working paper 12 20R

Mortgage Companies and Regulatory Arbitrage

Yuliya Demyanyk and Elena Loutskina

FEDERAL RESERVE BANK OF CLEVELAND

Working Paper 12-20R April 2014*

Mortgage Companies and Regulatory Arbitrage

Yuliya Demyanyk and Elena Loutskina

Mortgage companies (MCs) do not fall under the strict regulatory regime of depository institutions. We empirically show that this gap resulted in regulatory arbitrage and allowed bank holding companies (BHCs) to circumvent consumer compliance regulations, mitigate capital requirements, and reduce exposure to loan-related losses. Compared to bank subsidiaries, MC subsidiaries of BHCs originated riskier mortgages to borrowers with lower credit scores, lower incomes, higher loan-to-income ratios, and higher default rates. Our results imply that precrisis regulations had the capacity to mitigate the deterioration of lending standards if consistently applied and enforced for all types of intermediaries.

Keywords: Banking Regulation, Regulatory Arbitrage, Shadow Banking, Lending Standards, Mortgage, Foreclosure, Bank, Crisis.

JEL Codes: G21, G28, D12.

*First version: September 2012. Earlier revisions November 2012 and May 2013.

Yuliya Demyanyk is at the Federal Reserve Bank of Cleveland, and she can be reached at ydemyanyk@clev.frb.org. Elena Loutskina is at the University of Virginia, and she can be reached at eloutskina@virginia.edu. The authors thank Jennifer Bray, Mark Dobbins, Tom Fitzpatrick, Mark Greenlee, Chris Henderson, Paul Kaboth, and James Thomson for sharing their knowledge about the supervision and regulation of mortgage companies. They thank Sumit Agarwal, Scott Frame, John Krainer, Marc Lipson, Atif Mian, Amit Seru, Philip Strahan, Daniel Streitz, the participants of American Economic Association meetings, the Federal Reserve System Committee on Financial Structure and Regulation meetings, the Financial Intermediation Research Society conference, and seminars at the University of Virginia, the Federal Reserve Bank of Cleveland, and Georgetown University for useful discussions and comments.

1 Introduction

The collapse of the housing market in 2007 initiated an economic downturn with a profound impact on the world economy (Brunnermeier (2009)). The securitization market, "shadow banking," and inadequate regulation are widely blamed for the deterioration of the lending standards and, ultimately, the crisis.[1] There is little direct empirical evidence, however, on the behavior of "shadow banking" credit intermediaries and the effect of their regulations (Keys, Mukherjee, Seru, and Vig (2009) and Acharya, Schnabl, and Suarez (2011)). This paper shows that a regulatory gap between depository (banks) and nondepository (mortgage companies—MCs) credit intermediaries altered the behavior of even regulated lenders and contributed to the deterioration of underwriting standards in the mortgage market. Our results suggest that regulations prior to 2007 had the capacity to mitigate the deterioration of precrisis lending standards, but only if applied and enforced similarly across all lenders.

Depository institutions are subject to safety and soundness regulations, deposit insurance requirements, and consumer compliance regulations, among others. These regulations are designed to curb banks' risk-taking behavior stemming from underpriced deposit insurance.[2] The seminal banking literature, however, questions the necessity of regulating credit intermediaries that originate loans to distribute (OTD). Origination of risky loans requires soft information production, and thus should be dominated by banks which are better ex ante screeners (Leland and Pyle (1977), Boyd and Prescott (1986)) and more efficient ex post monitors (Diamond (1984)). OTD lenders, such as MCs, should predominantly originate loans based on hard information that they can pass to the secondary market investors (Rajan, Seru, and Vig (2009), Loutskina and Strahan (2011), and Gorton and Pennacchi (1995)). By extension, MCs should be "market-regulated" to maintain high underwriting standards.

MCs are effectively market-regulated. They fall under a significantly smaller set of regulations as compared to banks. Even MC subsidiaries of heavily regulated bank holding companies (BHCs) enjoy weak regulations and lax enforcement of them. To isolate and evaluate the impact of the

[1] See, e.g., Mian and Sufi (2009), Keys, Mukherjee, Seru, and Vig (2010), Mian and Sufi (2010), and Purnanandam (2011) for the evidence of secondary loan market impact on the deteriorating lending standards. Agarwal, Ambrose, and Yildirim (2010), Demyanyk and Van Hemert (2011), and Mayer and Pence (2008) document the significant role of subprime lending in the 2007 crisis.

[2] Flannery (2007) argues that "left to themselves, banks would accept too large a default probability, so supervisors design constraints to increase bank safety." The regulations should be binding to ensure their effectiveness.

regulatory gap, we examine behavior of BHCs that lend through both affiliated depository institutions (ADIs) and affiliated MCs (AMCs). The within-BHC analysis allows us to nonparametrically control for parent-specific heterogeneity such as access to securitization markets, economies of scale or scope in loan sales, loan inventory management, risk aversion, etc. The core assumption underlying our empirical strategy is that, absent the regulatory differences, all the loans originated and securitized through AMCs could have been originated and securitized through ADIs.[3]

Using the within-BHC strategy, we empirically evaluate the implications of three differences in the regulation of AMCs and ADIs. First, as detailed in Section 2 of the paper, the safety and soundness regulations require banks to hold capital even for loans they are planning to sell. In contrast, MCs have no explicit capital requirements as they do not fall under banking regulations. BHCs can also avoid consolidating AMCs for capital requirement purposes. As a result, by lending through their AMCs, BHCs can conserve their capital.

Second, ADIs have to recognize loan impairments as soon as they occur; the performance of their loan portfolios affects the parent BHCs' capital requirements, loan-loss provisions, and the price of the deposit insurance. AMCs, on the other hand, are only guided by Generally Accepted Accounting Principles (GAAP) and have a lot of flexibility in recognizing losses—they can "sit" on nonperforming loans in the expectation of working them out or selling them to a special "scratch-and-dent desk" entity. Moreover, AMCs are structured as limited liability entities, thus keeping BHCs' exposure to AMCs' lending activities limited to its equity investment. As a result, a parent BHC does not have to provision for or recognize losses from AMC loan portfolios to a full extent.

Third, while banks are subject to consumer compliance regulations that make origination of inferior-quality loans costly, these regulations are not enforced for MCs. Thus, in general, MCs can originate lower-quality noncompliant loans that banks cannot, and in particular, BHCs can have inferior underwriting standards at their AMCs.

In this paper, we empirically evaluate whether lending through AMCs allowed BHCs to mitigate the capital requirements, limit exposure to mortgage-related losses, and engage in riskier lending. In our first set of tests we find that undercapitalized BHCs are more likely to establish an AMC or

[3]To better understand our empirical strategy, consider a world with a regulatory regime that is uniform across MCs and DIs. In this world, the loans originated by AMCs have to be fully consolidated, the capital provisioned for, checked for consumer compliance, etc. In other words, AMC loans would put the same strain on a BHC's capital requirements or risk-management needs as ADI loans. Banning regulatory differences, we thus, question the need for BHCs to establish separate legal entities such as MCs.

to increase lending through existing AMCs. These relationships cease to exist during the period of regulatory uncertainty when capital arbitrage was almost eliminated by regulators. The evidence suggests that by lending through AMCs as opposed to lending through ADIs, BHCs can circumvent their capital requirements.

We then document that BHC mortgage-related losses are positively related to the extent of OTD lending by ADIs, but unrelated to the extent of OTD lending by AMCs. To show this, we exploit the 2007 shutdown of the secondary loan market that led to significant amounts of already originated-to-distribute and rapidly deteriorating loans accumulating on lenders' balance sheets (Purnanandam (2011)). Our results are consistent with BHCs being able to avoid loan losses from their AMCs' loan portfolios.

We then compare the lending standards of AMCs and ADIs within a BHC. Using ZIP code–level representative borrower framework, we show that AMCs tend to lend to borrowers with lower credit scores, higher loan-to-income ratios, and lower incomes as compared to ADIs' borrowers.[4] We further confirm the ZIP code–level evidence using a sample of about 1.4 million individual loans originated in 2005-2006 by ADIs and AMCs of BHCs. Using the loan-level data, we find that, in addition to lending to riskier borrowers, AMCs tend to originate riskier types of loans such as adjustable-rate and interest-only mortgages. Furthermore, AMC borrowers are 5% more likely than ADI borrowers to become delinquent or default on their loans within two years of origination. This 5% default differential is economically significant given the average delinquency and default rate of 9% in our loan-level sample.

The ZIP code–level and loan-level results uniformly confirm that precrisis AMCs' lending standards were inferior to those of ADIs. We offer a set of robustness tests to illustrate that our conclusions cannot be explained by (i) differences in the extent to which AMCs and ADIs participate in the securitization market (GSE or privately securitized loans, subprime loans, etc.); (ii) ADIs serving a wider set of consumer finance market segments as compared to AMCs; (iii) potential differences in AMC and ADI considerations regarding a parent BHC's reputation.

Finally, we illustrate that our results are not specific to the sample of MCs that are affiliated with BHCs. We quantify the economic effect of aggregate MC lending on consumer default rates.

[4]Similarly, Carey, Post, and Sharpe (1998) document that finance companies tend to lend to riskier and more leveraged corporate borrowers.

Specifically, we show that MCs' (AMCs and independent MCs—IMCs—combined) precrisis market share had statistically and economically significant effect on aggregate ZIP code–level mortgage delinquency and foreclosure rates during the 2007-2008 period. A one-standard-deviation increase in precrisis MC market share is associated with a 1.4% (1.2%) increase in delinquency (foreclosure) rates. The economic effect of the MC activity on mortgage defaults is similar in magnitude to that of subprime lending.

Our paper sheds light on two important issues that played a role in the 2007 credit crisis: the role of the "shadow banking" system and the inadequate regulation thereof (see, e.g., Gorton and Metrick (2010)). First, we contribute to the literature on the behavior of shadow banking intermediaries. MCs are among the largest nonbank credit intermediaries. They have consistently originated about half of the mortgages in the U.S. economy since 1992 (Figure 1). In 2006, they originated $1.35 trillion in mortgages, relative to the $1.12 trillion originated by banks. MCs continue to originate more than 30% of U.S. mortgages through 2010. In this line of research, Keys, Mukherjee, Seru, and Vig (2009) is the closest study to ours. It documents that heavily regulated banks *securitized* lower-quality *subprime* loans than weakly regulated MCs. We complement these findings by offering an economic rationale behind the origination, rather than securitization, decisions of these intermediaries.

Second, our study contributes to the literature exploring regulatory design and its consequences. The international banking literature documents variation in regulation across countries and links it to banks' risk-taking behavior (Barth, Caprio, and Levine (2004); Ongena, Popov, and Udell (Forthcoming)). U.S. studies acknowledge the existence of inconsistent regulatory enforcement and oversight (Kane (2000) and Calomiris (2006)) and evaluate their implications (Rosen (2003)). Agarwal, Lucca, Seru, and Trebbi (2012) document discrepancies in federal and state regulators' enforcement actions in supervising the exact same *banks*. We add to this literature by identifying a regulatory gap between *MCs* and *banks* and documenting its consequences for both financial institutions and consumers. Understanding the economic rationale for such financial intermediaries' behavior is a first step to efficient regulatory design. Most of the Dodd-Frank regulatory reform initiatives are geared toward regulating a wider set of financial institutions' activities, as opposed to consistently enforcing existing regulations across all intermediaries. We provide evidence suggesting that the differences in the regulatory environment between depository and nondepository

institutions created opportunities and incentives even for highly regulated BHCs to originate riskier loans.

Our results imply that the regulation in place before the crisis had the capacity to limit excessive risk-taking behavior, but only if consistently applied and enforced across all lenders. We do not argue that regulatory arbitrage is the only rationale for MCs' existence, or that banks' regulations and supervision were flawless. Neither do we argue that the deteriorating lending standards were solely due to inconsistent regulations—the securitization market's demand for risky loans significantly contributed to this phenomenon. However, we do argue that the regulatory gap allowed institutions to accommodate this demand and contributed to the erosion of lending standards.

2 Mortgage Companies and Financial Regulation

Historically, financial regulation in the U.S. was implemented through two types of regulators: the "institutional regulators" and the "functional regulators." The institutional regulators oversaw the activities of *depository institutions* and ensured their compliance with safety and soundness regulations and consumer compliance regulations, among others.[5] The functional regulators oversaw all entities engaged in respective functional activities. For example, the Securities and Exchange Commission (SEC) enforced the U.S. securities laws.[6]

Despite the fact that MCs held a 50% market share since the early 1990s (Figure 1), these financial institutions were largely ignored by the fragmented U.S. regulatory system for two reasons: (i) MCs did not hold deposits and, hence, did not need a charter from an institutional regulator, and (ii) the MCs' activities did not fall under the domains of the functional regulators. The only authorities that had a legal standing to oversee MCs were the Federal Trade Commission and State Attorney Generals. Both had the ability to bring punitive actions against MCs, but *only* if they observed unfair and deceptive practices evidenced by a *pattern* of customer complaints (Engel and McCoy (2011)). Before the 2007 crisis, this "repeat complaint-oriented supervision" had little power to systematically affect MC practices, thus leaving MCs essentially free of a regulatory burden.

[5] Different types of the depository institutions are supervised by Office of the Comptroller of the Currency, Federal Deposit Insurance Corporation (FDIC), the Federal Reserve System, and the Office of Thrift Supervision.

[6] The most prominent functional regulators are the SEC, established in 1934 to enforce the U.S. securities law; the Commodity Futures Trading Commission, established in 1974 to oversee futures and options markets; and the state insurance regulators.

One might reasonably argue that AMCs of BHCs should have fallen under the oversight of the BHCs' regulators. After all, they were subsidiaries that, as we now know, presented a significant threat to their parents, and ultimately to their depositors as well. Below, we discuss the history and philosophy of the banking regulation that allowed even AMCs to fall between the cracks of financial regulations.[7]

Safety and Soundness Regulation

Since the Glass-Steagall Act of 1934, U.S. depository institutions (banks, thrifts, credit unions, and savings and loans—collectively labeled "banks" in this section) were closely supervised to protect depositors. Underpriced deposit insurance created incentives for banks to "accept too large of a default probability" (Flannery (2007)). Safety and soundness regulations were designed to curb such risk-taking behavior and protect the federal safety net of the FDIC. Supervision was, and still is, done through periodic site visits and examination of banks' Reports of Condition and Income (Call Reports). Initially, the safety and soundness supervision aimed simply at avoiding bank failures. Over time, the supervision expanded to evaluation of banks' risks, such as financial, interest rate, credit, liquidity, and others. Regulators' assessment of these risks ultimately formed bank risk ratings (the CAMELS ratings).[8]

Under the Bank Holding Company Act of 1956, the safety and soundness standards only applied to individual banks rather than BHCs. Concerns that BHCs could rapidly shift resources at the expense of some depository subsidiaries led the Federal Reserve to advocate the "source of strength" doctrine under which a BHC must assist its troubled *depository* affiliates before the failure is imminent. The Financial Institutions Reform Recovery and Enforcement Act of 1989 (FIRREA) codified this doctrine, while the Federal Deposit Insurance Improvement Act of 1991 extended it by requiring a parent BHC to take corrective action when an insured *depository* subsidiary failed to meet required levels of capitalization ("prompt corrective action provisions").[9] The sole guiding

[7]The discussion below is partially based on our extensive interviews with bank supervisors and examiners. We do not provide a detailed overview of U.S. banking regulation, but rather discuss unique features of it relevant to this study. Agarwal, Lucca, Seru, and Trebbi (2012) present a detailed discussion of the fragmented and inconsistent nature of the U.S. regulatory system.

[8]Rosen (2003) describes the safety and soundness regulations and CAMELS ratings in detail.

[9]Ashcraft (2008) discusses in detail the economic implications of the doctrine and associated legislature. This study documents a significant improvement in the affiliate banks' safety and soundness upon the passage of this reform.

principle of this "umbrella supervision" was to protect *depositors* and the federal safety net of the FDIC (Lee (2012) and Greenlee (2008)). The legislation remained silent regarding the safety and soundness standards for nonbank subsidiaries of BHCs.

The Gramm–Leach–Bliley Act (GLBA) of 1999 codified the lack of regulatory oversight over the MCs. GLBA dismantled the legal barriers to conglomeration in the financial services industry and expanded the span of allowable nonbank activities for BHCs. Concerned with inability of bank examiners to understand the new lines of business, GLBA deferred the examination and oversight of nonbank subsidiaries to their respective functional regulators.[10] The problem was that MCs had never been assigned a functional regulator. The BHC regulators were granted visitorial powers, advisory in nature, to evaluate nonbank subsidiaries, but *only* if the latter constituted a serious risk to the financial safety and soundness of a depository institution. The risk status was to be determined by the respective functional regulators, which did not exist for MCs.[11]

One major implication of this regulatory gap was MCs having no explicitly imposed or enforced capital requirements. Supervisors routinely require banks and BHCs to meet minimum capital requirements. Even loans originated by banks with the sole purpose of distribution are subject to sizable capital requirements.[12],[13] BHCs were able to avoid capital provisioning for loans held on AMCs' balance sheets. For example, it was sufficient for a BHC to hold a 79% or less equity stake in an MC subsidiary to avoid consolidating it for capital requirement purposes.[14] Anecdotal evidence also suggests that even fully owned and controlled AMCs were not always capital provisioned for. Regulators were content with not allocating capital for loans held (i) for sale; (ii) off banks' balance sheets; (iii) in limited liability nondepository subsidiaries.[15] Thus, AMCs could take over loan origination from ADIs and help their depository affiliates and parent BHCs to conserve capital.

[10]For example, the Federal Reserve System: Purposes and Functions (2005) explicitly states that "nonbank subsidiaries ... are supervised and regulated by their appropriate functional regulators."

[11]See Mandanis Schooner (2002) and Engel and McCoy (2011).

[12]For example, consider a bank that annually originates OTD mortgages in the amount of 50% of its total assets (75th percentile in our sample). Under an optimistic 90-day holding period for these loans (Engel and McCoy (2011)), this bank would have to hold a rolling inventory of mortgages amounting to 12.5% of its total assets ($50\% \times 90/360$). With 8% risk weight of mortgages in the capital requirements, these "temporary" holdings would lead to 1% higher capital requirements, which is significant compared to the average bank equity capital (Table 2).

[13]Note that our arguments are valid irrespective of whether OTD loans are fully sold or are swapped for highly rated tranches of RMBS securities (Isil, Nadauld, and Stulz (2012)). Both mechanisms provide capital relief to a parent BHC, but require time to implement.

[14]BHCs can still recognize profits from nonconsolidated AMCs via dividend payments.

[15]We have heard this claim repeatedly in our numerous interviews with bank regulators, examiners, and legal scholars.

The first part of our analysis explores whether less-capitalized BHCs were more likely to establish AMCs.

Legislators were aware of the risks nonbank subsidiaries presented for their depository affiliates. They established formal financial barriers between bank and nonbank affiliates. Sections 23A and 23B of the Glass-Steagall Act explicitly prohibited any transactions between bank and nonbank affiliates that could adversely affect the health of a depository institution. GLBA took one step further and required BHCs to conduct any nonbank activities "in nonbank subsidiaries that are separately incorporated, separately capitalized, and insulated by 'firewalls' from their affiliated banks" (see, e.g., Gouvin (2002) and Wilmarth (2002)). While the "source of strength" doctrine and the "prompt corrective action provisions" forced BHCs to carry almost full responsibility for their troubled depository subsidiaries, the regulators explicitly prohibited BHCs from rescuing troubled nonbank subsidiaries. As a result, BHCs' exposure to the limited liability AMCs was indeed limited to the equity investment. While these regulations protected depositors, they did not eliminate BHCs' ability to pursue risky activities. BHCs merely had to do so through their AMCs.

BHCs could also avoid recognizing losses from AMCs' operations. The mandatory Call Reports guidelines require *banks* to recognize loan delinquencies and defaults as soon as they occur and to the full amount of underlying loans, irrespective of the collateral values.[16] MCs, being nondepository institutions, only had to adhere to GAAP loss-reporting requirements. Specifically, MCs had to recognize loan impairment when "it was probable that a loss has been incurred."[17] The MCs' losses were also recorded net of *expected* collateral values. As a result, MCs enjoyed a lot of flexibility in recognizing loan-related losses. AMCs, for example, had an option to delay recognizing losses in the expectation of working loans out or selling them in the secondary market through so-called "scratch-and-dent desks" entities.

The ability to avoid loan-loss recognition was extremely beneficial for BHCs. AMCs' loan losses, if recognized by a parent, would be charged against BHC equity capital and, hence, affect BHCs' cost of funds (Stein (1998)). Loan impairments, such as 30-day-past-due status, increase the costs of loan-loss provisioning and the price of the deposit insurance. In the second set of our empirical analysis, we evaluate whether BHCs were able to avoid incurring losses from AMCs' loan portfolios.

[16]See FFIEC's Instructions of Preparation of Consolidated Report of Condition and Income, 2001.

[17]See, e.g., Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 310-10 and FASB ASC 450-20.

Consumer Compliance

Consumer compliance regulations, an extension of the safety and soundness regulations, are the second significant part of the banks' regulatory oversight. Consumer compliance regulations started with Congress passing the Truth in Lending Act in 1968. The Act requires disclosure statements to be given to consumers about their mortgage loans. The Act was amended in 1994 with the Home Ownership and Equity Protection Act (HOEPA) to curb *subprime lending*, which had started gaining popularity at the time (Riegle–Neal Community Development and Regulatory Improvement Act of 1994).[18] One part of HOEPA requirements was legally binding for all intermediaries, but applicable only to a small portion of the subprime market. Another part of HOEPA was more guidance than law, and aimed to broadly prevent "unfair and deceptive lending practices." Despite enforcing both parts of the consumer compliance regulation for *depository* institutions, the Federal Reserve under Greenspan never enacted the second part of the regulation on a broad scale (Engel and McCoy (2011)).

Consumer compliance regulations require bank examiners to evaluate lending standards and procedures established by depository institutions, the training of lending officers, and the adherence to established lending practices. Supervisors go as far as evaluating a small random sample of all originated (not only retained) loans to verify compliance. They ensure that, for example, banks verify borrowers' ability to repay their loans and do not approve loan applications based solely on expectations of house price appreciation. Noncompliant banks are subject to financial penalties and a prolonged examination of a wider subset of *originated* loans.

MCs were subject only to a subset of consumer compliance regulations, which were rarely, if ever, enforced. Similar to examinations of AMCs for safety and soundness, BHC supervisors had no legal standing to evaluate AMCs for consumer compliance. The January 1998 letter from the Board of Governors of the Federal Reserve System clearly states:[19]

"... the Board adopted a policy that the Federal Reserve will (1) not routinely conduct

[18]The HOEPA regulation was made ineffective by proactive regulation avoidance and exemption lobbying done by both depository and nondepository lenders (Engel and McCoy (2011)). Even the state HOEPA laws had minimal to no impact on the subprime market in general and behavior of subprime lenders in particular (Bostic, Engel, McCoy, Pennington-Cross, and Wachter (2008)). A 2001 Federal Reserve System study shows that 5% of subprime loans fell under HOEPA regulation.

[19]See http://www.federalreserve.gov/boarddocs/caletters/1998/9801/caltr9801.htm.

consumer compliance examinations of nonbank subsidiaries of bank holding companies, and (2) not investigate consumer complaints relating to these subsidiaries. This action formalizes a policy regarding examinations that has been System practice all along. In addition, with regard to complaint investigations, the action establishes a policy in an area where the Reserve Banks have exercised their own discretion in the past. All consumer complaints against such entities received by the Federal Reserve System will now be referred to the Federal Trade Commission and not be investigated by Reserve Banks."

No enforcement of the consumer compliance regulations for AMCs relaxed parent BHCs' regulatory constraints and expanded the latter's ability to take risks. They merely had to pursue this risky, noncompliant lending through AMCs. Our final set of empirical tests evaluates the risk-taking behavior of ADIs and AMCs within a BHC by comparing the ex ante and ex post loan characteristics of two types of affiliates.

All told, compared to banks, MCs were subject to a smaller set of regulations that were rarely, if ever, enforced. In this paper, we evaluate whether this regulatory gap affected the behavior of even heavily regulated BCHs and motivated them to (a) originate more loans through AMCs to mitigate capital requirements and (b) serve riskier marginal borrowers through AMCs to circumvent the consumer compliance regulations and avoid loan-related losses. The regulatory gap allowed BHCs to pursue risker investment activities through AMCs, thus contributing to overall economic risk.[20]

3 Data and Sample Selection

In this study, we combine data from several sources. In the first part of the paper, we establish the existence of regulatory arbitrage. Here, we evaluate the BHCs' financial conditions from the Call Reports. In the second part of the paper, we evaluate the lending standards of banks and MCs. The challenge of this analysis lies in the lack of readily available data that capture the loan originator, the origination decision, and borrower characteristics at the loan level. We use the Home Mortgage Disclosure Act (HMDA) data that cover a comprehensive set of loans (about 87% of all

[20]The lack of safety and soundness regulation in general and no capital requirements in particular contributed to the risk-shifting behavior of, for example, Countrywide, which, despite the obvious deterioration of loan quality at the beginning of the mortgage crisis in early 2007, did not shut down its subprime arm until well into the crisis: November 2007. Similarly, Landier, Sraer, and Thesmar (2011) document that New Century Financial Corporation reacted to adverse economic conditions by aggressively investing in riskier ("interest only") loans.

loans originated) and lenders (99% of the sector based on total assets) in the U.S. economy, but lack core loan-risk characteristics such as a borrower's credit score and the value of a property. Other data sources, e.g., data from credit bureaus, provide us with a rich set of borrower characteristics, but lack information about loan originators.

In this study, we adopt two approaches to resolve this issue. First, we use the ZIP code–level representative borrower approach from Mian and Sufi (2009). Effectively, we compare representative borrowers to whom a BHC lends mostly through its ADIs to representative borrowers to whom the BHC lends mostly through its AMCs (BHC-ZIP-year level of observation). This approach allows us to draw conclusions based on a very broad sample of U.S. borrowers, lenders, and markets. However, it is based on average, rather than individual, loan and borrower characteristics and only allows us to exploit across ZIP code variation in borrower characteristics. Second, we confirm our representative borrower results using the loan-level data. We merge HMDA, Call Reports, and loan-level databases to build a loan-level sample for which lender types, borrower characteristics, and loan performance are jointly available. This sample allows us to exploit the within–ZIP code heterogeneity across borrowers. Below, we describe in detail the sample formation procedures and merging criteria for all of the utilized data sets.

3.1 Loan Origination and Lender Identity

We obtain information on loan originations from a comprehensive sample of mortgage applications collected by the Federal Reserve under provisions of the HMDA.[21] The data cover the loan originations by 99% of *depository and nondepository* financial institutions. The HMDA Loan Application Registry provides us with the mortgage origination date, the identity of the lender, the dollar amount of the loan, the borrower income, and whether the lender retained the loan or sold it to a third party. We only consider loans that have valid information for these attributes. We drop subsidized loans (e.g., those sponsored by the Veteran Administration), home equity loans, and construction loans. We also require the census tract provided by the HMDA to map to ZIP code and Core Based Statistical Area (CBSA) identifiers. This set of restrictions leaves us with

[21] HMDA was passed into law by Congress in 1975 and expanded in 1988, with the purpose of informing the public and the regulators about whether or not financial institutions adequately serve local credit needs. Since the onset of the crisis, the data has been widely used in the academic research. See, e.g., Loutskina and Strahan (2009) for detailed data description.

96.65 million loans originated between 1999 and 2006, out of which 54.5 million were originated by mortgage companies and 36 million were originated by BHCs with MC affiliates.

We augment HMDA data with the "HMDA Lender File" compiled by Robert Avery from the Board of Governors of the Federal Reserve System. The lender file provides a variety of identifying information for all lenders who have ever filed a HMDA report. It allows us to identify depository and nondepository lending institutions and match them to their respective parent BHCs. We exclude about 1.5% of the lenders (0.001% of loans) where we cannot clearly identify if the originator was a depository or nondepository institution. The resulting sample covers 15,280 distinct lenders of which 10,904 are depository institutions.

Table 1 Panel A provides summary statistics of HMDA loan and borrower characteristics for four types of lenders: independent depository institutions (IDIs), independent MCs (IMCs), affiliated depository institutions (ADIs), and affiliated MCs (AMCs). Consistent with our premises, we observe that MC borrowers are characterized by higher loan-to-income ratios and lower absolute and relative incomes as compared to bank borrowers.[22] MCs securitize about 75 percent of loans. Banks, on the other hand, still originate the dominant share of loans to hold and securitize only 35 to 40 percent of mortgages, primarily through the GSEs. As compared to banks, AMCs and IMCs show higher engagement in subprime lending.

The exact definition of a subprime loan is elusive and varies from study to study.[23] The common element across all definitions of a subprime loan is a high default risk. In line with this common thread we exploit the HMDA requirement as of 2004 to report yield spread on all loans with interest rates exceeding the prime rate by three (five) percentage points for first-lien (subordinate-lien) loans. We classify all loans with excess yield spread as subprime. This subprime proxy is loan specific and is available for years 2004-2006.[24] For robustness, we also proxy the subprime activity

[22]We have conducted (i) the t-tests for the difference in mean characteristics of MCs' and bank affiliates' loans (columns (3) and (4)), and (ii) the Kolmogorov-Smirnov tests to access differences in distributions of these variables. The resulting statistics uniformly indicate significant differences in distributions with p-values below 1%. We do not report the results of these tests for brevity.

[23]The term "subprime" can be used to describe certain characteristics of the borrower, lender, or a type of security that the loan can become a part of. The Board of Governors of the Federal Reserve System, OCC, FDIC, and OTS define all borrowers with a FICO credit score less than 660 as subprime. The U.S. Department of Housing and Urban Development uses HMDA data and interviews lenders to identify subprime lenders among them. There are, however, some subprime lenders making prime loans and some prime lenders originating subprime loans.

[24]The HMDA "high-cost lending" measure of subprime activity is highly correlated with the measure based on the "subprime lender" identifier—reported by the U.S. Department of Housing and Urban Development. The correlation is 0.89.

in a given ZIP code by the fraction of nonagency securitized subprime mortgages: the number of subprime and Alt-A loans originated in each year and ZIP code normalized by a number of loans originated in the same geography (reported by HMDA). The data come from the CoreLogic LoanPerformance Securities (LP) database, which contains information about over 90% of all U.S. nonagency securitized mortgages (some 20 million loans in the subprime and Alt-A segments).

3.2 Characteristics of Bank Holding Companies

The "HMDA Lender File" allows us to map the HMDA lending institutions to parent BHC data provided by the Call Reports. All FDIC-insured commercial banks and BHCs are required to file Call Reports with the regulators on a quarterly basis. These reports contain detailed information on BHCs' income statement, balance sheet, and some off-balance-sheet activities.

We obtain the following BHC financial information from these reports: BHCs' size, profitability, share of mortgages in the loan portfolio, liquidity position, equity capital, and loan performance measures. We ensure that the changing reporting requirements are reflected in our calculations and that our measures are consistent over time. While the majority of the variables are standard to the banking literature, we would like to describe in detail the on-balance-sheet measures of mortgage defaults: (i) net chargeoffs (net of recoveries) on one-to-four-family residential mortgages, and (ii) nonperforming mortgages in this category, i.e., mortgage loans that are 90 days past due or delinquent. Both variables are normalized by the volume of one-to-four-family residential mortgages on BHCs' balance sheets. The net mortgage chargeoffs have an immediate impact on bank profitability. However, a bank facing an overwhelming number of potential foreclosures might recognize chargeoffs gradually. The charge-offs measure of mortgage quality could to some extent be subject a bank's discretion (Agarwal, Amromin, Ben-David, and Dinc (2013)). Therefore, we also analyze the nonperforming mortgages that are free from this bias and provide a more direct on-balance-sheet measure of borrowers' default rates.

Table 2 reports summary statistics for the sample of BHCs mapped to HMDA data. It shows that only 10% of BHCs had MC affiliates, and those BHCs were on average 16 times larger than BHCs lending only through their ADIs. The radically different securitization rate and share of deposits in total assets suggests that BHCs with MC subsidiaries preferred (or found it easier) to grow by funding themselves via the securitization market rather than by raising deposits. BHCs

that were more active in the secondary loan market held smaller liquid fund balances.

3.3 Representative Borrower Characteristics and Default Rates

HMDA data provide a number of loan and lender characteristics, but lack some characteristics that might be considered crucial in the loan-risk assessment, such as a borrower credit score and house price appreciation (Demyanyk and Van Hemert (2011)). To fill this gap, we obtain borrower characteristics from the anonymized Equifax data provided by the Federal Reserve Bank of New York's Consumer Credit Panel. These data contain a wide range of consumer credit–related information for a random 5% of almost all individuals who have a social security number and a credit report in the U.S. (about 12 million consumers). The credit score reported by Equifax allows us to construct a "Low Credit Score" measure at the ZIP code–year level. It equals the share of consumers in a ZIP code with a credit score below 660.[25]

Using Equifax data, we also construct two measures of loan performance at the ZIP code level. First, we construct a cumulative foreclosure rate over the 2007-2008 period defined as the number of individuals who had at least one home in foreclosure within the past 24 months as of December 2008, normalized by a total number of individuals with mortgages as of December 2008. There were, on average, 3.1% (3.5%) of borrowers in foreclosure during 2007-2008 (2008-2009).[26] Since the event of foreclosure is subject to lenders' and/or servicers' discretion, we also utilize a quarterly ZIP code–level delinquency rate equal to a share of mortgage borrowers who were more than 30 days past due on their loans or in "severe derogatory" state as defined by Equifax. We normalize this measure by a total number of individuals with mortgages in the same ZIP code–quarter. Given that borrowers can be classified as delinquent on their loans in multiple quarters, we average the quarterly delinquency rates across eight quarters of 2007-2008 to capture a representative delinquency. The delinquencies-based measure is free from the lenders' discretion and provides a more unbiased proxy of borrowers' quality. In 2007-2008, on average, 5.5% of mortgage borrowers were delinquent on their loans in any given quarter.

[25] The range of possible credit score values in Equifax data is 280–850. Equifax uses the 660 cutoff point in identifying borrowers with "subprime" scores. For details, see http://news.equifax.com/index.php?s=18010&item=96773. Our results are robust to using a continuous measure of credit scores.

[26] For comparison, the Mortgage Bankers Association reports the average rate of homes in foreclosure between 2007 and 2008 (2008 and 2009) to be 3.2% (3.6%). We report the results based on 2007-2008 foreclosures and delinquencies. The results based on 2008-2009 data are qualitatively and quantitatively similar.

Finally, we augment our representative borrower characteristics with the ZIP code–level house price indices (HPIs) from CoreLogic. These indices are calculated using a weighted repeat sales methodology and are normalized to 100 as of January 2000. We use the county-level HPIs where ZIP code HPIs are not available. Our results are virtually unchanged if we restrict our sample to only those ZIP codes for which the HPIs are not missing. Table 1 Panel A reports the summary statistics for the variables obtained from Equifax and CoreLogic. Combined, HMDA, Equifax, and CoreLogic provide us with the sample that covers about 49% of the ZIP codes and represents 81% of the U.S. population.

3.4 Individual Loan-Level Data

In our final set of tests, we confirm the ZIP code representative borrower results using the loan-level analysis. Similar to Agarwal and Evanoff (2013), we merge HMDA with two credit registries: Lender Processing Services, Applied Analytics (LPS) and LP data. LPS includes loan-level information collected from residential mortgage servicers. As of July 2008, LPS includes loans from nine of the top ten servicers, and represents around two-thirds of the mortgage market in the U.S. Prior to 2005, however, the LPS coverage and the set of available loan characteristics is limited. Therefore, we restrict our analysis to loans originated in the 2005-2006 period, wherein the loan-level data offer widest coverage both geographically and in terms of available loan characteristics. LPS data consistently underrepresent the riskier types of mortgages, such as subprime. We supplement it with LP data that contain information on securitized subprime loans. Combined, LP and LPS provide us with the largest mortgage credit registry available. We map LPS-LP loan registry to HMDA originations at the loan-level based on the origination date, ZIP code of the property location, loan amount, loan type, loan purpose, occupancy type, and lien. We exclude from our analysis all loans that do not have a unique combination of the above characteristics in both HMDA and LPS-LP data and implement a sequential mapping procedure to eliminate any double counting of loans due to the overlapping nature of LPS and LP data. We are able to match 1.4 million loans out of 8.9 million loans originated by BHC subsidiaries in the 2005-2006 period (HMDA). The sample contains loans from 31% of the ZIP codes that house 59% of the U.S. population. To adhere to the contract terms of the data providers, we discard all HMDA lender identifying information and only retain lender types and anonymized identifiers of BHCs.

Panel B of Table 1 reports the summary statistics for LP-LPS-HMDA merged data. As compared to the entire loan population reported in HMDA, the LP-LPS-HMDA loans are on average larger, and granted to people with higher income levels and higher loan-to-income ratios. The privately securitized and subprime loans are overrepresented, while the GSE securitized and refinancing loans are underrepresented in LP-LPS-HMDA data relative to HMDA sample. Admittedly, this sample is not a random draw from the U.S. mortgages pool and might be subject to some (unobserved) selection. Despite this fact, we believe that this sample provides a unique opportunity to evaluate our hypotheses.

The univariate comparison of columns (3) and (4) suggests that, as compared to borrowers of ADIs, borrowers obtaining loans from AMCs have lower incomes, higher loan-to-income ratios, lower FICO scores, and higher loan-to-value ratios. MCs originate riskier types of loans: interest-only loans, adjustable-rate mortgages, and loans with prepayment penalty. AMC borrowers are 2.8% more likely to become delinquent within two years of loan origination, which is economically significant when compared to the average delinquency rate of 9%. Similarly, AMC borrowers are more likely to end up in foreclosure as compared to ADI borrowers. Similar, and yet more striking, differences are observed when one compares IMC and IDI borrower characteristics. Overall, the univariate comparison of AMC and ADI loan characteristics provides support to our lending standards–related hypothesis.

4 Empirical Tests and Results

4.1 Capital Arbitrage

Our first hypothesis posits that by lending through AMCs as opposed to ADIs, a BHC can conserve its capital. While ADIs need to hold capital for all originated loans on their books, even for those they plan to sell in the secondary market, AMCs do not have to capital provision for their loans. A BHC can also avoid consolidating its AMCs for capital requirement purposes. Thus, lending done by a BHC via its AMCs as opposed to its ADIs could allow a BHC to extend its mortgage business without a mandatory capital expansion.

The relationship between a decision to establish (or increase lending through) an AMC subsidiary and the amount of a BHC's regulatory capital is hard to establish. BHCs engage in regu-

latory arbitrage exactly to increase or maintain their regulatory capital ratios (e.g., Tier 1 capital ratio). As BHCs increase the amount of AMC lending, their regulatory capital ratio is not expected to change or is even expected to increase. One way to solve the problem is to use the BHC balance sheet equity capital ratio (ratio of book value of equity to total assets) instead of the regulatory capital. BHCs engage in regulatory capital arbitrage to maintain or even reduce their risk-based assets while increasing the total assets. Acharya, Schnabl, and Suarez (2011) argue that this increase in total assets relative to risk-weighted assets is captured in the equity capital but not in the regulatory capital. In line with this argument, we adopt the following empirical design:

$$\begin{aligned} AMC\ Lending_{i,t} &= Year_t + BHC_i + \beta_1 Equity\ Capital_{i,t-1} + \\ &\quad \beta_2 BHC\ Controls_{i,t-1} + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where the core variable of interest $Equity\ Capital_{i,t-1}$ is measured as percentage of total assets. Our objective is to explore whether less capitalized BHCs are more likely to establish AMCs (or increase lending through their existing AMCs). We control for other measures of financial constraints: the liquidity position, cost of deposits, share of deposit financing, and bank size. We further control for AMC and ADI loan portfolio structures to capture the heterogeneity across these two types of intermediaries due to specialization. Two sets of respective fixed effects absorb any BHC- or time-specific unobserved heterogeneity. Thus, our results are based on the within-BHC variation in the variables of interest. The annual data spans from 1992 through 2006 and covers 217 BHCs that had an AMC in at least one year.

First, we evaluate the extensive margin and explore whether less capitalized BHCs are more likely to establish an AMC. Panel A of Table 3 reports the results of the linear probability model where $AMC\ Lending_{i,t}$ is a dummy variable that equals one if a BHC i lends through an AMC subsidiary in year t and zero otherwise.[27] To avoid perfect collinearity between the dependent variable and the BHC fixed effects, we only consider BHCs with at least one change of status between lending and not lending through an AMC. We find that AMCs are more likely to be

[27]The choice of the linear probability model, as opposed to probit model, is motivated by the incidental parameter problem associated with the probit/logit fixed effect regressions (Lancaster (2000)). In the unreported set of robustness tests, we implement the fixed-effect logit regression analysis with the Chamberlain (1980) adjustment that produces consistent estimates. We find the results to be qualitatively similar.

established by BHCs that have a lower equity capital ratio. A one-standard-deviation decrease in $Equity\ Capital_{i,t-1}$ (2.78%) leads to about five percentage points of increase in the likelihood of establishing an AMC.

Second, we evaluate whether the lower level of equity capital is associated with an increase in the extent of AMC lending. In Panel B of Table 3, $AMC\ Lending_{i,t}$ is the dollar volume of a BHC lending through AMCs normalized by the total assets of the parent BHC. The dependent variable, thus, captures any change in AMC originations, including de novo establishments or closings of AMCs by the same BHC. In this part of the analysis, we aim to isolate the intensive margin and only consider BHC-year observations with above-zero AMC lending. The results indicate that the equity capital has a material impact on the extent of the AMC lending. A one-standard-deviation decrease in equity capital is associated with an increase in AMC originations equivalent to 3% of a BHC's total assets.[28]

The results in both Panels are consistent with less capitalized BHCs being more likely to lend through their AMCs. One can argue, however, that the results could be due to an omitted variable bias. For example, rapidly growing and, hence, less capitalized BHCs might find it more efficient to expand lending through AMCs that face almost no geographic entry barriers. To eliminate such explanations, we exploit the regulatory uncertainty stemming from Enron's collapse in 2001.

In early 2002, the regulators officially called FASB to reexamine the consolidation practices for "variable interest entities" (VIE). The industry considered the regulatory change a real possibility, which is evident from the asset-backed commercial paper market stalling in response to this announcement (Acharia and Schnabl (2010)). In 2003, the FASB issued guidance number 46, which recommended consolidation of a wide range of VIEs. If the guidance were to be followed by a regulatory change, BHCs would have had to consolidate AMC activities irrespective of the equity stake held in affiliates or the degree of control over them. Such a ruling would have had a dramatic impact on BHCs capital requirements. Pursuing AMC lending when it could be consolidated to BHCs' balance sheets at any moment might have proved to be extremely costly for BHCs. In July 2004, however, U.S. regulators officially backed down and the final regulatory change was minor.

In columns (3) and (6) of Table 3, we exploit this regulatory uncertainty as an exogenous shock

[28]Our conclusions are consistent with Acharya, Schnabl, and Suarez (2011), who find that capital arbitrage was a core consideration behind banks establishing asset-backed commercial paper conduits, another shadow banking vehicle.

to the ability of BHCs to save on equity capital by redistributing lending away from ADIs and to AMCs. We evaluate whether the coefficient of the core variable of interest is rendered insignificant during the 2002-2004 period. Specifically, we interact $Equity\ Capital_{i,t-1}$ with $Post_{2002}$ ($Post_{2005}$) dummy equal to one for years after and including 2002 (2005) and zero otherwise. The results show a statistically and economically insignificant link between the BHCs' capital and their willingness to establish (or extend the activities through) AMCs during the period of regulatory uncertainty. Upon the resolution of said uncertainty, in 2005-2006, the relationship between BHCs' equity capital and AMC activities is somewhat reestablished. While we cannot fully eliminate the omitted variable bias concerns, the regulatory uncertainty results impose significant additional hurdles on the alternative economic mechanisms potentially driving our results.

4.2 Limited Loss Exposure

In this section, we evaluate whether the limited liability structure of AMCs and their GAAP-driven loan-loss and loan-impairment recognition practices allowed BHCs to limit recognition of AMC loan-losses. The challenge in establishing this relationship lies in the lack of the balance sheet data for MCs or their loan portfolio performance. MCs originated the majority of their loans to distribute and, hence, passed the credit risk to the secondary market, which further inhibits our ability to capture loan losses. To compare whether BHCs recognized AMC and ADI loan losses differently, we exploit the exogenous freeze of the mortgage-backed securities market in mid-2007. Purnanandam (2011) documents that when the secondary market came under pressure, banks were stuck with large quantities of rapidly deteriorating loans they previously originated to distribute. Consequently, banks that were more active in the OTD business model before the crisis experienced higher loan-related losses during and after the crisis.

We augment the Purnanandam (2011) identification strategy to evaluate whether the on-balance-sheet BHC losses were different if "to-be-securitized" loans were originated by ADIs or

AMCs of a BHC. We estimate the following difference-in-difference regression equation:

$$\begin{aligned} &\textit{On-balance-sheet Loan Losses}_{it} = BHC_i + Quarter_t + \\ &\beta_1 PostQ1,2007 \times \textit{Total OTD}_i^{2006} + \beta_2 PostQ1,2007 \times \textit{OTD through AMC}_i^{2006} + \\ &+\gamma_1 PostQ1,2007 \times \textit{Loan Portfolio Controls}_i^{2006} + \gamma_2 \textit{Bank Controls}_{it} + \varepsilon_{it}, \end{aligned} \tag{2}$$

where *On-balance-sheet Loan Losses*$_{it}$ for BHC i in quarter t is either the net chargeoffs (Panel A of Table 4) or the nonperforming mortgages, i.e., those that are past due 90 days or more (Panel B). Both measures are normalized by the balance sheet volume of one-to-four-family mortgages as of the beginning of the quarter. Furthermore, in case BHCs don't recognize losses from AMC loan portfolios as mortgage-related losses but rather as losses from investment activities, we analyze the quarterly net income of BHCs (Panel C). $PostQ1,2007$ is a dummy variable that equals one after the disruption of the secondary market (i.e., after the first quarter of 2007) and zero otherwise. The sample spans from the last quarter of 2005 to the second quarter of 2008. *Total* OTD_i^{2006} reflects the extent of a BHC OTD activity before the crisis as reported in HMDA. Specifically, it is equal to the volume of loans originated and subsequently securitized by all BHC affiliates in 2006, normalized by the balance sheet volume of one-to-four-family mortgages as of the end of 2005. Similarly, *OTD through* AMC_i^{2006} is the 2006 volume of AMCs' loans originated and securitized, similarly normalized.

The coefficient β_1 captures the impact of aggregate BHC OTD activities on loan losses after the freeze of the secondary market, while β_2 captures the *incremental* effect of AMC OTD activity. Following Purnanandam (2011), we expect β_1 to be positive. If the loan losses incurred by ADIs and AMCs are recognized similarly, we expect the coefficient β_2 to be zero. The existence of the regulatory arbitrage, however, should lead to negative β_2 that fully or partially offsets the positive effect of β_1.

In the regression, we control for a variety of bank financial conditions. BHC-specific fixed effects allow for control of a host of BHC-specific, time-invariant factors (e.g., the risk preferences of a BHC's management team). Time-specific fixed effects capture the impact of economy-wide factors on mortgage performance. Since the inferences could be affected by heterogeneity across ADIs and AMCs loan portfolios (see Table 1) we control for the following 2006 loan portfolio characteristics

interacted with $PostQ1,2007$ dummy: percent of jumbo loans, percent of refinancing loans, loan-to-income ratio, loan size, borrower income, percent of minority borrowers, and average borrower income relative to area income. These characteristics are estimated separately for AMCs and ADIs, as well as for loans securitized and loans retained, thus creating four groups of control variables not reported in the table for brevity.

Table 4 reports the results: BHC mortgage-related losses are positively related to the extent of OTD lending by ADIs but unrelated to the extent of OTD lending by AMCs. Consistent with Purnanandam (2011), we find that BHCs with a higher extent of OTD activity experience higher mortgage-related losses after Q1 of 2007. In contrast, higher OTD origination by BHCs through AMCs subsidiaries is not associated with higher BHC-level losses. The coefficient on AMC lending (β_2) almost entirely offsets the adverse effect of aggregate OTD activity (β_1) on performance of a BHC's mortgage portfolio. The evidence is consistent with BHCs being able to avoid recognizing AMC loan losses.

One can argue, however, that despite loan portfolio controls, the results can be attributed to ADI loans being of a lower quality than AMC loans. We confirm that this is not the case via two empirical tests. In Section 4.3, we explicitly compare the loan characteristics of ADIs and AMCs. In Table 4, we augment the above empirical setup and evaluate whether BHCs recognized ADI and AMC subprime-related losses similarly. Specifically, we interact the $PostQ1,2007$ dummy with the extent of subprime lending by respective subsidiaries. Both variables are normalized by the balance-sheet volume of one-to-four family mortgages as of the end of 2005. It is hard to argue that ADI and AMC subprime loans were significantly different in quality. Thus, we evaluate the impact of relatively homogenous ADI and AMC loans on BHCs' loan losses. Columns (3) and (6) show that a high extent of BHC subprime originations in 2006 is associated with significantly inferior BHC loan performance post Q1 of 2007. The effect, however, is almost entirely negated if all subprime loans are originated through AMCs. Overall, the results lead us to conclude that BHCs had the ability not to recognize AMC loan losses.[29]

[29] In an additional untabulated set of robustness tests, we ensure that BHCs do not merely delay loan-loss recognition from AMC activities. We evaluate the cumulative performance of BHCs over different horizons post-Q2 of 2007 and find results similar to those reported in Table 4. Furthermore, we verify that our results cannot be attributed to AMCs and ADIs' mortgage market specialization (Table 1). We decompose BHCs' (AMCs') OTD activity into GSE, private securitization of subprime loans, and other private securitization, and find the results quantitatively and qualitatively similar.

4.3 AMC and ADI Lending Standards

We have presented evidence consistent with the regulatory gap between ADIs and AMCs allowing BHCs to circumvent their capital requirements and limit exposure to AMC loan losses. These factors create incentives for BHCs not only to originate more loans though AMCs, but also to originate inferior-quality loans through them. The absence of consumer compliance enforcement for MCs makes this risk-shifting strategy viable. In this section, we empirically compare the ex ante and ex post risk characteristics of ADI and AMC loans. First, we utilize a representative ZIP code–level borrower framework to evaluate the ex ante differences in the ADI and AMC lending standards. Second, to ensure the robustness of our results, we analyze a sample of about 1.4 million individual loans. Finally, we quantify the contribution of aggregate MC lending to borrowers' defaults using a broad sample of ZIP code–level delinquency and foreclosure rates.

Within-BHC Lending Standards: Representative Borrower Analysis

We analyze the lending standards of ADIs and AMCs within a BHC using a representative ZIP code–level borrower framework (BHC-ZIP-year level of analysis) similar to Mian and Sufi (2009). Our core objective is to isolate the effect of the different regulatory environments of AMCs and ADIs. We achieve it via two dimensions of sample selection. First, as discussed earlier, we only consider within-BHC lending of ADIs and AMCs. With parent BHCs being ultimate pooling agents and ensuring equal ability to securitize loans across all of its subsidiaries, our within-BHC analysis compares the lending standards of ADIs and AMCs that could have *securitized the same loans.* Second, to eliminate the effect of potential market-entry frictions, we exclude from the analysis markets where a BHC lends only through an ADI or only through an AMC. Specifically, by only considering CBSAs served by both AMCs and ADIs in a given year-BHC, we eliminate potential alternative explanations stemming from different barriers to entry, strategic expansion goals, and conglomeration activity. Effectively, we ensure, through sample selection, that ADIs and AMCs of a BHC had the *ability* to originate and securitize the same loans.

We start with the following regression model:

$$\begin{aligned} \textit{Share of AMC Lending}_{izt} &= \beta_1 \textit{Low Credit Score}_{zt} + \beta_2 \textit{Loan-to-Income Ratio}_{izt} + \\ & \beta_3 \textit{Relative Borrower Income}_{izt} + \textit{Market-Year}_{ct} + BHC_i + \\ & \gamma Controls_{izt} + \varepsilon_{izt}, \end{aligned} \tag{3}$$

where *Share of AMC Lending*$_{izt}$ is a ratio of AMC lending to total mortgage lending within BHC i, ZIP code z, and year t. The core variables of interest are the three measures of borrower quality: (i) *Low Credit Score*$_{zt}$ is a fraction of individuals with a credit score below 660 residing in a ZIP code, (ii) *Loan-to-Income Ratio*$_{izt}$ is an average loan-to-income ratio of a BHC-specific representative borrower, and (iii) *Relative Borrower Income*$_{izt}$ is an average BHC borrower's income relative to median area income as reported by HUD. Note that we do not aim to establish causality. We are agnostic as to whether the presence of AMCs provides riskier borrowers access to capital or whether the presence of the riskier borrowers attracts an AMC to a given geography. Both could stem from the regulatory gap.

We include three types of additional control variables. We control for the ultimate originator's (the BHC's) financial conditions: liquidity, size, cost of funds, equity capital, and mortgage and C&I loan specialization. We also control for the lagged annual house price appreciation. The CBSA–year fixed effects, *Market-Year*$_{ct}$, ensure that our results are not driven by differences in local economic conditions (e.g., income growth). BHC_i fixed effects absorb the BHC-specific time-invariant heterogeneity (e.g., risk preferences). Standard errors are clustered at the CBSA-year level. The availability of Equifax data restricts us to evaluating the lending standards post 1999. To avoid the contaminating effect of the crisis on the lending behavior of financial institutions, we end our sample in 2006.

Columns (1) and (2) of Table 5 report our baseline results consistent with AMCs having inferior precrisis lending standards as compared to ADIs of the same BHC. Specifically, we find that BHCs lend disproportionately more through their AMCs in ZIP codes characterized by borrowers with lower credit scores, higher loan-to-income ratios, and lower relative incomes. These results are consistent with the univariate comparison of ADI and AMC loan characteristics presented in Table 1.

One can argue that despite the fact that we conduct our analysis within-BHC, the results could still be attributed to other differences across ADIs and AMCs in addition to the regulatory gap. Table 1 documents significant heterogeneity across ADI and AMC lending and securitization specialization.

First, our results could be due to the higher extent of AMCs' participation in mortgage securitization in general, and private securitization in particular. Mian and Sufi (2009) show that lending standards deteriorated due to oversupply of funds from the securitization market. Since AMCs sell a larger share of their loans, they should be more influenced by the precrisis boom in the respective funding supply as compared to ADIs. To alleviate this concern, we conduct our analysis within the pool of privately securitized (non-GSE) loans (column (5)). We intentionally exclude loans securitized through the GSEs, as these loans are subject to much higher and, most importantly, uniform lending standards—including high credit score and no less than 20% downpayment. The results indicate that this heterogeneity across ADIs and AMCs cannot fully explain our baseline evidence that BHCs lend disproportionately more through their AMCs in ZIP codes with inferior-quality borrowers.

Second, to account for different rate of participation of ADIs and AMCs in the subprime market, we control for the involvement of BHCs in subprime originations in the respective ZIP codes (column (3)). Furthermore, when we build our dependent variable using BHC lending only in the prime segment of the mortgage market (column (4)), we still observe that the underwriting standards of AMCs were inferior to those of ADIs.

The third potential explanation for our results stems from MCs only originating mortgages, while banks provide a wide set of consumer financial services: savings accounts, small-business loans, money market accounts, etc. ADIs can be motivated to actively steer better-quality borrowers to their branches, since these borrowers have the capacity to consume other financial services. ADIs can either offer more attractive deal terms on loans as compared to those offered by AMCs, or have AMC managers redirecting better-quality customers to ADI branches.[30] To ensure that our baseline results are not driven by such customer-steering behavior, we analyze the difference in lending standards between AMCs and ADIs in the geographies (CBSAs) where a parent BHC does

[30] Agarwal and Evanoff (2013) explore another aspect of lenders' steering behavior. They analyze loans that were denied by one BHC subsidiary but subsequently approved by another subsidiary.

not have physical branches and ADIs' ability to cross-sell services is limited at best. About 60% of the BHC-ZIP-year observations in our data come from such geographies. Column (6) of Table 5 suggests that AMCs have inferior lending standards as compared to those of ADIs, even in the areas where BHCs do not have a physical branch presence.

Forth, our results could also be attributed to ADIs carrying a parent BHC's name and, thus, being fully responsible for shaping the latter's reputation (Carey, Post, and Sharpe (1998)). The richness of our data allows us to evaluate the validity of the reputation-based economic mechanism driving the wedge in the lending standards. Specifically, we compare the lending behavior of ADIs to that of AMCs with names consonant to the parent BHC names (e.g., Bank of America Mortgage). We operate under the plausible assumption that such AMCs are as responsible for shaping the reputation of the parent BHC as ADIs. Column (7) reports the results of our baseline analysis after we exclude the "generic-name" AMCs from the sample. The empirical evidence does not support the reputation concerns being a primary explanation for the difference in mortgage-lending standards between AMCs and ADIs.

Finally, in the set of robustness tests (not tabulated), we further verify that our results are not driven by the other market segmentation between AMCs and ADIs. We find a similar wedge in the lending standards if we limit our sample to (i) conventional loans, (ii) first liens, (iii) subprime loans, etc. All our results are consistent with AMCs lending to inferior quality borrowers as compared to those of ADIs.

Within-BHC Lending Standards: Loan-Level Evidence

In this subsection, we confirm the ZIP code representative borrower evidence using a sample of 1.4 million *individual* loans originated in 2005-2006 from a matched LPS-LP-HMDA-Call Report sample. Admittedly, this sample is not necessarily random and might not be fully representative of the U.S. economy. In designing and evaluating our tests, we are cognizant of this issue. Nonetheless, the ability to jointly control for a wide set of lender, borrower, and loan characteristics allows us to effectively eliminate a number of potential omitted variable driven explanations. The loan-level within-BHC analysis also addresses some reservations associated with representative borrower framework and aims to solidify the notion that AMCs' lending standards are inferior to those of ADIs.

First, we analyze whether AMCs are associated with riskier borrowers and riskier loan types at origination. For this purpose we estimate the following regression equation:

$$\begin{aligned} \textit{AMC Loan}_i &= \gamma_1 \textit{Borrower Characteristics}_i + \gamma_2 \textit{Loan Characteristics}_i + \\ &\quad \gamma_3 \textit{Controls}_{izt} + \textit{Market-Year}_{ct} + \textit{BHC}_j + \varepsilon_i, \end{aligned} \tag{4}$$

where $\textit{AMC Loan}_i$ is a dummy variable equal to one if a loan i was originated by an AMC and zero if it was originated by an ADI. The CBSA–year fixed effects, $\textit{Market-Year}_{ct}$, ensure that our results are not driven by differences in local economic conditions. BHC fixed effects absorb time-invariant heterogeneity across BHCs. As in the earlier analysis, we do not aim to establish causality but rather evaluate whether AMCs are associated with lower-quality loans. Table 6 presents the results with the coefficients multiplied by a hundred for tractability. Columns (1) and (2) report the results of the analysis without restricting the sample to CBSA-BHC-years where both types of affiliates operated. We go back to our original sample selection restriction in column (3).

The results confirm that AMCs are associated with lower-quality borrowers characterized by lower credit scores, lower incomes, and higher loan-to-value ratios. Using a rich set of loan characteristics available from the loan-level data, we further document that AMCs are more likely to originate loans of riskier types, such as adjustable-rate mortgages and interest-only mortgages. These conclusions hold even if we restrict our consideration only to privately securitized loans (column (4)).

Next we compare performance of ADI and AMC loans within two years of origination. Since the mortgage defaults were disguised precrisis by house price appreciation (Demyanyk and Van Hemert (2011)), we only consider the performance of loans originated in 2005 and 2006. Table 7 reports the result of the following regression analysis:

$$\begin{aligned} \textit{Mortgage Default}_i &= \beta_0 \textit{AMC Loan}_i + \beta_1 \textit{Borrower Controls}_i + \beta_2 \textit{Loan Controls}_i + \\ &\quad \beta_3 \textit{Lender Controls}_k + \beta_4 \textit{House Price Appreciation}_{z,t} + \\ &\quad \textit{Market-Year}_{ct} + \textit{BHC}_k + \varepsilon_z, \end{aligned} \tag{5}$$

where $\textit{Mortgage Default}_i$ is a dummy variable equal to one if the loan was in severe delinquency (60

days or more past due), foreclosure, or real estate owned within two years of origination.[31] CBSA-year fixed effects control for vintage year of the loan, the impact of local economic conditions, and legal environment on a borrower propensity to default. We control for the ZIP code–level house price appreciation over two years since loan origination. We do not explicitly control for whether a loan is subprime, since the interest rate and the loan type variables already capture this heterogeneity. The coefficients are multiplied by a hundred for tractability.

We find that mortgages originated by AMCs are on average 5.6% more likely to end up in default within two years of origination. Given that the average default rate in LPS-LP-HMDA matched sample is 9%, the effect is economically significant. Since we explicitly control for a vast set of borrower, loan, and lender characteristics, these results cannot be explained by AMCs and ADIs occupying different segments of the mortgage market. The analysis supports our argument that the regulatory inconsistencies allow BHCs to originate riskier loans.

Finally, the loan-level data allow us to evaluate the heterogeneity in risk-taking behavior across BHCs. We explore it along four BHC characteristics: (i) equity capital, (ii) size, (iii) extent of securitization activity (normalized by total assets), and (iv) extent of MC lending activity (share of originations). By interacting the *AMC Loan* dummy with these BHC characteristics (columns (4) through (7) of Table 7) we can infer the types of BHCs that more aggressively pursued riskier lending strategies through their AMCs.

First, we find that larger and less capitalized BHCs originated lower-quality loans through their AMCs (columns (4) and (5)). The capital-related evidence supports the notion that the need to conserve capital motivated BHCs to pursue mortgage lending through AMCs. Second, BHCs that originated a larger share of OTD mortgages were less likely to pursue inferior lending strategies through AMCs (column (6)). Finally, we observe that BHCs with a higher share of loans originated though AMC subsidiaries are characterized by inferior-quality loans (column (7)). This evidence is consistent with AMCs originating risky loans that ADIs could not originate due to regulatory constraints.

Aggregate Effect of MC Lending: Representative Borrower Default Analysis

[31] In the unreported set of tests, we conducted the delinquency and foreclosure analysis separately. We find the results quantitatively and qualitatively similar to those reported in Table 7.

We have shown that AMCs lend to ex ante lower-quality borrowers that are more likely to default ex post. One can argue, however, that the within-BHC results are based on about 30% of financial intermediaries engaged in mortgage lending and, thus, are not necessarily representative. In this section, we consider a broad sample of ZIP code–specific borrower defaults to establish the generality of our conclusions. Specifically, we deviate from the within-BHC framework and evaluate the combined effect of IMCs and AMCs on ZIP code–level delinquency and foreclosure rates available for a representative sample of U.S. ZIP codes. This analysis allows us to quantify the economic effect of unregulated MC lending on borrowers' defaults.

Similar to our previous approach, we evaluate whether higher mortgage default and delinquency rates in the 2007-2008 period are associated with higher MC lending in the 2005-2006 period:

$$Mortgage\ Defaults_{z,Post\text{-}Crisis} = CBSA_j + \beta_1 MC\ Share_{z,Precrisis} + \beta_2 Controls_{z,Precrisis} + \varepsilon_z, \quad (6)$$

where $Mortgage\ Defaults_z$ in a ZIP code z is proxied by two variables: (i) the average quarterly delinquency rate over the 2007-2008 period; and (ii) the foreclosure rate measured as a fraction of the mortgage holders in a given ZIP code who were in foreclosure in any period of time between 2007 and 2008. The delinquency rate is a better proxy of borrower quality since it is free of a lender/servicer/holder contribution to the decision to foreclose on a property. $MC\ Share_{z,Precrisis}$ is a share of loans originated by affiliated and independent MCs over the 2005-2006 period. We control for the borrower characteristics precrisis and the house price appreciation in 2007-2008. CBSA fixed effects accommodate the impact of a (sometimes rapidly) deteriorating local economy. Since, in this analysis, we deviate from the within-BHC identification framework, in the untabulated set of tests, we ensure that the aggregate MC lending behavior is consistent with the results presented in Table 5—namely, MCs in general lend disproportionately more in ZIP codes with lower-quality borrowers.

Table 8 and Table 9 report the results of the delinquency and foreclosure analysis, respectively. The coefficients are multiplied by a hundred for tractability. Columns (1) of both Tables document that MC lending is associated with higher default rates. Our results cannot be explained by MCs being dominant players in the subprime market (columns (2) and (3)). While the securitization market had a profound impact on credit standards, our results persist after we control for the extent

of mortgage securitization in a given ZIP code (column (4)). Even the share of MC activity in the prime market (as defined in HMDA) has an adverse impact on mortgage defaults (column (5)). Admittedly, the aggregate impact of MC activity could be entirely due to the presence of large IMCs such as New Century Financial. To evaluate the plausibility of this argument, we separate the activities of IMCs and AMCs into two different regressors (column (6)). The results are consistent with AMCs being as responsible for the inferior lending standards as IMCs. These two types of lenders have almost identical adverse effects on mortgage defaults.

Using a representative sample of U.S. ZIP code–level borrowers, we confirm that higher precrisis MC lending (independent and affiliated alike) is associated with higher postcrisis rate of mortgage foreclosures and delinquencies. The coefficient on $MC\ Share_z$ is positive and both economically and statistically significant across all specifications. A one-standard-deviation increase in the share of MC lending (12%) leads to about 1.3% increase in delinquency rate and 1.2% increase in foreclosure rate. These numbers, correspondingly, represent about a fifth of the average Q4 2008 delinquency rate (5.5%) and about a third of the average 2007-2008 foreclosure rate (3.22%). For comparison, a one-standard-deviation increase in subprime lending increases delinquency rates by about 0.96% and foreclosure rates by 1.1%. The impact of MC activity on mortgage defaults is, thus, similar in magnitude to that of subprime.

5 Concluding Remarks

We examine two important issues that played a role in the 2007 credit crisis: the rise of "shadow banking" and the inadequate regulation thereof. We bring to light the regulatory gap between banks and MCs that relaxed the regulatory constraints even for heavily regulated BHCs. Lending through AMCs allowed BHCs to mitigate regulatory capital requirements, avoid recognizing costly loan losses, and pursue risky lending while still adhering to banking regulations. Our empirical evidence is consistent with this behavior and suggests that the pre-Dodd-Frank regulatory standards were not as inadequate as they are perceived to be. The inconsistent coverage and enforcement of these regulations, however, eroded their effectiveness and contributed to the deterioration of lending standards.

Our paper adds to the ongoing debate on supervisory and regulatory design of the financial sector: depository and shadow banking institutions. Surprisingly, few voices in this debate address lack of uniform enforcement of existing regulations and the elimination of regulatory arbitrage. Most new reform initiatives are geared toward regulating a wider set of financial institutions' activities, as opposed to consistently enforcing existing regulations across all intermediaries. While we do not argue that banking supervision and regulations were optimal, our results suggest that regulatory design that is "institutional" in nature is flawed. It ignores financial institutions' ability to circumvent regulations via innovative corporate structures or innovative financial instruments. More importantly, it focuses on the financial stability of individual economic agents rather than on control over the systemic risks.

We do not argue that the inconsistent regulations were solely responsible for the deterioration of lending standards—the securitization market's demand for loans significantly contributed to this phenomenon. We do argue, however, that the flaws in the existing regulatory design accommodated this secondary market demand and thus contributed to the erosion of lending standards and, ultimately, the crisis. Consumers, financial corporations, and society as a whole incurred significant costs: the marginal borrowers received loans they could not sustain (as evident from defaults and delinquencies); high-quality borrowers bought houses at inflated prices; financial corporations also did not go unscarred by the systemic crisis that spread through the whole economy.

Our study also contributes to the evolving line of literature examining the economic determinants of shadow financial intermediaries' behavior. Despite being the largest shadow banking intermediaries, mortgage companies were largely ignored. Securitization was perceived to be a force of disintermediation in the financial markets, with the secondary market providing financial resources directly to consumers and the intermediaries merely channeling the funds. We now know that financial innovations in general, and securitization in particular, pushed financial intermediation to a new frontier (Gorton (2010) and Adrian and Ashcraft (2012)). The nondepository financial intermediaries play bigger roles in shaping access to finance by consumers and firms. The intermediaries became more interconnected, thus contributing to systemic risk (Brunnermeier, Dong, and Palia (2010)). Consequently, they can no longer be viewed as mere pass-through entities, and understanding their incentives is crucial in assessing both individual agents' and overall economic risks. This study contributes to the understanding of the shadow intermediaries' behavior, which is

important not only from the perspective of MCs' contribution to the 2007 crisis, but also from the perspective of the mortgage market's future development. MCs continue to hold 30% market share and, hence, have a significant role in shaping Americans' access to the dream of home ownership.

References

Acharia, V., and P. Schnabl (2010): "Do Global Banks Spread Global Imbalances? The Case of Asset-Backed Commercial Paper during the Financial Crisis of 2007-09," *IMF Economic Review*, 58, 37–73.

Acharya, V. V., P. Schnabl, and G. Suarez (2011): "Securitization Without Risk Transfer," *Forthcoming in Journal of Financial Economics*.

Adrian, T., and A. B. Ashcraft (2012): "Shadow Banking Regulation," Federal Reserve Bank of New York, Staff Report No. 559.

Agarwal, S., B. W. Ambrose, and Y. Yildirim (2010): "The Subprime Virus: Theory and Evidence," Working Paper.

Agarwal, S., G. Amromin, I. Ben-David, and S. Dinc (2013): "The Politics of Mortgage Foreclosures," Working Paper.

Agarwal, S., and D. D. Evanoff (2013): "Loan Product Steering in Mortgage Markets," Working Paper.

Agarwal, S., D. Lucca, A. Seru, and F. Trebbi (2012): "Inconsistent Regulators: Evidence from Banking," NBER Working Paper No. 17736.

Ashcraft, A. B. (2008): "Are Bank Holding Companies a Source of Strength to Their Banking Subsidiaries?," *Journal of Money, Credit and Banking*, 40(3), 273–294.

Barth, J., G. Caprio, and R. Levine (2004): "Bank Regulation and Supervision: What Works Best?," *Journal of Financial Intermediation*, 13, 205–248.

Bostic, R., K. Engel, P. McCoy, A. Pennington-Cross, and S. Wachter (2008): "State and Local Anti-Predatory Lending Laws: The Effect of Legal Enforcement Mechanisms," *Journal of Economics and Business*, 60(1-2), 47–66.

Boyd, J., and E. Prescott (1986): "Financial Intermediary-Coalitions," *Journal of Economic Theory*, 38(2), 211–232.

Brunnermeier, M. (2009): "Deciphering the Liquidity and Credit Crunch," *Journal of Economic Perspective*, 23(1), 77–100.

Brunnermeier, M. K., G. Dong, and D. Palia (2010): "Banks' Non-Interest Income and Systemic Risk," Working Paper.

Calomiris, C. W. (2006): "The Regulatory Record of the Greenspan Fed," *American Economic Review Papers and Proceedings*, 96(2), 170–173.

Carey, M., M. Post, and S. Sharpe (1998): "Does Corporate Lending by Banks and Finance Companies Differ? Evidence on Specialization in Private Debt Contracting," *Journal of Finance*, 53(3), 845–878.

Chamberlain, G. (1980): "Analysis of Covariance with Qualitative Data," *Review of Economic Studies*, 47, 225–238.

Demyanyk, Y., and O. Van Hemert (2011): "Understanding the Subprime Mortgage Crisis," *Review of Financial Studies*, 24(6), 1848–1880.

Diamond, D. (1984): "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, 51, 393–414.

Engel, K., and P. McCoy (2011): *The Subprime Virus: Reckless Credit, Regulatory Failure, and Next Steps*. Oxford University Press, Inc.

Flannery, M. J. (2007): "Supervising Bank Safety and Soundness: Some Open Issues," *Economic Review, Federal Reserve Bank of Atlanta*, Q1–2, 83–100.

Gorton, G., and A. Metrick (2010): "Regulating the Shadow Banking System," *Brookings Papers on Economic Activity*, 41(2), 261–312.

Gorton, G., and G. Pennacchi (1995): "Banks and Loan Sales: Marketing Nonmarketable Assets," *Journal of Monetary Economics*, 35, 389–411.

Gorton, G. B. (2010): *Slapped by the Invisible Hand: The Panic of 2007*. Oxford University Press, USA.

Gouvin, E. J. (2002): "Financial Hoding Company Liability After Gramm-Leach-Bliley," in *Financial Modernization After Gramm-Leach-Bliley*, ed. by P. A. McCoy, pp. 37–64. LexisNexis.

Greenlee, M. (2008): "Historical Review of "Umbrella Supervision" by the Board of Governors of the Federal Reserve System," *Review of Banking and Financial Law*, 27, 407–459.

Isil, E., T. Nadauld, and R. Stulz (2012): "Why Did Holdings of Highly-Rated Securitization Tranches Differ So Much Across Banks?," Working Paper.

Kane, E. J. (2000): "Ethical Foundations of Financial Regulation," *Journal of Financial Services Research*, 12(1), 51–74.

Keys, B., T. Mukherjee, A. Seru, and V. Vig (2009): "Financial Regulation and Securitization: Evidence from Subprime Loans," *Journal of Monetary Economics*, 56, 700–720.

——— (2010): "Did Securitization Lead to Lax Screening? Evidence From Subprime Loans," *Quarterly Journal of Economics*, 125.

Lancaster, T. (2000): "The incidental parameter problem since 1948," *Journal of Econometrics*, 95, 391–413.

Landier, A., D. Sraer, and D. Thesmar (2011): "The Risk-Shifting Hypothesis: Evidence from Subprime Originations," Working Paper.

Lee, P. L. (2012): "The Source-of-Strength Doctrine: Reverted and Revisisted," *The Banking Law Journal*, 129(10), 771–801.

Leland, H., and D. Pyle (1977): "Informational Asymmetries, Financial Structure, and Financial Intermediation," *Journal of Finance*, 32(2), 371–387.

Loutskina, E., and P. Strahan (2009): "Securitization and the Declining Impact of Bank Finance on Loan Supply: Evidence from Mortgage Originations," *Journal of Finance*, 64, 861–889.

——— (2011): "Informed and Uninformed Investment in Housing: The Downside of Diversification," *Review of Financial Studies*, 24, 1447–1480.

Mandanis Schooner, H. (2002): "Functional Regulation: The Securitization of Banking Law," in *Financial Modernization After Gramm-Leach-Bliley*, ed. by P. A. McCoy, pp. 189–198. LexisNexis.

Mayer, C., and K. Pence (2008): "Subprime Mortgages: What, Where, and to Whom?," in *In Housing Markets and the Economy: Risk, Regulation, and Policy: Essays in honor of Karl E. Case.*, ed. by E. L. Glaeser, and J. M. Quigley. Cambridge: Lincoln Institute of Land Policy.

Mian, A., and A. Sufi (2009): "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis," *Quarterly Journal of Economics*, 124(4), 1449–1496.

——— (2010): "The Great Recession: Lessons from Microeconomic Data," *American Economic Review*, 100(2), 51–56.

Ongena, S., A. Popov, and G. F. Udell (Forthcoming): "When the Cats Away the Mice Will Play: Does Regulation At Home Affect Bank Risk Taking Abroad?," *Journal of Financial Economics*.

Purnanandam, A. (2011): "Originate-to-Distribute Model and the Subprime Mortgage Crisis," *Review of Financial Studies*, 24(6), 1881–1915.

Rajan, U., A. Seru, and V. Vig (2009): "The Failure of Models that Predict Failure: Distance, Incentives and Defaults," Working Paper.

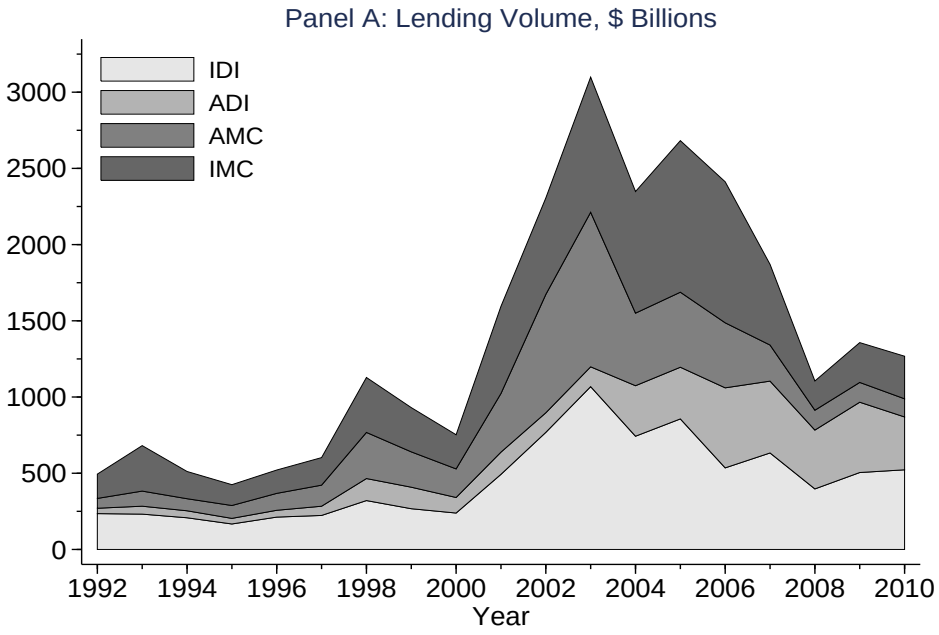
Rosen, R. J. (2003): "Is Three a Crowd? Competition Among Regulators in Banking," *Journal of Money Credit and Banking*, 35(6), 967–998.

Stein, J. (1998): "An Adverse-Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy," *RAND Journal of Economics*, 29, 466–486.

Wilmarth, A. E. J. (2002): "How Should We Respond to the Growing Risks of Financial Conglomerates?," in *Financial Modernization After Gramm-Leach-Bliley*, ed. by P. A. McCoy, pp. 65–134. LexisNexis.

Figure 1: Lending Volumes by Lending Institution Type

The figure shows lending volumes in $ billions for independent banks (IDIs), BHC bank subsidiaries (ADIs), BHC nonbank mortgage subsidiaries (AMCs), and independent mortgage companies (IMCs). Panel B depicts the market shares of respective financial intermediaries. Data source: HMDA.



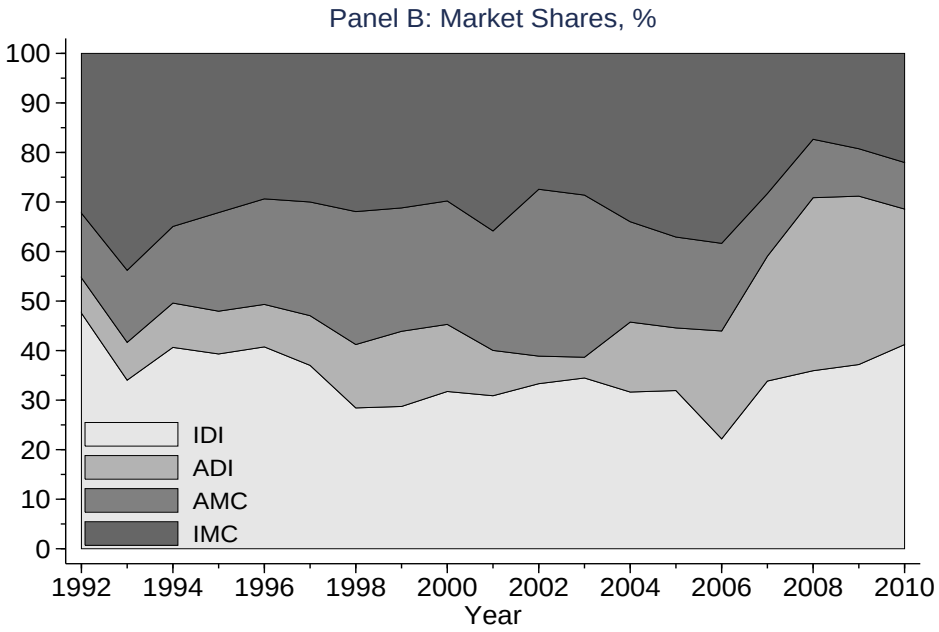


Table 1: Mortgage Lender: Summary Statistics.

This table reports summary statistics for four types of mortgage lenders: (i) independent depository institutions, IDIs; (ii) independent mortgage companies, IMCs; (iii) depository institutions affiliated with MC, ADIs; and (iv) MC subsidiaries of BHCs, AMCs. Panel A is based on HMDA data for years 1999 through 2006 and reports summary statistics for ZIP code–level variables from Equifax and CoreLogic data sets. Panel B reports summary statistics for the matched LP-LPS-HMDA data that covers loans originated in the 2005-2006 period.

	IDIs	IMCs	ADIs	AMCs
Panel A: ZIP Code Representative Borrower, 1999-2006				
Number of Loans (millions)	30.20	31.10	11.86	23.48
Loan Volume ($ billions)	4,962	5,256	1,851	4,055
Average Loan ($1,000)	164.20	169.10	155.90	172.90
Average Borrower Income ($1,000)	97.70	91.00	100.30	94.50
High-yield (Subprime) Loans (%, post 2004)	13.21	39.11	15.87	18.95
Securitized through GSEs (%)	28.08	18.55	21.95	53.93
Privately Securitized (%)	16.86	58.15	9.72	19.18
Refinancing (%)	63.40	54.87	58.55	59.86
Jumbo(%)	8.41	7.41	8.27	8.36
Average Loan-to-Income Ratio	1.99	2.44	1.82	2.17
Borrower Income to Area Income	1.88	1.71	1.91	1.78
House Price Appreciation (t-1, %)	10.39	10.00	7.16	9.55
Fraction of Mortgage Holders with Low FICO Score (%)	26.59	28.72	26.56	27.33
Share of Mortgages in Foreclosure, 2007-2008 (%)	3.00	4.11	3.04	3.20
Share of Delinquent Mortgages, 2007-2008 (%)	5.46	6.76	5.51	5.77
Panel B: Loan Level Data, 2005-2006				
Total Number of Loans, HMDA (millions)	7.01	9.98	4.33	4.59
Number of Loans, Matched Sample (millions)	1.13	2.06	0.79	0.58
Loan Volume ($ billions)	0.29	0.41	0.18	0.12
Average Loan ($1,000)	255.90	197.30	224.60	214.30
Average Borrower Income ($1,000)	114.00	96.30	111.00	106.50
High-yield (Subprime) Loans (%, post 2004)	17.02	60.09	17.85	26.27
Securitized through GSEs (%)	27.44	5.54	37.11	26.94
Privately Securitized (%)	33.21	47.62	21.42	39.10
Refinancing (%)	46.50	41.03	27.75	29.77
Average Loan-to-Income Ratio	2.55	2.38	2.38	2.39
Borrower Income to Area Income	1.77	1.52	1.73	1.68
House Price Appreciation (t-1, %)	13.53	12.76	10.01	11.71
Fraction of Borrowers with Score Below 660 (%)	19.55	46.94	18.94	23.57
Average FICO Score	708.76	655.28	717.10	695.82
Loan to Value Ratio (%)	68.07	111.63	76.37	82.69
Interest Only (%)	16.14	18.42	15.59	17.63
Prepayment Penalty (%)	25.11	39.88	13.94	22.57
Adjustable-Rate Mortgages (%)	32.21	32.95	14.51	26.03
Initial Interest Rate (%)	6.00	7.80	6.67	6.78
Full Documentation (%)	45.23	40.55	35.50	40.11
First Lien (%)	89.15	81.50	90.59	89.97
Delinquency Rate, 2 Years of Origination (%)	9.61	22.25	7.72	10.57
Foreclosure Rate, 2 Years of Origination (%)	4.14	11.45	3.88	5.13

Table 2: Bank Holding Company: Summary Statistics.

This table reports summary statistics for the sample of BHCs with and without MC subsidiaries. The sample contains BHC-year observations that map to HMDA. The financial characteristics are from Call Reports. The volume of mortgages lending and the extent of the securitization activities are from HMDA. The unit of observation is BHC-year. The sample spans from 1992 through 2006. Absolute values of t-statistics are reported in parentheses.

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

	Full sample		BHCs without MC Affiliates		BHCs with MC Affiliates			
	Mean	StDev	Mean	StDev	Mean	StDev	Difference	t-stat
Number of Observations	79,398		72,738		6,660		–	
Total Assets, $Billion	5.21	53.04	2.23	24.50	37.77	160.73	35.55***	(18.03)
Mortgage Originations (% of Total Assets)	10.62	27.78	9.04	19.41	27.87	69.00	18.83***	(22.19)
AMC Originations (% of Total Assets)	1.83	18.38	–	–	21.83	59.91	–	–
Securitization Rate (%)	29.26	32.14	26.32	30.87	61.32	28.08	35.00***	(96.52)
Nonperforming Loans (% of Mortgages)	0.61	1.23	0.60	1.25	0.71	1.01	0.10***	(7.75)
Mortgage Chargeoffs (% of Mortgages)	0.09	1.56	0.09	1.63	0.12	0.39	0.03***	(3.90)
Liquidity (% of Total Assets)	26.34	12.44	26.67	12.55	22.72	10.49	–3.95***	(28.92)
Deposits (% of Total Assets)	80.47	9.72	81.10	9.25	73.88	11.86	–7.22***	(48.38)
Cost of Deposits (%)	1.64	0.99	1.64	0.99	1.61	0.97	–0.03**	(2.18)
Equity Capital (% of Total Assets)	8.83	3.15	8.94	3.17	8.67	2.92	–0.28***	(7.34)
Net Income (% of Total Assets)	64.81	67.22	64.84	68.06	64.48	57.30	–0.36	(0.48)
Letters of Credit (% of Total Assets)	0.50	1.21	0.43	1.00	1.29	2.37	0.86***	(29.23)
Mortgages (% of Loan Portfolio)	36.37	13.29	36.46	13.24	35.39	13.74	–1.08***	(6.15)
C&I Loans (% of Loan Portfolio)	12.50	8.16	12.47	8.20	12.89	7.66	0.42***	(4.31)

Table 3: Rationale for Establishing MC Subsidiaries.

Panel A reports results of the following linear probability model:

$$AMC\ Subsidiary_{i,t} \quad = \quad Year_t + BHC_i + \beta_1 Equity\ Capital_{i,t-1} + \beta_2 BHC\ Controls_{i,t-1} + \varepsilon_{i,t},$$

where $AMC\ Subsidiary_{i,t}$ is a dummy variable that equals one if a BHC i has an MC subsidiary in year t and zero otherwise. Only BHCs with at least one change of status between lending and not-lending through an AMC are included in the sample. The coefficients reflect the marginal effects of the respective variables.

Panel B reports the results of the following linear regression model:

$$AMC\ Lending_{i,t} = Year_t + BHC_i + \beta_1 Equity\ Capital_{i,t-1} + \beta_2 BHC\ Controls_{i,t-1} + \varepsilon_{i,t},$$

where $AMC\ Lending_{i,t}$, is the volume of a BHC lending through an MC subsidiary normalized by total assets. Only BHC-year observations with above zero lending through AMCs are included in the analysis.

$Equity\ Capital_{i,t}$ is the ratio of book value of equity to total assets at the beginning of the year. D_{2002} (D_{2005}) is a dummy variable equal to one for years after and including 2002 (2005). The set of control variables includes *Liquidity* (Securities/Total Assets), *Cost of Deposits*, *Deposits/Total Assets*, BHCs' *Size* (log of total assets) and loan portfolio structure (*Mortgages/Total Assets*, and *C&I Loans/Assets*). All specifications include year and BHC fixed effects. Standard errors are clustered at BHC level. Absolute values of t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	Panel A: Establishing MC Subsidiary			Panel B: Extent of MC Lending		
Equity Capital$_{t-1}$	–1.91***	–1.41**	–3.57***	–1.18***	–0.68**	–1.40**
	(2.92)	(1.99)	(4.49)	(2.61)	(2.40)	(2.57)
Equity Capital$_{t-1}\times D_{2002}$	–	–	4.45***	–	–	0.99
			(5.15)			(1.64)
Equity Capital$_{t-1}\times D_{2005}$	–	–	–1.06*	–	–	–1.01*
			(1.66)			(1.76)
Liquidity$_{t-1}$	–	–0.63***	–0.52**	–	–0.08	–0.04
		(2.70)	(2.24)		(0.52)	(0.26)
Cost of Deposits$_{t-1}$	–	3.38	3.38	–	–1.45	–1.32
		(1.19)	(1.20)		(0.77)	(0.70)
Log(Assets)$_{t-1}$	–	0.21***	0.24***	–	0.025	0.03
		(5.83)	(6.58)		(0.97)	(1.33)
Deposits/Assets$_{t-1}$	–	–0.19	–0.13	–	–0.89***	–0.85***
		(0.80)	(0.57)		(5.79)	(5.53)
Mortgages/Assets $_{t-1}$	–	–0.01	0.03	–	0.30*	0.32**
		(0.03)	(0.15)		(1.91)	(2.04)
C&I Loans/Assets$_{t-1}$	–	–0.19	–0.20	–	–0.22	–0.21
		(0.54)	(0.56)		(0.94)	(0.92)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
BHC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,576	2,170	2,170	3,028	2,557	2,557
R^2	0.30	0.35	0.37	0.58	0.54	0.54

Table 4: BHC Mortgage-related Losses and MC Activity.

This table reports the results from the following regressions:

$$\begin{aligned} \textit{On-balance-sheet Loan Losses}_{it} \quad = \quad & BHC_i + Quarter_t + \beta_1 PostQ1,2007 \times \textit{Total OTD}_i^{2006} + \\ & \beta_2 PostQ1,2007 \times \textit{OTD through AMC}_i^{2006} + \gamma_1 PostQ1,2007 \times \textit{Loan Portfolio Controls}_i^{2006} + \gamma_2 \textit{BHC Controls}_{it} + \varepsilon_{it}, \end{aligned}$$

On-balance-sheet Loan Losses$_{it}$, is either the mortgage chargeoffs of BHC i during quarter t scaled by the outstanding mortgages at the beginning of the quarter (Panel A), the mortgages scaled by the outstanding mortgages at the beginning of the quarter (Panel B), or net income normalized by the total assets (Panel C). $PostQ1,2007$ is a dummy variable set to zero for quarters before and including 2007Q1, and one after 2007Q1. *Total OTD*$_i^{2006}$ is the volume of OTD mortgages originated in 2006 normalized by the beginning-of-the-year mortgages on BHC balance sheet. Similarly, *OTD through AMC*$_i^{2006}$ is the volume of OTD mortgages originated through AMC of a BHC in 2006 normalized by the beginning-of-the-year mortgages on the BHC's balance sheet. *Subprime*$_i^{2006}$ (*AMC Subprime*$_i^{2006}$) is the total (AMC originated) volume of subprime mortgages originated in 2006 normalized by the beginning-of-the-year mortgages on BHC balance sheet. *BHC Controls* are *Liquidity* (Securities/Total Assets), *Cost of Deposits*, *Deposits/Total Assets*, *Size*, *Mortgages/Total Assets*, and *C&I Loans/Assets*. BHC_i denotes BHC fixed effects and $Quarter_t$ are quarter fixed effects. The standard errors are clustered at the BHC-level. Absolute values of z-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: Net Mortgage Chargeoffs			Panel B: Nonperforming Mortgages			Panel C: Net Income		
Total OTD × *Post Q*1 2007	0.06***	0.13***	–0.01	0.05*	0.12***	–0.01	–0.004	–0.02**	0.01
	(2.64)	(2.86)	(0.35)	(1.87)	(2.65)	(0.31)	(0.38)	(2.37)	(1.18)
OTD through AMC × *Post Q*1 2007	–	–0.17***	0.01	–	–0.20***	0.002	–	0.05***	-0.01
	–	(2.72)	(0.77)	–	(3.06)	(0.06)	–	(2.84)	(0.84)
Subprime × *Post Q*1 2007	–	–	0.60***	–	–	0.61***	–	–	–0.17***
	–	–	(8.46)	–	–	(5.40)	–	–	(5.00)
AMC Subprime × *Post Q*1 2007	–	–	–0.63***	–	–	–0.76***	–	–	0.22***
	–	–	(7.07)	–	–	(7.62)	–	–	(4.53)
Originations × *Post Q*1 2007	–0.30***	–0.29	–0.17***	0.08	0.15	0.26**	0.04	0.04	0.01
	(2.61)	(1.60)	(2.64)	(0.29)	(0.72)	(2.11)	(0.79)	(0.51)	(0.11)
log(Assets)	–0.18***	–0.14**	–0.12*	0.057	0.16	0.18	0.03	0.04	0.04
	(3.32)	(2.12)	(1.96)	(0.41)	(0.81)	(0.87)	(0.82)	(0.90)	(0.84)
Equity Capital	0.43	0.60	0.70	–2.68	–2.51	–2.42	0.44	0.38	0.36
	(0.45)	(0.86)	(1.04)	(1.41)	(1.30)	(1.23)	(0.92)	(0.51)	(0.47)
Cost of Deposits	4.88**	3.67**	2.40**	4.14	3.15	1.90	0.02	0.602	0.96
	(2.02)	(2.42)	(1.97)	(1.34)	(1.00)	(0.64)	(0.03)	(0.50)	(0.79)
Liquidity	0.25*	0.25	0.22	–0.35	–0.35	–0.39	–0.30**	–0.26	–0.25
	(1.87)	(1.40)	(1.37)	(1.15)	(0.85)	(0.96)	(2.57)	(1.41)	(1.40)
C&I Loans/Assets	0.44*	0.18	0.15	0.27	0.07	0.07	–0.39***	–0.31	–0.30
	(1.84)	(0.81)	(0.80)	(0.40)	(0.10)	(0.09)	(2.58)	(1.29)	(1.30)
Number of Observations	5,076	5,013	5,013	5,076	5,013	5,013	5,076	5,013	5,013
R^2	0.49	0.64	0.73	0.58	0.60	0.61	0.91	0.92	0.92

Table 5: Affiliated MCs and Banks Lending Standards: Representative Borrower Analysis.

This table reports the results from the following regressions:

$$\textit{Share of AMC Lending}_{izt} = \beta_1 \textit{Low Credit Score}_{zt} + \beta_2 \textit{Loan-to-Income Ratio}_{izt} + \beta_3 \textit{Relative Borrower Income}_{izt} + \textit{Market-Year}_{ct} + BHC_i + \gamma \textit{BHC Controls}_{izt-1} + \varepsilon_{izt},$$

where $\textit{Share of AMC Lending}_{izt}$ is a ratio of AMC lending to total mortgage lending within BHC i, ZIP code z and year t. $\textit{Low Credit Score}_{zt}$ is a fraction of people with credit scores below 660 residing in a given ZIP code. $\textit{Loan-to-Income Ratio}_{izt}$ is a loan-to-income ratio of a BHC-ZIP-code-year representative borrower. $\textit{Relative Borrower Income}_{izt}$ is a borrower's income relative to median CBSA income. *BHC Controls* are *Liquidity*, *Cost of Deposits*, *Deposits/Total Assets*, *Size*, *Mortgages/Total Assets*, and *C&I Loans/Assets*. $\textit{Market-Year}_{ct}$ are CBSA-year fixed effects and BHC_i are BHC fixed effects. Columns (1) through (3) present the analysis for the full sample of BHC loans. The results reported in column (4) are based on the sample of only prime BHC loans, results in column (5) are based on the privately securitized BHC loans, results in column (6) are based on loans originated in geographies where BHCs do not have branches, and the results in column (7) are based on a sample where AMCs have names consonant with their parent BHCs. The unit of observation is BHC-ZIP-code-year. The sample contains 36.3 million loans originated between 1999 and 2006. Standard errors are clustered at the CBSA-year level. Absolute values of t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	Full Sample	Full Sample	Full Sample	Prime Loans	Securitized Loans	No-Branch Loans	Same Name MC Loans
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Low Credit Score	0.05***	0.04***	0.03**	0.01*	0.03**	0.07***	0.03**
	(3.01)	(2.74)	(2.28)	(1.71)	(2.28)	(8.66)	(2.02)
Loan-to-Income Ratio	0.01***	0.02***	0.02***	0.02***	0.02***	0.01***	0.02***
	(8.12)	(7.69)	(7.71)	(9.78)	(7.71)	(7.33)	(7.50)
Borrower/Area Income	–0.001***	–0.003***	-0.003***	–0.002***	–0.003***	–0.002***	–0.003***
	(3.29)	(8.12)	(8.09)	(4.75)	(8.09)	(4.19)	(7.52)
Share of Minority	–0.04***	–0.02***	–0.02***	–0.02***	–0.02***	–0.01*	–0.02***
	(5.38)	(4.07)	(4.13)	(5.33)	(4.13)	(1.83)	(3.67)
House Price Appreciation, t-1	–0.39***	–0.35***	–0.35***	–0.03	–0.35***	–0.25***	–0.34***
	(7.45)	(8.59)	(8.60)	(1.44)	(8.60)	(5.35)	(8.18)
Subprime Lending (LP)	–	–	–0.02*	–0.08***	–0.02*	0.08***	–0.02
			(1.84)	(7.67)	(1.84)	(9.00)	(1.38)
Securities/Assets	–	–0.01	–0.01	–0.33***	–0.01	0.03***	–0.08***
		(1.15)	(1.34)	(5.22)	(1.34)	(4.13)	(4.48)
Log(Assets)	–	2.40***	2.42***	–0.38***	2.42***	3.87***	1.91***
		(6.33)	(6.39)	(21.76)	(6.39)	(10.51)	(4.00)
Cost of Deposits	–	–0.21***	–0.22***	–5.48***	–0.22***	–0.08**	–0.08
		(4.21)	(4.34)	(9.68)	(4.34)	(2.00)	(0.86)
Deposits/Assets	–	–0.63***	–0.64***	–0.66***	–0.64***	0.15*	–0.46***
		(6.67)	(6.87)	(19.29)	(6.87)	(1.80)	(5.37)
Capital/Assets	–	–2.99***	–2.99***	6.15***	–2.99***	–2.26***	–4.00***
		(18.61)	(18.57)	(17.84)	(18.57)	(9.32)	(7.20)
Mortgages/Assets	–	–1.58***	–1.59***	–0.60***	–1.59***	–1.15***	–1.41***
		(34.83)	(35.39)	(5.59)	(35.39)	(23.13)	(26.45)
C&I Loans/Assets	–	–0.32**	–0.32**	–0.13	–0.32**	–0.40***	–0.53***
		(2.49)	(2.50)	(0.83)	(2.50)	(3.82)	(3.16)
BHC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CBSA× Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,492,948	1,137,775	1,137,775	372,698	1,137,775	684,353	1,111,298
Adjusted R^2	0.45	0.47	0.47	0.75	0.47	0.48	0.46

Table 6: Affiliated MCs and Affiliated Banks Lending Standards: Loan-level Analysis.

This table reports the results of the following regression analysis:

$$AMC\ Loan_i = \gamma_1 Borrower\ Characteristics_i + \gamma_2 Loan\ Characteristics_i + \gamma_3 Controls_{izt} + Market\text{-}Year_{ct} + BHC_j + \varepsilon_i,$$

where $AMC\ Loan_i$ is a dummy variable that equals one if a loan was originated by an AMC and zero otherwise. BHC controls include *Liquidity* (Securities/Total Assets), *Cost of Deposits*, *Deposits/Total Assets*, *Size* (log of total assets), *Mortgages/Total Assets*, and *C&I Loans/Assets*. We also control for House Price Appreciation, (t-1): the ZIP code house price appreciation over one year prior to loan origination. We include CBSA-year and BHC-specific fixed effects. Standard errors are clustered at BHC level. Columns (1) and (2) are based on the entire sample of loans. Column (3) contains the sample to loans originated in CBSAs where both bank and MC affiliates lend in a given year. Column (4) is based on the sample of privately securitized mortgages only. The sample contains loans originated over 2005-2006 period. The coefficients are multiplied by 100 for tractability. Absolute values of t-statistics are reported in parentheses.

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

	(1)	(2)	(3)	(4)
Low Credit Score	2.56***	2.27***	3.67***	3.74***
	(11.62)	(10.34)	(9.94)	(12.18)
Loan-to-Value Ratio	0.001**	0.001***	0.001***	0.001***
	(2.05)	(2.65)	(4.66)	(6.77)
log (Borrower Income)	–0.05	–0.02	–0.26*	–0.68***
	(0.45)	(0.15)	(1.88)	(3.66)
House Price Appreciation, (t-1)	7.51***	2.46***	5.15***	13.34***
	(7.79)	(2.61)	(3.09)	(5.41)
Initial Interest Rate	–0.57***	–0.29**	–0.54***	1.68***
	(4.93)	(2.24)	(2.95)	(5.93)
Adjustable Rate Mortgage	0.78***	0.69**	0.94**	2.94***
	(2.73)	(2.46)	(2.17)	(5.77)
Interest Only Mortgage	1.30***	1.25***	1.58***	-0.74
	(8.32)	(8.33)	(5.90)	(1.57)
Full Documentation	2.42***	2.37***	4.07***	2.33***
	(6.13)	(5.96)	(7.64)	(6.09)
First Lien	–5.15***	–5.14***	–8.67***	–20.12***
	(9.00)	(9.44)	(10.09)	(19.40)
Prepayment Penalty	–8.49***	–8.33***	–11.66***	–6.59***
	(9.52)	(9.50)	(10.39)	(4.09)
BHC Fixed Effects	Yes	Yes	Yes	Yes
CBSA × Year Fixed Effects	Yes	Yes	Yes	Yes
BHC Controls Included	No	Yes	Yes	Yes
Joint Bank-MC in CBSA Restriction	No	No	Yes	No
Number of Observations	1,373,098	1,373,098	924,721	396,479
Adjusted R^2	0.86	0.86	0.80	0.80

Table 7: Mortgage Defaults: Loan-level Analysis.

This table reports the results of the following regression analysis:

$$\begin{aligned} \textit{Mortgage Default}_i \quad = \quad & \beta_0 \textit{AMC Loan}_i + \beta_1 \textit{Borrower Controls}_i + \beta_2 \textit{Loan Controls}_i + \beta_3 \textit{BHC Controls}_i + \\ & \beta_4 \textit{House Price Appreciation}_{z,t} + \textit{Market-Year}_{ct} + BHC_k + \varepsilon_z, \end{aligned}$$

where *Mortgage Default*$_i$ is a dummy variable that equals one if a loan was 60 or more days past due, in severe delinquency, in foreclosure, or real-estate owned within two years since origination, and zero otherwise. *AMC Loan*$_i$ is a dummy variable that equals one if a loan was originated by an affiliated MC. *House Price Appreciation, (t+2)* is the ZIP code house price appreciation over two years after a loan was originated. *BHC Securitization Activity* is the share of securitized loans among those originated by all BHC affiliates in a given year. BHC controls include *Liquidity* (Securities/Total Assets), *Cost of Deposits*, *Deposits/Total Assets*, *Size* (log(Total Assets)), *Mortgages/Total Assets*, and *C&I Loans/Assets*. All specifications include CBSA-Year and BHC-specific fixed effects. The sample contain loans originated over 2005-2006 period. Standard errors are clustered at BHC level. In column (3) we change the sample and only consider loans originated in CBSAs where both bank and MC affiliates lend in a given year. The coefficients are multiplied by 100 for tractability. Absolute values of t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MC Dummy	5.62***	5.74***	5.58***	-43.25***	11.95***	13.88***	–2.65***
	(14.45)	(14.13)	(13.94)	(7.99)	(8.88)	(12.10)	(6.08)
MC Dummy × Size				2.50***			
				(9.40)			
MC Dummy × Equity Capital					–74.27***		
					(4.38)		
MC × BHC Secur. Activity						–11.54***	
						(7.50)	
MC × BHC Share MC Lending							14.02***
							(19.95)
Low Credit Score	11.42***	11.32***	11.50***	11.29***	11.30***	11.32***	11.22***
	(45.07)	(42.96)	(39.08)	(42.87)	(42.98)	(42.80)	(42.97)
Loan-to-Value Ratio	0.001**	0.001**	0.001**	0.001**	0.001**	0.001***	1.80**
	(2.23)	(2.55)	(3.79)	(2.58)	(2.52)	(2.64)	(2.42)
Loan-to-Income Ratio	0.79***	0.78***	0.65***	0.78***	0.78***	0.78***	0.78***
	(8.65)	(8.66)	(7.21)	(8.54)	(8.64)	(8.62)	(8.65)
House Price Appreciation, (t+2)	–23.49***	–21.51***	–19.83***	–21.55***	–21.55***	–21.39***	-21.57***
	(16.85)	(16.06)	(15.85)	(16.14)	(16.12)	(15.73)	(-16.11)
log (Borrower Income)	0.13	0.05	–0.15	0.01	0.05	0.04	0.03
	(0.61)	(0.26)	(0.75)	(0.06)	(0.24)	(0.18)	(0.16)
Initial Interest Rate	3.19***	3.12***	3.28***	3.17***	3.12***	3.16***	3.11***
	(26.71)	(24.72)	(21.89)	(24.86)	(24.80)	(24.99)	(25.27)
Adjustable-Rate Mortgage	3.94***	4.02***	4.99***	3.93***	4.01***	4.00***	3.94***
	(18.61)	(19.18)	(20.82)	(18.27)	(19.09)	(18.75)	(19.18)
Prepayment Penalty	5.72***	5.90***	5.53***	6.01***	5.95***	5.91***	6.04***
	(9.96)	(10.58)	(10.63)	(10.64)	(10.66)	(10.52)	(11.17)
Interest-Only Mortgage	2.37***	2.54***	2.53***	2.47***	2.54***	2.54***	2.45***
	(16.29)	(17.17)	(16.48)	(16.85)	(17.01)	(17.13)	(16.93)
Full Documentation	–2.68***	–3.21***	–2.24***	–3.26***	–3.23***	–3.22***	-3.28***
	(12.76)	(13.25)	(5.99)	(13.38)	(13.19)	(13.30)	(-13.49)
First Lien	–5.52***	–5.83***	–6.13***	–6.01***	–5.80***	–6.03***	-5.69***
	(9.86)	(10.73)	(9.94)	(11.06)	(10.69)	(11.29)	(-10.73)
Securitized through GSEs	–1.57***	–1.51***	–1.03***	–1.71***	–1.53***	–1.60***	-1.66***
	(11.17)	(11.21)	(5.44)	(12.66)	(11.45)	(12.02)	(-12.28)
Privately Securitized	–3.46***	–3.16***	–1.94***	–3.22***	–3.15***	–3.15***	-3.08***
	(14.97)	(13.22)	(4.55)	(13.15)	(13.32)	(12.84)	(-13.41)
BHC Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CBSA × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BHC Controls Included	No	Yes	Yes	Yes	Yes	Yes	Yes
Within the same BHC-CBSA-Year	No	No	Yes	No	No	No	No
Number of Observations	1,373,098	1,373,098	924,721	1,373,098	1,373,098	1,373,098	1,373,098
R^2	0.17	0.17	0.18	0.17	0.17	0.17	0.17

Table 8: Impact of MC Activity on Delinquencies.

This table reports the results from the following regressions:

$$Delinquency\ Rate_z = CBSA_j + \beta_1 MC\ Share_{z,Pre\text{-}Crisis} + \beta_2 Controls_z + \varepsilon_z,$$

where *Delinquency Rate*$_z$ is a fraction of mortgage holders in a ZIP code that were delinquent on their loans in any period of time between January 2007 and December 2008. *MC Share*$_{z,Pre\text{-}Crisis}$ is a share of loans originated by affiliated and independent MCs over the 2005-2006 period. The set of controls include (i) the borrower characteristics measured based on a 2005-2006 pool of ZIP code borrowers; (ii) house price appreciation over the 2007-2008 period; and (iii) extend of subprime originations and securitization activity in a ZIP code in 2005-2006. All specifications include CBSA fixed effects. Standard errors are clustered at CBSA level. The coefficients are multiplied by 100 for tractability. Absolute values of t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Measured over 2005–2006	(1)	(2)	(3)	(4)	(5)	(6)
MC Share	14.37***	11.78***	4.60***	12.27***	–	–
	(12.10)	(10.22)	(5.05)	(7.82)	–	–
Prime MC Share	–	–	–	–	3.53***	–
	–	–	–	–	(3.38)	–
Affiliated MC Share	–	–	–	–	–	12.38***
	–	–	–	–	–	(4.93)
Independent MC Share	–	–	–	–	–	12.26***
	–	–	–	–	–	(7.51)
Low Credit Score	20.14***	18.27***	8.43***	18.16***	8.35***	18.16***
	(17.14)	(15.07)	(9.62)	(14.16)	(9.51)	(14.33)
Loan-to-Income Ratio	0.13	0.12	0.82**	0.13	0.75*	0.13
	(0.39)	(0.36)	(2.05)	(0.40)	(1.82)	(0.41)
Borrower/Area Income	–0.07	–0.08	0.21***	–0.10	0.27***	–0.10
	(0.78)	(1.11)	(2.74)	(1.23)	(2.92)	(1.21)
Share of Minority	2.01***	1.58***	0.12	1.57***	0.18	1.57***
	(4.12)	(3.48)	(0.33)	(3.48)	(0.53)	(3.49)
House Price Appreciation 2007-2008	–2.51	–2.38	–1.32	–2.24	–1.71	–2.24
	(1.09)	(1.10)	(0.85)	(1.03)	(1.16)	(1.04)
Subprime Lending (LP)	–	4.02***	–	4.03***	–	4.02***
	–	(6.16)	–	(6.15)	–	(6.17)
Subprime Lending (HMDA)	–	–	16.98***	–	17.99***	–
	–	–	(20.44)	–	(22.15)	–
Share Securitized	–	–	–	–1.03	2.56	–1.03
	–	–	–	(0.62)	(1.60)	(0.64)
CBSA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	6,190	6,190	6,190	6,190	6,190	6,190
R^2	0.77	0.78	0.82	0.78	0.82	0.78

Table 9: Impact of MC Activity on Foreclosures.

This table reports the results of the following regression analysis:

$$Foreclosure\ Rate_z = CBSA_j + \beta_1 MC\ Share_{z,Precrisis} + \beta_2 Controls_z + \varepsilon_z,$$

where *Foreclosure Rate*$_z$ is a fraction of mortgage holders in a ZIP code that were in foreclosure in any period of time between January 2007 and December 2008. *MC Share*$_{z,Precrisis}$ is a share of loans originated by affiliated and independent MCs over the 2005-2006 period. The set of controls include (i) the borrower characteristics measured based on 2005-2006 pool of ZIP code borrowers; (ii) house price appreciation over the 2007-2008 period; and (iii) extent of subprime originations and securitization activity in a ZIP code in 2005-2006. All specifications include CBSA fixed effects. Standard errors are clustered at CBSA level. The coefficients are multiplied by 100 for tractability. Absolute values of t-statistics are reported in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Measured over 2005–2006	(1)	(2)	(3)	(4)	(5)	(6)
MC Share	10.34***	9.12***	5.55***	12.27***	–	–
	(6.57)	(5.97)	(3.87)	(7.82)	–	–
Prime MC Share	–	–	–	–	3.74***	–
	–	–	–	–	(2.66)	–
Affiliated MC Share	–	–	–	–	–	7.76*
	–	–	–	–	–	(1.93)
Independent MC Share	–	–	–	–	–	9.68***
	–	–	–	–	–	(4.70)
Low Credit Score	10.01***	9.13***	4.27***	18.16***	4.18***	9.04***
	(10.15)	(9.06)	(3.84)	(14.16)	(3.79)	(8.60)
Loan-to-Income Ratio	–0.08	–0.08	0.27	0.13	0.24	–0.08
	(0.24)	(0.24)	(0.77)	(0.40)	(0.69)	(0.24)
Borrower/Area Income	0.00	–0.00	0.14	–0.10	0.15	–0.01
	(0.02)	(0.04)	(1.39)	(1.23)	(1.25)	(0.07)
Share of Minority	3.15***	2.95***	2.23***	1.57***	2.28***	2.93***
	(6.07)	(5.87)	(5.43)	(3.48)	(5.71)	(5.68)
House Price Appreciation, 2007-2008	0.17	0.23	0.76	–2.24	0.59	0.31
	(0.08)	(0.10)	(0.35)	(1.03)	(0.28)	(0.14)
Subprime Lending (LP)	–	1.90***	–	4.03***	–	1.94***
	–	(3.31)	–	(6.15)	–	(3.50)
Subprime Lending (HMDA)	–	–	8.33***	–	9.75***	–
	–	–	(6.50)	–	(7.93)	–
Share Securitized	–	–	–	–1.03	1.41	–0.94
	–	–	–	(0.62)	(0.53)	(0.39)
CBSA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	6,190	6,190	6,190	6,190	6,190	6,190
R^2	0.67	0.68	0.69	0.78	0.69	0.68