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**Mortgage Companies and
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Yuliya Demyanyk and Elena Loutskina

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Mortgage companies (MCs) originated about 60% of all mortgages before the 2007 crisis and continue to hold a 30% market share postcrisis. While financial regulations are strictly enforced for depository institutions (banks), they are weakly enforced for MCs even if they are subsidiaries of a bank holding company (BHC). This study documents that the resulting regulatory arbitrage creates incentives for BHCs to engage in risk shifting through their MC affiliates. We show that MCs are established to circumvent the capital requirements and to shield the parent BHCs from loan-related losses. BHCs run the risky mortgage business through their MC affiliates. As compared to bank affiliates of BHCs, the MC affiliates lent more to individuals with lower credit scores, lower incomes, and higher loan-to-income ratios. MC borrowers experienced higher rates of foreclosure and delinquency during the crisis. Our results imply that the regulation in place had the capacity to prevent the deterioration of lending standards widely blamed for the crisis. The inconsistent enforcement of regulation, though, eroded its effectiveness. Higher involvement of mortgage companies in subprime lending and securitization activity do not explain our results.

1   Introduction

The 2007 crisis had a huge impact on the world economy and spurred a new wave of academic research (Brunnermeier (2009), Spiegel (2011)). The growth of the mortgage secondary market and the associated deterioration of lending standards were widely blamed for the crisis (Mian and Sufi (2009), Keys, Mukherjee, Seru, and Vig (2010) and Mian and Sufi (2010)). While the profession recognized the significant role of the non-bank credit intermediation (or "shadow banking") in the crisis, the lion share of the research still explored the depository institutions' behavior leading to the crisis.[1] In this paper we explore the determinants of behavior of one of the largest shadow banking players largely ignored by the literature—mortgage companies (MCs). MCs 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), but they did not go extinct together with subprime after the crisis.[2] In 2010, MCs originated about 30% of U.S. mortgages.

While the anecdotal evidence asserts that MCs originated loans to riskier borrowers, it is not directly consistent with the seminal banking literature. The MCs originate most of their loans to distribute as compared to banks that still originate the majority of their loans to hold. As the lending practices shift from an originate-to-hold to an originate-to-distribute 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)).[3] 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.

The argument above, however, ignores one important market friction, namely, regulatory envi-

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[1]See, e.g., Purnanandam (2011) and Loutskina and Strahan (2009).

[2]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.

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

ronment. Banks are subject to safety and soundness regulations, deposit insurance requirements, and consumer compliance regulations.[4] MCs can circumvent such regulation with ease and could be considered borderline unregulated credit intermediaries. In this paper we document the existence of the regulatory arbitrage between banks and MCs and show that the regulatory inconsistencies created incentives for MCs to loosen their lending standards as compared to those of banks. Our results imply that the regulation in place prior to the crisis had the capacity to prevent the deterioration of lending standards widely blamed for the crisis. The inconsistent enforcement of regulation, though, eroded its effectiveness.

Our analysis exploits the set of bank holding companies (BHCs) that have both MC and bank affiliates. We compare the behavior of BHCs with and without MC affiliates and document evidence consistent with the regulatory arbitrage. We then evaluate the lending standards of depository and non-depository institutions within a BHC. Without the regulatory gap and associated risk-shifting incentives, the bank and MC arms of the BHCs are expected to originate similar loans. Thus, the 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 show that BHCs establish MC subsidiaries to circumvent capital requirements and to shield themselves from loan-related losses. Despite having riskier loan portfolios, BHC lending through MC subsidiaries have lower on-balance-sheet loan-related losses post-crisis. With the regulatory arbitrage in place, BHCs lent to borrowers with lower credit scores, higher loan-to-income ratios, and lower relative incomes through their MC subsidiaries pre-crisis. MC loans were more likely to end up in foreclosure upon the onset of the crisis as compared to those originated by banks.[5]

What inconsistencies in regulation lead to the regulatory arbitrage? MCs face only a weak form of the safety and soundness regulation that is strictly binding for banks. First, 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, since it

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

[5]We verify that our evidence cannot be explained by the higher involvement of the MCs in the subprime market, disparity in the extent of securitization activity between banks and MCs, bank incentives to cross-sell services to higher-quality borrowers, or a difference in geographic barriers of entry between banks and MCs.

frees them of the need to expand their capital (*the capital arbitrage hypothesis*). Consistent with this hypothesis, we find that undercapitalized BHCs and those with less liquid funds, higher cost of deposits, and lower equity are more likely to establish an MC subsidiary.[6]

Second, 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 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. As a result, BHCs lending through MC subsidiaries should incur lower loan-related losses post-crisis relative to BHCs with no (or less) lending done through MC subsidiaries. We find evidence consistent with this *limited loss exposure hypothesis*. Our results could not be attributed to systematic difference between BHCs with and without MC subsidiaries.

Financial liberalization and the associated increase in banking competition lead to deteriorating incentives to maintain high lending standards (Hellman, Murdock, and Stiglitz (2000)). The goal of regulation is to limit risky activities that banks have incentives to pursue under underpriced deposit insurance (Flannery (2007)). *The capital arbitrage* and *the limited loss exposure* hypotheses, however, partially relax the regulatory constraints and allow BHCs to engage in risk shifting activities.[7] By originating riskier loans through MCs, BHCs do not have to provision even temporarily for potentially higher losses. BHCs do not have to hold capital and account for such inferior lending practices when assessing deposit insurance costs. Finally, BHCs with MC subsidiaries do not have to care as much about losses. To add insult to injury, BHCs are not only motivated to originate

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[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 (ABCP) conduits, another shadow banking system vehicle.

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

riskier loans through their MCs, they also face no barriers to do so. While the bank subsidiaries of BHCs are subject to consumer compliance regulations that make origination of risky loans costly, MCs get a free ride.[8]

Our empirical results confirm that MC lending standards were inferior to those of banks.[9] 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) 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.

In our last set of tests, we evaluate whether MC borrowers experienced higher default rates post-crisis. In this experiment, we have to consider independent MCs alongside affiliated MCs. We first confirm that all MCs are on average characterized by inferior lending practices. We then show that the pre-crisis market share of MCs has statistically and economically significant effects on ZIP code-level foreclosure and delinquency rates in 2007-2008. For comparison, 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. In this line of research Keys, Mukherjee, Seru, and Vig (2009) is the closest study to ours. It documents that heavily regulated banks *securitized* lower quality *subprime* loans than weakly regulated MCs. 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 to achieve healthier balance-sheets.

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[8]We describe the details of these regulations in Section 2 of this study.

[9]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 leverages borrowers.

Second, our study contributes to the literature exploring regulatory design and its consequences.[10] 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 inconsistent 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)). Most recent study Agarwal, Lucca, Seru, and Trebbi (2012) document discrepancies in federal and state regulators' enforcement actions in supervising the exact same financial institutions. The study argues that inconsistent regulatory oversight can hamper the effectiveness of regulation.[11]

We contribute to this literature by recognizing inconsistent regulatory enforcement for 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 the specific activities of financial institutions as opposed to consistently enforcing existing regulation. We argue that the inconsistent enforcement of banking regulation across depository and non-depository institutions created incentives and 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 enforced. 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

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[10]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.

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

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.

2   Mortgage Companies and Banking Regulation

MCs are fundamentally different from banks. Banks are "special," in that 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 mortgage market (Figure 1).

MCs were a financial innovation that came to life to circumvent binding capital requirements on depository financial institutions. At the time, 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.[12] Not being bound by similar regulation, MCs operated with a lot of freedom. 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.[13]

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

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[12]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).

[13]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.

announced a plan for a radical shift toward equating the regulatory standards across *all* lending institutions.[14]

Safety and Soundness Regulation

The regulation of depository institutions for safety and soundness has a long history in the United States.[15] Starting with the Glass-Steagall Act of 1932, the regulations have been continuously 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, bank owners 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.[16] 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 little or as much capital as they desired. One can argue that the regulatory agencies did not perceive the risk associated with MC lending to be *systemic*.[17]

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

[15]We do not provide a broad overview of US banking regulation but rather discuss unique features of it relevant for this study. Agarwal, Lucca, Seru, and Trebbi (2012) present a detailed discussion of the fragmented and inconsistent nature of the US regulatory system.

[16]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.

[17]The lack of such regulation contributed to the risk-shifting behavior of, for example, Countrywide, which, despite

The 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 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 the BHC parent in the expectation of working them out or selling them in the secondary market through so-called "scratch-and-dent desks." In most cases, MC-originated non-performing loans were not recognized on parents' balance sheets as loan losses. Furthermore, the BHCs' losses from affiliated-MC loan portfolios were limited to the BHCs' equity investment in the subsidiaries. Most MCs had an option to implode without passing all their losses on to the parent. In contrast, supervisors do not allow implosion of depository institutions without holding their parent BHCs fully responsible for any losses. In fact, the core goal of regulation is to preserve financial stability of depository institutions. Such inconsistencies in regulation 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

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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.

Act (HOEPA) to curb *subprime lending*, which had started gaining popularity at the time.[18] 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, and it aimed to broadly prevent "unfair and deceptive lending practices." Despite enforcing both parts in the consumer compliance supervision of banks, the Fed under Greenspan never enacted the second part of the regulation on a broad scale (Engel and McCoy (2011)).

Bank regulators took both parts of HOEPA seriously and have been enforcing the consumer protection rules for the prime and subprime 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. In such an analysis, regulators ensure that the depository institutions adhere not only to the legally enforced lending restrictions but also to the guidance issued by lawmakers. For example, banks had to ensure borrowers' ability to repay their loans and could not approve 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 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.

Recognizing the lapses in regulation practices, the Federal Reserve proposed a change in its treatment of the non-depository lenders. On July 14, 2008, Federal Reserve Chairmen Ben Bernanke announced a new binding rule for all mortgage lenders that largely followed the HOEPA guidance

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

to prevent unfair and deceptive lending practices.

Home Ownership and the Equity Protection Act

Since everyone has heard 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.[19] 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 this regulation.[20] 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.[21] 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

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[19]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).

[20]See Engel and McCoy (2011).

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

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 good 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.[22] 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 (Engel and McCoy (2011)). Consistent with this history, we find no difference in either mortgage company activity or its impact on foreclosures 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.[23]

3 Data and Sample Selection

We combine data from several sources. To establish the existence of the regulatory arbitrage 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 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

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[22]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.

[23]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.

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.

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.[24] Our sample covers extremely broad set of loans originated in the U.S. economy from 1999 to 2010.

The HMDA data include information on the year of the application, the identity of the lender, the dollar amount of the loan, whether or not the loan was accepted, and whether the lender retained the loan or sold it to a third party. We augment this data with the "HMDA Lender File" compiled by Robert Avery from the Board of Governors of the Federal Reserve System. The lender file provides a variety of identifying information for all lenders who have ever filed a HMDA report.

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[24] 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.

It allows us to identify depository and non-depository lending institutions and match them to their respective parents 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 a loan to have both geographical characteristics 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 whether the loans are likely 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),[25] lender (e.g., specialization in high-cost loans)[26], 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 and no documentation provided, or a 2/28 hybrid). The common element across all definitions of a subprime loan is a high default risk. In line with

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[25]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

[26]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.

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. The subprime mortgage measure based on HMDA high-cost definitions is institution specific and is available for years 2004-2010.[27]

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, 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 loans originated in the same geography (reported by HMDA) and collectively label those loans as "subprime." This subprime measure 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 percent 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 borrower incomes. Independent mortgage companies were very active players in the subprime mortgage market, with close to 40 percent of their originations being high yield loans. Table 1 suggest that the 2007 crisis dramatically affected the MCs' lending volumes but did not annihilate the business model of originating with a sole purpose of distributing. In the 2007-2010 period, MCs continue to securitize the lion's share of their loans.

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[27]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.

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' assets, profitability, mortgage loans, liquidity ratio, and equity capital. We ensure that the changing reporting requirements are reflected in our calculations and our data set is consistent over time. Table 2 reports summary statistics for the sample 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 quality: (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-sheet. 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 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 real estate prices that affect 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.[28] 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" for each time period 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, in a given year.[29] 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 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. One can note, however, that the distribution of the characteristics does not change from Panel A to Panel B. The Census data suggest that our final set of ZIP codes covers 80% of the U.S. population.

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

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

[29]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.

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.[30] We report the results based on 2007-2008 foreclosures. The results based on 2008-2009 foreclosures are qualitatively and quantitatively similar.

Second, we utilize a quarterly ZIP code-level delinquency rate equal to a share of mortgage borrowers who were more than 30 days past due on their loans or in "severe derogatory" state as defined by Equifax. We normalize this measure by a total number of individuals with mortgages in the same ZIP code-quarter. Given that a borrower can be classified as delinquent on his/her loan in multiple quarters, we average the quarterly delinquency rate across four quarters on 2008 to capture a representative delinquency level in that year. In 2008, 5.5% of the 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

The capital arbitrage hypothesis argues that a desire to circumvent the capital requirement regulations is central in motivating BHCs to establish MC subsidiaries. A decision to originate 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. We argue that the resulting regulatory arbitrage creates incentives for capital-constrained BHCs to establish MC subsidiaries.

There are challenges in establishing this relationship. BHCs engage in regulatory arbitrage exactly to increase or maintain their regulatory capital ratio (e.g., Tier 1 capital ratio). As BHCs

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[30]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 rage of homes in foreclosure between 2007 and 2008 is 3.2% and that between 2008 and 2009 is 3.6%.

increase the amount of MC lending, their regulatory capital ratio is not expected to change or is even expected to increase. Thus the relationship between a decision to establish an MC subsidiary (or the extent of lending through an MC) and the regulatory capital of the BHC is hard to establish. 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. Following this argument, we adopt following experiment design:

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

where $MC\ Lending\ Activity_{i,t}$ is either (i) a dummy variable that equals one if a BHC i has an MC subsidiary in year t and zero otherwise, or (ii) the extent of a BHC lending through an MC subsidiary normalized by total assets. 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 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 any heterogeneity due to specialization. To control for any bank or time specific unobserved heterogeneity leading banks to establish BHC subsidiaries, we introduce two 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 of each independent variable. 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

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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 subsidiary activity. Here, alongside BHCs that established an MC subsidiary within our sample period, we include BHCs that had an MC subsidiary throughout our sample period. We find that 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 are consistent with *the capital arbitrage hypothesis*: circumventing the binding capital requirements is central in BHCs decision to establish MC subsidiaries.

4.2   Limited Loss Exposure

Apart from a requirement to hold capital for all loans on banks' books, 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 banks' 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, MC present a perfect vehicle to mitigate costly regulation. Our *limited loss exposure hypothesis* argues that BHCs can avoid the full extent of loan related losses from the affiliated MC loan portfolios.[31]

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,

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[31]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.

passed the credit risk to the secondary market, which further inhibits our ability to capture loan losses. To compare banks 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.[32] Consequently, banks that were more active in the originate-to-distribute (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 securitized loans were originated by a bank subsidiary versus an MC subsidiary of a BHC.

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

$$On\text{-}balance\text{-}sheet\ Loan\ Losses_{it} = Bank_i + Quarter_t +$$
$$\beta_1 \times PostQ1, 2007 \times Total\ OTD_i^{2006} + \beta_2 PostQ1, 2007 \times OTD\ through\ MC_i^{2006} +$$
$$+\gamma_1 PostQ1, 2007 \times Loan\ Portfolio\ Controls_i^{2006} + \gamma_2 Bank\ Controls_{it} + \varepsilon_{it}, \quad (2)$$

where $On\text{-}balance\text{-}sheet\ Loan\ Losses_{it}$ 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

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[32]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.

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. Under *the limited loss exposure hypothesis*, however, we expect β_2 to be negative.

In the regression we control for 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 the economy-wide factors on mortgage performance.

The results are reported in Table 5. Panel A reports the results for net charge-offs while 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 rage of loan characteristics, it is possible that we do not fully capture the difference between MC and bank originated loans. Specifically, bank loans could be of a lower quality than MC loans which is captured by our coefficients. 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). Second, we explicitly control for bank and MC activities in the most risky segment of the market, namely subprime (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 the *the limited loss exposure hypothesis*: MCs serve BHCs as a tool to originate riskier loans and to shield their parent corporations from loan-related losses that stem from affiliated-MC loan portfolios. 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.[33]

4.3 MC and Bank Lending Standards within BHC

In this section we explicitly analyze whether bank and MC affiliates 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 as compared to bank subsidiaries. The fact that MCs are not subject to the consumer compliance regulation also makes it less costly for BHCs to originate inferior quality loans through their MC subsidiaries.

The challenge in evaluating the behavior of MCs lies in the lack of data that captures the loan originator, the origination decision, and borrower characteristics at the loan level. The Home Mortgage Disclosure Act (HMDA) data we utilize cover a comprehensive set of loans (about 87% of all loans originated) and lenders (99% of the banking 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.[34] Mapping them at the loan level is

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[33]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.

[34]We use data provided by the Federal Reserve Bank of New York, the Consumer Credit Panel, and Equifax, one of the major credit bureaus in the United States.

not only costly but also explicitly prohibited by the data providers.

In this study 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, the MC arms of the BHCs are expected to originate the same or better quality loans that 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:

$$
\begin{aligned}
\textit{Share of MC Lending}_{izt} \quad = \quad & \beta_1 \textit{Low Credit Score}_{zt} + \beta_2 \textit{Loan-to-Income Ratio}_{izt} + \\
& \beta_3 \textit{Relative Borrower Income}_{izt} + \textit{Market-Year}_{ct} + \textit{Bank}_i + \\
& \gamma \textit{Controls}_{zit} + \varepsilon_{izt}, \quad\quad\quad\quad\quad\quad\quad\quad\quad (3)
\end{aligned}
$$

where $\textit{Share of MC Lending}_{izt}$ is a ratio of MC lending to total mortgage lending within BHC i, ZIP code z and year t. The core variables of interest are the three measures of borrower quality: (i) $\textit{Low Credit Score}_{zt}$ is a fraction of people residing in a ZIP code with credit score below 660, (ii) $\textit{Loan-to-Income Ratio}_{izt}$ is an average loan-to-income ratio of a representative borrower, and (iii) $\textit{Relative Borrower Income}_{izt}$ is a borrower's income relative to median are income as reported by HUD. The last two variables are BHC specific and are based on HMDA data.

We include three types of control variables. First, we control for the 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). We also incorporate other loan portfolio characteristics. The CBSA–year fixed effects, $Market\text{-}Year_{ct}$, 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 Equifax data availability only allow us to evaluate the lending standards post 1999. To avoid the contaminating effect of the crisis on the lending behavior of financial institutions we end our sample in 2006.

Our core objective is to document the difference in lending standards stemming from different regulatory environment of MCs and banks. However, 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 lending standards as compared to bank subsidiaries of the same parent BHC pre-crisis. 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.[35] The lending standards of MCs are inferior to those of banks even after we control for the BHC financial conditions (column (2)).

To further eliminate doubt that the results may be due to the higher engagement 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. Being primarily securitizers, MCs are expected to be more influenced by this increase in the funding supply. This could explain the inferior lending standards of MCs. 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 customers and hence want to establish relationships with them, not limited to mortgage lending, such as savings accounts, small business loans, money market accounts, etc. As a result, banks can draw higher rents from establishing relationships with 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

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

by MC subsidiaries, or having affiliated MC managers redirecting better quality customers to bank branches.

To ensure that our earlier results are driven by the regulatory inconsistency and not by bank customer selection behavior, in the last column of Table 6 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.[36] Even in the areas where BHCs do not have a physical branch presence, MCs have inferior lending standards as compared to those of banks. 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 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 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. These results are not reported in the paper for brevity.

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[36]Banks lend in this areas using variety of mortgage brokers.

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 indicators of loan riskiness, namely 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. However, 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 have to deviate from within-BHC analysis, we first ensure that the aggregate MC lending behavior is consistent with the analysis presented in the previous section. To do so, we repeat the previous experiment in the ZIP code representative borrower setting to confirm that MCs (here independent and affiliated combined) are characterized by inferior lending practices based on ex ante borrower characteristics.

$$
\begin{aligned}
\textit{Share of MC Lending}_{zt} \quad = \quad & \beta_1 \textit{Low Credit Score}_{zt} + \beta_2 \textit{Loan-to-Income Ratio}_{zt} + \\
& \beta_3 \textit{Relative Borrower Income}_{zt} + \textit{Market-Year}_{ct} + \\
& \gamma \textit{Controls}_{zt} + \varepsilon_{izt},
\end{aligned} \tag{4}
$$

The results reported in Table 7 confirm our within-BHC finding that MCs lend disproportionately more to representative borrowers with lower credit scores, higher loan-to-income ratios, and lower relative incomes. This pattern is observable irrespective of the market segment, extent of participation in subprime activities, or securitization rate.

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 designs, we analyze how the extent of MC lending in a given ZIP code pre-crisis (2005-2006) affected the mortgage default rates during the crisis (2007-2008):

$$
\textit{Mortgage Defaults}_{z,Post\text{-}Crisis} \quad = \quad CBSA_j + \beta_1 MC\ Share_{z,Pre\text{-}Crisis} + \beta_2 Controls_z + \varepsilon_z, \tag{5}
$$

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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 foreclosure 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 foreclosures and its interaction with MC lending, we evaluate whether the share of MC activity in the prime market (as defined in HMDA) has an adverse impact on foreclosure (column (5)).

It is possible, though, that independent and affiliated MCs are two different types of entities with different incentives, e.g., reputation considerations. Table 1 suggests that independent MCs were more active in the subprime market. To ensure that our results are not merely driven by independent MCs, we include the market shares of independent and affiliated MCs in ZIP code lending pre-crisis as two separate independent variables (columns (6) and (7)). We find that the activities of independent and affiliated MCs have almost identical impacts on the measures of mortgage defaults.

The results across all specifications and both panels uniformly confirm that ZIP codes with higher relative lending by MCs pre-crisis (even in the prime market) have higher foreclosure and delinquency rates post-crisis. 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 (0.098) leads to about 1% increase in foreclosure rate and 1.1% increase in delinquency rate. These numbers 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 (from HMDA: 0.12) increases delinquency by about 0.96% and foreclosure by 1.1%. The impact of MC activity on mortgage defaults is very much comparable to the impact of subprime.

5   Concluding Remarks

We build this study on the intersection of two very important issues that played a role in the 2007 credit crisis and are now widely discussed by both academics and practitioners: 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 representative of the shadow banking. These dominant loan originators in the U.S. economy prior to the crisis were largely left unattended by the existing literature, despite their obvious role in the market collapse. Understanding the behavior of these economic agents is important not only from the perspective of their 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 created both incentives and opportunities for MCs to originate riskier loans. MC subsidiaries of the BHCs allowed the latter to circumvent the regulatory capital requirements and the predatory lending requirements, and to avoid incurring the resulting loan losses. Inconsistent regulation contributed to the deterioration of lending standards widely blamed for the 2007 crisis. Our empirical evidence suggests that the existing regulation standards are not as inadequate as they are perceived to be. 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)). 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.

Panel A: Lending Volume, $ Billions


Panel B: Market Shares, %

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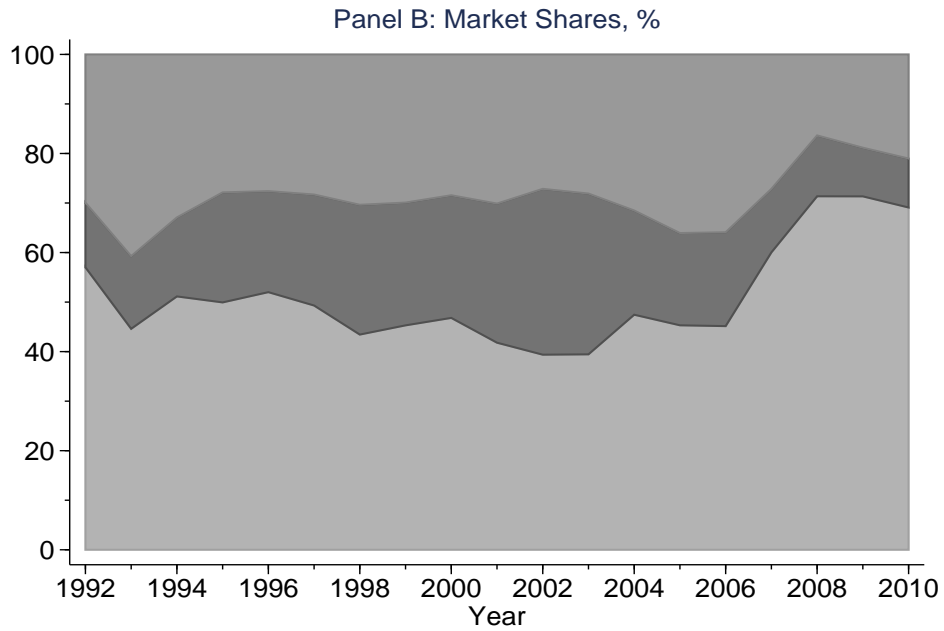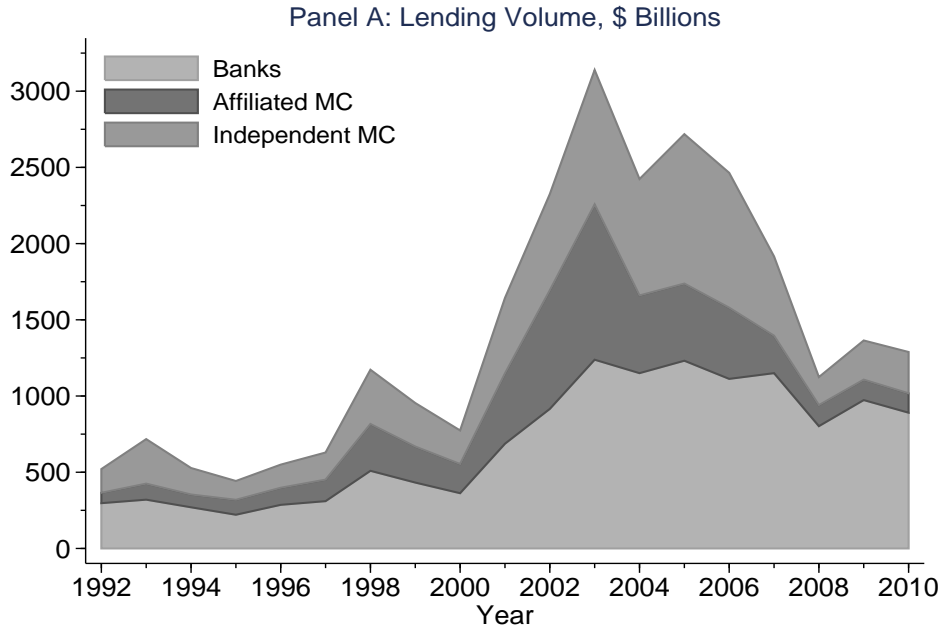
Figure 2: Lending Volumes and Market Shares by Lending Institution Type. Including Subprime Lending.

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.

Panel A: Lending Volume, $ Billions

Banks
Affiliated MC
Independent MC
Banks, Subprime
Affiliated MC, Subrpime
Independent MC, Subrpime

Panel B: Market Shares, %

Banks
Affiliated MC
Independent MC
Banks, Subprime
Affiliated MC, Subrpime
Independent MC, Subrpime
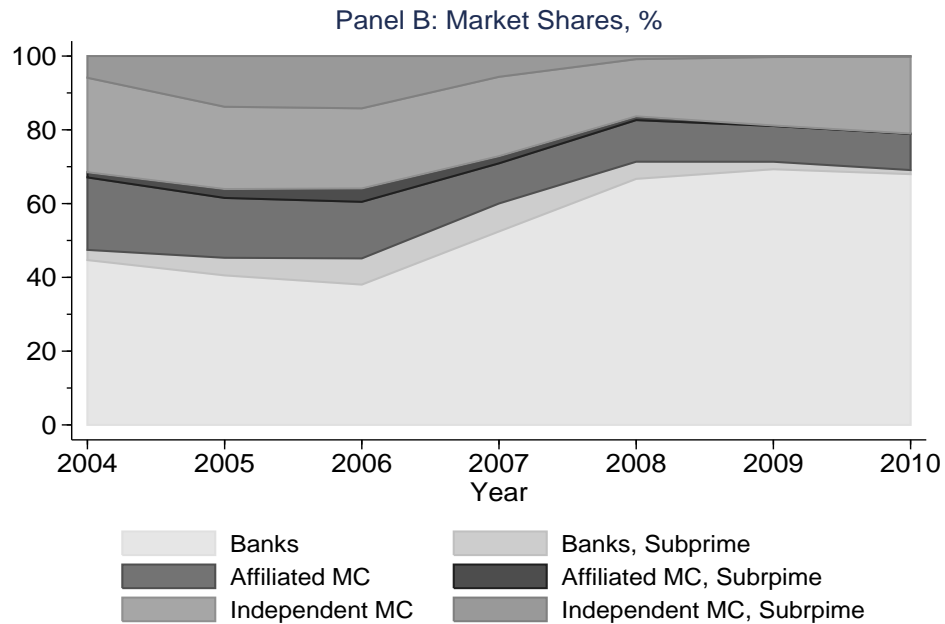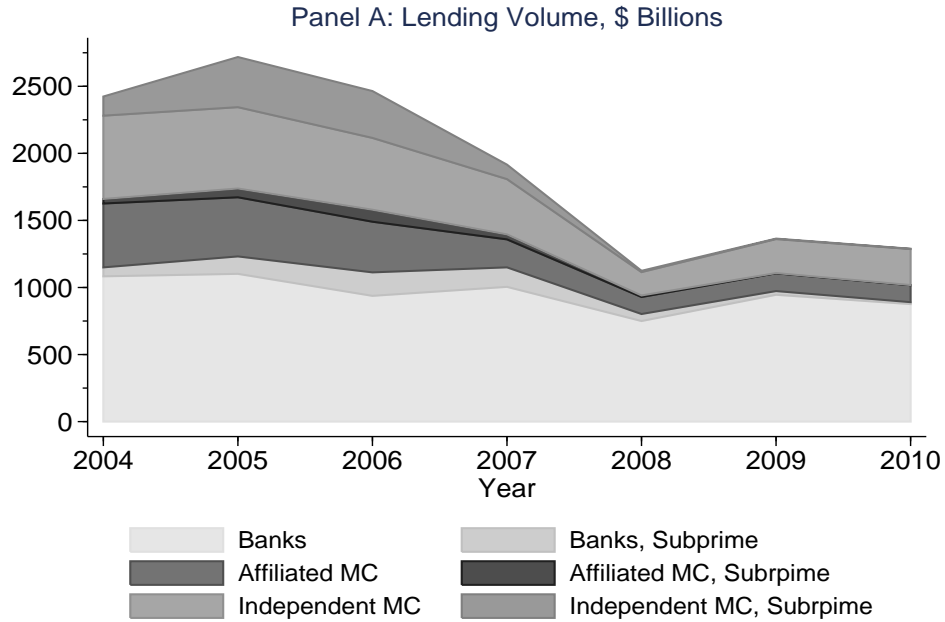
Table 1: Mortgage Lender: Summary Statistics.

This table reports summary statistics for four types of mortgage lenders. The first column of the table 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 affiliated with 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 mapped to mortgage lending data (HMDA). The sample contains BHCs with and without MC subsidiaries. The financial characteristics are as reported by BHCs 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. The data summarized in Panel B contain only those ZIP codes where all the listed variables are not missing. Data sources: Market Shares, Loan-to-Income Ratios, Shares of Minority, and Subprime Mortgage Lending (HMDA) variables are from HMDA data set. Low Credit Score is from Equifax. House Price Appreciation and Subprime Mortgage Lending (LP) are from CoreLogic. [a] - Subprime Mortgage Lending (HMDA) is available for years 2004–2010.

Variable	1999–2006			2008–2010		
	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: Why do BHCs Establish MC Subsidiaries?

This table reports the results from the following regression equation:

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

In Panel A, $MC\ Lending\ Activity_{i,t}$ is a dummy variable that equals one if a BHC i has an MC subsidiary in year t and zero otherwise. Panel A reports the results of the probit analysis where the coefficients reflect the marginal effects of the respective variables. In Panel B, $MC\ Lending\ Activity_{i,t}$, is the volume of a BHC lending through an MC subsidiary normalized by total assets. $Equity\ Capital_{i,t}$ is the ratio of book value of equity to total assets at the beginning of the year. $Year_t$ is a year fixed-effects, $Bank_i$ is 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

| | PROBIT | | | OLS | | |
| | Panel A: Establishing MC subsidiary | | | Panel B: Extent of MC lending | | |
	(1)	(2)	(3)	(4)	(5)	(6)
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 FE	Yes	Yes	Yes	Yes	Yes	Yes
BHC FE	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:

$$On\text{-}balance\text{-}sheet\ Loan\ Losses_{it} = Bank_i + Quarter_t + \beta_1 PostQ1,2007 \times Total\ OTD_i^{2006} +$$
$$\beta_2 PostQ1,2007 \times OTD\ through\ MC_i^{2006} + \gamma_1 PostQ1,2007 \times Loan\ Portfolio\ Controls_i^{2006} + \gamma_2 Bank\ Controls_{it} + \varepsilon_{it},$$

The dependent variable, $On\text{-}balance\text{-}sheet\ Loan\ Losses_{it}$, 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. $Bank_i$ denotes bank fixed effects and $Quarter_t$ are quarter fixed effects. Adjusted R-squared and number of observations are provided in the bottom rows. 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		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total OTD × Post Q1 2007	0.06*** (2.64)	0.13*** (2.86)	−0.01 (0.35)	0.05* (1.87)	0.12*** (2.65)	−0.01 (0.31)	−0.004 (0.38)	−0.02** (2.37)	0.01 (1.18)
OTD through MC × Post Q1 2007	—	−0.17*** (2.72)	0.01 (0.77)	—	−0.20*** (3.06)	0.002 (0.06)	—	0.05*** (2.84)	−0.01 (0.84)
Subprime × Post Q1 2007	—	—	0.60*** (8.46)	—	—	0.61*** (5.40)	—	—	−0.17*** (5.00)
MC Subprime × Post Q1 2007	—	—	−0.63*** (7.07)	—	—	−0.76*** (7.62)	—	—	0.22*** (4.53)
Originations × Post Q1 2007	−0.30*** (2.61)	−0.29 (1.60)	−0.17*** (2.64)	0.08 (0.29)	0.15 (0.72)	0.26** (2.11)	0.04 (0.79)	0.04 (0.51)	0.01 (0.11)
log(Assets)	−0.18*** (3.32)	−0.14** (2.12)	−0.12* (1.96)	0.057 (0.41)	0.16 (0.81)	0.18 (0.87)	0.03 (0.82)	0.04 (0.90)	0.04 (0.84)
Equity Capital	0.43 (0.45)	0.60 (0.86)	0.70 (1.04)	−2.68 (1.41)	−2.51 (1.30)	−2.42 (1.23)	0.44 (0.92)	0.38 (0.51)	0.36 (0.47)
Cost of Deposits	4.88** (2.02)	3.67** (2.42)	2.40** (1.97)	4.14 (1.34)	3.15 (1.00)	1.90 (0.64)	0.02 (0.03)	0.602 (0.50)	0.96 (0.79)
Liquidity	0.25* (1.87)	0.25 (1.40)	0.22 (1.37)	−0.35 (1.15)	−0.35 (0.85)	−0.39 (0.96)	−0.30** (2.57)	−0.26 (1.41)	−0.25 (1.40)
C&I Loans/Assets	0.44* (1.84)	0.18 (0.81)	0.15 (0.80)	0.27 (0.40)	0.07 (0.10)	0.07 (0.09)	−0.39*** (2.58)	−0.31 (1.29)	−0.30 (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:

$$Share\ of\ MC\ Lending_{izt} = \beta_1 Low\ Credit\ Score_{zt} + \beta_2 Loan\text{-}to\text{-}Income\ Ratio_{izt} + \beta_3 Relative\ Borrower\ Income_{izt} + Market\text{-}Year_{ct} + Bank_i + \gamma Controls_{zit} + \varepsilon_{izt},$$

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 residing in a ZIP code whose credit score is below 660. $Loan\text{-}to\text{-}Income\ Ratio_{izt}$ 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 surrounding census tract. The last two variables are BHC specific and are based on HMDA data. Measures of a BHC financial conditions are as defined earlier. $Market\text{-}Year_{ct}$ are CBSA-year fixed effects and $Bank_i$ 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)
Bank 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 form the following set of regressions.

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

where $\text{Share of MC Lending}_{zt}$ is a ratio of MC lending (here affiliated and independent combined) to total mortgage lending within ZIP code z and year t. $\text{Low Credit Score}_{zt}$ is a fraction of people residing in a ZIP code whose credit score is below 660. $\text{Loan-to-Income Ratio}_{zt}$ is an average loan-to-income ratio of a representative borrower. $\text{Relative Borrower Income}_{zt}$ 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 from the following regressions:

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

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, X_z is a vector of regressors listed in the first column of the table measured for each ZIP code prior to the onset of the crisis (2005 and 2006). $CBSA_j$ captures the 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. X_z is a vector of regressors listed in the first column of the table measured for each ZIP code prior to the onset of the crisis (2005 and 2006). $CBSA_j$ captures the 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