Mortgage Companies and Regulatory Arbitrage*

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November 2012

Abstract

Mortgage companies (MCs) do not fall under the strict regulatory regime applicable to depository institutions. We empirically show that the resulting regulatory arbitrage allowed bank holding companies (BHCs) to circumvent capital requirements and avoid loan-related losses. MC subsidiaries of BHCs originated riskier mortgages (than bank subsidiaries), characterized by borrowers with lower credit scores, lower incomes, higher loan-to-income ratios, and higher default rates. Our results imply that regulation had the capacity to prevent the deterioration of pre-crisis lending standards, but only if consistently applied and enforced. The higher involvement of MCs in subprime lending and securitization do not explain our results.

*We thank Jennifer Bray, Tom Fitzpatrick, Chris Henderson, Paul Kaboth, and James Thomson for sharing with us their knowledge about supervision and regulation of mortgage companies. We thank John Krainer, Philip Strahan, the participants of the Federal Reserve System Committee on Financial Structure and Regulation Meeting, and the participants of the seminars at the University of Virginia-Darden Business School and the Federal Reserve Bank of Cleveland for useful discussions and comments. The views expressed are those of the authors and do not necessarily reflect the official positions of the Federal Reserve Bank of Cleveland or the Federal Reserve System.

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1 Introduction

The collapse of the housing market in 2007 instigated an economic downturn that has made a profound impact on the world economy (Brunnermeier (2009)). The securitization market, inadequate regulation, and "shadow banking" are widely blamed for the deterioration of the lending standards that led to the crisis (Spiegel (2011)). It has been empirically documented that the secondary market for mortgages with its abundant supply of capital and insatiable hunger for risky loans contributed to the deterioration of lending standards.[1] There is little empirical evidence, however, on the role of (in)adequate regulation and its impact on the behavior of "shadow banking" credit intermediaries.[2] Our paper empirically shows that inconsistent regulations across depository (banks) and non-depository (mortgage companies, MCs) credit intermediaries altered the behavior of even regulated lenders and contributed to deterioration of the underwriting standards in the mortgage market. Our results imply that the regulations in place prior to 2007 had the capacity to prevent the deterioration of lending standards widely blamed for the crisis. The inconsistent coverage and enforcement of these regulations, though, eroded their effectiveness.

To isolate the impact of regulation across lenders we exploit a unique empirical setup centered around the bank holding companies (BHCs) with both depository subsidiaries (banks) and non-depository subsidiaries (MCs). Banks are subject to safety and soundness regulations, deposit insurance requirements, and consumer compliance regulations.[3] MCs either do not fall under these regulations or enjoy an extremely lax enforcement of them, even when they are subsidiaries of heavily regulated BHCs. By analyzing the behavior of MCs and banks within a BHC, we ensure that both financial intermediaries have similar ability to access particular lending markets, the economies of scale or scope in loan sales, differential risk aversion, etc. Without the regulatory gap, bank and MC arms of a BHC are expected to originate similar quality loans.

The seminal banking literature questions the necessity to regulate the credit intermediaries that originate most of their loans to distribute when banks still originate the majority of their loans to

[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 (2009) document the significant role of the subprime lending in the 2007 crisis.

[2] Keys, Mukherjee, Seru, and Vig (2009) and Acharya, Schnabl, and Suarez (2011) empirically evaluate the behavior of the "shadow banking" intermediaries.

[3] We provide a detailed discussion of the regulations affecting depository and non-depository institutions in Section 2 of this study.

hold. As the lending practices shift from an originate-to-hold to an originate-to-distribute (OTD) model, lending officers' incentives to produce soft information about a borrower erodes (Rajan, Seru, and Vig (2009), Gorton and Pennacchi (1995), Loutskina and Strahan (2011)).[4] Banks, being better ex ante screeners (Leland and Pyle (1977), Boyd and Prescott (1986)) and ex post monitors (Diamond (1984)), are better positioned to produce private information about borrowers. This "private information advantage" should allow banks to measure and price risks more accurately and ration credit less. By extension, banks should be more active in the soft-information-intensive segment of the market, i.e., they should lend more to borrowers with inferior hard information as compared to MCs. By extension MCs should be "market-regulated" to maintain high underwriting standards.

The argument above, however, does not take into account banks' incentives to pursue risky activities under underpriced deposit insurance (Flannery (2007)). Financial liberalization and the associated increase in banking competition lead to deteriorating incentives to maintain high lending standards (Hellman, Murdock, and Stiglitz (2000)). The role of regulation is to curb such behavior.[5] The regulatory inconsistencies across bank and MC lenders partially relax these regulatory constraints and create opportunities for BHCs' to engage in riskier lending activities through their MC subsidiaries.

How did the differences in regulatory environment between banks and MCs relax regulatory constraints of BHCs'? First, MCs face only a weak form of the safety and soundness regulation that is strictly binding for banks. Banks have to hold capital even for loans they are planning to sell. MCs, as non-depository institutions, have no capital requirements whatsoever and are able to operate with as little capital as they desire. Such gap in regulation creates incentives for BHCs to expand their mortgage business through MCs without expanding their capital. Furthermore, the non-performing loans and loan-loss provisions play a prominent role in enforcing the safety and soundness regulation as it aims to ensure the stability of banking institutions. The performance of a bank's loan portfolio defines the amount of capital and deposit insurance costs a regulator would impose and, hence, affects the bank's cost of capital. All depository institutions adhere to

[4]The originating financial institutions cannot credibly communicate some borrower-specific information (soft or private information) to the secondary market investors (Stein (2002)).

[5]Kane (1989) and Cole, McKenzie, and White (1995) document the problem of "gambling on resurrection," which is synonymous with risk shifting Jensen and Meckling (1976). Akerlof, Romer, Hall, and Mankiw (1993) elaborate on moral hazard and argue that bank managers may engage in fraudulent lending practices to "loot" banks.

strict guidelines on loan-loss recognition and provisioning. MCs, on the other hand, have a lot of flexibility in (not) provisioning for losses. MCs can "sit" on non-performing loans in the expectation of working the loans out or selling them to a special "scratch-and-dent desk" entity. A parent BHC does not have to provision for expected losses from affiliated MC loan portfolios. Last but not least, since MCs are structured as limited liability entities, the BHC losses from MC lending activity are limited to the equity capital of the latter. Overall, BHCs lending through MC subsidiaries are less exposed to loan-related losses relative to BHCs with no (or less) lending done through MC subsidiaries.

We document the behavior consistent with BHCs being able to circumvent the capital requirements by lending through MC subsidiaries. Undercapitalized BHCs and those with less liquid funds, higher cost of deposits, and lower equity are more likely to establish an MC subsidiary.[6] We then show that BHCs avoided loan loss recognition from their MC subsidiaries' loan portfolios. By augmenting the empirical setup of Purnanandam (2011), we document that the higher extent of pre-crisis OTD activity of bank subsidiaries leads to significantly higher post-crisis losses recognized by BHCs. Higher OTD lending through MC subsidiaries, on the other hand, does not have any an effect on the losses for the parent corporation upon the shut-down of the secondary loan market in 2007.

Overall, by originating riskier loans through MCs, BHCs do not have to provision for potentially higher losses, do not have to hold capital or account for such inferior lending practices when assessing deposit insurance costs. To add insult to injury, BHCs face no barriers to have inferior underwriting standards at their MC subsidiaries: while the bank subsidiaries of BHCs are subject to consumer compliance regulations that make origination of risky loans costly, MCs get a free ride.

Our empirical results confirm that over the period between 1999 and 2006 MC lending standards were inferior to those of banks.[7] Affiliated MCs lent to borrowers with lower credit scores, higher loan-to-income ratios, and lower relative incomes as compared to BHC-affiliated banks. The results of the analysis are robust and could not be explained by MCs and banks serving different segments of the market. We observe the similar difference in the lending standards if we consider only (i)

[6] 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 system vehicle.

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

prime loans, (ii) non-jumbo loans, (iii) first liens, (iv) privately securitized loans, or if we (v) run the analysis by different loan-size-based segments of the market.[8]

Finally, we evaluate whether MC borrowers experienced higher default rates post-crisis. In this experiment we consider independent MCs alongside affiliated ones due to limitations of our loan performance data. We show that the pre-crisis market share of MCs, independent and affiliated alike, has statistically and economically significant effects on ZIP code-level foreclosure and delinquency rates in 2007-2008. A one standard-deviation increase in MC market share pre-crisis is associated with 1.4% (1.2%) increase in delinquency (foreclosure) rate. The economic magnitude of an MC activity impact on mortgage defaults is comparable to that of subprime.

Our paper contributes to two strands of literature. First, we contribute to the literature exploring the economic determinants of the shadow banking system behavior. MCs are among the largest non-bank credit intermediaries. They consistently originated about half of the mortgages in the U.S. economy since 1992 (Figure 1). In 2006, they originated $1.35 trillion of mortgages, relative to the $1.12 trillion originated by banks. MCs commanded a dominant share of the subprime market (Figure 2). Understanding the determinants of MCs' behavior is important given that MCs did not go extinct together with subprime and continue to originate north of 30% of U.S. mortgages through 2010. In this line of research Keys, Mukherjee, Seru, and Vig (2009) is the closest study to ours. Keys et al document that heavily regulated banks *securitized* lower quality *subprime* loans than weakly regulated MCs. The authors attribute this finding to the ability of fragile capital structure of MCs to mitigate moral hazard problems in the securitization market. In contrast to Keys et al, who evaluate 1.6 million subprime *non-agency securitized* loans, we evaluate the *origination* decisions of two types of lenders utilizing a broad sample of 96 million loans in the U.S. economy. Our results are consistent with those documented by Keys et al as the binding regulatory requirements might force banks to sell lower quality loans, on average, to achieve healthier balance-sheets.

Second, our study contributes to the literature exploring regulatory design and its consequences.[9] The banking regulation literature analyzes the efficacy of various aspects of regulation but offers little empirical evidence (see, e.g., Hellman, Murdock, and Stiglitz (2000), Dewatripont and Tirole (1994), Boot and Thakor (1993)). More recent studies acknowledge the existence of in-

[8] We find similar evidence when we compare behavior of unaffiliated MCs to that of banks.

[9] The original economic theory of regulation offered by Stigler (1971) and Peltzman (1976) argues that regulation is designed primarily for the regulated-industry insider's benefit.

consistent regulation. Rosen (2003) and Rezende (2011) document that banks engage in regulatory arbitrage by proactively seeking softer regulators via changing charters, engaging in merger activity, or changing incorporation location. The regulatory agencies further contributed to softening of the regulation as they compete for charter members, constituting the "the race to the bottom" (Kane (2000), Calomiris (2006)).[10] The most recent study, Agarwal, Lucca, Seru, and Trebbi (2012), documents discrepancies in federal and state regulators' enforcement actions in supervising the exact same financial institutions. The authors argue that inconsistent regulatory oversight can hamper the effectiveness of regulation.

We contribute to this literature by recognizing inconsistent regulation of MCs and banks and by empirically documenting its consequences for both financial institutions and consumers. The importance of such evidence is hard to underestimate, given the recent financial crisis and Dodd-Frank regulatory reform (Brunnermeier, Crocket, Goodhart, Persaud, and Shin (2009)). Most of the new reform initiatives are geared toward regulating more activities of financial institutions as opposed to consistently enforcing existing regulations across all intermediaries. We argue that the differences in the regulatory environment between depository and non-depository institutions created opportunities for the market in general and BHCs in particular to originate riskier loans. Our results imply that the regulation in place before the crisis had the capacity to limit excessive risk-taking behavior by lenders, but only if consistently applied and enforced across all lenders. Financial institutions exploited the regulatory loopholes to "feed the beast" of the securitization market and to realize the origination-volume-based fees the latter was willing to pay. We do not argue that the deteriorating lending standards were due solely to the lax regulation. The "securitization market hunger for risky loans" significantly contributed to this phenomenon. Neither do we argue that regulatory arbitrage is the only rationale for the MCs' existence. We argue that inconsistent regulatory oversight allowed institutions to accommodate this hunger and contributed to the erosion of lending standards.

The paper proceeds as follows. Section 2 describes in detail the regulatory environment of mortgage lenders. Section 3 presents our sample selection procedures. Section 4 presents our empirical results and robustness tests. Finally, Section 5 concludes the paper.

[10] A number of studies evaluate the efficacy and informativeness of bank supervisory examination. See, e.g., Berger, Davies, and Flannery (2000).

2 Mortgage Companies and Banking Regulation

MCs are fundamentally different from banks. Banks are "special," as they provide liquidity to both firms and consumers (Diamond and Dybvig (1983), Holmstrom and Tirole (1998), Kashyap, Rajan, and Stein (2002)). MCs are intermediaries for the most part, merely channeling funds from the secondary market to ultimate borrowers. They follow the originate-to-distribute model, while banks originate the majority of their loans to hold (Table 1). MCs are not a feature of the recent market boom. They came into existence in the early 1970s. By the early 1990s, they held a solid 50% market share in the U.S. mortgage market (Figure 1).

Since Glass-Steagall Act of 1932, the U.S. depository institutions (banks, thrifts, credit unions, and savings and loans) were burdened by close supervision that increased their cost of capital (Stein (1998)). They had to comply with the safety and soundness regulations, deposit insurance requirements, and consumer compliance regulations.[11] MCs were a financial innovation that came to life to circumvent these binding regulatory requirements. Regulators knew about this motivation for the MCs' existence but did not mind. After all, MCs harnessed the power of the secondary market to provide Americans with the dream of home ownership.[12]

Not surprisingly, the MC business was very appealing to the point where BHCs started to diversify and establish MC subsidiaries. Counter to any logical reasoning, even BHC-affiliated MCs continued to enjoy lax regulatory oversight and enforcement. The MC regulations (or the lack of thereof) are very likely to change. In July 2008, Federal Reserve Chairman Ben Bernanke announced a plan for a radical shift toward equating the regulatory standards across *all* lending institutions.[13]

Safety and Soundness Regulation

The regulation of depository institutions for safety and soundness has a long history in the United States.[14] Starting with the Glass-Steagall Act of 1932, the regulations have been continu-

[11]The depository institutions are supervised by Office of the Comptroller of the Currency (OCC), Federal Deposit Insurance Corporation (FDIC), the Federal Reserve System and the Office of Thrift Supervision (OTS).

[12]Establishing and operating a new MC is relatively easy and inexpensive relative to establishing a new bank branch. In this study, we do not consider the implication of a difference in geographic barriers of entry across banks and MCs for two reasons. First, we find that BHC originate about 43% of their bank originated loans in geographies where they do not have branches. Second, we conduct most of our analysis within geographies where both banks and mortgage company subsidiaries of the same BHC lend. Hence our results are could not be explained by the difference in barriers of entry.

[13]See Statement by Chairman Ben S. Bernanke on July 14, 2008.

[14]We do not provide a broad overview of US banking regulation but rather discuss unique features of it relevant for

ously updated to ensure stability of the banking system. Glass-Steagall established the FDIC to insure bank deposits and to thereby limit runs on all U.S. commercial banks. The second goal of the Act was to reduce disruptions to the U.S. economy engendered by bank failures.

There were two core motivations for establishing the safety and soundness regulation. First, given underpriced deposit insurance, banks face distorted incentives to increase asset risk and leverage. Second, there is a "systemic risk" justification for government control over financial firms. Bank failures impose external costs on uninvolved parties. Flannery (2007) argues that "left to themselves, banks would accept too large a default probability, so supervisors design constraints to increase bank safety. Unless those constraints are binding, the supervision is ineffectual. This is a crucial point to remember when discussing supervisory policies related to financial stability."

Safety and soundness regulations entail regular exams, during which supervisors evaluate a bank's risk exposure as reflected in balance sheets, risk-management reports, audit reports, delinquency reports, etc. Based on this risk assessment, examiners decide whether a bank's reserves for loan losses are sufficient and then assign a strength rating to a bank (the CAMELS rating). The objectives of such analysis are to (i) ensure that a financial institution has sufficient capital to withstand potential losses from its investments and (ii) determine the appropriate price of its deposit insurance.[15] Supervisors require that banks have sufficient capital for all loans they have on the balance sheet, even if the banks originated them with the purpose of distributing.

Independent MCs, as unregulated financial institutions, were fully exempt from such examinations. They could operate with as much or as little capital as they desired. One can argue that the regulatory agencies did not perceive the risk associated with MC lending to be *systemic*.[16] The BHC affiliated MCs, theoretically, were supervised for safety and soundness as parts of regulated parents. However, when the supervisors exercised their "visitorial powers," banks were thoroughly examined, whereas MCs were weakly and infrequently "reviewed," with the depth of the reviews not being even close to the intensity of banks' exams (Engel and McCoy (2011)). In situations

this study. Agarwal, Lucca, Seru, and Trebbi (2012) present a detailed discussion of the fragmented and inconsistent nature of the US regulatory system.

[15]The analysis does not include the evaluation of individual loans (investments) but rather an aggregate performance at a bank or BHC. Rosen (2003) describes additional details of the safety and soundness regulations.

[16]The lack of such regulation 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.

where BHC-level reports did show elevated risks for MC-originated loans, regulators were content with the notion that these loans would shortly be sold in the secondary market and thus were not expected to impact parent BHCs' financial conditions.

Supervisors closely evaluate the delinquency reports of a parent corporation. As opposed to depository institutions, which had to adhere to strict regulations on loan-loss recognition and provisioning, MCs had discretion in how to deal with non-performing loans. Both independent and affiliated MCs were under no requirement to provision for or immediately recognize non-performing loans. Affiliated MCs had an option to delay passing loan losses on to a parent BHC in the expectation of working them out or selling them in the secondary market through so-called "scratch-and-dent desks." Furthermore, BHC's losses from an affiliated-MC loan portfolio were likely to be limited to its equity investment in the subsidiary. Most MCs had an option to implode without passing all their losses on to a parent. In contrast, supervisors were determined to prevent any *depository* subsidiary from implosion without holding its parent BHC fully responsible for applicable losses. Such inconsistencies in regulation and its enforcement imply that, by originating riskier loans through MCs, banks had the ability to not only circumvent capital requirements and loan-loss recognition and provisioning, but also to manage down the costs of their deposit insurance.

Consumer Compliance

Consumer compliance regulations, an extension of the safety and soundness, are the second significant part of the regulatory oversight. It 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.[17] One part of HOEPA requirements was legally binding, but applicable only to a small portion of the subprime market. Another part of HOEPA was more of a guidance than a law, which aimed to broadly prevent "unfair and deceptive lending practices." Despite enforcing both parts of the consumer compliance regulation for depository institutions, the Fed under Greenspan never enacted the second part of the regulation on a broad scale (Engel and McCoy (2011)).

The regulators require the *depository* institutions to adhere not only to the legally enforced lending restrictions but also to the guidance issued by lawmakers in both, prime and subprime,

[17] Riegle–Neal Community Development and regulatory Improvement Act of 1994.

segments of the market. They 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 *originated* loans to verify compliance. Regulators ensure that, for example, banks verify borrowers' ability to repay their loans and do not approve loan application based solely on expectation of housing price appreciation (see, e.g., Engel and McCoy (2011)). Non-compliant banks are subject to financial penalties and a prolonged examination of a wider subset of originated loans. The regulation was not enforced for MCs. Even BHC-affiliated MCs were mostly left to their own devices.

In 1999, this inconsistent enforcement of both safety and soundness and consumer compliance supervision was codified by the Gramm–Leach–Bliley Act, which stated that the Federal Reserve could not examine the subsidiaries of BHCs unless they had a substantial effect on the safety and soundness of their parent or sister affiliates. Since the depository subsidiaries of BHCs were still regulated by their respective oversight agencies and still adhered to the safety and soundness and consumer compliance regulations individually, the Gramm–Leach–Bliley Act effectively codified only the weak regulation of the non-depository subsidiaries of the BHCs. As in the game of musical chairs, neither parent corporations nor regulators expected the music of the secondary market's insatiable hunger to stop any time soon. So, both perceived the affiliated MC activity to be low risk.

Home Ownership and the Equity Protection Act

Given a wide post-crisis debate about HOEPA, it deserves a special discussion of its (in)effectiveness. As mentioned above, the federal HOEPA regulation was enacted in 1994 and had two parts. Part one aimed at regulating so-called high-cost loans. Many researchers and policy-makers labeled those "subprime loans," even though not all high-cost loans were subprime. This part of HOEPA prevented lenders from including aggressive clauses (prepayment penalties, balloon clauses, and negative amortization) in *refinance* loans with interest rates and fees exceeding a certain threshold.[18] The threshold was very high, so only a small fraction of high-cost loans fell under these restrictions. According to 2001 Federal Reserve System study, only 5% of subprime loans fell under

[18]The regulation covered loans with an annual percentage rate (APR) at origination exceeding the yield on Treasury securities of comparable maturity by eight percent for first-liens or by ten percent for subordinate-liens. It also covered loans with total points and fees in excess of eight percent of the total loan amount or $400 (subject to annual indexing), whichever was greater (Riegle–Neal Community Development and Regulatory Improvement Act of 1994).

this regulation (Engel and McCoy (2011)). According to Gramlich (2007), only *one percent of subprime loans* was affected by the regulation.

Part two of HOEPA aimed at curbing unfair or deceptive mortgage practices and, more generally, lending that did not serve the best interests of a borrower, regardless of the cost of a loan. A part of the requirements was to ensure a borrower had an ability to repay the loan based in his or her income and not, for example, based on expectations that a value of a purchased home will keep on rising allowing an easy sale of the home in order to pay the lender back. These provisions, though, were not self-executing. Congress instructed the Fed to enact them but it was never done under Greenspan. Arguably, the only entities that were affected by this guidance were the depository institutions through the consumer compliance regulation.

Following the federal HOEPA regulation, a growing number of states have enacted mini-HOEPA statutes to "curb predatory lending." By 2005, well over half of the states have established anti-predatory lending statutes of one kind or another. These laws vary in terms of the loans they cover (threshold levels), the practices they prohibit, and the methods of enforcement they permit. Bostic, Engel, McCoy, Pennington-Cross, and Wachter (2008) find that even the state laws had almost no or minimal impact on the subprime market in general and behavior of subprime lenders in particular. They attribute the laws' ineffectiveness to one component of the laws (the law coverage) negating the effectiveness of other component (the restrictions). There is a valid reason for that.

The HOEPA regulation was made ineffective by proactive regulation avoidance and exemption lobbying done by both depository and non-depository lenders. Federal law has preempted portions of these state laws at various times for certain types of lenders and loan products.[19] In 1996 OTS issued two preemption rules declaring that state mortgage laws no longer applied to federal thrifts or their subsidiaries. In 2001 the Bush administration decided to use OTS preemption rule to halt state efforts to restrict unfair lending practices (Engel and McCoy (2011)). In 2004 OCC issued a preemption rule for the national banks excusing them and their subsidiaries from compliance with state consumer protection laws.

Combined, all these activities rendered both federal and state HOEPA regulation ineffective. Consistent with this history, we find no difference in either mortgage company activity or its

[19]For example, the Federal Alternative Mortgage Transactions Parity Act preempts balloon clause restrictions for all mortgages by non-depository lenders except for traditional fixed-rate, fully amortizing mortgages. The Home Owners' Loan Act preempts state anti-predatory lending laws for federal savings associations and their subsidiaries.

impact on mortgage defaults when we compare states with stronger mini-HOEPA laws to those with or weak or no mini-HOEPA laws. In this analysis, we exploit the index of mini-HOEPA laws restrictiveness compiled by Bostic, Engel, McCoy, Pennington-Cross, and Wachter (2008). The results are not presented in this paper for the sake of brevity.[20]

3 Data and Sample Selection

We combine data from several sources. In the first part of the paper, we establish the existence of the regulatory arbitrage. Here we evaluate the BHCs' financial conditions from the Report of Income and Conditions for Bank Holding Companies (BHCs). In the second part of the paper we evaluate the lending behavior of MCs. The challenge of this analysis lies in the lack of data that capture the loan originator, the origination decision, and borrower characteristics at the loan level. The Home Mortgage Disclosure Act (HMDA) data, which we utilize, cover a comprehensive set of loans (about 87% of all loans originated) and lenders (99% of the sector based on total assets) in the U.S. economy, but lack core borrower risk characteristics such us credit score and the value of the property (housing prices). Other data sources, e.g., data from credit bureaus, provide a rich set of borrower characteristics but lack information about loan originators. Mapping them at the loan level is not only costly but also explicitly prohibited by the data providers. In this study we adopt a representative borrower approach at the ZIP code level, similar to one used in Mian and Sufi (2009). We effectively compare creditworthiness of representative (ZIP code) borrowers to which a BHC lends through its bank and MC subsidiaries. The ZIP code level borrower characteristics and foreclosure information come from Equifax/Federal Reserve Bank of New York CCP (Equifax). The ZIP code level housing price data and a number of subprime mortgages are from CoreLogic. Below we describe in detail the sample formation procedures and merging criteria for all of the above data sets.

[20]To our knowledge, the only paper that finds a significant shift in lending behavior due to mini-HOEPA laws is Dagher and Fu (2011). They document that counties within states with more stringent mini-HOEPA regulation experienced fewer crisis-related foreclosures associated with mortgage company activity.

3.1 Loan Origination and Lender Identity

We obtain information about loan originations by various financial institutions from a comprehensive sample of mortgage applications that have been collected by the Federal Reserve under provisions of the Home Mortgage Disclosure Act. 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. HMDA Loan Application Registry data are collected by the Federal Reserve and cover a broad set of *depository and non-depository* financial institutions. Whether an institution is covered depends on its size, the extent of its activity in a metropolitan statistical area (MSA), and the weight of residential mortgage lending in its portfolio.[21] Our sample covers extremely broad set of loans originated in the U.S. economy from 1999 to 2010.

The HMDA data contain information on all mortgage applications by the U.S. households. The data provides us with the year of the application, the identity of the lender, the dollar amount of the loan, whether or not the loan was accepted or denied, and whether the lender retained the loan or sold it to a third party. We augment this dataset 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 non-depository lending institutions and match them to their respective parent BHCs. We exclude about 1.5 percent of the lenders (0.001% of loans) where we cannot clearly identify if the originator was a depository or non-depository institution. As a result, our sample covers 15,280 distinct lenders of which 10,904 are depository institutions.

With the identity of the lenders in hand, we evaluate the origination decision of financial institutions to representative borrowers at the ZIP code level. Since HMDA data provide us with the census tract of the property location and not the ZIP code, we map census tracts to ZIP codes and Core Based Statistical Areas (CBSAs) identifiers. We require both geographic characteristics

[21] Any depository institution with a home office or branch in an MSA must report HMDA data if it has made a home purchase loan on a one-to-four unit dwelling or has refinanced a home purchase loan and if it has assets above $30 million. Any non-depository institution with at least ten percent of its loan portfolio composed of home purchase loans must also report HMDA data if it has assets exceeding $10 million. Consequently, HMDA data does not capture lending activity of small or rural originators. U.S. Census shows that about 83 percent of the population lived in metropolitan areas over our sample period and hence the bulk of residential mortgage lending activity is likely to be reported under the HMDA.

of a loan application to be valid. Due to this restriction, we drop about 5 additional percent of loan-level observations that contain loans in Census tracts located in rural areas. We further drop loans that do not have valid information about borrower income, loan amount, or exact nature of the origination decision. We also exclude subsidized loans (e.g., those sponsored by Veteran Administration (VA)), home equity loans and construction loans. This set of restrictions leaves us with 160,038,199 loans out of which 81,075,489 were originated by mortgage companies and 104,520,682 were securitized between 1999 and 2010.

Table 1 provides summary statistics based on the HMDA data for different types of financial institutions over different sub-periods of our sample. The unit of observation is ZIP code-year. Alongside the core loan characteristics we report several risk characteristics of the borrower such as loan-to-income ratio, borrower income relative to local area income and borrower minority status. Furthermore, we identify the securitization channel (GSE vs. private securitization) and a likelyhood of a loan to be subprime.

The exact definition of a subprime loan is elusive and varies from study to study. The term "subprime" can be used to describe certain characteristics of the borrower (e.g., a FICO credit score less than 660),[22] lender (e.g., specialization in high-cost loans)[23], type of security that the loan can become a part of (e.g., high projected default rate for the pool of underlying loans), or mortgage contract type (e.g., no money down, no documentation, or a 2/28 hybrid). 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 2004-2010.[24]

To make sure that we properly control for the subprime market activity in a given geography we further augment our subprime measure by a fraction of non-agency securitized subprime mortgages,

[22]The Board of Governors of the Federal Reserve System, OCC, FDIC, and OTS use this definition. See e.g., http://www.fdic.gov/news/news/press/2001/pr0901a.html

[23]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 between the percentages of subprime loans in a given ZIP code-year across two measures in 2004-2006 sample—when both measures are reported—is 0.89.

as reported in LoanPerformance (LP) data provided by CoreLogic, relative to all mortgage loans originated in each ZIP code (reported in the HMDA data). The LP data contains information about over 90% of all U.S. non-agency securitized mortgages (some 20 million loans in the subprime and Alt-A segments). For our analysis, we count a number of subprime and Alt-A loans originated in each year and ZIP code, normalize them by a number of loans originated in the same geography (reported by HMDA) and collectively label those loans as "subprime." This subprime proxy is ZIP code specific and varies over time.

Consistent with Figures 1 and 2, Table 1 shows that, prior to the crisis, more than half of the loans in the U.S. economy where originated by MCs. MC lending activity declined about 75% after the crisis, while bank mortgage lending experienced a relatively modest 18% decline. Overall, prior to the crisis, mortgage companies originated more subprime loans, more house purchase loans (fewer refinancing) and fewer jumbos compared to depository institutions. MCs securitized about 75% of their loans, primarily through private parties. Deposit institutions, on the other hand, securitized only 35 to 40 percent of loans they originated, primarily through the GSEs. The MC borrowers are characterized by higher loan-to-income ratios and lower relative incomes. Independent mortgage companies were very active players in the subprime mortgage market, with close to 40% of their originations being high yield loans. Table 1 suggests that the 2007 crisis dramatically affected the MCs' lending volumes but did not annihilate the business model of originating with a purpose of distributing. In the 2007-2010 period, MCs continue to securitize the lion's share of their loans.

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 Report of Income and Conditions for Bank Holding Companies (Call Reports). All FDIC-insured commercial banks are required to file Call Reports with the regulators on a quarterly basis. These reports contain detailed information on the bank's income statement, balance sheet, and some off-balance-sheet activities.

We obtain the following BHC financial information from these reports: banks' size, profitability, share of mortgages in the loan portfolio, liquidity position, and equity capital. We ensure that the changing reporting requirements are reflected in our calculations and our measures are consistent over time. Table 2 reports summary statistics for the sample of BHCs mapped to HMDA

data. 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 charge-offs (net of recoveries) on 1-4 family residential mortgages, and (ii) non-performing mortgages in this category, i.e., mortgage loans that are 90 days past due or delinquent. Both variables are normalized by the volume of 1-4 family residential mortgages on BHC's balance-sheets. The net mortgage charge-offs have an immediate impact on bank profitability. However, a bank facing an overwhelming number of potential foreclosures might recognize charge-offs gradually. Hence, the charge-offs measure of mortgage quality could to some extent be subject a bank's discretion. Mortgage non-performing loans, on the other hand, are free from this bias and provide a more direct on-balance-sheet measure of borrowers' default rate.

3.3 Representative Borrower Characteristics and Default Rates

While HMDA data combined with HMDA Lender File provide abundant information about lenders' identity and their type, they lack several core borrower characteristics that might be considered crucial in borrower risk assessment. Specifically, they lack borrowers' credit scores and loan-to-value ratios. We obtain the information about borrowers' credit scores from the anonymized data set provided to us by Equifax, one of the three major credit bureaus in the U.S.

The Equifax data is available from the Federal Reserve Bank of New York Consumer Credit Panel. It contains consumer credit-related information for a random 5% of almost all individuals who have a social security number and a credit report in the United States.[25] The total number of randomly selected consumers included in the data is about 12 million. We aggregate the credit score data for each year and ZIP code, constructing a measure "Low Credit Score" that equals the share of consumers who have a credit score less than 660 relative to a total number of consumers residing in the same ZIP code, also based on Equifax data.[26] We then merge these data with our HMDA data by the ZIP code.

Finally, we augment our representative borrower characteristics with the ZIP code level house price indices (HPI) from CoreLogic. These indices are calculated using a weighted repeat sales

[25]For a more detailed description of the data see Lee and Van Der Klaauw (2010).

[26]The range of possible credit score values in Equifax data is 280–850. Equifax uses the 660 cut-off point in identifying borrowers with "subprime" scores. For details, see the document available from the following link: http://news.equifax.com/index.php?s=18010&item=96773. Our results are robust to a different selection of credit score threshold (values lower than 660) and to using a continuous measure of credit scores.

methodology. They are normalized by setting the index value to 100 for January 2000. The CoreLogic HPI data set is available for the majority of U.S. ZIP codes. Where not available, we augment the ZIP code HPI data with county-level HPI. Our results are virtually unchanged if we restrict our sample to only those ZIP codes for which the HPI are not missing.

Table 3 provides summary statistics for the core borrower characteristics from the HMDA data and those obtained from Equifax and CoreLogic. On average, 28% of individuals in a ZIP code have credit scores below a value of 660. This number is the same before and after the crisis, which is not surprising given the relative nature of the credit scores (Demyanyk (2010)). As Table 3 shows, the availability of the measures we use for the analysis varies drastically and covers from about 56,000 to about 263,000 ZIP code-year observations. In Panel B, we provide summary statistics only for ZIP code-year observations where all the measures of borrower characteristics are available. Imposing this restriction leaves us with 92,814 ZIP code-lender-year observations. The Census data suggest that our final set of ZIP codes covers 81% of the U.S. population. Consistent with this, the distribution of the characteristics does not change from Panel A to Panel B.

To evaluate the impact of pre-crisis mortgage company lending on post-crisis default rates, we use two measures. First, we construct a ZIP code-level foreclosure rate over 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. Our measure is a cumulative foreclosure rate from the beginning of 2007 to the end of 2008. There were, on average, 2.5% homes in foreclosure in a ZIP code between 2007 and 2008. The number increased to 3% for the years 2008–2009.[27] We report the results based on 2007-2008 foreclosures. The results based on 2008-2009 foreclosure rates are qualitatively and quantitatively similar.

Second, we utilize a quarterly ZIP code-level delinquency rate equal to a share of mortgage borrowers who were either 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

[27] Our strategy of evaluating two-year cumulative foreclosure rate is defined by the availability of mortgage foreclosure data at the ZIP code level. Foreclosure rates were calculated using the credit bureau data. They are, however, consistent with the rates calculated using the data from the Mortgage Bankers Association. According to the data they report, the average rate of homes in foreclosure between 2007 and 2008 is 3.2% and that between 2008 and 2009 is 3.6%.

multiple quarters, we average the quarterly delinquency rates across four quarters in 2008 to capture a representative delinquency. In 2008, on average, 5.5% of mortgage borrowers were delinquent on their loans across four quarters. For robustness we evaluate average quarterly delinquency rates for the 2007 and 2007-2008 periods and find the results quantitatively and qualitatively similar.

4 Empirical Tests and Results

4.1 Capital Arbitrage

We argue that a desire to circumvent the capital requirement regulations motivates BHCs to establish MC subsidiaries. Origination of loans through a bank or an MC subsidiary has a different implication on BHCs' capital requirements. While banks need to hold capital for all originated loans on their books, even for those they plan to sell on the secondary market, MCs can operate with as little capital as they desire. Lending done by a BHC via its MC subsidiary, as opposed to its bank subsidiary, allows the BHC to extend its mortgage business without a mandatory capital expansion. The resulting regulatory arbitrage creates incentives for capital-constrained BHCs to establish MC subsidiaries.

The relationship between a decision to establish an MC subsidiary (or the extent of lending through an MC) and the amount of BHC's regulatory capital is hard to establish. BHCs engage in regulatory arbitrage exactly to increase or maintain their regulatory capital ratios (e.g., Tier 1 capital ratio). As BHCs increase the amount of MC 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 bank 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 experiment design:

$$\begin{aligned} MC\ Lending_{i,t} &= Year_t + Bank_i + \beta_1 Equity\ Capital_{i,t-1} + \\ &\quad \beta_2 Financial\ Constraints_{i,t-1} + \beta_3 Controls_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

First, we evaluate whether binding capital requirements motivate BHCs to establish MC subsidiaries in the probit setting where $MC\ Lending_{i,t}$ is a dummy variable that equals one if a BHC i lends through an MC subsidiary in year t and zero otherwise. In this analysis we exclude BHCs that lend through their MC subsidiaries in every year of our sample period. Second, we analyze if more capital constrained BHCs increase lending through their existing MC subsidiaries. Here ($MC\ Lending_{i,t}$) is the dollar volume a BHC lending through an MC subsidiary normalized by total assets. We limit the sample to BHC-year observations with $MC\ Lending_{i,t}$ above zero. In both cases, the core variable of interest is $Equity\ Capital_{i,t-1}$. Since our objective is to examine whether more capital-constrained BHCs are more likely to establish (lend more through) MC subsidiaries, we augment the equity capital ratio with other measures of financial constraints. Specifically, we include liquidity position, cost of deposits, amount of deposit financing, and bank size in the set of core regressors. We further control for bank loan portfolio structure to capture heterogeneity due to specialization. We control for any bank or time specific unobserved heterogeneity through respective sets of fixed effects. 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 MC subsidiary in at least one year.

Panel A of Table 4 reports the results of the probit model where coefficients reflect the marginal effects. We find that MC subsidiaries are more likely to be established by BHCs that are less adequately capitalized or face tighter financial constraints, namely, less liquid funds, higher cost of deposits, or lower share of deposit in liabilities. A one standard deviation decrease in $Equity\ Capital_{i,t-1}$ (2.78%) leads to about 5 percent increase in the likelihood of establishing an MC subsidiary.

Panel B of Table 4 evaluates whether the equity capital and financial constraints have an impact on the extent of the MC subsidiaries lending. A one standard deviation decrease in equity capital leads to an increase in MC originations equivalent to three percent of a BHC's total assets. Overall, the results in both Panels suggest that by lending through MC subsidiaries BHCs can circumvent the capital requirements regulations.

4.2 Limited Loss Exposure

Apart from enforcing the capital requirements, supervisors thoroughly examine banks to ensure their stability. During such exams, non-performing loans and loan-loss provisions are analyzed. All

depository institutions adhere to strict guidelines on loan-loss recognition and provisioning. The performance of a bank's loan portfolio defines the amount of capital and deposit insurance costs a regulator would impose and, hence, directly affects a bank's cost of capital.

MCs offer a lot of flexibility to parent BHCs in (not) recognizing losses. Non-performing loans in MC loan portfolios do not have to be immediately recognized or explicitly provisioned for. Such actions could be delayed in expectation of working the non-performing loans out or selling them to a special "scratch-and-dent desk" entity. MCs can delay passing the realized loan-losses to a parent corporation. In good times losses could be offset by the fee income MCs generate. In bad times, the losses a parent BHC incurs from affiliated-MC activity are limited to the equity capital a BHC initially invested in an MC. Thus, MCs serve parent BHCs as a great tool in avoiding the full extent of loan related losses.[28]

The challenge in establishing this relationship lies in the lack of the balance sheet data for MCs or their loan portfolio performance. MCs originated 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 bank and MC loan loss recognition patterns we exploit the exogenous freeze of the mortgage back securities (MBS) market in mid-2007. We adopt the empirical design similar to Purnanandam (2011), who documents that when the secondary market came under pressure in 2007, banks were stuck with large quantities of inferior quality loans they previously originated to distribute.[29] Consequently, banks that were more active in the OTD business model before the crisis in 2007 experienced higher loan-related losses during and after the crisis. We augment this identification strategy to evaluate whether the on-balance-sheet BHC-losses were different if "to be securitized" loans were originated by a bank subsidiary versus an MC subsidiary of a BHC.

[28] Ideally we also would like to evaluate the loan loss provisioning prior to the crisis. However, while the data on loan losses are available for each loan category, the loan loss provisions are only available for the overall BHC loan portfolio. Any analysis of the relationship between the extent of MC activity and loan loss provisioning would be fraught with unobserved heterogeneity, potentially biasing the inferences.

[29] Almost all of the MBS deals had a clause allowing the investor to place the loans back to originator within the first 90 days after deal inception if the loans underperform. Furthermore, it can take about two to three quarters from a loan origination to its sale in the secondary market.

We estimate the following difference-in-difference regression equation:

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

where *On-balance-sheet Loan Losses*$_{it}$ for BHC i in quarter t is either the net charge-offs or the non-performing mortgages, i.e., those that are past due 90 days or more. We normalize both variables by the balance-sheet volume of one-to-four family mortgages as of the beginning of the quarter. $PostQ1, 2007$ is a dummy variable that equals 1 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. 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* MC_i^{2006} is the 2006 volume of loans originated and subsequently securitized through an MC subsidiary, similarly normalized. Thus, β_1 captures the difference in loan losses during the freeze of the secondary market across BHCs with varying intensities of OTD activities and β_2 captures an *incremental* effect of OTD activity through MC subsidiaries. Following Purnanandam (2011), we expect β_1 to be positive. If the loan losses incurred by bank and MC subsidiaries are recognized similarly, we should expect the coefficient β_2 to be insignificant. The existence of the regulatory arbitrage, however, should lead to β_2 being negative.

In the regression we control for a variety of bank financial conditions that can potentially affect the quality of mortgages on banks' balance sheets. Since the inferences could be affected by a difference in quality of loans originated through bank and MC subsidiaries, we control for the BHCs' lending practices as of 2006. Specifically, we interact the following 2006 loan portfolio characteristics with $PostQ1, 2007$ indicator variable: borrower loan to income ratio, loan size, borrower income, percent of minority borrowers, percent of jumbo loans, percent of refinancing loans, borrower income relative to area income. These characteristics are estimated separately for bank and MC subsidiaries within the same BHC as well as for loans securitized and loans retained, thus creating four groups of control variables. These controls are not reported in the table for

brevity. Finally, bank specific fixed effects allow to control for a host of bank invariant factors (e.g., the risk preferences of a management team). Time specific fixed effects capture the impact of economy-wide factors on mortgage performance.

The results are reported in Table 5. Panel A reports the results for net charge-offs and Panel B reports the results for non-performing loans. Consistent with Purnanandam (2011), we find that BHCs with higher extent of OTD activity experience higher mortgage related losses after Q1 of 2007. However, originating and distributing loans through an MC subsidiary creates an opposite effect. Columns (2) and (5) confirm that higher BHC securitization through MCs pre-crisis leads to lower, not higher, on-balance-sheet BHC-level losses post-crisis, as compared to BHCs that originate less (or not at all) through MC subsidiaries pre-crisis. The effect is of a similar magnitude and fully offsets the adverse effect of OTD activity on mortgage related defaults.

While we control for a wide range of loan characteristics, it is possible that we do not fully capture the difference between MC and bank originated loans. Our coefficients might be consistent with bank loans being of a lower quality than MC loans. We address this issue in two ways. First, we explicitly compare the difference in loan characteristics between bank and MC affiliates (Section 4.4, Table 6) and find this is not the case. Second, we control for the extent of bank and MC subprime activities (Table 5). We include the volume of subprime loans originated by bank and MC arms in 2006 interacted with the $PostQ1,2007$ dummy. Both variables are normalized by the balance-sheet volume of one-to-four family mortgages as of the end of 2005. It is unlikely that bank and MC pools of subprime loans were drastically different in quality. Columns (3) and (6) show that a high extent of BHC subprime originations in 2006 led to significantly inferior performance post Q1 of 2007. The effect, however, is fully negated if all subprime originations are done through an MC subsidiary.

The evidence is consistent with MCs serving BHCs as a tool not only to to originate riskier loans but also to shield their parent corporations from loan-related losses. One can argue, however, that BHCs merely don't recognize losses from MC loan portfolios as mortgage related losses but rather as losses from investment activities. To evaluate this argument we augment our tests and analyze quarterly net income of BHCs in Panel C. Similar to previous results we find that net income of BHCs heavily engaged in OTD activity experienced a hard hit post Q1 of 2007. Engaging in OTD

activity through MC subsidiary, however, shields BHCs from this adverse effect.[30]

4.3 MC and Bank Lending Standards within BHC

In this section we analyze whether bank and MC subsidiaries of BHCs have different lending standards. Having no binding capital requirements on MC lending and being able to limit loss exposure, BHCs have incentives to risk-shift and originate riskier loans through MC subsidiaries instead of bank subsidiaries. The fact that MCs are not subject to the consumer compliance regulation makes it less costly for BHCs to originate inferior quality loans through their MC subsidiaries.

As detailed in Section 3 of this paper, we adopt a representative borrower and representative lender approach at the ZIP code level and evaluate how the heterogeneity of borrowers affects the lending decision of BHCs. Effectively, we compare the representative borrowers to which a BHC lends mostly through its bank arm to the representative borrowers the BHC lends mostly through its MC arm (BHC-ZIP-year level of observation). In this analysis, we (i) consider only BHCs with MC subsidiaries to avoid selection bias, (ii) consider only markets (Core Based Statistical Areas, CBSAs) where the BHCs lend through both their bank and MC arms to avoid any bias due to differences in barriers of entry, and (iii) control for the ultimate originators' financial conditions and fixed effects. Without the inconsistent regulatory oversight and associated risk-shifting incentives, MC affiliates of BHCs are expected to originate the same or better quality loans than their bank affiliates originate. Our identification strategy of analyzing the lending standards within BHCs ensures that our results are not due to financial institutions' ability to access particular lending markets, the economies of scale or scope in loan sales, differential risk aversion, etc.

We evaluate the relative lending standards of banks and MCs using the following model:

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

where *Share of MC Lending*$_{izt}$ is a ratio of MC lending to total mortgage lending within BHC i,

[30] Arguably, a BHC can delay loan loss recognition from MC activities. In a separate set of tests (not reported) we evaluated the cumulative performance of BHCs over different horizons post Q2 of 2007 and find similar results.

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 representative borrower, and (iii) *Relative Borrower Income*$_{izt}$ is a borrower's income relative to median area income as reported by HUD.

We include three types of control variables. First, we control for the lagged annual house price appreciation to capture the impact of loan-to-value ratios on the origination decisions. Second, we control for the ultimate originator financial conditions: liquidity (ratio of securities to assets), size (the log of assets), cost of funds (cost of deposits, ratio of deposits to assets), equity capital, and loan specialization (ratio of mortgages to assets, and ratio of C&I loans to assets). 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) or growth options across geographies. $Bank_i$ fixed effects absorb the BHC specific heterogeneity (e.g., risk preferences). Standard errors were estimated via the bootstrap procedure and clustered at the CBSA-year level. The availability of Equifax data restricts us to evaluate the lending standards post 1999. To avoid the contaminating effect of the crisis on lending behavior of financial institutions, we end our sample in 2006.

Our core objective is to document the difference in lending standards stemming from different regulatory environments of MCs and banks. These two types of lending entities are also different along other dimensions. MCs are pooling agents harnessing the power of the secondary market to fund the consumers' dream of home ownership. Between 1999 and 2007, there were about two thousand MCs originating about 55% of the loans in the U.S. economy and about seven thousand banks originating the remaining 45%. Being large pooling agents, MCs cater their lending standards to the secondary market to a greater extent than banks do, which still originate about half of their loans to hold. Arguably, banks and MCs also face different barriers of entry in new markets.

Our within-BHC analysis following the Equation 3 above is well identified and accounts for the unique features of MCs and banks. First, we compare lending standards of entities that have the same access to the secondary market. Bank subsidiaries of BHCs could have originated and subsequently securitized the same loans that their MC affiliates originated. A parent BHC is an ultimate pooling agent ensuring equal ability to securitize across all of its subsidiaries. Second, we only consider markets (CBSAs) served by both MCs and banks within a given BHC, ensuring

no differences in entry barriers. Thus, the design of the analysis ensures that our results are not stemming from financial institutions' ability to access particular lending markets, or the economies of scale or scope in loan sales, or differential risk aversion, etc. The results reported in Table 6 could only be attributed to regulation.

All specifications of Table 6 agree that MC subsidiaries had inferior pre-crisis lending standards as compared to bank subsidiaries of the same BHC. Specifically, MC subsidiaries of BHCs originated more loans to borrowers with lower credit scores, higher loan-to-income ratios, and lower relative incomes compared to bank subsidiaries.[31]

To further eliminate doubt that the results may be due to higher participation of MCs in the subprime market, we control for involvement of BHCs in subprime originations in the respective ZIP codes (column (3)). Even if we consider BHC activity only in the prime mortgage segment of the market (column (4)), we still observe that the underwriting standards of MCs were inferior to those of banks.

One can argue, though, that even after we control for subprime lending, our results could be due to MCs' higher market share in the market segment that boomed pre-crisis. Mian and Sufi (2009) show that lending standards deteriorated due to oversupply of funds from the securitization market. Since MCs sell majority of their loans, they should be more influenced by this increase in the funding supply. To alleviate this concern, we conduct our analysis within the pool of privately securitized loans. 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. With banks being more involved in GSE securitization (see, e.g., Table 1), including GSE securitized loans might bias the results in our favor. The results reported in column (5) further support our conjecture that MCs originated and securitized riskier loans than banks. The difference in origination standards between banks and MCs are independent of the financial institution's "intent" to sell loans.

Another potential explanation for our results stems from banks and MCs serving different product segments of the market. Banks offer variety of services to customers while MCs only operate in one segment, namely, mortgages. Banks draw rents from selling other services to their

[31]Since the dependent variable is bound between zero and one we conducted robustness tests (not reported for brevity) where the dependent variable was transformed as log(p/1-p). The obtained results are consistent with those reported in Table 6.

customers and, hence, might want to establish relationships with them not limited to mortgage lending, such as savings accounts, small business loans, money market accounts, etc. Banks can draw higher rents from better quality customers who have capacity to consume other bank services. One could argue that banks can be actively steering better customers to their branches by either offering more attractive deal terms on loans as compared to those offered by MC subsidiaries, or having affiliated MC managers redirecting better quality customers to bank branches.

To ensure that our earlier results are not driven by bank customer selection behavior, we analyze the difference in lending standards between MCs and banks in the areas (CBSAs) where BHCs do not have a physical branch location. In this geographies, BHCs have no incentives to redirect customers to banks as the opportunities to build broad relationships with mortgage customers are limited. Note, that about 60% of BHC-ZIP-year observations in our previous analysis come from such geographies. The last column of Table 6 reports that MCs have inferior lending standards as compared to those of banks even in the areas where BHCs do not have a physical branch presence. This confirms that relationship lending is unlikely to drive our results.

Finally, our results could potentially be driven by BHCs' concerns for their reputation with customers. Carey, Post, and Sharpe (1998) compared corporate lending by banks and finance companies. They found that finance companies tend to lend to riskier and more leveraged borrowers. Carey at al could not discriminate between regulatory and reputation-based explanations of their results. The richness of our data allows us to evaluate the validity of the reputation-based economic mechanism behind the wedge in the lending standards. We compare the lending behavior of bank affiliates to that of MCs with consonant names (e.g., Bank of America Mortgage). We find that the results do not change, even in magnitude, once we exclude the "generic-name" MCs from our sample (column (7) of Table 6). Assuming that MCs with names similar to that of a parent BHC are as responsible for shaping the reputation of the latter as its bank affiliates are, our empirical evidence does not support the reputation concerns as a primary explanation for the difference in mortgage lending standards between MCs and banks.

In the additional set of robustness tests (not reported for brevity) we further verify that our results are not driven by the potential market segmentation between MCs and banks. We find similar lending patterns between banks and MCs even if we limit our sample to only conventional loans or only first-liens. All our analysis strongly supports the notion that MCs had inferior lending

standards as compared to banks.

4.4 MC Lending and Mortgage Defaults

The within-BHC analysis offers a number of advantages with the biggest one being identification. However, it comes with shortcomings. It does not allow us to analyze the important ex post indicators of loan riskiness such as mortgage defaults (foreclosures and/or delinquencies). We do not have foreclosure data specific to individual financial institutions (apart from the loan-loss attributes described earlier). We can only measure foreclosure rates for representative ZIP code-level borrowers. BHCs in our sample are only responsible for about 36% of mortgages originated to such representative borrowers. To bridge this gap we evaluate total MC lending impact on local mortgage defaults rates where total MC lending is a sum of independent and affiliated MC mortgage originations.

Since we deviate from the within-BHC analysis, we first ensure that the aggregate MC lending behavior is consistent with the analysis presented in the previous section. Specifically, we repeat the experiment following equation (3) where we aggregate the data to the ZIP code-year level. The dependent variable, *Share of MC Lending*$_{zt}$, is a share of total MC lending, independent and affiliated combined, in a given ZIP code. The results reported in Table 7 confirm our earlier within-BHC finding that MCs lend disproportionately more to representative borrowers with lower credit scores, higher loan-to-income ratios, and lower relative incomes. We observe this pattern irrespective of the market segment, extent of participation in subprime activities, or securitization rates of lenders.

Knowing that the aggregate lending standards of MCs are not different from the lending standards of affiliated MCs, we turn to analyzing the impact of MC lending on mortgage defaults. In line with our earlier experiment design, we analyze how the extent of pre-crisis (2005-2006) MC lending in a given ZIP code affects post-crisis (2007-2008) mortgage default rates:

$$\textit{Mortgage Defaults}_{z,\textit{Post-Crisis}} = CBSA_j + \beta_1 \textit{MC Share}_{z,\textit{Pre-Crisis}} + \beta_2 Controls_{z,\textit{Pre-Crisis}} + \varepsilon_z, \quad (4)$$

where *Mortgage Defaults*$_z$ is proxied by two variables. First, we consider a foreclosure rate measured as a fraction of mortgage holders in a ZIP code that were in foreclosure in any period of time

between 2007 and 2008. Second, we utilize the average quarterly delinquency rate in 2008. Both measures come from Equifax. $MC\ Share_z$ is measured over 2005-2006 period and represents a share of loans originated by MCs in all loans originated in a ZIP code z. We control for the borrower characteristics pre-crisis. Following the "housing boom and bust" argument, we control for the housing price appreciation between 2005 and 2006. Finally, by including CBSA fixed effects, we effectively control for any increase in mortgage default rates due to rapid deterioration of the local economy. We draw our inferences from the across ZIP code variation within each CBSA. Standard errors are clustered at the CBSA level.

Table 8 reports the results of the foreclosure analysis and Table 9 reports the results for delinquencies. Column (1) of each table presents our core regression specification and confirms that the extent of MC lending has an adverse effect on mortgage default rate. The results persist after we control for the subprime lending in the ZIP code prior to the crisis (columns (2) and (3)) to accommodate the "MCs are dominant players in the subprime market" argument. Securitization market had a profound impact on credit standards (Mian and Sufi (2009)). Consequently, we control for the extent of the securitization of the mortgages in a given ZIP code (column (4)). To accommodate any effect of subprime lending on mortgage defaults and its interaction with MC lending, we evaluate whether the share of MC activity in the prime market (as defined in HMDA) also has an adverse impact on mortgage defaults (column (5)).

Finally, to ensure that our results are not merely driven by independent MCs, we evaluate the ZIP code market shares of independent and affiliated MCs as two separate variables (columns (6) and (7)). We find that the activities of independent and affiliated MCs have almost identical impacts on mortgage defaults.

The results are reported in Tables 8 and 9 where all the coefficients are multiplied by 100 for tractability. All specifications in both tables uniformly confirm that ZIP codes with higher pre-crisis MC lending (even in the prime market) have higher post-crisis foreclosure and delinquency rates. 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 percent) leads to about 1.2 percent increase in foreclosure rate and 1.3 percent increase in delinquency rate. These numbers, correspondingly, represent about a third of the average 2007-2008 foreclosure rate (3.22 percent) and about a fifth of the average Q4 2008 delinquency rate (5.5 percent). For comparison,

a one standard deviation increase in subprime lending increases delinquency rate by about 0.96 percent and foreclosure rate by 1.1 percent. The impact of MC activity on mortgage defaults is similar in magnitude to that of subprime.

5 Concluding Remarks

We build this study on the intersection of two important issues that played a role in the 2007 credit crisis: the significance of the "shadow banking" system and inadequate regulation of it (see, e.g., Gorton and Metrick (2010)). Mortgage companies, being non-depository financial intermediaries, are representatives of the "shadow banking" sector. These dominant loan originators in the U.S. economy were largely left unattended by the existing literature, despite their role in the market collapse. This study explores the behavior of these economic agents and is important not only from the perspective of MCs' contribution to the 2007 crisis, but also from the perspective of understanding the future of the mortgage market. MCs continue to hold 30% market share and, hence, have a significant role in shaping Americans' access to the dream of home ownership.

We show that inconsistent regulations between banks and MCs relaxed the regulatory constraints for heavily regulated BHCs and allowed them to pursue riskier lending opportunities. By originating riskier loans through their MC subsidiaries, BHCs were able to circumvent the regulatory capital requirements and the consumer compliance requirements. They also avoided the resulting loan losses. As a result, the inconsistent regulation contributed to the deterioration of lending standards widely blamed for the 2007 crisis. Our empirical evidence suggests that the pre Dodd-Frank regulation standards were not as inadequate as they are perceived to be. The inconsistent coverage and enforcement of these standards, however, significantly contributed to the crisis. Our paper, thus, contributes to the ongoing debate on supervision and regulation design for the entire financial sector: depository and shadow banking institutions. Surprisingly, there are few voices in this debate speaking to the lack of uniform enforcement of the existing regulation and elimination of regulatory arbitrage. Most of the new reform initiatives are geared toward regulating more of the financial institutions' activities rather than consistently enforcing the existing regulation. We do not argue that the existing regulation is in any way optimal. Neither do we argue that the lack of regulatory enforcement and oversight was solely responsible for the deterioration

of lending standards. The securitization market hunger for risky loans significantly contributed to this phenomenon (Mian and Sufi (2009)). We argue that the holes in the regulatory oversight accommodated this hunger and significantly contributed to the erosion of lending standards.

We further contribute to the evolving line of literature trying to understand the economic determinants of the shadow financial intermediaries' behavior. Securitization was perceived to be a force of disintermediation in the financial markets. The secondary market was providing financial resources "directly" to consumers, and the intermediaries, like MCs, merely channeled 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 non-depository financial intermediaries play bigger and bigger role in shaping access to finance by various economic agents: consumers and firms alike. The intermediaries become more and more interconnected, thus contributing to systemic risk (Brunnermeier, Dong, and Palia (2010)). Consequently, they can no longer be viewed as mere pass-through entities. Understanding the incentives of financial intermediaries becomes important in assessing both individual agents' and overall economic risks.

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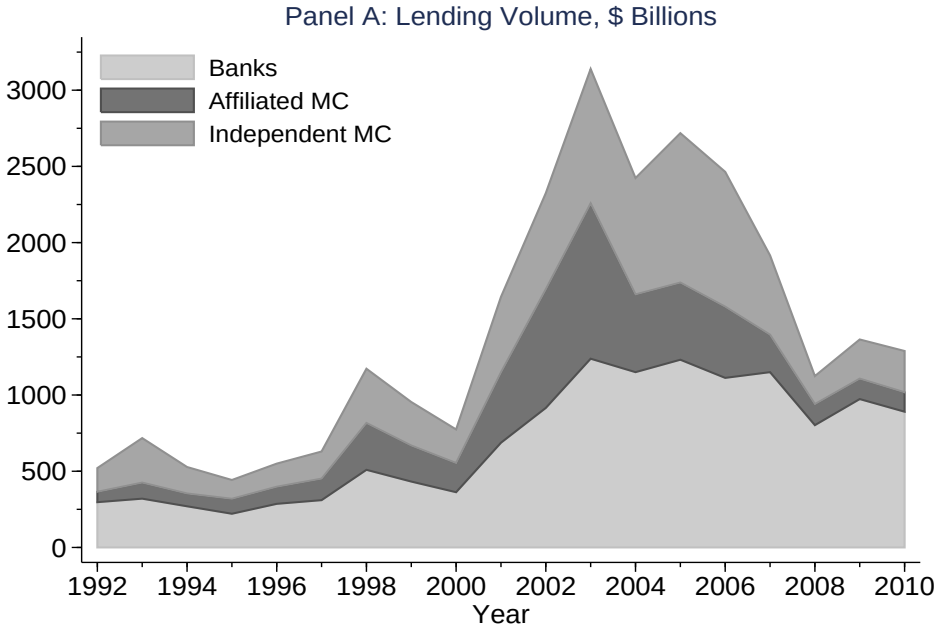
Figure 1: Lending Volumes and Market Shares by Lending Institution Type

The figure shows lending volumes in $ billions for banks, their non-bank mortgage subsidiaries, and independent mortgage companies. Data source: HMDA.



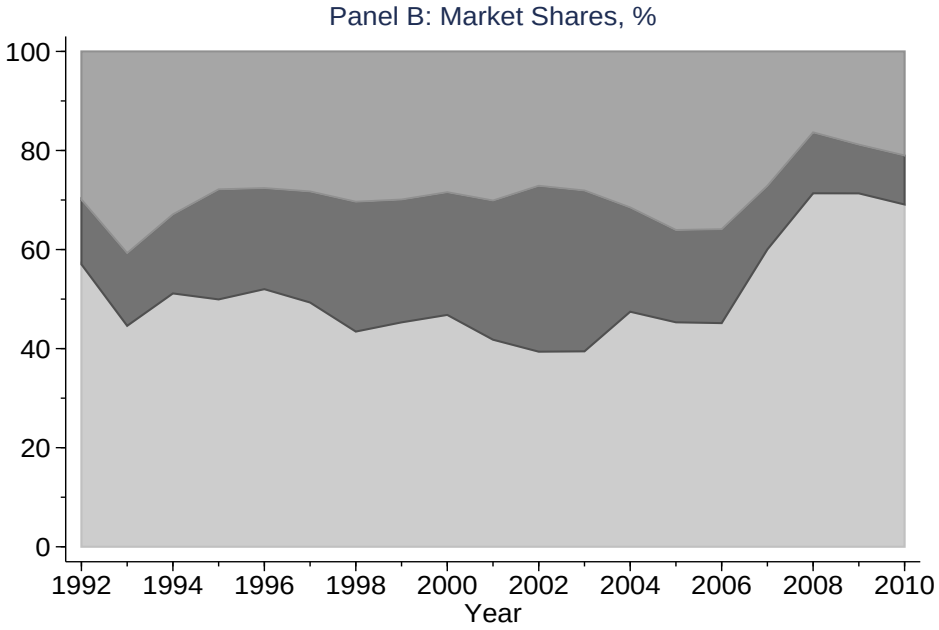
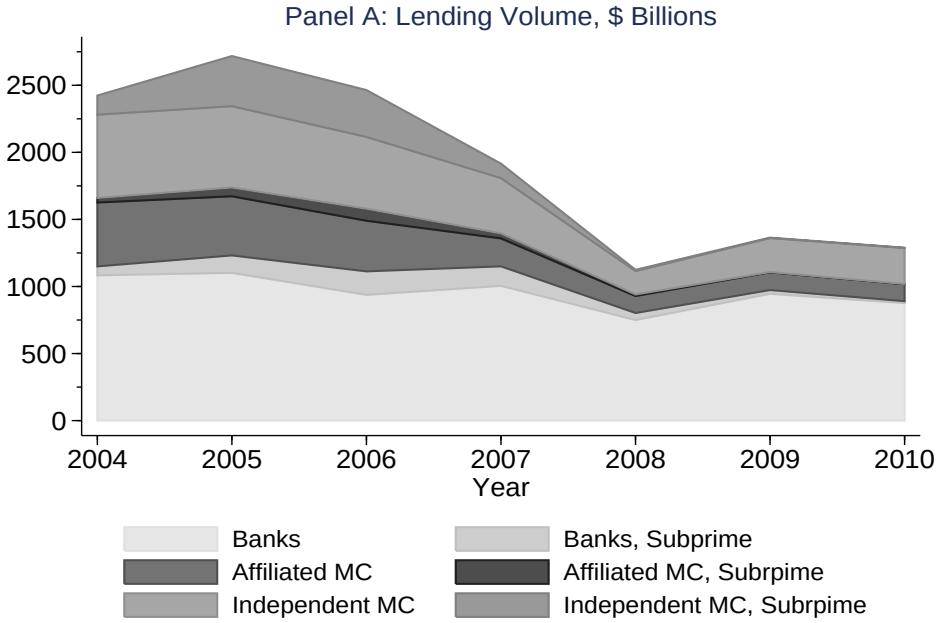


Figure 2: Lending Volumes and Market Shares by Lending Institution Type. Including Subprime Lending.

The figure shows lending volumes in $ billions for banks, their non-bank mortgage subsidiaries, and independent mortgage companies. The lending is broken down by regular priced and high-cost (subprime) mortgages. Data source: HMDA.



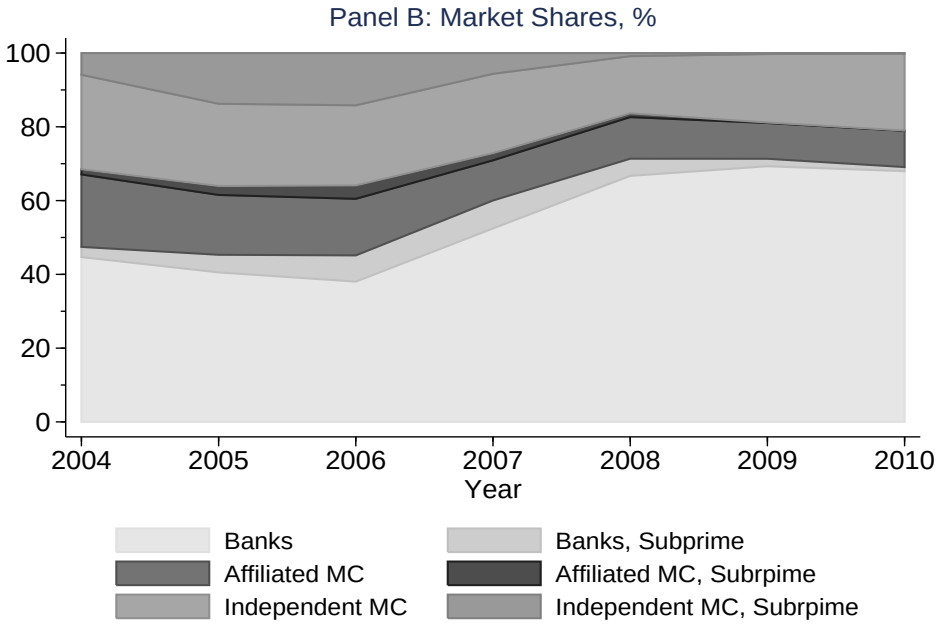


Table 1: Mortgage Lender: Summary Statistics.

This table reports summary statistics for four types of mortgage lenders. The first column summarizes the data for depository institutions (labeled as banks) which do not have any mortgage subsidiaries affiliated with them. The second column shows the statistics for the for depository institutions that have mortgage companies affiliated with them (banks with MC). The third column provides statistics for mortgage companies that are subsidiaries of BHCs (MC affiliated). The fourth column summarizes the data for independent mortgage companies. The data cover loans originated between 1999 and 2010 as reported in HMDA data. Year 2007 is omitted for quality of the inferences.

	Banks Without MC	Banks With MC	MC Affiliated	MC Independent
Panel A: Loans originated from 1999 to 2006	(1)	(2)	(3)	(4)
Number of Loans (millions)	31.4	12.3	24.0	30.6
Loan Volume ($ billions)	5,141	1,901	4,170	5,142
Average Loan ($1,000)	163.6	154.7	173.7	168.2
Average Borrower Income ($1,000)	97.0	99.4	94.4	89.6
High-yield (Subprime) Loans (%, post 2004)	13.1	15.6	19.1	39.6
Securitized through GSEs (%)	28.1	21.8	53.2	18.5
Privately Securitized (%)	16.9	9.8	20.0	58.2
Refinancing (%)	35.6	28.4	29.5	20.8
Jumbo Loans (%)	4.7	4.0	4.2	2.8
Average Loan to Income Ratio	2.0	1.8	2.2	2.3
Borrower Income to Area Income	1.9	1.9	1.8	1.7
Panel B: Loans originated from 2008 to 2010				
Number of Loans (millions)	10.6	7.2	2.7	5.5
Loan Volume ($ billions)	2,121	1,677	645	1,232
Average Loan ($1,000)	200.1	232.7	236.5	223.0
Average Borrower Income ($1,000)	116.0	125.6	120.0	108.3
High-yield (Subprime) Loans (%)	10.2	6.6	13.2	13.6
Securitized through GSEs (%)	29.1	53.3	53.2	23.9
Privately Securitized (%)	17.5	4.0	18.7	58.5
Refinancing (%)	36.8	28.7	21.1	23.1
Jumbo Loans (%)	3.3	2.9	2.2	2.2
Average Loan to Income Ratio	2.1	2.3	2.4	2.6
Borrower Income to Area Income	1.83	1.90	1.88	1.65

Table 2: Bank Holding Company: Summary Statistics.

This table reports summary statistics for the sample of BHCs with and without MC subsidiaries. Only BHCs mapped to mortgage lending data (HMDA) are considered. The financial characteristics are as reported in FR Y-9C quarterly consolidated financial statements of the BHCs, provided by the Federal Reserve Bank of Chicago. We report the summary statistics for two periods: 1992 through 2006 and 2008 through 2010.

	Mean	25th Percentile	Median	75th Percentile
Panel A: 1992-2006. 12856 BHC-quarter observations				
Total Assets, $Billion	20.25	0.41	1.12	6.69
Mortgage Originations (% of Total Assets)	19.16	4.19	8.08	15.52
Securitization Rate (%)	46.86	18.58	48.40	73.50
MC Originations (% of Total Assets)	10.77	0.00	0.00	6.07
Non-performing Mortgages (% of Mortgages)	0.66	0.16	0.41	0.80
Mortgage Charge-offs (% of Mortgages)	0.12	0.00	0.03	0.08
Liquidity (% of Total Assets)	24.20	16.61	23.05	30.44
Deposits (% of Total Assets)	75.77	69.85	78.24	83.95
Cost of Deposits (%)	1.63	0.83	1.45	2.30
Equity Capital (% of Total Assets)	8.78	7.23	8.45	9.75
Net Income (% of Total Assets)	0.69	0.34	0.62	0.96
Letters of Credit (% of Total Assets)	1.05	0.01	0.33	1.16
Mortgages (% of Loan Portfolio)	35.43	26.43	35.64	43.84
C&I Loans (% of Loan Portfolio)	12.96	7.11	11.70	17.26
Panel B: 2007-2008. 1366 BHC-quarter observations				
Total Assets, $Billion	53.23	0.80	1.74	7.84
Mortgage Originations (% of Total Assets)	11.20	3.88	6.92	11.41
Securitization Rate (%)	49.90	27.91	53.17	74.70
MC Originations (% of Total Assets)	5.08	0.00	0.00	4.45
Non-performing Mortgages (% of Mortgages)	0.53	0.12	0.30	0.62
Mortgage Charge-offs (% of Mortgages)	0.32	0.02	0.08	0.30
Liquidity (% of Total Assets)	17.73	11.01	16.31	22.25
Deposits (% of Total Assets)	74.19	69.05	75.65	81.12
Cost of Deposits (%)	1.74	0.93	1.62	2.37
Equity Capital (% of Total Assets)	9.15	7.51	8.85	10.40
Net Income (% of Total Assets)	0.24	0.13	0.35	0.65
Letters of Credit (% of Total Assets)	0.19	0.00	0.00	0.11
Mortgages (% of Loan Portfolio)	39.49	32.69	39.73	47.84
C&I Loans (% of Loan Portfolio)	11.65	6.59	10.50	15.50

Table 3: Mortgage Borrowers: Summary Statistics.

This table reports summary statistics for a representative mortgage borrower at the ZIP code-year level. Panel A describes all ZIP code-level data available for the analysis. Panel B provides summary statistics for the sub-sample where all listed variables are non-missing. The Market Shares of MCs, Loan-to-Income Ratios of borrowers, Shares of Minority borrowers, and Subprime Mortgage Lending (HMDA) measures are from HMDA data. Low Credit Score is from Equifax. House Price Appreciation and Subprime Mortgage Lending (LP) are from CoreLogic. [a] - Subprime Mortgage Lending (HMDA) is only available for years 2004–2010.

	1999–2006			2008–2010		
Variable	N	Mean	St.Dev	N	Mean	St.Dev.
Panel A: Sample available for analysis						
MC market share	262,881	0.49	0.19	57,773	0.23	0.12
Low Credit Score	153,008	0.28	0.09	57,759	0.28	0.10
Loan-to-Income Ratio	262,792	1.74	0.55	57,748	2.03	1.24
Borrower/Area Income	181,938	1.81	1.54	57,748	1.70	1.00
Share of Minority	181,866	0.20	0.23	57,769	0.20	0.23
Subprime Mortgage Lending (LP)	262,881	0.10	0.12	57,773	0.00	0.00
Subprime Mortgage Lending (HMDA)[a]	57,946	0.27	0.15	57,773	0.12	0.14
House Price Appreciation, t-1	146,003	0.06	0.06	39,330	–0.07	0.09
Panel B: Sample with all core variables non-missing						
MC market share	87,814	0.53	0.12	37,483	0.26	0.11
Low Credit Score	87,814	0.27	0.09	37,483	0.27	0.10
Loan-to-Income Ratio	87,814	1.98	0.50	37,483	2.18	1.10
Borrower/Area Income	87,814	1.87	1.56	37,483	1.69	1.04
Share of Minority	87,814	0.22	0.24	37,483	0.23	0.24
Subprime Mortgage Lending (LP)	87,814	0.17	0.14	37,483	0.00	0.00
Subprime Mortgage Lending (HMDA)[a]	36,138	0.25	0.14	37,483	0.08	0.10
House Price Appreciation, t-1	87,814	0.08	0.06	37,483	–0.07	0.09

Table 4: Rationale for Establishing MC Subsidiaries

Panel A of this table report results of the following probit regression analysis:

$$MC\ Subsidiary_{i,t} = Year_t + Bank_i + \beta_1 Equity\ Capital_{i,t-1} + \beta_2 Other\ Financial\ Constraints_{i,t-1} + \beta_3 Controls_{i,t} + \varepsilon_{i,t},$$

where $MC\ Subsidiary_{i,t}$ is a dummy variable that equals one if a BHC i has an MC subsidiary in year t and zero otherwise. We exclude BHCs that lend through their MC subsidiaries throughout our sample period. The reported coefficients reflect the marginal effects of the respective variables.

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

$$MC\ Lending_{i,t} = Year_t + Bank_i + \beta_1 Equity\ Capital_{i,t-1} + \beta_2 Other\ Financial\ Constraints_{i,t-1} + \beta_3 Controls_{i,t} + \varepsilon_{i,t},$$

where $MC\ Lending_{i,t}$, is the volume of a BHC lending through an MC subsidiary normalized by total assets. We exclude all BHC-year observation with no lending through MC subsidiaries. $Equity\ Capital_{i,t}$ is the ratio of book value of equity to total assets at the beginning of the year. *Other Financial Constraints* are *Liquidity* (Securities/Total Assets), *Cost of Deposits*, and *Deposits/Total Assets*. We control for BHCs' *Size* (log(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. 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	–2.40***	–1.92**	–1.97**	–1.18***	–0.75***	–0.68***
	(2.91)	(1.96)	(2.01)	(2.61)	(2.54)	(2.40)
Liquidity		–0.86***	–0.98***		–0.20	–0.08
		(3.52)	(3.08)		(1.61)	(0.52)
Cost of Deposits		4.46**	4.47**		1.02	1.45
		(2.16)	(2.16)		(0.54)	(0.77)
Deposits/Assets		–0.25	–0.24		–0.90***	–0.89***
		(0.82)	(0.79)		(5.86)	(5.79)
Log(Assets)		0.32***	0.31***		0.02	0.025
		(6.00)	(5.95)		(0.93)	(0.97)
Mortgages/Assets			–0.12			0.30*
			(0.40)			(1.91)
C&I Loans/Assets			–0.33			–0.22
			(0.69)			(0.94)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
BHC Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,576	2,023	2,023	3,028	2,557	2,557
R^2 or Pseudo R^2	0.242	0.254	0.255	0.579	0.537	0.539

Table 5: BHC Mortgage-related Losses and MC Activity.

This table reports the results form the following regressions:

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

The dependent variable, *On-balance-sheet Loan Losses*$_{it}$, is measured by either the mortgage charge-offs of BHC i during quarter t scaled by the outstanding mortgages at the beginning of the quarter (Panel A), the non-performing 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 that is set to zero for quarters before and including 2007Q1, and one after that. *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 MC*$_i^{2006}$ is the volume of OTD mortgages originated through MC subsidiary of a BHC 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 bank fixed effects and $Quarter_t$ are quarter fixed effects. The standard errors are clustered at the BHC-level. z-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: Net Mortgage Charge-offs			Panel B: Non-performing 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 MC × *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)
MC 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)
Observations	5,076	5,013	5,013	5,076	5,013	5,013	5,076	5,013	5,013
Adjusted R-squared	0.49	0.64	0.73	0.58	0.60	0.61	0.91	0.92	0.92

Table 6: Affiliated MCs and Banks Lending Standards: within BHC Analysis.

This table reports the results from the following regressions:

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

where *Share of MC Lending*$_{izt}$ is a ratio of MC lending to total mortgage lending within BHC i, ZIP code z and year t. *Low Credit Score*$_{zt}$ is a fraction of people with credit score is below 660 residing in a given ZIP code. *Loan-to-Income Ratio*$_{izt}$ is an average loan-to-income ratio of a representative borrower. *Relative Borrower Income*$_{izt}$ is a borrower's income relative to median income in a borrower Census tract. *BHC Controls* are *Liquidity*, *Cost of Deposits*, *Deposits/Total Assets*, *Size*, *Mortgages/Total Assets*, and *C&I Loans/Assets*. *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 loans to representative borrower. The results reported in column (4) are based on the analysis of only prime loans, results in column (5) are based on the privately securitized loans, and results in column (6) are based on loans originated in geographies where BHCs do not have branches. The unit of observation is BHC-ZIP code-year. The sample contains 36.3 million loans originated between 1999 and 2006. Standard errors are generated by a bootstrap procedure and clustered at the CBSA-year level. Z-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***	0.032**	0.014*	0.032**	0.075***	0.032**
	(2.99)	(2.81)	(2.29)	(1.70)	(2.26)	(8.45)	(2.03)
Loan-to-Income Ratio	0.01***	0.02***	0.016***	0.018***	0.016***	0.010***	0.017***
	(8.29)	(7.99)	(8.17)	(9.80)	(7.35)	(7.34)	(7.80)
Borrower/Area Income	–0.001***	–0.003***	–0.003***	–0.002***	–0.003***	–0.002***	–0.003***
	(3.51)	(8.07)	(7.73)	(4.67)	(7.85)	(3.84)	(7.13)
Share of Minority	–0.04***	–0.02***	–0.022***	–0.021***	–0.022***	–0.009*	–0.021***
	(5.20)	(4.09)	(4.13)	(5.25)	(3.96)	(1.77)	(3.68)
House Price Appreciation$_{t-1}$	–0.39***	–0.35***	–0.355***	–0.030	–0.355***	–0.248***	–0.337***
	(7.08)	(8.78)	(8.27)	(1.12)	(7.83)	(5.41)	(7.87)
Subprime Lending (LP)	–	–	–0.023*	–0.075***	–0.023*	0.078***	–0.018
	–	–	(1.94)	(7.62)	(1.83)	(8.53)	(1.47)
Securities/Assets	–	–0.63***	–0.639***	–0.328***	–0.639***	0.155*	–0.458***
	–	(7.11)	(6.89)	(5.17)	(7.16)	(1.85)	(5.35)
Log(Assets)	–	–0.01	–0.012	–0.376***	–0.012	0.027***	–0.078***
	–	(1.12)	(1.24)	(22.01)	(1.30)	(4.01)	(4.28)
Cost of Deposits	–	2.40***	2.420***	–5.478***	2.420***	3.869***	1.915***
	–	(6.38)	(6.41)	(9.88)	(6.81)	(11.38)	(4.03)
Deposits/Assets	–	–0.21***	–0.216***	–0.657***	–0.216***	–0.079**	–0.084
	–	(4.32)	(4.49)	(19.31)	(4.26)	(2.15)	(0.89)
Capital/Assets	–	–2.99***	–2.987***	6.147***	–2.987***	–2.261***	–4.002***
	–	(16.82)	(18.26)	(17.56)	(17.46)	(9.09)	(7.23)
Mortgages/Assets	–	–1.58***	–1.588***	–0.604***	–1.588***	–1.145***	–1.412***
	–	(32.08)	(33.38)	(5.55)	(33.59)	(22.78)	(26.30)
C&I Loans/Assets	–	–0.32**	–0.322**	–0.130	–0.322**	–0.403***	–0.529***
		(2.40)	(2.51)	(0.70)	(2.53)	(3.82)	(3.23)
BHC Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CBSA× Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,492,948	1,137,775	1,137,775	372,698	1,137,775	684,353	1,111,298
R^2	0.45	0.47	0.47	0.75	0.47	0.48	0.46

Table 7: MCs and Banks Lending Standards: Economy-wide Analysis.

This table reports the results of the following regression analysis.

$$\textit{Share of MC Lending}_{zt} = \beta_1 \textit{Low Credit Score}_{zt} + \beta_2 \textit{Loan-to-Income Ratio}_{zt} + \beta_3 \textit{Relative Borrower Income}_{zt} + \textit{Market-Year}_{ct} + \varepsilon_{zt},$$

where *Share of MC Lending*$_{zt}$ is a ratio of MC lending (here affiliated and independent combined) to total mortgage lending within ZIP code z and year t. *Low Credit Score*$_{zt}$ is a fraction of people residing in a ZIP code whose credit score is below 660. *Loan-to-Income Ratio*$_{zt}$ is an average loan-to-income ratio of a representative borrower. *Relative Borrower Income*$_{zt}$ is an average borrower's income relative to median income in a surrounding Census tract. *Market-Year*$_{ct}$ are CBSA-year fixed effects. Column (1) presents the analysis for the full sample of loans. The results reported in column (2) are based on the analysis of only prime loans originated in 2004 to 2006 period, results in column (3) are based on the privately securitized loans. The unit of observation is ZIP code-year. The sample contains 98 million loans originated between 1999 and 2006. Standard errors are clustered at the CBSA-year level. t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	Full Sample	Prime Loans	Securitized Loans
	(1)	(2)	(3)
Low Credit Score	0.204***	0.069***	0.16***
	(9.67)	(2.92)	(7.59)
Loan-to-Income Ratio	0.009***	0.044***	–0.01*
	(2.64)	(10.60)	(1.73)
Borrower/Area Income	–0.004**	–0.015***	–0.003**
	(2.00)	(6.84)	(2.33)
Share of Minority	0.038***	0.007	0.05***
	(3.97)	(0.65)	(4.66)
Subprime Lending	0.036**	0.023***	0.02***
	(2.49)	(4.64)	(4.86)
House Price Appreciation$_{t-1}$	–0.049**	–0.031	0.04*
	(2.09)	(1.49)	(1.91)
CBSA × Year FE	Yes	Yes	Yes
N	87,814	36,112	87,492
R^2	0.58	0.64	0.51

Table 8: Impact of MC Activity on Foreclosures.

This table reports the results of the following regression analysis:

$$\text{Foreclosure Rate}_z = CBSA_j + \beta_1 MC\ Share_z + \beta_2 Controls_z + \varepsilon_z,$$

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. All the coefficients are multiplied by 100 for tractability. We control for borrower characteristics measured based on 2006 pool of ZIP-code borrowers. We further control for housing price appreciation over 2005-2006 period. All specifications include CBSA fixed effects. Standard errors are clustered at CBSA level. t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Measured over 2005–2006	(1)	(2)	(5)	(3)	(4)	(6)	(7)
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	–	–	–	–	–	9.71**	7.76*
	–	–	–	–	–	(2.36)	(1.93)
Independent MC Share	–	–	–	–	–	10.39***	9.68***
	–	–	–	–	–	(6.55)	(4.70)
Low Credit Score	10.01***	9.13***	4.27***	18.16***	4.18***	10.02***	9.04***
	(10.15)	(9.06)	(3.84)	(14.16)	(3.79)	(10.00)	(8.60)
Loan-to-Income Ratio	–0.08	–0.08	0.27	0.13	0.24	–0.08	–0.08
	(0.24)	(0.24)	(0.77)	(0.40)	(0.69)	(0.26)	(0.24)
Borrower/Area Income	0.00	–0.00	0.14	–0.10	0.15	0.01	–0.01
	(0.02)	(0.04)	(1.39)	(1.23)	(1.25)	(0.06)	(0.07)
Share of Minority	3.15***	2.95***	2.23***	1.57***	2.28***	3.15***	2.93***
	(6.07)	(5.87)	(5.43)	(3.48)	(5.71)	(5.99)	(5.68)
House Price Appreciation	0.17	0.23	0.76	–2.24	0.59	0.15	0.31
	(0.08)	(0.10)	(0.35)	(1.03)	(0.28)	(0.07)	(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	Yes
N	6,190	6,190	6,190	6,190	6,190	6,190	6,190
Adjusted R^2	0.67	0.68	0.69	0.78	0.69	0.67	0.68

Table 9: Impact of MC Activity on Delinquencies.

This table reports the results from the following regressions:

$$Delinquency\ Rate_z = CBSA_j + \beta_1 MC\ Share_z + \beta_2 Controls_z + \varepsilon_z,$$

where *Delinquency Rate*$_z$ is an average fraction of mortgages in a ZIP code that were classified as past due 30 days or more or in severe distress across four quarters of 2008. All the coefficients are multiplied by 100 for tractability. We control for borrower characteristics measured based on 2006 pool of ZIP-code borrowers. We further control for housing price appreciation over 2005-2006 period. All specifications include CBSA fixed effects. Standard errors are clustered at CBSA level. t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Measured over 2005–2006	(1)	(2)	(5)	(3)	(4)	(6)	(7)
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	–	–	–	–	–	17.02***	12.38***
	–	–	–	–	–	(5.26)	(4.93)
Independent MC Share	–	–	–	–	–	14.16***	12.26***
	–	–	–	–	–	(11.32)	(7.51)
Low Credit Score	20.14***	18.27***	8.43***	18.16***	8.35***	20.09***	18.16***
	(17.14)	(15.07)	(9.62)	(14.16)	(9.51)	(17.51)	(14.33)
Loan-to-Income Ratio	0.13	0.12	0.82**	0.13	0.75*	0.14	0.13
	(0.39)	(0.36)	(2.05)	(0.40)	(1.82)	(0.46)	(0.41)
Borrower/Area Income	–0.07	–0.08	0.21***	–0.10	0.27***	–0.09	–0.10
	(0.78)	(1.11)	(2.74)	(1.23)	(2.92)	(0.99)	(1.21)
Share of Minority	2.01***	1.58***	0.12	1.57***	0.18	2.03***	1.57***
	(4.12)	(3.48)	(0.33)	(3.48)	(0.53)	(4.21)	(3.49)
House Price Appreciation	–2.51	–2.38	–1.32	–2.24	–1.71	–2.43	–2.24
	(1.09)	(1.10)	(0.85)	(1.03)	(1.16)	(1.07)	(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	Yes
N	6,190	6,190	6,190	6,190	6,190	6,190	6,190
Adjusted R^2	0.77	0.78	0.82	0.78	0.82	0.77	0.78