

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

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July 29, 2020

This article synthesizes the large literature regarding the role of various players in Residential Mortgage Backed Securities (‘RMBS’) securitization at the center of the 2008-2009 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 Collateralized Debt Obligations (‘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 ratings 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 these zip codes. Overall, a consistent narrative based on substantial research indicates that conflicts of interest, misreporting, and fraud were focal features of the financial crisis.

^{1*} I am very grateful for numerous conversations with my financial crisis coauthors, Samuel Kruger, Richard Lowery, Gonzalo Maturana, Jordan Nickerson, Alessio Saretto, and Dragon Tang, on these issues, as well as Jonathan Cohn, Steven N. Durlauf (the editor), Amit Seru, Amir Sufi, René M. Stulz, Sheridan Titman, three anonymous referees, and many other academics and industry experts from seminars and private conversations that have helped me to better understand and interpret the available evidence. I thank Shanil Noorani, Alex Priest, Lee Seltzer, Eric Vance, Brady Wyllie, and other assistants for research support. Griffin is an owner of Integra FEC and Integra REC. Integra FEC engages in financial consulting on a variety of issues, including mortgage fraud and credit ratings. Griffin and Integra FEC have served as a consultant for the U.S. DOJ, state DOJs, the U.S. SEC, and private parties regarding some of these issues. Integra REC is a party to RMBS litigation against banks regarding mortgage fraud. Griffin is a Professor at the McCombs School of Business, University of Texas, Austin. Email: john.griffin@utexas.edu.

Despite years of research on the 2008-2009 financial crisis, there is still a lack of consensus on the crisis' causes. The purpose of this article is to synthesize this large body of research and draw judgments from empirical evidence regarding the forces leading up to the financial crisis. Significant academic research has emerged that, when considered together, builds a cohesive narrative that conflicts of interest and the malfeasant features it generated played a central role in the financial crisis.

Non-agency Residential Mortgage-Backed Securities ("RMBS"), pools of residential mortgage backed securities not guaranteed by a government agency, grew nearly threefold from one trillion to \$2.7 trillion between 2003 and 2007. Collateralized Debt Obligations ("CDOs"), which consist of the lower-level tranches or less-safe parts of RMBS, grew even faster from nearly \$300 billion to \$1.1 trillion.² Pools of loans packaged into RMBS and then CDO securities were analyzed and rated by the most reputable and independent rating agencies in the world. The ratings allowed for large swaths of institutional investors to purchase parts, or tranches, of these securities without knowledge of the complex details behind their creation. Approximately 85% of RMBS and CDOs issued were initially given the safest rating of AAA, but by the summer of 2007 these securities began to experience extensive rating downgrades and collateral value collapses. Losses to many institutions rippled across the U.S. financial system. Why did this happen?

The loan securitization process consists of a number of players that I order in terms of their economic importance and power in the securitization chain: underwriters, credit rating agencies, originators, appraisers, and CDO managers. Although it is commonly thought that 'originate-to-distribute' loans received little scrutiny, the securitization system, at least on paper, included many checks and balances to ensure standards and incentives were properly maintained across all of the system's stakeholders. For example, underwriters, who were staking their investment bank's reputation and future business on producing high-performing securitized products, conducted internal analysis

² Calculations from data provided by the Securities Industry and Financial Markets Association (SIFMA).

and hired external due diligence providers to evaluate the quality of the loans they purchased. Pools were evaluated by credit rating agencies which marketed their rating accuracy and reputation. Loans were issued by originators that presumably valued their reputation and future business with underwriters. Loans were appraised by independent appraisers with rigorous ethical standards.

Even though each participant played important and distinct roles, they all faced a similar conflict of interest. Either directly or indirectly, each participant depended on new deal flow sourced from the underwriting investment banks 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.³ Therefore, whether the various players in the securitization chain fell prey to the relevant conflicts of interest is ultimately an empirical question. The academic research summarized below is referenced with more detailed descriptions and citations 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 [Piskorski, Seru, and Witkin (2015)]. Across the universe of non-agency RMBS, Griffin and Maturana (2016a) show that 48.8% of loans had at least one of three forms of

³ 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."

misreporting (appraisal, second-lien, or owner occupancy misrepresentations). But, this total does not include misreported income [Jiang, Nelson, and Vytlačil (2014), Ambrose, Conklin, and Yoshida (2016), and Mian and Sufi (2017)], misreported assets [Garmaise (2015)], additional appraisal overstatements [Kruger and Maturana (2020)], or due diligence failures. As part of 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 their companies. 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 [FCIC (2011) and DOJ Statement of Facts with major banks]. This data was more detailed than that analyzed by academics and allowed underwriters to recognize in real-time that the representations of RMBS collateral disclosed to the public were massively incorrect. Thus, banks committed fraud by falsely and knowingly misrepresenting material deal characteristics to the public. Consistent with this evidence, banks have paid at least \$137 billion in public legal settlements⁴ for their role in underwriting and originating fraudulent securities.

Both RMBS [Ashcraft, Goldsmith-Pinkham, and Vickery (2010)] and CDO [Griffin and Tang (2012)] 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 [Sangiorgi and Spatt (2017a)] facilitated what has been coined a ‘race-to-the-bottom’ [Golan, Parlour, and Rajan (2015)] where rating agencies competed to give out laxer ratings. Rating agencies made adjustments beyond their models merely to match their competitors’ rating, and these adjustments led to worse performance [Griffin, Nickerson, and Tang (2013)]. Without the adjustments, a ‘AAA’ rating would have been ‘BBB’ [Griffin and Tang (2012)], completely altering the economics of the CDOs. In addition to offering adjustments on individual

⁴ Calculations are shown and overviewed in Griffin, Kruger, and Maturana (2019).

deals, the rating agencies used CDO models assuming that the underlying tranches of RMBS were almost uncorrelated—the default correlation was on average around 0.01 [Nickerson and Griffin (2017)]. The DOJ’s settlement with S&P documents evidence of other business professionals weighing-in on modeling assumptions due to competitive concerns and there is substantial evidence of rating agencies engaging in conflicts of interest [Griffin and Tang (2011), Kedia, Rajgopal, and Zhou (2014), Efung and Hau (2015)]. Overall, both the academic and legal evidence indicates that rating agencies issued inflated ratings to cater to underwriters in attempts to maintain market share while fraudulently presenting their ratings to the public as independent and objective.

Loan originators focused on generating volume [Keys, Mukherjee, Seru, and Vig (2010), Purnanandam (2011), Keys, Seru, and Vig (2012), and Rajan, Seru, and Vig (2015)] rather than ensuring quality. In the process, they knowingly issued loans to many borrowers with risk characteristics that did not meet underwriting guidelines [Piskorski, Seru, and Witkin (2015)]. The originators that committed the most fraud experienced the most rapid growth in market share until 2006 [Griffin and Maturana (2016a)], when early loan defaults led to their collapse. Appraisals were supposed to be independent, but significant evidence has emerged of inflated appraisals and targeted appraisals [Ben-David (2011), Carrillo (2013), Agarwal, Ben-David, and Yao (2015), Griffin and Maturana (2016a), Kruger and Maturana (2020), and Conklin, Coulson, Diop, and Le (2020)].

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 Asset-Backed Security (“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 [Chernenko (2017)]. CDOs of CDOs (“CDO²”), hybrid CDOs, and synthetic CDOs allowed the leftover tranches to also 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 [Piskorski, Seru, and Witkin (2015) and Kruger and Maturana (2020)]. 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 [FCIC (2011) and bank DOJ settlements]. Underwriters of previously perceived high reputation sold the largest volume of structured securities in the first half of 2007 [Griffin, Lowery, and Saretto (2014)]. Banks took Credit Default Swap (‘CDS’) derivative bets in the form of long-short trading strategies to profit from the impending collapse of BBB RMBS collateral [FCIC (2011)]. They also held inventory from their securitization activities [Erel, Nadauld, and Stulz (2014)] and asset-backed commercial paper that flowed back to the balance sheet [Acharya, Schnabl, and Suarez (2013)], which subsequently resulted in large losses. Although not the focus of this paper, because of the complexity and inter-related nature of shadow banking, mortgage-related losses were amplified across the financial system [Acharya and Richardson (2009), Brunnermeier (2009), and Billio, et al. (2012)]. However, it is clear and fundamental to note the timing of events: the banking crisis was not a random sunspot event, but was preceded by a collapse in rating trust in the structured products market.

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 [Mian and Sufi (2009)]. The geographic distribution of the rise and fall of real estate valuations closely maps to areas with higher subprime activities, and even more explicitly to zip codes where fraudulent originators had large market share [Griffin and Maturana (2016b)]. Zip codes with large amounts of fraud experienced a 32.5% house price bust, whereas zip codes with low levels of misreporting only experienced a 5.4% house price correction; these levels of

misreporting along with subprime housing map to geographic variation in house prices better than other variables proposed in the literature [Griffin, Kruger, and Maturana (2020)].

Overall, the evidence builds a cohesive narrative that the conflicts of interest, misreporting, and outright fraud in RMBS and CDOs were not sideshows, but central features of the crisis. First, the massive wave of structured products was profitable to banks as they turned extremely poor loans into largely AAA paper. Second, the excessive and fraudulent lending supply was closely linked to the massive housing bubble. Nevertheless, the macro nature of the crisis and the simultaneity of multiple events is not the cleanly identified experimental setting that econometricians might hope for, and most studies on the subject lack strong causal instruments. Thus, the inferences in this paper are largely based on abductive reasoning from the various pieces of evidence established from academic studies as well as from government investigations. While most of my research in this area supports the fraud-related view, many alternative narratives are also available⁵ that carry merit and I briefly discuss these views to the extent that there is related academic research.

The financial crisis findings also map to a broader historical narrative that often finds that 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.

⁵ Lo (2012) surveys leading academic and practitioner books about the crisis. Many practitioner books, such as Lewis (2010), tell interesting anecdotes of both questionable and nefarious activities. Popular academic books about the crisis are written by Akerlof and Shiller (2015), Roubini and Mihm (2011), and Mian and Sufi (2015).

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 1,700 bankers⁶ served time in prison, 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 [Griffin, Kruger, and Maturana (2019)].

The goal in writing this paper is to increase awareness of the costs of fraud. I realize that many of the connections made between academic papers here are conceptual. In a world with incomplete information, it is impossible to document the full magnitude of effects that are imprecisely measured. Despite these limitations, the depth and strength of the evidence speaks 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 appear to be alive in our marketplace today and similar securitization structures have re-emerged, I follow Zingales (2015) in hoping that further awareness of the ‘rent-seeking’ dimension of finance will spur additional research such that the unforeseen costs of such distortive activities can be mitigated.

1. Background and Securitization Conflicts of Interest

1.1. AAA Structured Products

⁶ <https://www.gao.gov/assets/160/152972.pdf>

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 1,000.⁷ Rating performance 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 of RMBS, 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. Based on prices from individual RMBS, non-agency RMBS recovered to 90% of their original value by December 2019, but because of falling interest rates over this period, this is 74% below the 166.4% total return for the agency Bloomberg Barclays US MBS Index over the same period from July 2007 to December 2019. AAA-rated tranches in 2006 performed better, but still experienced drastic declines. BBB-rated tranches from 2006 and 2007 vintages experienced more than a 90% decline from their initial price and never recovered. These lower-rated tranches of RMBS were the building blocks for most AAA-rated CDOs. How were these products created?

1.2. 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 the quality of securities. Exhibit 1 shows the major players involved in the creation of securitized products. The players are ordered in terms of their relative power and economic importance in overseeing the securitization process; those at the top (underwriters and rating agencies) are the ultimate arbitrators of securities before sending them to investors, whereas the players at the bottom are more disparate and behind the scenes.

⁷ 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 the Securitization Chain

Securitization Chain	Intended Role	Potential Conflict
Underwriters	Stake reputation on quality	More profit from lower-quality loans marketed as high-quality
Rating Agencies	Independently certify risk	Depend on underwriters for future business
Originators	Issue high-quality loans	Paid on volume and markup, not loan performance
Appraisers	Independently assess house value	Depend on originators for future business
Collateral Managers	Stake reputation on performance	Depend on the underwriters for future deal flow

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. A possible misperception from this literature is that ‘lax screening’ practices must mean that there were simply naïve mistakes made from the lack of a loan examination process. However, we now know through the Financial Crisis Inquiry Report [FCIC (2011), p. 165-168] 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. Additionally, Keys, Seru, and Vig (2012) showed that borrower characteristics (like self-employment status) that a bank did not report in securitization were distinctly worse for those slightly above securitization thresholds. Choi and Kim (2020) show that private loans were screened and processed more rapidly than GSE loans in the boom period, up until when the private market collapsed and more effort was spent on screening. Originate-to-distribute seems to have facilitated poor due diligence practices.

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 and safeguards to ensure that each player 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, a CDO collateral manager, and smaller players, including auditors, due diligence companies, loan servicers, data providers, and internal and external Automated Valuation Model (‘AVM’) modelers. Each player had checks and balances. For example, appraisers supplied independent house valuations subjected to best appraisal practices and had their accuracy checked by underwriters, who would leverage internal and external AVMs.

Additionally, 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 and pass such misrepresentations through to the investors, 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, despite the detailed 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 major players in the securitization chain: underwriters, credit rating agencies, originators, appraisers, and CDO managers, as well as questions surrounding the role and effect on individuals, institutions, and incentives within the banks.

2.1. Underwriters

2.1.1 What is the evidence of mortgage fraud?

RMBS prospectuses list key asset quality features such as 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 in geographic regions, or at certain banks. One of the earliest papers by Ben-David (2011) finds evidence of inflated appraisals and ‘cash back’ deals in highly-levered deals in the Chicago area. Piskorski, Seru, and Witkin (2015) and Griffin and Maturana (2016a) were the first studies to examine and find wide-scale evidence of misreporting from 2002 through 2007. Even though the studies used completely different data and loan-level methodologies, they reached very similar conclusions on the widespread nature of second-lien and owner occupancy misreporting across the entire space of all major non-agency RMBS underwriters. 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. These papers find that loans with undisclosed second-liens issued on the same day as the first-lien amounted to approximately 10% of all non-agency loans, with the same originator often underwriting both the first- and second-lien loan, which 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, indicating that the fraud was not confined to the non-agency space.

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 had 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 which were also quite prevalent.

Jiang, Nelson, and Vytlačil (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 Vytlačil (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 over-represented income of 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 correlate at the zip code level with Piskorski, Seru, and Witkin (2015)'s second-lien misreporting.

The combined value of public settlements of such mortgage frauds against underwriting banks is over \$137 billion.⁸ 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 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,⁹ including: (a) sampling small sets of loans in due diligence and not extrapolating these inferences to the entire pool; (b) waiving through bad loans that did not meet underwriting guidelines into the pool anyway; (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?

⁸ Calculations are shown and overviewed in Griffin, Kruger, and Maturana (2019).

⁹ A summary of such evidence is found in Internet Appendix C of Griffin, Kruger, and Maturana (2019).

As discussed above, the Statements of Facts and the Financial Crisis Inquiry Report (2011) demonstrate that underwriters 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. But, this transparency was never provided to investors. The pattern seems to satisfy the legal definition of *fraud*,¹⁰ as the false 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 for 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 evidence consistent with the tailoring of security structuring for short-bets and negative performance 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 find 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 securitization 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

¹⁰ <https://www.fbi.gov/resources/library/mortgage-fraud-reports>

overstated? In addition to providing false information to main inputs and directly inflating 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 (2010) find that RMBS ratings became more inflated, particularly from 2005 to 2007. They find that a simple model with loan-level features and historical parameters available to the credit rating agencies 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 [Golan, Parlour, and Rajan (2015)], 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 reverted back to their models and undid these adjustments. This

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

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

demonstrates that the adjustments were made at issuance to match competition, consistent with a ‘race-to-the-bottom’ effect of competitive catering to the investment banks.

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. Eling 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.

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 create an 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 issue increased with deal complexity. Were these problems on a deal-by-deal basis, or could the inherent over-optimistic nature of the models themselves have 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. Conceptually, since the ABS CDO was comprised of lower-tranches of RMBS,

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.

the correlation near zero seems odd since most diversification benefits are captured within the underlying RMBS loan pool.

An interesting question is whether these low assumptions were simply due to poor modeling choices or business concerns to compete for more aggressive ratings. The DOJ and state DOJ partners secured a \$1.375 billion settlement from S&P and a \$864 million settlement with Moody's.¹⁴ As part of the settlements in each case, an agreed-upon Statement of Facts¹⁵ document detailed evidence of business concerns being considered in modeling choices. For example, in the S&P settlement, it documents that a CDO model that was tougher than the previous model was not released as scheduled because of concerns of S&P missing 'potential business opportunities'. In the Moody's settlement, it is explicitly referenced that Moody's was concerned about the correlated nature of MBS tranches feeding into CDOs and developed and tested new methodology to address these issues. One analyst noted that, "The correlations will be a big problem. As the correlations increase our Aaa will be even harder to achieve." Although this evidence does not imply that the credit rating agencies foresaw the nature in which national lending practices likely caused housing prices to be correlated more highly than in the past, it does appear that the consistently aggressive modeling choices used by the rating agencies were decisions carefully influenced by business concerns. Interestingly, the view that market structure puts downward pressure on ratings quality is also shared by the former CEO of Moody's.¹⁶

2.2.2 Did credit rating agencies commit fraud?

¹⁴ Griffin and Integra FEC worked as financial consulting experts for the federal and some state DOJ's on these cases for over six years, but only publicly released facts are discussed here.

¹⁵ <https://www.justice.gov/file/338706/download>, <https://www.justice.gov/opa/press-release/file/926556/download>

¹⁶ As released in the congressional committee on Credit rating agencies and the Financial crisis, an October 2007 email from former Moody's CEO to the board, Raymond McDaniel describes the problem: "The real problem is not that the market does underweights ratings quality but rather that, in some sectors, it actually penalizes quality by awarding rating mandates based on the lowest credit enhancement needed for the highest rating. Unchecked, competition on this basis can place the entire financial system at risk."

As described in their respective DOJ Statement of Facts, both S&P and Moody's had internal codes and other public statements which clarified the independent and objective nature of their ratings and safeguards against conflicts of interest. For example the S&P '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 not the case.

A related argument regarding rating agencies is that since the investment banks knew and created the rating 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 about 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?

In reviewing the credit rating problems and literature, White (2010) states that: "The securitization of these subprime mortgages was only able to succeed—that is, the resulting securities were only able to be widely marketed and sold—because of the favorable ratings bestowed on the more-senior tranches." This included AAA MBS, but an important aspect of the economics of structured products was the repackaging of the MBS into ABS CDOs. Additionally, most of the AAA-rated tranches of CDOs and CDO²s 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 historically analyzed 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.¹⁷

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. 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, they had ample reason to know that the assessments of the rating agencies were 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 (2010)] 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 existed, a second form of ratings fraud closely followed because the banks knew that RMBS ratings relied on key misrepresented loan features. 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 to the demand for higher ratings.

¹⁷ 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 income and documentation misreporting. Their measure of dubious origination practices aggregated at the zip code level is also correlated with Mian and Sufi (2017)’s measure of income overstatement. Kruger and Maturana (2020) 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, and Evanoff (2016) find evidence of originators steering clients into more expensive mortgage products through affiliated companies. The customers were charged considerably higher rates, even though they qualified for less expensive products and had lower default rates. The behavior especially targeted women and low-income borrowers. Consistent with this evidence, federal and state agencies drove major settlements with Countrywide, Citigroup, Wells Fargo, Goldman Sachs, and others for steering customers into more expensive mortgages. Fligstein and Roehrkasse (2016) find 43 financial firms and conglomerates which settled lawsuits for predatory mortgage lending.

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 (2020) 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 appraisal values *exactly* equal the transaction value, which is confirmed by Conklin, Coulson, Diop, and Le (2020).

While a targeted appraisal indicates that the appraisal is not conforming to appraiser guidelines, it does not indicate whether the appraisal is inflated. Griffin and Maturana (2016a) and Kruger and Maturana (2020) 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 (2020) 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, and over 11,000 appraisers¹⁸ signed a petition calling for changes in the industry structure where lenders directly or indirectly pressure 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 (2020) 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

¹⁸ <http://appraiserspetition.com>

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. Collateral managers who took higher quality collateral were more likely to be from firms with other lines of business and were seemingly more concerned about reputational risk.

2.6. Individual Borrowers and the Public More Generally

Let us next discuss to what extent individual house buyers were involved in fraud and to what extent they were affected by some of the activities mentioned here. Piskorski, Seru, and Witkin (2015) and Griffin and Maturana (2016a) show owner occupancy misreporting was likely driven by borrowers and was not systematic across lenders. Garmaise (2015) finds that borrowers who report unverified assets slightly above round number thresholds are more than twice as likely to default, consistent with borrower-led asset misrepresentation. Ambrose, Conklin, and Yoshida (2016) use a model of estimated income compared to reported income and find that income misreporting was borrower-led, but that banks were likely aware of this misreporting. Ben-David (2011) shows that financially constrained home buyers took on mortgages at artificially inflated transaction prices to obtain cash back. Note that these papers do not argue that lenders were unaware of the misreporting.¹⁹ Individuals also engaged in speculation [Chinco and Mayer (2016), Adelino, Schoar, and Severino (2016), and Gao, Sockin, and Xiong (2020)]. Mian and Sufi (2018) show that this speculation was concentrated in a small set of speculators and flippers. Amromin, Huang, Sialm, and Zhong (2018), find that prime borrowers took out more complex mortgages and exhibited behavior consistent with strategic default.

¹⁹ Because of the due diligence process, originators and underwriters should have been largely aware of these forms of misreporting.

Although only a relatively small set of individuals were engaged in questionable activities, the costs were born by individual consumers quite broadly. Academic and court evidence has shown individuals were victims of loan steering, as discussed in Section 2.3; in terms of comparing borrower-led behavior to lender-led steering, Agarwal, Ambrose, and Yao (2020) conclude that lenders steered the lower-risk borrowers into second-liens to avoid mortgage insurance, an activity consistent with considerable lender sophistication.

Many individuals bought houses at inflated prices and were forced into foreclosure due to the fluctuations in prices. Additional important forms of loss include losses in investment portfolios, including pension and mutual funds, and the tax burden due to fraudulent security losses to public entities and subsequent banking bailout. More broadly, individuals were subject to 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. Nevertheless, the extent to which all of these costs are due to fraud or other conditions is difficult to quantify given both the scope of the crisis and the duration of the financial crisis' recovery.

2.7. Investors

2.7.1 Were investors informed/ aware of security misrepresentations?

An opinion 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. This is not necessarily the case. The added spread could have been due to illiquidity differences, which is a central feature of recent academic research. 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 commensurate with the previously discussed large amounts of mis-rating in CDOs and RMBS, the extent of fraud in the securities, and

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 investors were unaware of the mispricing. Kruger and Maturana (2020) 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, 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.

Cordell, Huang, and Williams (2011) indicate that lower tranches of CDOs were largely securitized into other CDOs and CDO²s, demonstrating the 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 my 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.²⁰ 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%).

Acharya, Schnabl, and Suarez (2013) found that banks engaged in regulatory arbitrage to issue \$1.3 trillion of asset-backed commercial paper conduits with assets from, among others, mortgages, CDOs, and other structured and non-structured products during the run-up. The conduits were short-term instruments that reached throughout the banking system, but were backed by longer-term liabilities. Frame, Fuster, Tracy, and Vickery (2015) find that Fannie Mae and Freddie Mac held \$300 billion in non-agency loans to profit from the available credit spread. 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 less severe 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 and bank Statement of

²⁰ 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, including non-agency MBS (\$4.96 Trillion), home equity ABS (\$2.23 Trillion), and CDOs (\$0.659 Trillion) issued between 2000 and 2010, but with most of the issuances between 2003 and 2007. The numbers above also seem to be missing categories such as pension funds. For example, data collected by the author show that most pension funds were holding AAA RMBS positions.

Facts that such information was widely known within banks. It seems unlikely that underwriting banks could see all the data on poor loans and mounting defaults and still be bullish on housing.

Was the increase in supply due to optimistic lender expectations? Besides many theoretical papers, the empirical paper that is commonly pointed to regarding evidence for overly optimistic or naïve 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 individuals 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.²¹ 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.

In areas of elastic housing supply, house price increases are expected to be 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 (2020) 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

²¹ New York, where most of the underwriters were located, did not experience the wild fluctuations present in the 'sand states.'

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.

A related possibility widely discussed but most prominently examined by Falhenbrach and Stulz (2011) is whether CEOs took bets not in the interest of shareholders. They find that bank CEOs did not sell shares in advance of the crisis and that CEOs took an average loss of \$30 million on their bank's positions.²² They conclude that the most likely possible explanation is that, "Ex ante, these risks looked profitable for shareholders. Ex post, these risks had unexpected poor outcomes. These poor outcomes are not evidence of CEOs acting in their own interest at the expense of shareholder wealth."

So why did the banks take such large losses that even surprised, at least partially, their CEOs? 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 the creation of these securities and some holdings of long AAA positions in super-senior CDOs. The idea was that when housing deteriorated, banks could profit from the defaults of the CDS positions and then unwind the 'super-senior' AAA positions after the CDS bets paid off [FCIC (2011)]. These shorts may have also been viewed as partial hedges for their securitization activities. As previously discussed, Faltin-Traeger and Mayer (2012) find evidence supporting the view that underwriting banks intentionally structured CDS for poor performance.

²² Cziraki (2018) find that CEOs and other bank insiders with larger exposure to real estate sold more stock in 2006 relative to banks not exposed to real estate. In terms of whether short-termism caused the crisis, Fahlenbrach and Stulz (2011) also find that banks with more short-term cash incentive pay relative to stock compensation did not outperform. In contrast, Kolasinski and Yang (2018) use a measure of CEO compensation including equity and option vesting schedules and find that firms with CEOs whose compensation packages would allow them to cash out sooner had more exposure to subprime and higher stock returns in 2007, but lost more in the crisis and experienced larger fines for subprime-related fraud. Beltratti and Stulz (2012) find that shareholder friendly boards did not perform better through the crisis.

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 banks. They find empirical support that losses were related to the ongoing structured finance activities within a 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. Acharya, Schnabl, and Suarez (2013) find that even though banks issued asset-backed commercial paper conduits off-balance sheet for regulatory arbitrage, conduit loss estimates between \$68 billion and \$204 billion flowed back to conduit sponsors.

Overall, even though there is an impressive set of facts about the role of banks and bankers in the crisis, there is no clear academic consensus as to if top bankers saw the crisis coming. One simple but consistent explanation is that even though banks were negative on subprime through their lower-rated MBS short bets and plans to unwind AAA long positions, they thought their banks were properly hedged and 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 their 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 so 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, 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. Similarly, Piskorski, Seru, and Witkin (2015) fail to find lower levels of misreporting for banks with better-perceived reputation.

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. 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.

Rajan (1994) describes that the market may be more forgiving of poor bank performance after an adverse economic shock. Consistent with this intuition, Gopalan, Nanda, and Yerramilli (2011) find that “correlated bankruptcies that occur during periods of credit crisis appear to have a minimal effect on lead arrangers, suggesting that reputation concerns may give them ex ante incentives to herd in lending decisions.” Consistent with these papers, an interesting feature of the crisis aftermath is that large underwriters (excluding bankrupt Bear Sterns and Lehman Brothers) also emerged as the largest bankers post-crisis. Thus, at least from a casual look, there does not appear to be large differences in reputation losses across banks, perhaps due to the fact that most of the major underwriters were engaged in creating fraudulent RMBS and CDOs, and that the banks were bailed out.

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 (2019) 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 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. There were at least thirty prohibition orders prohibiting individuals from the banking industry issued from 2008 to 2012 that

can be linked to loan misrepresentation or steering.²³ Overall, the fact that individuals were not prosecuted criminally or civilly, and few lost their jobs meant that there were little direct costs to employees that engaged in fraudulent behavior other than for the banks that went bankrupt.

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)].²⁴ 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

²³ From January 1, 2008 through December 31, 2012, the National Credit Union Administration (NCUA), Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), and Board of Governors of the Federal Reserve System (Fed) handed down 777 prohibition orders. 469 of these orders did not list a reason for the order. Of the remaining 308 prohibition orders listing reasons, 27 involved loan misrepresentation, and three involved both loan misrepresentation and loan steering.

²⁴ 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.

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.²⁵

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 there could be excess lending outside of subprime zips.

As previously discussed, there were widespread differences in fraudulent mortgage origination practices across originators [Piskorski, Seru, and Witkin (2015) and Griffin and Maturana (2016a)]. 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 1, 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

²⁵ Mian and Sufi (2018) also construct a new measure of securitization lending supply and find a causal link to prices.

originators only experience 5.4% price decreases. Note that none of this sorting is documenting causality, but a correlation.

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 market share of dubious originators within a zip code is strongly related to house prices, even within an MSA, and even when controlling for past house price growth. They also demonstrate that the distortive effects of dubious origination practices were not limited to subprime zip codes, but were 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 and a regulatory change in Chicago, the paper finds evidence of causality running from the share of dubious origination in a zip code to house prices.

This is not to say that there could not have been other channels at work in the crisis. The largest area of academic contention is whether speculation, not excess credit or fraud, drove house prices. Chincio and Mayer (2016), Adelino, Schoar, and Severino (2016), and Gao, Sockin, and Xiong (2020) 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, and Violante (2017)].

Reasons the papers obtained varying views may be from measurement differences in MSA level variation compared to zip code level variation, different focuses on either the boom or bust, or differences in construction and comparisons. Griffin, Kruger, and Maturana (2020) 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 (2020) perform a simple but interesting counterfactual by examining house price fluctuations in the boom and bust in zip codes with varying levels of fraudulent activity. The zip codes with high worse originator share experienced house price growth of 60.9% during 2003-2006, but prices only rose 25.9% in zip codes with low worse originator share. During the 2007-2010 bust, zip codes with a large share of dubious credit fell 32.5%, compared to only 5.4% in zip codes with low levels of fraudulent credit. These results are not explained by speculation, house price elasticity, or other measures, but at the same time do not prove causality.

The worse originator market share is the market share of originators with the highest second-lien fraud. A puzzle is that the fraction of second-lien misreporting by these originators peaked in the first half of 2005 [Griffin and Maturana (2016a)], yet the market share of these originators continued to expand and peaked in the second-half of 2006. Griffin and Maturana (2016a, 2016b) show that lenders with higher levels of second-lien fraud have worse predictive power from loan characteristics and take the view that second-lien misreporting by an originator is an indicator of other fraudulent and poor practices. The view that misreporting practices by dubious originators are systemic and not just limited to second-lien fraud is also consistent with Statements of Facts in DOJ settlements. Yet, one must ask whether it is the nature of the fraud by the dubious originators that led to house price dislocations, or other excessive but non-fraudulent lending practices by these lenders that led to house price dislocations. It seems plausible that the two forces work together, but given data limitations it is doubtful that this question can be disentangled empirically.

Logically, what happens when a lender commits mortgage fraud? If a loan's value is greater than the value of the house, the loan would likely not be able to be securitized since most RMBS prospectuses state that all loans have LTV ratios below 100. But, if the lender overstates the value of the house through an inflated appraisal, such that the loan value is no longer greater than the value of the house, the misrepresented loan can be securitized.

What if all the misrepresentations had been disclosed, would the loans have been made? If extremely blatant, where the loan violates features stated in RMBS prospectuses, then the loan couldn't be made if the misrepresentation was revealed. If revealed, the misrepresentation would likely be penalized by the credit rating agencies' models, potentially leading to lower ratings and making the RMBS less profitable. The most likely answer is that some of the loans would not have been made and some of the loans would have been made, but at a less profitable price point. It is unclear if the reduction in profit from revealing the misrepresentation would have destroyed or merely reduced the economic viability of the loans.

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 are also strongly empirically correlated 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 2007-2009 financial crisis. The academic evidence shows that the issues were widespread as most firms engaged

in underwriting, credit rating, originating, appraising, and CDO managing, which together 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 facilitated a massive and costly dislocation in housing prices in the run-up, a 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,²⁶ 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. Policy makers should consider the forward-looking implications of bailing out banks seemingly struggling from short-term liquidity issues that may later be linked to wide-scale fraudulent activity. Forensic financial research may also be able to detect

²⁶ As calculated from a 2013 report by the United States Government Accountability Office.

questionable activity in its early stages, when the cumulative spillover costs of fraud can hopefully be less severe.

Although all of us had hoped history would not repeat the same mistakes, the conflicts of interest regarding underwriters, rating agencies, originators, and appraisers at the heart of 2003-2007 RMBS and CDO securitizations appear to be of a similar nature and an item of concern in other securitized (collateralized loan obligation and commercial mortgage backed securities) and non-securitized markets even recently. As the financial crisis revealed serious structural issues in the prior period, the current COVID economic crisis could reveal the extent to which conflicts of interest and malfeasance have been hiding in financial markets today.

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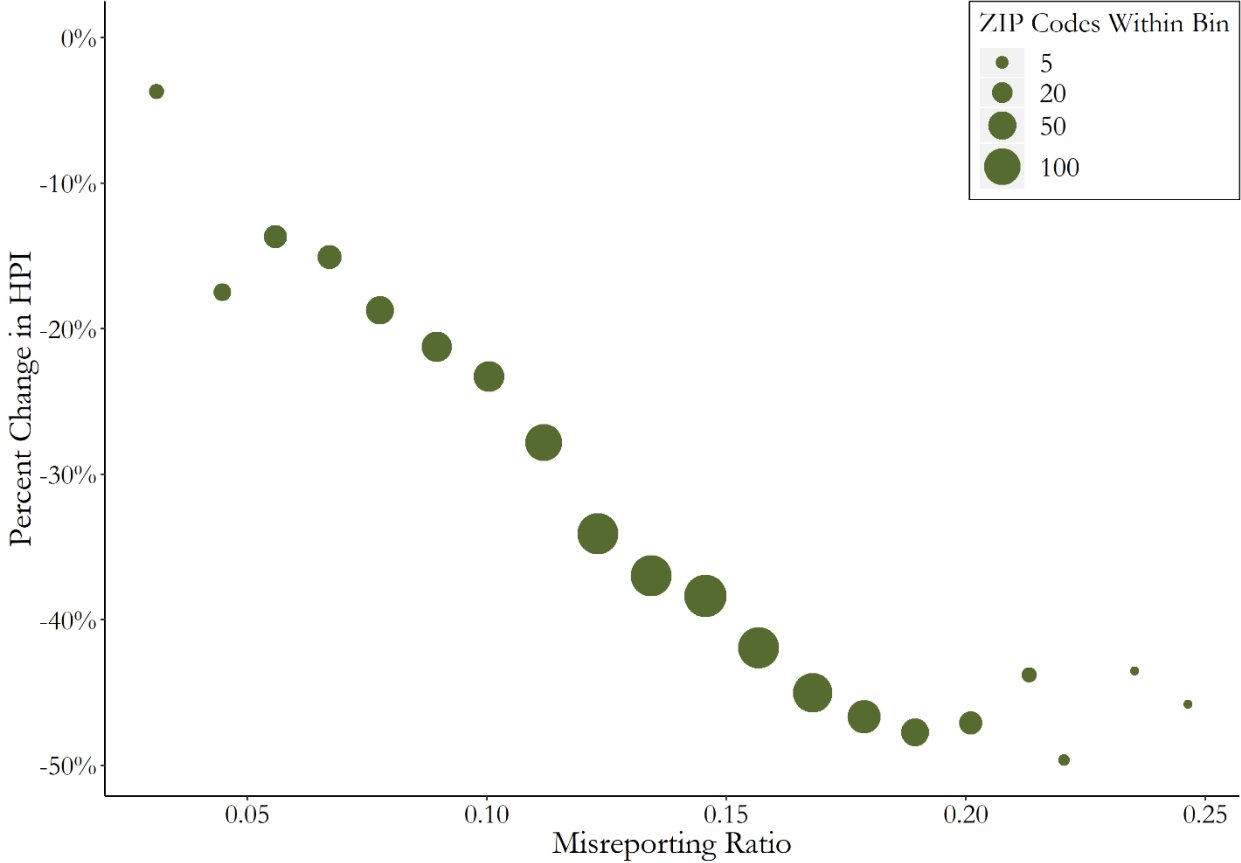
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Figure 1: California House Price Decreases from 2007-2010 and the Prior Misreporting Ratio per ZIP Code



Low Fraud ZIPs

High Fraud ZIPs

This binscatter plot shows the relationship between the 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 (from 2003-2007) divided by the total loan count with a known originator as originally 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 FHFA (2020) for 1187 unique California ZIP codes were used in the making of this plot. Further details are in the replication package.

**Disclosure Statement for John M. Griffin for “Ten Years of Evidence:
Was Fraud a Force in the Financial Crisis?”**

- *Each author of a submitted article should identify each interested party from whom he or she has received significant financial support, summing to at least \$10,000 in the past three years or that will exceed this threshold under contracts in place at the time of submission. Support includes financial support (e.g., consulting fees, retainers, grants, research support, equity shares or stock options, and the like), and in-kind support (e.g., access to data). An interested party is any individual, group, organization, or business entity that has a stake (e.g., financial, political, regulatory, etc.) related to the article.*

Because of my early work on credit rating agencies, I was asked to be a consultant for the U.S. DOJ on a more than four-year investigation which ultimately led to a \$1.375 billion dollar settlement of the U.S. DOJ against S&P. From that contract, a company (Integra FEC) developed that primarily assists government entities in fraud investigations. I am an owner/CEO of Integra FEC LLC and Integra REC LLC. Data used in most of my papers related to RMBS securities was purchased by Integra FEC LLC, a Texas LLC.

Integra FEC LLC’s clients in issues related to credit ratings or structured products over the last few years have been federal agencies (DOJ and SEC), state DOJ’s, and private law firms. Integra FEC LLC has engaged in consulting on a variety of issues including credit ratings and RMBS fraud.

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Griffin is an owner/CEO of Integra FEC LLC and Integra REC LLC.

- *The disclosures required above apply to any close relative or partner of any author.*

I am not aware of any close relatives who consult on issues related to this paper.

- *Each author must disclose if another party had the right to review the paper prior to its circulation.*

No third-party had a right to review the paper.

- *If any support provided to an author by an interested party is subject to any non--disclosure obligation, this fact must be disclosed to the Journal along with the nature of the conflict.*

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