy Influence and Block Reform. Staff Report.

Conklin, J., N. E. Coulson, M. Diop, and T. Le. 2018. Competition and appraisal inflation. Working paper.

Cordell, L., Y. Huang, and M. Williams. 2011. Collateral damage: Sizing and assessing the subprime CDO crisis. Working Paper.

Cornaggia, J. N., K. J. Cornaggia, and J. E. Hund. 2017. Credit ratings across asset classes: A long-term perspective. *Review of Finance* 21(2):465-509.

Coval, J., J. Jurek, and E. Stafford. 2009. The economics of structured finance. *Journal of Economic Perspectives* 23(1):3-25.

Di Maggio, M., & A. Kermani. 2017. Credit-induced boom and bust. *The Review of Financial Studies* 30(11): 3711-3758.

DeFusco, A., C. Nathanson, and E. Zwick. 2017. Speculative dynamics of prices and volume. Working Paper.

Demiroglu, C., and C. James. 2018. Indicators of collateral misreporting. *Management Science* 64(4):1747-60

Efing, M., and H. Hau. 2015. Structured debt ratings: Evidence on conflicts of interest. *Journal of Financial Economics* 116(1):46-60.

Elul, R., and S. Tilson. 2016. Owner occupancy fraud and mortgage performance. Working Paper, Federal Reserve Bank of Philadelphia.

Endlich, L. J. 1999. *Goldman Sachs: The culture of success*. New York: Simon and Schuster.

Engel, K., and P. McCoy. 2011. *The subprime virus: Reckless credit, regulatory failure, and next steps*. Oxford, UK: Oxford University Press.

Erel, I., T. D. Nadauld, and R. M. Stulz. 2014. Why did holdings of highly rated securitization tranches differ so much across banks? *Review of Financial Studies* 27(2):404-53.

Fahlenbrach, R., R. Prilmeier, and R. Stulz. 2012. This Time Is the Same: Using Bank Performance in 1998 to Explain Bank Performance during the Recent Financial Crisis. *Journal of Finance* 67(6):2139-2185.

Fahlenbrach, R. and R. Stulz. 2011. Bank CEO incentives and the credit crisis. *Journal of Financial Economics* 99(1):11-26.

Faltin-Traeger, O., and C. J. Mayer. 2012. Lemons and CDOs: Why did so many lenders issue poorly performing CDOs? Research Paper, Columbia Business School.

Financial Crisis Inquiry Commission. 2011. The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States. Washington: Government Printing Office.

Frame, W. S., A. Fuster, J. Tracy, and J. Vickery. 2015. The Rescue of Fannie Mae and Freddie Mac. *Journal of Economic Perspectives,* 29 (2): 25-52.

Fulghieri, P., G. Strobl, and H. Xia. 2014. The economics of solicited and unsolicited credit ratings. *Review of Financial Studies* 27(2):484-518.

Gao, Z., M. Sockin, and W. Xiong. 2018. Learning about the neighborhood. Working Paper.

Garmaise, M. J. 2015. Borrower misreporting and loan performance. *Journal of Finance* 70(1):449-84.

Glaeser, C., and C. Nathanson. 2017. An extrapolative model of house price dynamics. *Journal of Financial Economics* 126(1): 147-170.

Golan, L., C. A. Parlour, and U. Rajan. 2015. Competition, managerial slack, and corporate governance. *Review of Corporate Finance Studies* 4(1):43-68.

Gorton, G. B. 2010. *Slapped by the invisible hand: The panic of 2007*. Oxford University Press.

Griffin, J. M., S. A. Kruger, and G. Maturana. 2018a. Do labor markets discipline? Evidence from RMBS bankers. *Journal of Financial Economics* Forthcoming.

Griffin, J. M., S. A. Kruger, and G. Maturana. 2018b. What Drove the 2003-2006 House Price Boom and Subsequent Collapse? Disentangling Competing Explanations, University of Texas Working Paper.

Griffin, J. M., R. Lowery, and A. Saretto. 2014. Complex securities and underwriter reputation: Do reputable underwriters produce better securities? *Review of Financial Studies* 27(10):2872-925.

Griffin, J. M., and G. Maturana. 2016a. Who facilitated misreporting in securitized loans? *Journal of Finance*. 29(2):384-419.

Griffin, J. M., and G. Maturana. 2016b. Did dubious mortgage origination practices distort house prices? *Review of Financial Studies* 29(7):1671-708.

Griffin, J. M., J. Nickerson, and D. Y. Tang. 2013. Rating shopping or catering? An examination of the response to competitive pressure for CDO credit ratings. *Review of Financial Studies* 26(9):2270-310.

Griffin, J. M. and D. Y. Tang. 2011. Did credit rating agencies make unbiased assumptions on CDOs? *American Economic Review* 101(3):125-30.

Griffin, J. M., and D. Y. Tang. 2012. Did subjectivity play a role in CDO credit ratings? *Journal of Finance* 67(4):1293-328.

Government Accountability Office. 2013. Financial Regulatory Reform: Financial Crisis Losses and Potential Impacts of the Dodd-Frank Act

He, J., J. Qian, and P. E. Strahan. 2016. Does the market understand rating shopping? Predicting MBS losses with initial yields. *Review of Financial Studies* 29(2):457-85.

He, J., J. Qian, and P. E. Strahan. 2011. Credit ratings and the evolution of the mortgage-backed securities market. *American Economic Review* 101(3):131-135.

He, J., J. Qian, and P. E. Strahan. 2012. Are all ratings created equal? The impact of issuer size on the pricing of mortgage-backed securities. *Journal of Finance* 67(6):2097-2137.

Jiang, W., A. A. Nelson, and E. Vytlacil. 2014. Liar's loan? Effects of origination channel and information falsification on mortgage delinquency. *Review of Economics and Statistics* 96(1):1-18.

Jiang, J., I. Y. Wang, and K. P. Wang. 2018. Revolving Rating Analysts and Ratings of Mortgage-Backed and Asset-Backed Securities: Evidence from LinkedIn. *Management Science* 64(12):5832-5854.

Kaplan, G., K. Mitman, and G. L. Violante. 2017. The housing boom and bust: Model meets evidence. Working Paper.

Kedia, S., S. Rajgopal, and X. Zhou. 2014. Did going public impair Moody's credit ratings? *Journal of Financial Economics* 114(2):293-315.

Keys, B. J., T. Mukherjee, A. Seru, and V. Vig. 2010. Did securitization lead to lax screening? Evidence from subprime loans. *Quarterly Journal of Economics* 125(1):307-62.

Keys, B. J., A. Seru and V.Vig. 2012. Lender screening and the role of securitization: Evidence from prime and subprime mortgage markets. *Review of Financial Studies* 25(7):2071-108.

Kolasinski, A. C., and N. Yang. 2018. Managerial myopia and the mortgage meltdown. *Journal of Financial Economics* 128(3):466-485.

Kolb, R. 2010. *Lessons from the financial crisis: Causes, consequences, and our economic future*. New Jersey: John Wiley & Sons, Inc.

Krishnamurthy, A. 2008. The financial meltdown: Data and diagnoses. NBER working paper.

Kruger, S. and G. Maturana. 2018. Collateral misreporting in the RMBS market. Working Paper.

Lewis, M. 2010. *The Big Short*. New York: W. W. Norton.

Lo, A. W. 2012. Reading about the Financial Crisis: A Twenty-One-Book Review. *Journal of Economic Literature* 50(1):151-78.

Lowenstein, R. 2010. *The End of Wall Street*. New York: Penguin Books.

Mathis, J., J. McAndrews, and J. C. Rochet. 2009. Rating the raters: Are reputation concerns powerful enough to discipline rating agencies? *Journal of Monetary Economics* 56(5):657-74.

McLean, B., and J. Nocera. 2010. *All the devils are here: The hidden history of the Financial Crisis*. London, UK: Penguin Group.

Mehran, H., and R. Stulz. 2007. The economics of conflicts of interest in financial institutions. *Journal of Financial Economics* 85(2):267-96.

Merrill, C. B., T. D. Nadauld, and P. E. Strahan. 2017. Final demand for structured finance securities. *Management Science* 65(1):390-412.

Mian, A., and A. Sufi. 2009. The consequences of mortgage credit expansion: Evidence from the U.S. mortgage default crisis. *Quarterly Journal of Economics* 124(4):1449-96.

Mian, A., and A. Sufi. 2013. Household balance sheets, consumption, and the economic slump. *The Quarterly Journal of Economics* 128(4):1687-1726.

Mian, A., and A. Sufi. 2014. What explains the 2007-2009 drop in employment? *Econometrica* 82(6): 2197-2223.

Mian, A. and A. Sufi. 2015. *House of Debt: How They (and You) Caused the Great Recession, and How We Can Prevent It From Happening Again.* Chicago, IL: University of Chicago Press.

Mian, A., and A. Sufi. 2016. Who bears the cost of recessions? The role of house prices and household debt. *Handbook of Macroeconomics* 2:255-96.

Mian, A., and A. Sufi. 2017. Fraudulent income overstatement on mortgage applications during the credit expansion of 2002 to 2005. *Review of Financial Studies* 30(6):1831-64.

Mian, A., and A. Sufi. 2018. Finance and business cycles: The credit-driven household demand channel. *Journal of Economic Perspectives* 32(3):31-58.

Mian, A., A. Sufi and F. Trebbi. 2015. Foreclosures, house prices, and the real economy. *Journal of Finance* 70(6): 2587-2634.

Nadauld, T. D., and S. M. Sherlund. 2013. The impact of securitization on the expansion of subprime credit. *Journal of Financial Economics* 107(2):454-76.

Nickerson, J., and J. M. Griffin. 2017. Debt correlations in the wake of the Financial Crisis: What are appropriate default correlations for structured products? *Journal of Financial Economics* 125(3):454-74.

Piskorski, T., A. Seru, and J. Witkin. 2015. Asset quality misrepresentation by financial intermediaries: Evidence from RMBS market. *Journal of Finance* 70(6):2635-78.

Povel, P., R. Singh, and A. Winton. 2007. Booms, busts, and fraud. *Review of Financial Studies* 20(4): 1219-54.

Purnanandam, A. 2011. Originate-to-distribute model and the subprime mortgage crisis. *Review of Financial Studies* 24(6):1881-915.

Rajan, U., A. Seru, and V. Vig. 2015. The failure of models that predict failure: Distance, incentives, and defaults. *Journal of Financial Economics* 115(2):237-60.

Roubini, N. and S. Mihm. 2015. *Crisis Economics: A Crash Course in the Future of Finance.* New York: Penguin Books.

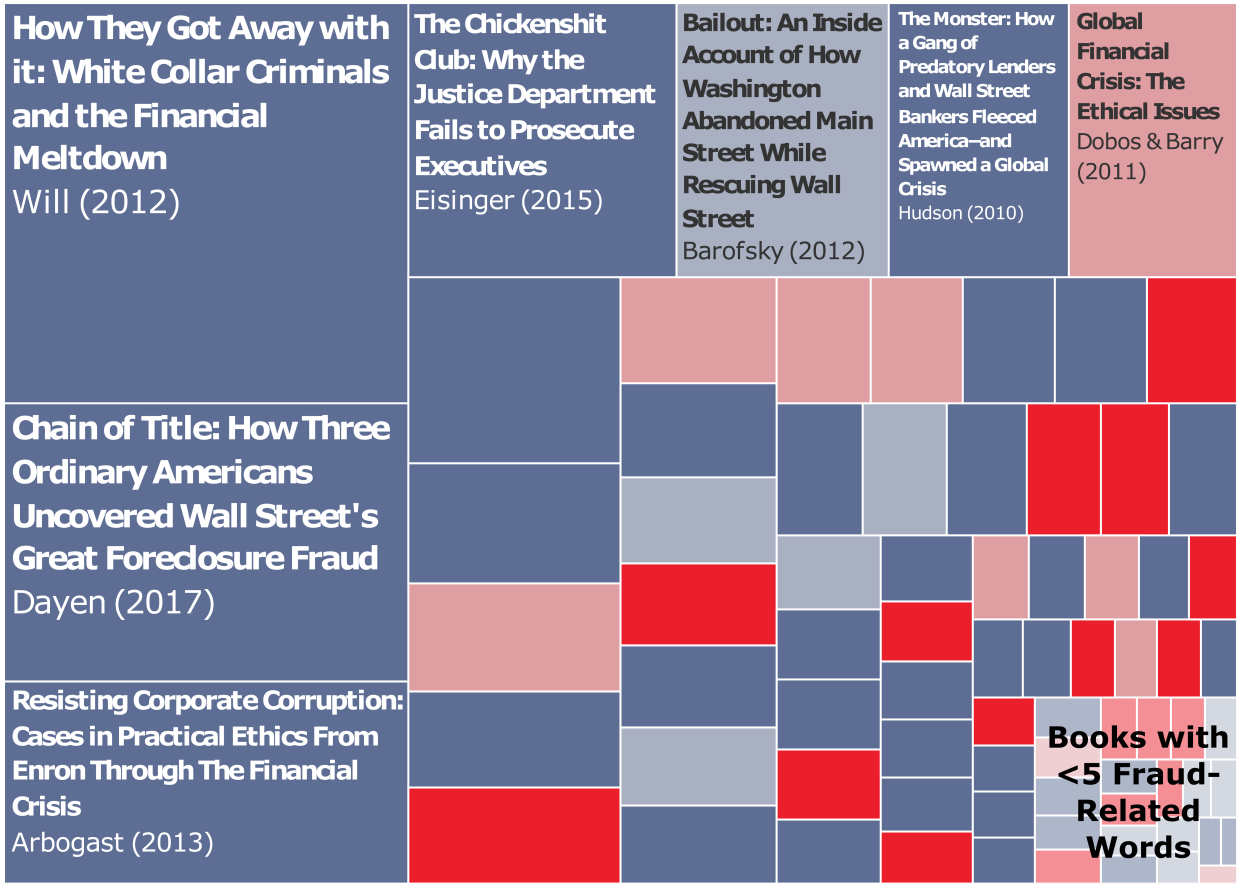
Saiz, A. 2010. The geographic determinants of housing supply. *The Quarterly Journal of Economics* 125(3):1253-96.

Sangiorgi, F., and C. S. Spatt. 2017a. Opacity, credit rating shopping and bias. *Management Science* 63(12): 4016-36.

Sangiorgi, F., and C. S. Spatt. 2017b. The economics of credit rating agencies. *Foundations and Trends in Finance* 12(1):1-116.

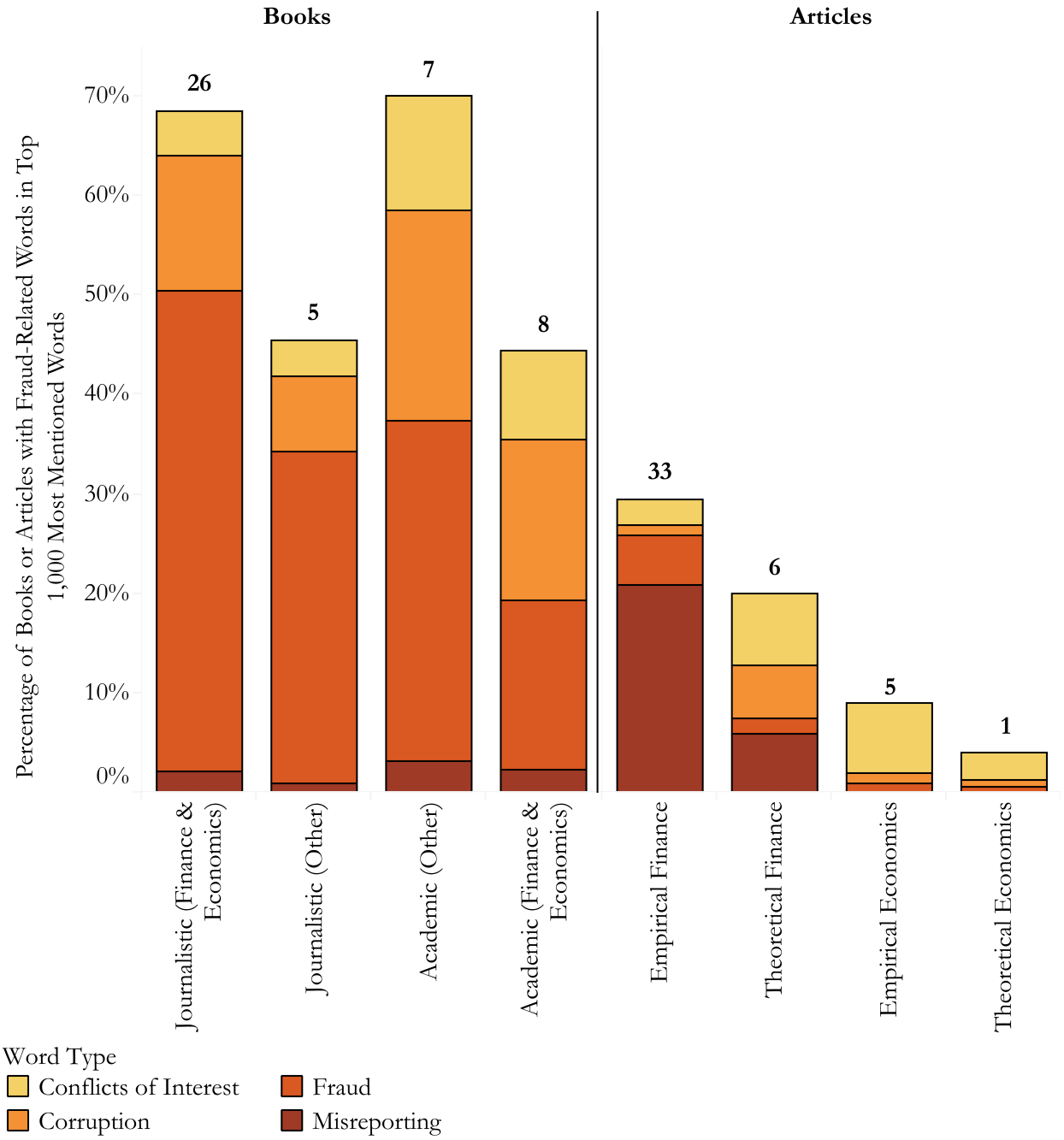
Zingales, L. 2015. Presidential address: Does finance benefit society? *Journal of Finance* 70(4):1327-63.

Figure 1. Mentions of Fraud-Related Words by Book Classification



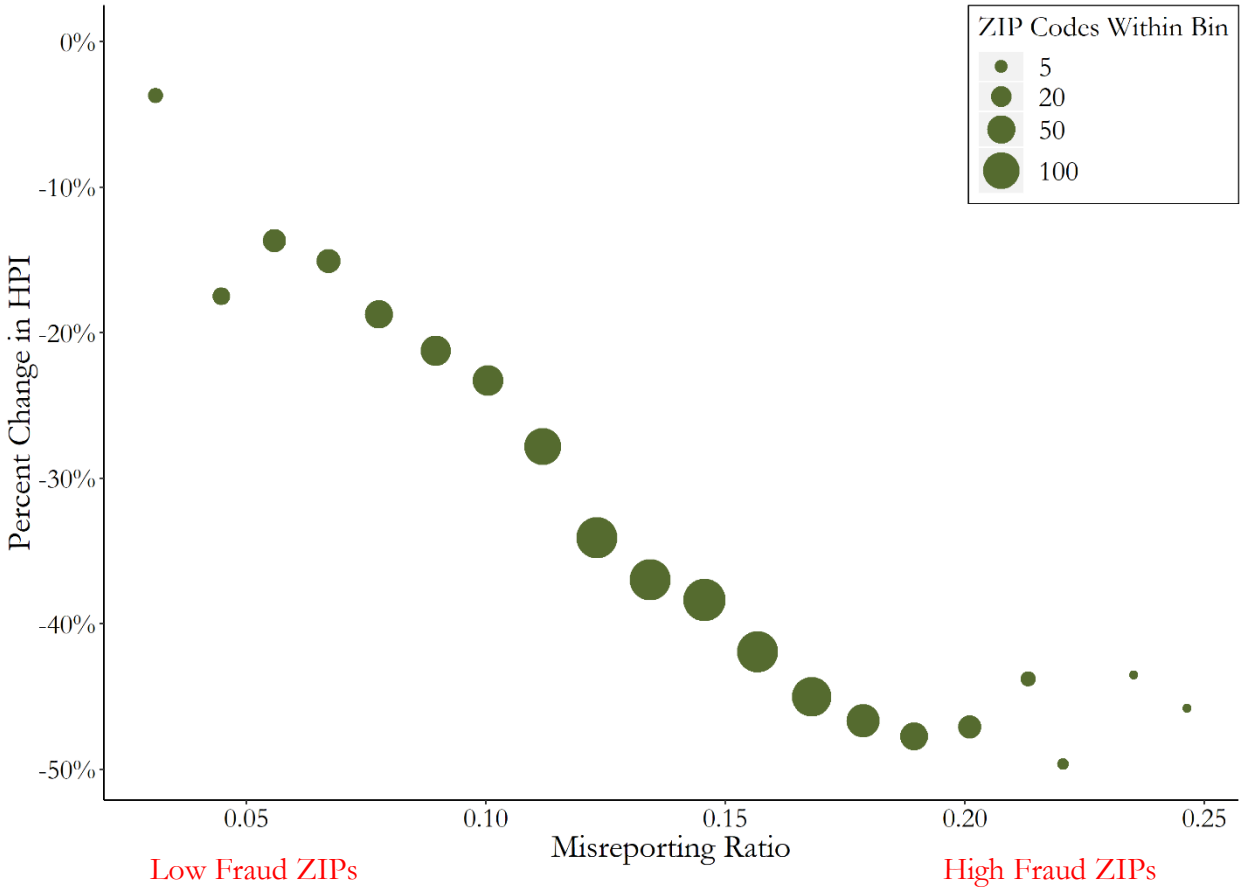
This figure visualizes the proportion of mentions of "fraud," "corruption," "conflicts of interest," "misreporting," and "misrepresentation" (and all related forms) of total word count for 77 leading books related to the 2008 financial crisis. The size of each rectangle is relative to the mentions of fraud and related words as a proportion of total word count for a given article. The range is from 0% to 0.45%. Books were selected by filtering Amazon's best seller rankings for books that mention financial crisis. The list was further filtered to exclude books that have not been cited per Google Scholar. Journalistic books include books written by journalists, private or governmental researchers, and people with PhDs and/or some university affiliation but with significant industry experience.

Figure 2. Percentage of Books and Articles with Fraud-Related Words in Top 1,000 Most Mentioned Words



This figure shows the proportion of 77 leading books and 217 top articles on the financial crisis in which "fraud," "corruption," "conflicts of interest," "misreporting," and "misrepresentation" are in the top 1,000 most mentioned words for the source. The bars are then segmented by the breakdown of fraud-related words that are most commonly mentioned by each source classification. Only articles published between 2008 and September 2018 in top journals (American Economic Review, The Journal of Finance, Journal of Financial Economics, Journal of Political Economy, Quarterly Journal of Economics, and The Review of Financial Studies) that mentioned financial crisis were included.

Figure 3: Percent Change in HPI in California and the Misreporting Ratio per ZIP Code



This binscatter plot shows the relationship between percent change in the Federal Housing Finance Agency (FHFA) HPI per ZIP code from January 2007 to the end of December 2010 on the y axis, and the ratio of misreported loans per ZIP code on the x axis. The ratio of misreported loans was calculated by taking the fraction of loans in the Zip code by a dubious originator divided by the total loan count with a known originator as calculated in Griffin and Maturana (2016b). The total number of observations are grouped into 20 bins of equivalent misreporting length (.01127) and then the observations within each bin are averaged which results in one point per bin. The size of each point conveys the number of ZIP codes within each bin. Data from 1187 unique California ZIP codes were used in the making of this plot.