Mortgage Brokers, Technology, and Credit Supply: Evidence from MERS*

(Very Preliminary Work; Do Not Cite)

Stefan Lewellen†
Pennsylvania State University

Emily Williams‡
Harvard Business School

September 16, 2018

Abstract

We examine the effects of the the Mortgage Electronic Registration System, or MERS, on mortgage origination volumes and foreclosure rates prior to the Great Recession. MERS was introduced in the late 1990s and significantly reduced the cost and time associated with secondary loan sales. Using novel data from the Massachusetts Registry of Deeds, we show that the introduction of MERS led to an expansion in credit supply that was primarily fueled by mortgage brokers originating subprime loans. We also find that foreclosure rates were higher on these loans. Our paper is the first to explain why mortgage brokers were best placed to originate subprime loans.

*We thank the Secretary of the Commonwealth of Massachusetts for sharing its data. Daniel Neagu provided outstanding research assistance. We also thank John Barrios, Patrick Clapp, Lauren Cohen, Josh Coval, Marco Di Maggio, Mark Egan, Daniel Green, David Haushalter, Richard Howe, Victoria Ivashina, Anya Kleymenova, Amit Seru, Amir Sufi, Adi Sunderam, Boris Vallee, Emil Verner, Annette Vissing-Jorgensen, seminar participants at Harvard Business School, and participants at the 2018 Early Career Women in Finance Conference, the 2018 LBS Summer Symposium, and the 2018 Chicago Booth Institute for Global Markets – Stigler Center Conference on the 10th Anniversary of the Financial Crisis for helpful comments. Part of this research was conducted while Lewellen was visiting Carnegie Mellon University on leave from London Business School. Williams thanks the HBS Division of Research and the HBS Data Services Group for funding assistance and research support.

†Visiting Assistant Professor of Finance, Pennsylvania State University. Email: lewellen@psu.edu.

‡Assistant Professor of Finance, Harvard Business School. Email: ewilliams@hbs.edu.

1 Introduction

Mortgage brokers originated more than half of all subprime loans prior to the financial crisis (Berndt, Hollifield, and Sandas (2016)). However, little is known about *why* mortgage brokers originated so much subprime lending, or why this activity exploded in the years leading up to the financial crisis. Given the outsized role of subprime lending in many commentaries of the crisis (see, e.g., Mian and Sufi (2009)), it is important to understand the factors influencing the growth of subprime lending before the crisis and the factors that contributed to excessive subprime delinquencies and to the eventual collapse of the subprime lending market.[1]

The goal of this paper is to examine one such factor: namely, financial innovation. In particular, we focus on the introduction of the Mortgage Electronic Registration System (MERS) in the late 1990s.[2] In simple terms, MERS allows a financial institution to sell a mortgage without having to legally update the mortgage's owner of record, thereby significantly reducing the time and costs associated with secondary loan sales. As such, the introduction of MERS represented a major innovation in the secondary market for mortgages. In fact, according to Ketcham (2012), more than two-thirds of all home loans in the United States were registered through MERS by the end of 2007, less than a decade after its introduction.[3] However, despite the enormous importance of MERS for the mortgage market, there are currently no papers studying the economic effects of MERS or the unintended consequences that the introduction of MERS may have imparted on credit markets prior to

[1] Keys, Mukherjee, Seru, and Vig (2010) examine a related financial innovation (securitization) and its effects on the mortgage market.

[2] MERS is a registered trademark of MERSCORP Holdings, Inc.

[3] Ketchum, Christopher (2012), "Stop Payment! A Homeowners' Revolt Against the Banks." *Harper's Magazine*, January 2012. Accessed at https://harpers.org/archive/2012/01/stop-payment-a-homeowners-revolt-against-the-banks/.

and during the most recent financial crisis.

Our central argument is that, by reducing the time and costs associated with selling mortgages, MERS may have indirectly helped to fuel the boom and subsequent collapse of the subprime mortgage market. Our argument has three primary components. First, while all originators would stand to benefit from the introduction of MERS, the largest benefits should accrue to the institutions with the highest probability of selling loans: namely, mortgage brokers.[4] Second, by significantly reducing transaction costs, MERS allowed mortgage brokers to expand origination volumes.[5] Finally, the "marginal" new loan originations in this setting would likely involve borrowers with poor credit scores, since borrowers with prime credit scores had no trouble obtaining credit even in the absence of MERS.[6] Importantly, this argument predicts higher origination volumes *particularly by mortgage brokers, particularly for subprime borrowers* following the introduction of MERS. Despite a wealth of evidence on the role of subprime mortgages in the financial crisis (see, e.g., Ashcraft and Schuermann (2008), Mian and Sufi (2009), Demyanyk and Hemert (2011), Purnanandam (2011), and Dell'Ariccia, Igan, and Laeven (2012)), we are aware of no other papers that attempt to show why mortgage brokers in particular were responsible for the rise in subprime mortgage originations.

Consistent with our hypotheses, we find that both the number of mortgages and the dollar volume of lending activity increase following an institution's adoption of MERS. These effects are stronger for mortgage brokers and are stronger in areas populated by many borrowers

[4]Mortgage brokers do not originate loans they intend to hold on their balance sheet; all loans are originated with the intent to (eventually) sell them.

[5]In particular, by lowering the marginal cost of origination, MERS may have allowed financially-constrained mortgage brokers to fund additional originations.

[6]See, e.g., Bhutta and Keys (2016) and Akey, Heimer, and Lewellen (2017).

with subprime credit scores. The economic magnitudes of these effects are large: according to our estimates, the incremental increase in origination volumes associated with MERS is about 9.7%, or about $90 billion. We also find that foreclosure rates are higher for mortgages originated by MERS-active mortgage brokers than for bank-originated loans or loans originated by institutions that are not MERS members. Importantly, these findings are also stronger in areas populated by subprime borrowers. Hence, while the introduction of MERS represented a significant financial innovation for the mortgage industry, its unintended consequences may have led to the origination of a significant quantity of low-quality loans prior to the 2007-2009 financial crisis.

To test our hypotheses, we obtain a novel dataset from the Massachusetts Registry of Deeds containing all land records filed with county clerks in six Massachusetts counties from 1990-2018. These land records indicate, for each loan, (1) the names of the original mortgage lenders, (2) whether the loan was registered with MERS at any point along the ownership chain, (3) the names of any subsequent owners of the mortgage prior to the loan being registered with MERS, and (4) whether foreclosure proceedings were ever completed on the property.[7] We then hand-match the names of lenders in our dataset with various databases from the Federal Financial Institution Examination Council (FFIEC) to obtain data on each institution's history and entity type (i.e. mortgage broker, commercial bank, bank subsidiary, bank affiliate, or other). As such, our dataset provides a comprehensive picture of the secondary market for purchased mortgage loans with the state of Massachusetts.

Our empirical design combines the bilateral nature of the MERS system (i.e. in a MERS-

[7]One caveat of our data is that, because MERS alleviates the need to register ownership changes with the county clerk, once a loan is registered with MERS, we do not know whether the loan was subsequently purchased or the identity of any future purchasers.

registered transaction, the buyer and seller of a loan must both belong to MERS) with stringent geographic fixed effects. In particular, our primary tests compare loan origination volumes, foreclosure rates, and other outcome variables for MERS-active mortgage brokers relative to MERS-active banks and non-MERS active lenders in the periods before and after *another transaction partner* joins MERS. That is, suppose broker A (existing MERS member) and broker B (not a MERS member) both operate in a Census tract, and both brokers sell loans to bank C. Our tests compare changes in origination volumes at broker A with changes in origination volumes at broker B after *bank C* joins MERS. In this way, any changes in origination volumes are not a function of the brokers themselves joining MERS, but are rather a function of one of their business partners joining MERS. In support of this assumption, we verify that parallel trends exist for MERS-active and non-active lenders in the period before a mutual trading partner joins MERS. Our regressions also include zip code $\times$ year, lender $\times$ year, and buyer $\times$ seller (i.e. relationship) fixed effects. Since different institutions adopted MERS at different times, our setting also benefits from staggered treatment adoption within very narrowly-defined geographic areas, making it unlikely that a common economic shock is responsible for driving our results.

Our main hypothesis is that MERS led to a reduction in the time and cost associated with the sale of loans on the secondary market. This hypothesis suggests that MERS should cause an outward shift in the supply curves of member institutions, which, holding demand constant, should correspond with higher quantities and lower mortgage rates after an institution becomes a MERS member. Most mortgage brokers are small and likely face funding constraints that limit the number of loans they can originate at a given point in time. If MERS helps institutions to alleviate such funding constraints, then an institution joining

MERS would also expect its supply curve to flatten. Since brokers are more likely to face financial constraints than banks, we would thus expect supply curves to shift outwards for both banks and brokers following the introduction of MERS, but for supply curves to flatten more for mortgage brokers than for banks after an institution joins MERS.

Collectively, these hypotheses suggest that MERS had two effects: it caused an outward shift in the supply curves of MERS-active originators, and it caused a flattening of the supply curve for institutions facing financial constraints. In addition, the introduction of MERS may have also benefited securitization trusts and other purchasers of loans by reducing the time and costs associated with purchasing loans from mortgage originators. Under this hypothesis, MERS would shift the supply curve of loan purchasers outwards. In response, purchasers would rationally increase their demand for MERS loans, which would produce an outward shift in the demand for MERS-registered mortgages. Hence, there are two causal channels through which MERS may have affected origination volumes: through outward shifts (and possible flattening) of the supply schedules of originators, and through outward shifts in the supply curve of securitization trusts which in turn causes an outward shift in the demand curve for MERS-registered loans.

One potential concern is that, rather than capturing increases in mortgage supply due to MERS, our results could simply be capturing an increase in the demand for residential mortgages (see, e.g, Barberis, Greenwood, Jin, and Shleifer (2018)). However, this explanation does not seem consistent with our results. First, this hypothesis would predict increases in mortgage rates following a positive demand shock, whereas the data show that mortgage rates declined during the period following the introduction of MERS.[8] Second, this hypoth-

[8]See, e.g., the 30-year fixed mortgage rate in FRED (series MORTGAGE30.US).

esis cannot explain why origination volumes would increase more for MERS members when a common trading partner joins MERS, after controlling for zip code × time fixed effects. Third, this hypothesis cannot explain increased origination volume by mortgage brokers in subprime areas. Hence, this hypothesis seems unlikely to explain our results.

Another potential concern is that demand shocks from investors may explain our results. For example, investors may have increased their general demand for mortgage-backed securities, leading securitization trusts to respond by increasing their demand for purchased loans. This would lead to an upward movement along the supply curve of originators, which would in turn allow originators to expand their supply of mortgages to consumers. Hence, this chain of events would also cause mortgage rates to fall and mortgage origination volumes to increase. To the extent that mortgage brokers have flatter supply schedules than banks, this could also explain our finding that quantity increases are larger for mortgage brokers than banks. However, this channel does not seem consistent with our collection of results. First, lender × time and zip code × time fixed effects should account for any economy-wide, local area, or lender-specific demand shocks. Second, while parallel trends tests confirm no significant differences in origination trends between MERS members and non-MERS members, we observe large differences in trends after a common trading partner joins MERS, which suggests that MERS (and not investor demand) is the cause of the change in origination trends. Finally, we verify that our results continue to hold when our sample is restricted to "national" lenders that should all be subject to a common demand shock. These lenders join MERS at very different times, which is not consistent with an "investor demand" explanation for our results.

We also confirm that our results are not driven by the particular specifications we employ

in our main tests. We aggregate our results to the Census tract level and find that our main results still hold in a series of Census tract by institution type by year regressions. These results help to confirm the general validity of our results.

Our paper makes three primary contributions to the literature. To our knowledge, our paper is the first to examine the effect of MERS on mortgage originations and is the first to explain why mortgage brokers in particular expanded origination to subprime borrowers prior to the onset of the crisis. Our results also contribute to the debate over the beneficiaries of the increase in credit supply prior to the 2007-2009 financial crisis (see, e.g., Mian and Sufi (2009) and Adelino, Schoar, and Severino (2016)). Finally, our results contribute to the literature on FinTech (Buchak, Matvos, Piskorski, and Seru, 2018; Fuster, Plosser, Schnabl, and Vickery, 2018) and the efficiency of innovations within the finance industry (Philippon, 2015; Bai, Philippon, and Savov, 2016) by showing that even a very successful financial innovation like MERS may be associated with unintended consequences that can have an important impact on the short-run health of the financial sector.

2 Institutional Background

The Mortgage Electronic Registration System (MERS) was launched in 1997 in response to concerns by many mortgage market participants that the lack of a centralized registration system for mortgages was impeding the secondary loan sale process. MERS was designed to create an institution that could serve as the owner of record for a given mortgage, allowing the mortgage to be traded repeatedly among MERS members without any party having to legally update the mortgage's ownership records. In particular, when a mortgage is sold, the

sale must be registered with the county clerk in the property's home county in the form of a so-called "assignment document." The assignment document lists the grantor (the seller of the mortgage) and the grantee (the purchaser of the mortgage). In this way, the county clerks (and hence, the public) always know who the current owner is of a given mortgage, making the process of assessing and validating a property's title very straightforward.

However, the rise of the mortgage backed securities (MBS) market placed a significant strain on both county clerks and on the buyers and sellers of mortgages. In order for a mortgage to be included in an MBS deal, the mortgage must be designated as "bankruptcy remote," which in practical terms requires the mortgage to be assigned multiple times before the ownership passes to the bankruptcy-remote legal entity. This process places a significant strain on county clerks and makes the process of selling a mortgage into an MBS deal extremely time-consuming. The overarching goal of MERS was (and is) to make the market for secondary mortgages as efficient as possible by removing these costly, time-consuming legal impediments to the sale process.

In particular, MERS offers two primary benefits to its members. First, MERS eliminates the costs associated with filing assignment documents with county clerks. By registering the mortgage in the name of MERS, lenders can sell or transfer loans to another MERS member without needing to update the legal ownership of the mortgage. MERS can also significantly reduce the amount of time needed to sell a loan, particularly if the loan is sold to a securitization trust. In addition to completing multiple assignments to place a loan into a bankruptcy-remote vehicle, securitization trusts must validate all previous assignments related to a mortgage, which can take as long as six months to complete due to backlogs at

the various county clerk offices.[9]

The MERS system also provides other benefits to members, such as "e-signing" capabilities (reducing paperwork) and the creation of a unique mortgage identifier, which allows for the more accurate tracking of a mortgage through time.[10] Hence, while the introduction of MERS undoubtedly increased the average efficiency with which mortgages could be sold on the secondary market, it is not clear whether mortgage loans originated through MERS were identical to loan originated in the absence of MERS, raising questions about the eqiulibrium effects of this technology on the broader market for mortgage loans.

3 Data

3.1 Massachusetts Registry of Deeds Data

We obtain all Massachusetts land records from 1990 - 2018 in bulk format from the Registry of Deeds Division of the Secretary of the Commonwealth of Massachusetts. This data, which is also available to the public at http://masslandrecords.com, contains every property-related document filed with county clerks in each of the state's 14 counties. A typical (anonymized) property transaction record from our data is described in Figure A1.

3.1.1 Mortgage and Assignment Documents

For each property transaction, at least two documents are typically filed with the county clerk: a deed and a mortgage. The deed records the names of the buyers and sellers of the property and the total consideration paid by the buyers to the sellers. The mortgage docu-

[9]Source: https://www.mersinc.org/media-room-docman/1112-myths-and-merits-of-mers/file.
[10]Source https://mersinc.org/join-mers-docman/1037-mers-system-marketing-brochure/file.

ment specifies the individuals or corporations who are acquiring the property (the "grantors" of the mortgage) and the banks providing funding (the "grantees" of the mortgage). If the original mortgage lenders decide to sell the loan to another institution, they are generally required to file another document called an "assignment." Among other data items, the assignment document states the names of the prior lenders (the grantors) and the names of the new lenders (the grantees). Hence, if Lewellen Bank sold an outstanding mortgage loan to Williams Bank, Lewellen Bank would be listed as the grantor and Williams Bank would be listed as the grantee in the assignment document. We manually link each assignment document with its corresponding mortgage and only keep those assignment documents where the seller of the loan (i.e. the grantor from the assignment document) is the same institution that originated the mortgage (i.e. the grantee from the mortgage document).

A key benefit of MERS is that if a loan is sold from one MERS member to another MERS member, and if the original lender listed MERS as a mortgage grantee, then no assignment document needs to be filed with the county clerk when a loan is sold because MERS remains the legal grantee to the mortgage even after the loan is sold. In this way, MERS works much in the same way that the Depository Trust Company (DTC) works for securities trades. Hence, in cases where MERS is assigned as a grantee on the mortgage, there is usually no assignment document filed even if the loan was subsequently sold.

3.1.2 Dataset Construction

Our primary dataset is a mortgage-year panel spanning the sample period 1990-2018. For each mortgage, we record the property address, purchase date, mortgage amount, lender and borrower names (that is, grantee and grantor information), and whether the loan was

subsequently assigned. If the loan was subsequently assigned, we also record the assignment date and the buyer and seller of the loan (we require the seller of the loan to match the lender on the mortgage). Data on assignments is combined with data from the mortgage so that each mortgage (and optionally, assignment) corresponds to one row in our final dataset.

For each unique grantee or grantor in our dataset, we then manually determine whether the entity is an individual or institution. We discard the names of all individuals and trusts that appear to be controlled by individuals. We then manually match each remaining institution to the Home Mortgage Disclosure Act (HMDA) dataset by name and obtain the institution's lender code, which can either be 0 (commercial banks), 1 (subsidiaries of banks), 2 (subsidiaries of bank holding companies), 3 (non-bank lenders), or 5 (affiliates of banks). We define a dummy variable, *Broker*, that equals one if the institution has a HMDA lender code of 3 and equals zero otherwise.

We also hand-collect data such as RSSD ID numbers, failure or resolution outcomes, and M&A activity for each commercial bank from the National Information Center.[11] Our final dataset consists of approximately 1.6 million mortgages originated between 1990 and 2018.

We next define a dummy variable named *MERS Active* that takes the value of one if a lender appears to have joined MERS and takes the value of zero otherwise. One caveat to our dataset is that we cannot see the date that institutions join MERS. For each institution, we therefore use the first date that MERS appears as a mortgage grantee alongside that institution as the date that the institution joined MERS. For example, if Lewellen Bank and MERS are both listed as mortgage grantees on July 1, 2010, and MERS never appeared as a

[11]Specifically, we use the National Information Center's "institution search" web page available at https://www.ffiec.gov/nicpubweb/nicweb/searchform.aspx.

grantee on Lewellen Bank's previous mortgages, then we would code the *MERS Active* flag for Lewellen Bank as equal to one. In particular, we would code the *MERS Active* flag for Lewellen Bank as equal to one and would code the year of Lewellen Bank's MERS adoption as 2010. For the purposes of our difference-in-differences regressions, the "pre-event period" would be recorded as 2008 and 2009, while the post-event period would be recorded as 2011 and 2012.

In some of our tests, we also construct the variable *MERS Active* at the Census tract level. We define a Census tract as being MERS-active if more than 20% of mortgage originations in that tract in a given year list MERS as a grantee on the mortgage. The median number of mortgages per Census tract per year is 72, while the median number of mortgages per institution per Census tract per year is approximately 17. Hence, we select a threshold of $17/72 \approx 20\%$ to define a Census tract as MERS-active because this corresponds to approximately one institution within a median Census tract becoming fully MERS-active.

Our final dataset contains data from six of the 14 counties in Massachusetts: Berkshire, Franklin, Hampshire, Middlesex, Suffolk, and Worcester counties. Collectively, these counties account for more than 52% of the state's population and contain four of the five largest cities in the state (Boston, Worcester, Lowell, and Cambridge). The six counties in our final sample are also spread out across the entire state. We exclude data from the other eight Massachusetts counties because the data from these counties are either incomplete or are not available in bulk electronic format.

One concern is that the six counties we include in our sample may not be representative of either Massachusetts or the U.S. as a whole during our sample period. To assuage these concerns, we compare real GDP growth, employment growth, and house price appreciation

in the six counties we study versus Massachusetts and the U.S. as a whole, both before and during our sample period. In untabulated results, we find that the six counties in our sample are similar to the excluded counties in terms of demographics, home ownership, home values, and economic trends.

3.2 Other data sources

We are in the process of linking Zillow to the Massachusetts land records through the book and page numbers corresponding to each document in the land records. As noted above, we also obtain information on institutions' locations and histories from the FFIEC. Finally, we manually match lender names from the Massachusetts land records with lender names from the Home Mortgage Disclosure Act (HMDA) dataset in order to obtain data on institutions' lender types.

3.3 Summary Statistics

Panel A of Table 1 shows the number of Census tracts in each year that become MERS-active during our sample period. The table shows that MERS membership grew extremely fast following the introduction of MERS in 1997. By 2001, 10% of all Census tracts had become MERS-active.[12] By the end of 2003, 67% of Census tracts were MERS-active. By the end of 2006, 91% of Census tracts had become MERS-active, and this fraction increased to 99.1% of Census tracts by 2018.

Panel B of Table 1 provides summary statistics on the number of mortgages assigned to

[12] As described above, for a Census tract to become MERS-active, at least 20% of the mortgage originations in that Census tract in that year had to list MERS as a mortgage grantee.

MERS during our sample period. The table shows that approximately 379,000 (or around 23%) of the mortgages originated during our sample period listed MERS as a grantee. However, most of the loans listing MERS as a grantee (more than 248,000) were originated by mortgage brokers rather than commercial banks, bank subsidiaries, or bank affiliates (collectively referred to as "banks"). Indeed, more than 55% of all loans originated by mortgage brokers listed MERS as a grantee, whereas only 11% of loans originated by banks listed MERS as a grantee. Hence, most of the "MERS loans" during our sample period were originated by mortgage brokers. In fact, a randomly drawn loan from a mortgage broker was *five times* more likely to be a MERS loan than a randomly drawn loan from a commercial bank.

Panel A of Table 2 provides summary statistics on many of our key variables of interest. On average, lenders originate 127 mortgages with a face value of approximately $47 million within a Census tract within a given year for the Census tracts in our sample. The average foreclosure rate on these mortgages is 1.2%. We define certain Census tracts as being "subprime" tracts based on the proportion of loans made in that tract originated by lenders who are labeled by the Department of Housing and Urban Development (HUD) as being "subprime" lenders (following ***CITES***). An average subprime Census tract has 49 mortgage originations worth about $29 million (median: $7 million) per year and a foreclosure rate of 1.8%.

Panel B of Table 2 examines similar statistics for loans originated by mortgage brokers versus banks. On average, mortgage brokers originate 35 loans worth about $8 million per Census tract per year and banks originate 81 loans worth approximately $27 million per Census tract per year within the Census tracts in our sample. The average foreclosure rate for loans made in these Census tracts is significantly higher for brokers (2.1%) than for banks

(0.9%).

Figure 1 plots the time series fraction of all mortgages within the sample that have assignment documents filed at some point during their lives. Despite the fact that our sample period includes the securitization boom of the early 2000s, the figure shows that the fraction of mortgages being assigned (i.e. sold) has actually *fallen* significantly over time in the land records data. This is precisely due to the introduction of MERS: since registering a mortgage with MERS alleviates the need for the buyer and seller to file an assignment document, loans can be sold to securitization trusts (or to other lenders) without a subsequent assignment document having to be filed.

4 Results

4.1 Main results

To execute our primary tests, we aggregate our mortgage-level data at the lending institution by Census tract by time level. Our primary hypothesis is that the introduction of MERS made it easier and/or less expensive for mortgage brokers to sell loans, which in turn allowed brokers to increase origination volumes, particularly to subprime borrowers. However, an institution's decision to adopt MERS is likely to be non-random. In particular, it is difficult to disentangle supply-driven versus demand-driven explanations for MERS adoption and subsequent loan behavior. For example, if current or future economic conditions in a given area are expected to be particularly good, or if investor demand for (securitized) mortgages in an area is particularly strong, this area might witness increased MERS adoption and

increased mortgage originations due to increases (or anticipated increases) in the demand for mortgages. In contrast, our hypothesis is that mortgage originations increase due to increases in credit supply that stem from increased MERS adoption on the part of mortgage brokers and banks.

To overcome issues stemming from the timing of MERS adoption, we exploit the fact that when an institution joins MERS, it can only use the MERS system to sell or buy loans from other MERS institutions. Consider two brokers, A and B, that both operate in the same Census tract. Suppose that A is a MERS member and B is not a MERS member. Suppose that both brokers also sell loans to banks C and D, neither of which are MERS members. Now, suppose that bank C becomes a MERS member. When bank C joins MERS, this means that broker A can now sell loans to bank C through MERS. However, since broker B is not a MERS member, broker B will not be able to sell loans to bank C through MERS.

We then saturate our regressions with zip code × year, institution × year, and mortgage buyer × mortgage seller (i.e. "relationship") fixed effects. Hence, we are looking at differences in origination volume within a specific zip code across MERS-active versus non-active institutions, when a common trading partner joins MERS, after controlling for the relationships between buyers and sellers and any lender-specific demand shocks that are occurring at a given point in time.

Figure 2 displays this identification strategy graphically. The specific regression we run is:

$$\begin{aligned} Ln\ Y_{ijczt} &= \alpha + \beta Post_{ijczt} + \gamma MERSActive_{ijcz} + \delta Post_{ijczt} \times MERSActive_{ijcz} + \\ &\quad \xi_{zt} + \phi_{it} + \theta_{ij} + \varepsilon_{ijczt}\ , \end{aligned} \tag{1}$$

where i indexes the original mortgage lender, j indexes another institution that i has previously sold loans to, and the other variables are as defined before. This regression has zip code $\times$ year, institution $\times$ year, and "relationship" (i.e. buyer $\times$ seller) fixed effects. As such, it compares broker A's lending within the Census tract *after bank A joins MERS*, relative to broker B's lending at the same point in time. We use a three-year window for each "event", with year -1 designated as the pre-event period and year 1 designated as the post-event period.

The results of this test are reported in Table 3. Consistent with our hypothesis, columns (1) and (2) show that total origination volumes increase by 9-10% at broker A relative to broker B when bank C joins MERS. Importantly, Figure 3 also shows that parallel trends exist for the origination volumes of MERS-active and non-active institutions prior to their common trading partner joining MERS. However, following the trading partner joining MERS, origination volumes increase far more rapidly at the MERS-active institution. Intuitively, since MERS requires bilateral relationships, the new member is more likely to purchase loans from broker A (the MERS member) than broker B (the non-member) in order to obtain the benefits of using MERS.

We also interact the variables in equation (1) with a dummy variable named *Broker* that takes the value of one if an institution has a HMDA lender type of 3 ("non-bank entity"). Our central hypothesis is that following the introduction of MERS, origination volumes increased specifically for mortgage brokers relative to other types of lenders, since mortgage brokers stand to benefit the most from the introduction of MERS. Consistent with our hypothesis, columns (3) and (4) show that both origination counts and origination volumes are higher for mortgage brokers than for other lender types after a trading partner joins MERS.

To examine foreclosures, we next run a conditional logit regression at the mortgage level, where mortgages are grouped by Census tract. Table 4 shows that foreclosure rates are approximately 2.7 times higher for loans originated by MERS-active members relative to non-members after a common trading partner joins MERS (column (1)). Consistent with our proposed channel, column (2) confirms that foreclosure rates are also higher for MERS-active mortgage brokers than for other MERS-active lender types when a common trading partner joins MERS.

Finally, Table 5 examines the link between origination volumes, lender types, and the creditworthiness of potential borrowers. In particular, the table looks within the set of institutions that became MERS-active at some point during our sample period and examines differences in origination volumes between mortgage brokers and banks within Census tracts that are designated as "subprime" versus other, non-subprime tracts. Columns (1) and (2) show that, while origination volumes are significantly lower in subprime areas, there is no difference in the volumes of lending between subprime and non-subprime areas after lenders active in each area join MERS. However, columns (3) and (4) show that after a trading partner joins MERS, dollar origination volumes increase for loans originated *by mortgage brokers, in subprime areas* relative to loans originated by banks. Hence, this result suggests that MERS helped to fuel increased originations by mortgage brokers to subprime borrowers prior to the Great Recession.

4.2 Robustness

4.2.1 Consumer demand shocks

Our main hypothesis is that MERS led to a reduction in the time and cost associated with the sale of loans on the secondary market. This hypothesis suggests that MERS should cause an outward shift in the supply curves of member institutions, which, holding demand fixed, should correspond with higher quantities and lower mortgage rates after an institution becomes a MERS member. MERS also may have benefited securitization trusts and other purchasers of loans by reducing the time and costs associated with purchasing loans from mortgage originators. Under this hypothesis, MERS would shift the supply curve of loan purchasers outwards. In response, purchasers would rationally increase their demand for MERS loans, which would produce an outward shift in the demand for MERS-registered mortgages. Hence, there are two causal channels through which MERS may have affected origination volumes: through outward shifts (and possible flattening) of the supply schedules of originators, and through outward shifts in the demand for purchased loans which in turn allowed originators to expand their supply of loans.

One potential concern is that, rather than capturing increases in mortgage supply due to MERS, we could simply be capturing an outward shift in the demand for residential mortgages (see, e.g, Barberis, Greenwood, Jin, and Shleifer (2018)). However, this explanation does not seem consistent with our results. First, this hypothesis would predict increases in mortgage rates, whereas the data show that mortgage rates declined during the period following the introduction of MERS.[13] Second, this hypothesis cannot explain why origina-

[13]See, e.g., the 30-year fixed mortgage rate in FRED (series MORTGAGE30.US).

tion volumes would increase more for MERS members when a common trading partner joins MERS, after controlling for zip code × time fixed effects. Third, this hypothesis cannot explain increased origination volume by mortgage brokers in subprime areas. Hence, this hypothesis seems unlikely to explain our results.

However, a related concern is that lenders may anticipate demand shocks caused by (for example) current rapid house price appreciation. In that case, a lender may join MERS in order to take advantage of this future consumer demand shock. To verify that this explanation is not driving our main results, we re-run our main analyses after restricting our sample to only include "national" lenders, which are defined as lenders with a presence both inside and outside of New England. These lenders are active in many different localities, making it unlikely that a realized or anticipated demand shock from a specific local area (i.e. a zip code or Census tract) would cause the institution to decide to join MERS. Hence, if our previous findings are not caused by local demand shocks, we would expect our results to be similar after restricting the sample to national lenders.

Tables 6 and 7 show that this is indeed the case. Tables 6 shows that the effects of MERS on mortgage counts and dollar origination volumes are similar in both magnitude and significance to the results reported previously in Table 3. Similarly, Table 7 re-estimates the foreclosure tests from Table 4 on the sample of national lenders and again finds economically and statistically similar results. Hence, our results cannot be fully explained by local demand shocks that are causing institutions to join MERS.

4.2.2 Common investor demand shocks

Another potential concern is that demand shocks from investors may explain our results. For example, investors may have increased their general demand for mortgage-backed securities, leading securitization trusts to respond by increasing their demand for purchased loans. This would lead to an upward movement along the supply curve of originators, which would in turn allow originators to expand their supply of mortgages to consumers. Hence, this chain of events would also cause mortgage rates to fall and mortgage origination volumes to increase. To the extent that mortgage brokers have flatter supply schedules than banks, this could also explain our finding that quantity increases are larger for mortgage brokers than banks.

However, this channel does not seem consistent with our collection of results. First, lender $\times$ time and zip code $\times$ time fixed effects should account for any economy-wide, local area, or lender-specific demand shocks. Second, while parallel trends tests confirm no significant differences in origination trends between MERS members and non-MERS members, we observe large differences in trends after a common trading partner joins MERS, which suggests that MERS (and not investor demand) is the cause of the change in origination trends. Finally, our results continue to hold when our sample is restricted to "national" lenders that should all be subject to a common demand shock. These lenders join MERS at very different times, which is not consistent with an "investor demand" explanation for our results.

4.2.3 Tract-level tests

As further evidence of our proposed supply-driven channel, we aggregate our data to the institution *type* by Census tract by time level. Here, we exploit within-zip code-time variation in mortgage originations across Census tracts that differ in their level of institutional exposure to MERS. In particular, we define *MERS Active* as equal to one if at least 20% of mortgage originations in that Census tract-year listed MERS as a grantee. Hence, at each point in time, a Census tract is either MERS Active or not. We then examine the relationship between origination volumes and our MERS Active variable in a difference-in-differences regression.

More concretely, we construct a five-year window around each Census tract's switch to becoming MERS Active. The first two years of the five-year period (corresponding to the two years prior to the Census tract becoming MERS active) are defined as the pre-event period. The last two years of the five-year period are defined as the post-event period. For each Census tract that becomes MERS active, we then define the control group as being all non-MERS active Census tracts within the same zip code at the same points in time. We saturate our regression with zip code $\times$ time fixed effects, which should account for any demand or supply shocks at the zip code level that might affect all Census tracts within the zip code. As such, our empirical design allows us to compare two Census tracts within the same zip code at the same point in time, where one Census tract has just become MERS Active and the other Census tract is not yet MERS active.

According to our main hypothesis, we should see a similar number of mortgage originations between the two Census tracts prior to one Census tract becoming MERS-active (i.e.

parallel trends). However, we should then see a greater number and higher volume of mortgage originations in the newly-MERS active Census tract relative to the non-active Census tract *within the same zip code* in the two years after the first tract became MERS-active. To test this hypothesis, we run the regression:

$$Ln\ Y_{czt} = \alpha + \beta Post_{czt} + \gamma MERSActive_{cz} + \delta Post_{czt} \times MERSActive_{cz} + \xi_{zt} + \varepsilon_{czt}\ , \quad (2)$$

where Y is again the outcome variable of interest (number of originations, dollar volume of originations, numer of foreclosures, and so on), c indexes Census tracts, z indexes zip codes, t represents time, $MERSActive$ equals 1 for the five calendar years surrounding the *tract's* MERS-active date and is zero otherwise, and $Post$ takes the value of 1 in the two years after a tract becomes MERS-active and is zero otherwise.

Table 8 presents the results of these tests. Columns (1) and (2) show that both the number of mortgages and the dollar volume of mortgages originated in a Census tract expand significantly in the two years after the tract becomes "MERS-active," while there is no corresponding increase in originations within non-MERS active tracts. Column (3) examines foreclosures and finds no significant differences between foreclosure rates in MERS vs. non-MERS Census tracts. Finally, column (4) shows that loan-to-value ratios increase in MERS-active Census tracts in the two years after the Census tract becomes MERS-active.

We next expand our regression to compare origination volumes between (MERS-active vs. non-active) brokers and banks in each Census tract at each point in time. In particular, we add a time-invariant variable named $Broker$ which equals 1 when a lender has a HMDA lender type code of 3 (mortgage broker) and equals 0 otherwise. Data in this regression is

grouped at the lender type by Census tract by time level. The regression specificatoin is:

$$\begin{aligned} Ln\ Y_{lczt} &= \alpha + \beta Post_{czt} + \gamma MERSActive_{cz} + \delta Broker_{l} + \theta Post_{czt} \times MERSActive_{cz} + \\ &\quad \lambda Post_{czt} \times Broker_{l} + \psi MERSActive_{cz} \times Broker_{l} + \\ &\quad \phi Post_{czt} \times MERSActive_{cz} \times Broker_{l} + \xi_{zt} + \eta_{l} + \varepsilon_{lczt}\ , \end{aligned}$$

where l indexes lender types. A positive value of ϕ would indicate that the expansion in credit supply following a Census tract's exposure to MERS is larger for mortgage brokers serving the tract.

Indeed, our evidence in Table 9 suggests that ϕ is positive and large. Columns (1) and (2) show that both mortgage originations and dollar origination volumes increase by 15% and 21%, respectively, for mortgage brokers relative to other types of lenders after a tract becomes MERS-active. Collectively, the results of these aggregated tests suggest that errors with our primary specifications are unlikely to explain our main findings.

5 Conclusion

This paper studies the introduction of the Mortgage Electronic Registration System (MERS) in the late 1990s and documents the contribution of MERS to the significant expansion in mortgage credit supply that occurred during the run-up to the 2007-2009 financial crisis. By removing the need for lenders to update county courthouse records every time a loan was sold, and by removing the need for securitizers to validate a mortgage's past assignments, MERS significantly reduced the time and costs associated with secondary loan sales.

We show that the introduction of MERS helped to fuel the increase in subprime mortgage originations by mortgage brokers during the years leading up to the crisis. In particular, we hypothesize that: (1) the benefits of MERS should be the largest for mortgage brokers, since brokers have the highest propensity to sell loans; (2) the reductions in sales times and sales costs due to the MERS system allowed lenders (and particularly mortgage brokers) to expand origination volumes; and (3) brokers expanded origination volumes by disproportionately making loans to subprime borrowers. As such, we argue that the introduction of MERS can help to explain why mortgage brokers increased origination volumes particularly to subprime borrowers prior to the onset of the financial crisis.

We use detailed data from the Massachusetts land records and the bilateral nature of MERS membership coupled with strict geographic fixed effects to show three primary results. First, MERS-active institutions increased their mortgage origination volumes at the Census tract level after a trading partner adopted MERS, relative to institutions that were not MERS members but also had relationships with the same trading partner. Second, mortgage brokers are primarily responsible for the overall increase in mortgage origination volumes. Finally, these "extra" loans made by mortgage brokers are disproportionately made to borrowers residing in low-income areas with a high preponderance of subprime loans. Hence, as hypothesized, our results suggest that the introduction of MERS led to an expansion in lenders' credit supply, with the bulk of the expansion coming from mortgage brokers lending to subprime borrowers.

To our knowledge, our paper is the first in the literature to examine the effect of MERS on mortgage originations and is the first to explain why brokers expanded origination to subprime borrowers prior to the onset of the crisis. Our results also contribute to the debate

over the beneficiaries of the increase in credit supply prior to the 2007-2009 financial crisis. Finally, our results contribute to the literature on FinTech (Buchak, Matvos, Piskorski, and Seru, 2018; Fuster, Plosser, Schnabl, and Vickery, 2018) and the efficiency of innovations within the finance industry (Philippon, 2015; Bai, Philippon, and Savov, 2016) by showing that even a very successful financial innovation like MERS may be associated with unintended consequences that can have a important impact on the health of the banking sector.

References

Adelino, Manuel, Antoinette Schoar, and Felipe Severino (2016), "Loan Originations and Defaults in the Mortgage Crisis: The Role of the Middle Class." *Review of Financial Studies*, 29, 1635–1670.

Akey, Pat, Rawley Z. Heimer, and Stefan Lewellen (2017), "Politicizing consumer credit." Working Paper.

Ashcraft, Adam and Till Schuermann (2008), "Understanding the Securitization of Subprime Mortgage Credit." *Foundations and Trends in Finance*, 2, 191–309.

Bai, Jennie, Thomas Philippon, and Alexi Savov (2016), "Have Financial Markets Become More Informative?" *Journal of Financial Economics*, 122, 625–654.

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer (2018), "Extrapolation and Bubbles." *Journal of Financial Economics*, 129, 203–227.

Berndt, Antje, Burton Hollifield, and Patrick Sandas (2016), "How Subprime Borrowers and Mortgage Brokers Shared the Pie." *Real Estate Economics*, 44, 87–154.

Bhutta, Neil and Benjamin J. Keys (2016), "Interest Rates and Equity Extraction during the Housing Boom." *American Economic Review*, 106, 1742–1774.

Buchak, Greg, Gregor Matvos, Tomasz Piskorski, and Amit Seru (2018), "Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks." Working Paper, Stanford University.

Dell'Ariccia, Giovanni, Deniz Igan, and Luc Laeven (2012), "Credit Booms and Lending Standards: Evidence from the Subprime Mortgage Market." *Journal of Money, Credit, and Banking*, 44, 367–384.

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

Fuster, Andreas, Matthew Plosser, Philipp Schnabl, and James Vickery (2018), "The Role of Technology in Mortgage Lending." *Review of Financial Studies*, forthcoming.

Keys, Benjamin J., Tanmoy Mukherjee, Amit Seru, and Vikrant Vig (2010), "Did Securitization Lead to Lax Screening? Evidence from Subprime Loans." *Quarterly Journal of Economics*, 125, 307–362.

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

Philippon, Thomas (2015), "Has the US Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation." *American Economic Review*, 105, 1408–38.

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

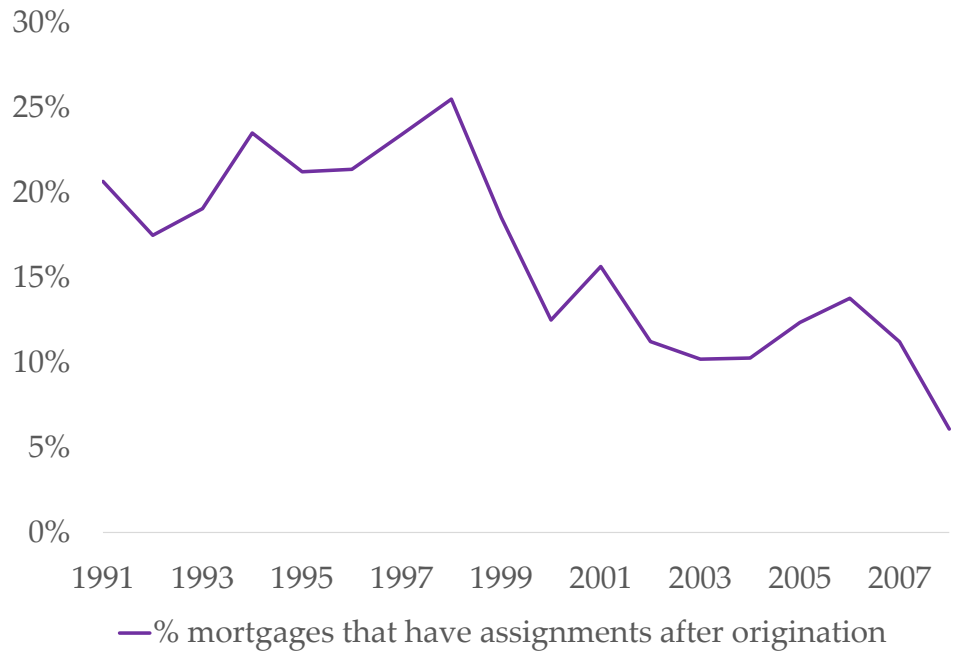


Figure 1: Per-cent of mortgages that have been assigned immediately after origination.

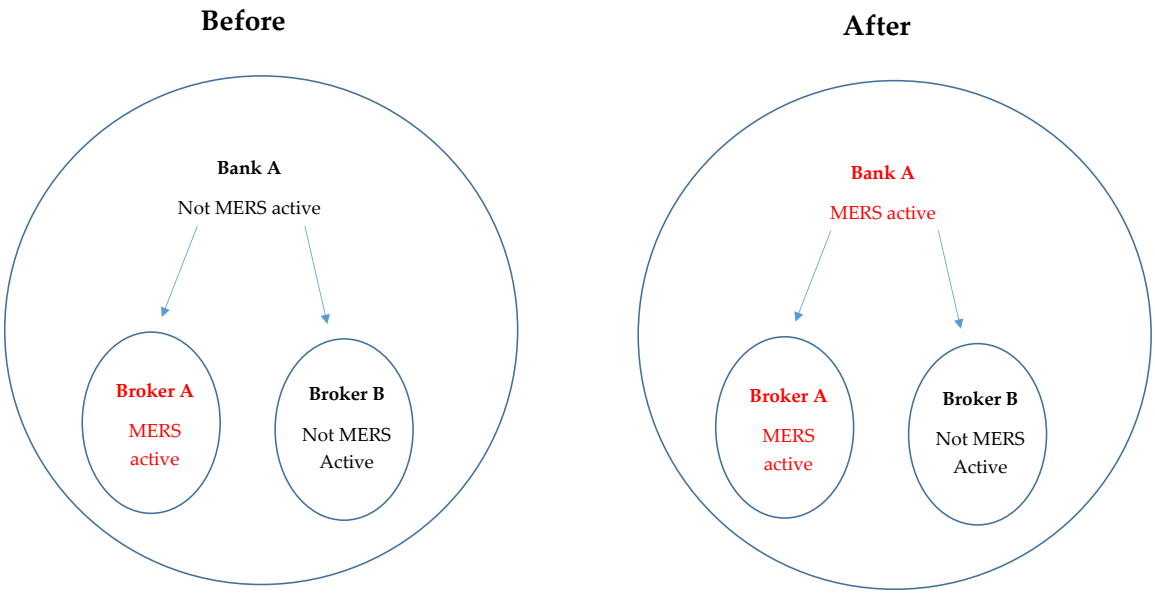


Figure 2: Description of identification strategy.

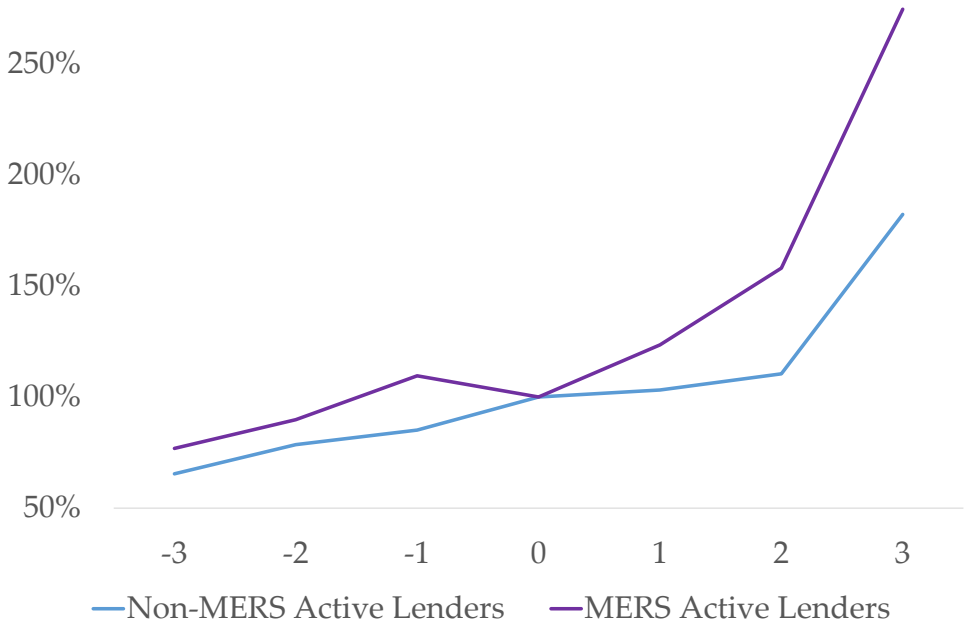


Figure 3: Average lending per census tract/year for MERS active vs non-MERS active lenders in years -3 to +3 where year 0 is the year the assignment grantee becomes a MERS member.

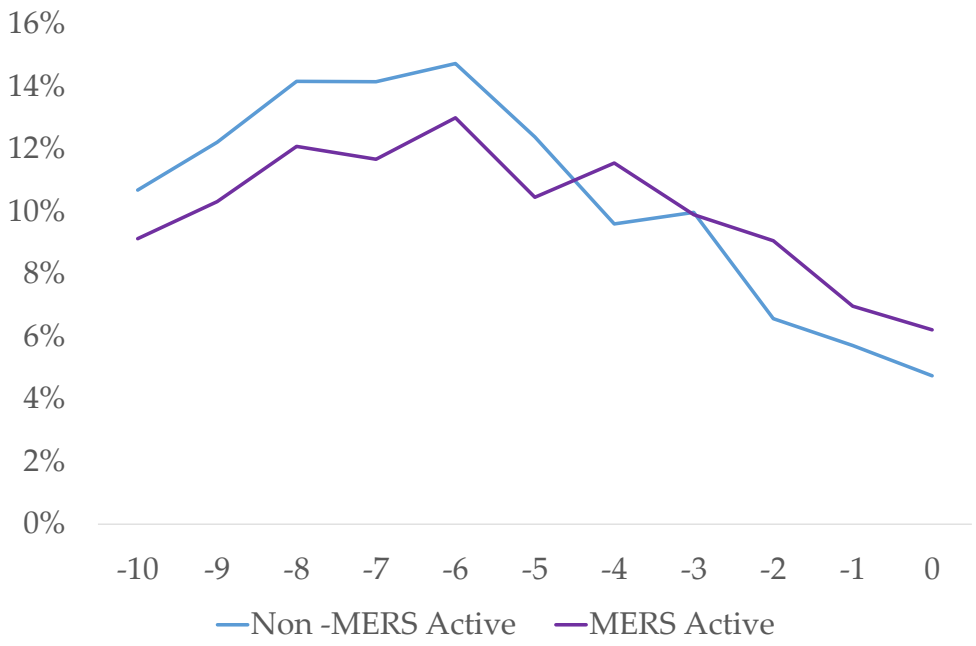


Figure 4: Percentage of all assignments for MERS Active and non-MERS active mortgage grantees in years -10 to 0 where year 0 is the year the assignment grantee becomes a MERS member

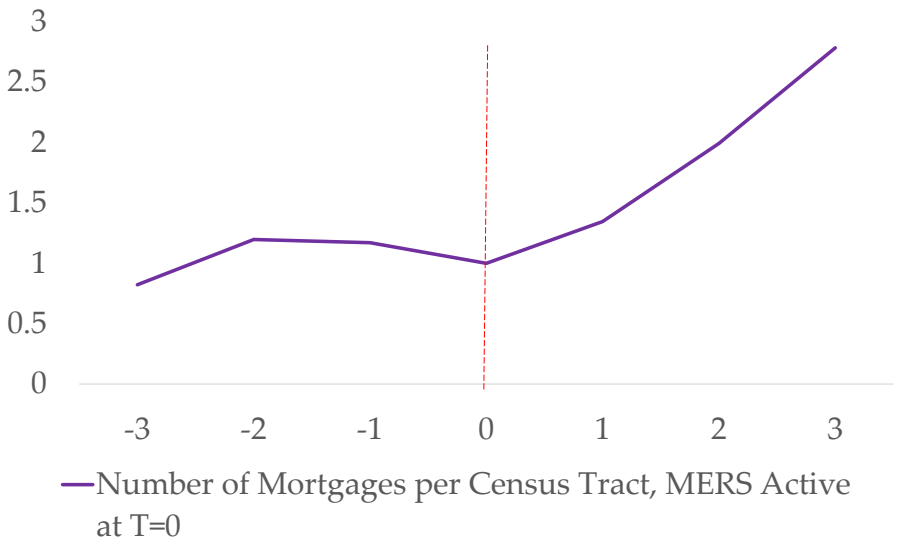


Figure 5: Number of Mortgages Per MERS Active Census Tract (scaled to 1 at T=0).

Table 1: This table contains summary statistics using data obtained from the Massachusetts Registry of Deeds. Panel A documents the number of census tracts that become MERS active by year. A MERS active census tract is a census tract with at least one mortgage originated in that year assigned to the Mortgage Electronic Registration System at origination. Panel B documents the total number of mortgages originated in the sample, by lender type. Bank originated mortgages are defined as mortgages originated by institutions with HMDA lender code 0,1,2, or 5, which are banks, subsidiaries of banks, subsidiaries of bank holding companies, and affiliates of banks respectively. Broker originated mortgages are defined as mortgages originated by institutions with HMDA lender code 3, which are stand-alone institutions not related to banks either as a subsidiary or as an affiliate. HMDA lender codes are obtained through a fuzzy matching process by institution name, and a manual search of any non-matched names. The table also documents the number of mortgages by lender type and in total that are registered with the Mortgage Electronic Registration System at origination.

Panel A

Year	No. Census Tracts	No. MERS Active Census Tracts	Proportion MERS Active
1998	562	0	0.0%
1999	560	1	0.2%
2000	535	5	0.9%
2001	552	56	10.1%
2002	570	166	29.1%
2003	569	383	67.3%
2004	542	440	81.2%
2005	577	491	85.1%
2006	562	512	91.1%
2007	556	513	92.3%
2008	544	511	93.9%
2009	538	509	94.6%
2010	538	513	95.4%
2011	518	498	96.1%
2012	543	529	97.4%
2013	531	519	97.7%
2014	518	510	98.5%
2015	518	511	98.6%
2016	525	518	98.7%
2017	515	510	99.0%
2018	425	421	99.1%

Panel B

	No. of Mortgages	No. of MERS Mortgages	% MERS
Bank Originated	1,162,762	130,738	11%
Broker Originated	451,259	248,563	55%
Total	1,623,199	379,301	23%

Table 2: This table contains summary statistics using data obtained from the Massachusetts Registry of Deeds. Panel A documents mortgage origination by census tract/year for the full sample and for census tracts identified as subprime. A subprime census tract is a census tract with a large proportion of loans in that census tract originated by subprime specialists identified by HUD. Panel B documents mortgage origination by census tract/year/lender type where brokers are identified as institutions with a HMDA lender code of 3, or manually identified when no HMDA code exists. Banks are identified as institutions with a HMDA lender code of 0,1,2, or 5, or manually identified when no HMDA code exists.

	Panel A: By Area Type					
	Average	Min	25	50	75	Max
All Census Tracts						
No. Mortgages per Census Tract/Year	122	1	18	72	170	1555
Total Origination per Census Tract/Year	46,600,000	20,000	3,057,508	13,400,000	36,600,000	32,600,000,000
Foreclosure Rate	1.2%	0.0%	0.0%	0.0%	1.0%	50%
Subprime Census Tracts						
No. Mortgages per Census Tract/Year	49	1	13	33	63	492
Total Origination per Census Tract/Year	29,300,000	55,852	2,024,611	6,882,636	17,200,000	13,100,000,000
Foreclosure Rate	1.8%	0%	0%	0%	2.0%	50%
	Panel B: By Lender Type					
	Average	Min	25	50	75	Max
Brokers						
No. Mortgages per Census Tract/Year	35	1	6	18	44	567
Total Origination per Census Tract/Year	7,950,030	29,500	935,559	3,195,377	8,831,999	2,410,000,000
Foreclosure Rate	2.1%	0%	0%	0%	0%	27%
Banks						
No. Mortgages per Census Tract/Year	81	1	11	42	111	991
Total Origination per Census Tract/Year	27,100,000	20,000	1,890,415	7,531,018	21,000,000	13,100,000,000
Foreclosure Rate	0.9%	0%	0%	0%	0.39%	12%

Table 3: This table contains results of an institution by year by census tract regression. The dependent variable is the log of the total number of mortgages and the log of the total dollar amount of mortgages originated per year/census tract/institution. MERS Active is a dummy variable taking a value of 1 if the mortgage grantee is MERS active, and a value of 0 if the mortgage grantee is not MERS active in the pre and post period. Post is a dummy variable taking a value of 1 for the year post the year the assignee the mortgage grantee has a relationship with becomes MERS active, and a value of 0 for the year prior to the year the assignee the mortgage grantee has a relationship with becomes MERS active. Broker is a dummy variable that takes a value of 1 if the institution has a HMDA lender code 3 (i.e. is a broker), and a value of 0 if the institution has a HMDA lender code 0,1,2, or 5 (i.e. is a bank, or a subsidiary or affiliate of a bank).Zip code x year, assignee x year and relationship fixed effects are included. Assignee is the institution the mortgage grantee assigns mortgages to in the pre period that subsequently becomes a MERS member in the post period. Relationship is the assignee/mortgage grantee relationship. Standard errors are clustered by year.

Dependent Variable	Log (Total Origination)	Log (No. Mortgages)	Log (Total Origination)	Log (No. Mortgages)
Post x MERS Active	0.0970**	0.0884**	-0.178**	-0.128**
	(0.0429)	(0.0390)	(0.0723)	(0.0551)
Post x MERS Active x Broker			0.400***	0.364***
			(0.102)	(0.0871)
Post x Broker			-0.266***	-0.357***
			(0.0807)	(0.0690)
Assignee x Year Fixed Effects	Y	Y	Y	Y
Relationship Fixed Effects	Y	Y	Y	Y
Zip Code x Year Fixed Effects	Y	Y	Y	Y
Observations	36,275	36,361	36,275	36,361
R-squared	0.510	0.528	0.511	0.530

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

Table 4: This table contains results of a mortgage level conditional logit regression grouped by census tract. The dependent variable - Foreclosed - is a dummy variable taking a value of 1 if the mortgage was subsequently foreclosed and a value of 0 if the mortgage was not foreclosed. MERS Active is a dummy variable taking a value of 1 if the mortgage grantee is MERS active, and a value of 0 if the mortgage grantee is not MERS active in the pre and post period. Post is a dummy variable taking a value of 1 for the year post the year the assignee the mortgage grantee has a relationship with becomes MERS active, and a value of 0 for the year prior to the year the assignee the mortgage grantee has a relationship with becomes MERS active. Broker is a dummy variable that takes a value of 1 if the institution has a HMDA lender code 3 (i.e. is a broker), and a value of 0 if the institution has a HMDA lender code 0,1,2, or 5 (i.e. is a bank, or a subsidiary or affiliate of a bank). Standard errors are clustered by year.

Dependent Variable	Foreclosed	
Post x MERS Active	-0.492***	-1.103***
	(0.117)	(0.193)
MERS Active	1.218***	1.292***
	(0.0985)	(0.172)
Post	-0.270**	-0.133
	(0.114)	(0.168)
Post x MERS Active x Broker		1.017***
		(0.272)
Post x Broker		-0.405*
		(0.246)
Broker		0.0752
		(0.188)
MERS Active x Broker		-0.101
		(0.211)
Observations	116,193	116,193

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

Table 5: This table contains results of an institution by year by census tract regression. The dependent variable is the log of the total number of mortgages and the log of the total dollar amount of mortgages originated per year/census tract/institution. The data is restricted to mortgages originated by institutions that are MERS members in the pre and post period. Subprime is a dummy variable that takes a value of 1 if the census tract is defined as subprime and a value of 0 if the census tract is defined as not subprime. A census tract is subprime if a large proportion of all mortgages originated are originated by subprime specialists as defined by HUD. Post is a dummy variable taking a value of 1 for the year post the year the assignee the mortgage grantee has a relationship with becomes MERS active, and a value of 0 for the year prior to the year the assignee the mortgage grantee has a relationship with becomes MERS active. Broker is a dummy variable that takes a value of 1 if the institution has a HMDA lender code 3 (i.e. is a broker), and a value of 0 if the institution has a HMDA lender code 0,1,2, or 5 (i.e. is a bank, or a subsidiary or affiliate of a bank).Zip code x year, assignee x year and relationship fixed effects are included. Assignee is the institution the mortgage grantee assigns mortgages to in the pre period that subsequently becomes a MERS member in the post period. Relationship is the assignee/mortgage grantee relationship. Standard errors are clustered by zip code.

Dependent Variable	Log (No. Mortgages)	Log (Total Origination)	Log (No. Mortgages)	Log (Total Origination)
Subprime	-0.225***	-0.320***	-0.222***	-0.242***
	(0.0302)	(0.0612)	(0.0437)	(0.0640)
Post x Subprime	0.0460	0.0705	0.00562	-0.0752
	(0.0317)	(0.0670)	(0.0520)	(0.0906)
Post x Subprime x Broker			0.0603	0.211**
			(0.0665)	(0.0872)
Assignee x Year Fixed Effects	Y	Y	Y	Y
Relationship Fixed Effects	Y	Y	Y	Y
Zip Code x Year Fixed Effects	Y	Y	Y	Y
Observations	172,350	172,350	172,350	172,350
R-squared	0.456	0.365	0.456	0.365

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

Table 6: This table contains results of an institution by year by census tract regression. The data is restricted to mortgages where the assignment grantee is a national institution. An institution is defined as national if it does not just operate locally in New England. The dependent variable is the log of the total number of mortgages and the log of the total dollar amount of mortgages originated per year/census tract/institution. MERS Active is a dummy variable taking a value of 1 if the mortgage grantee is MERS active, and a value of 0 if the mortgage grantee is not MERS active in the pre and post period. Post is a dummy variable taking a value of 1 for the year post the year the assignee the mortgage grantee has a relationship with becomes MERS active, and a value of 0 for the year prior to the year the assignee the mortgage grantee has a relationship with becomes MERS active. Lender Type is a dummy variable that takes a value of 1 if the institution has a HMDA lender code 3 (i.e. is a broker), and a value of 0 if the institution has a HMDA lender code 0,1,2, or 5 (i.e. is a bank, or a subsidiary or affiliate of a bank).Zip code x year, assignee x year and relationship fixed effects are included. Assignee is the institution the mortgage grantee assigns mortgages to in the pre period that subsequently becomes a MERS member in the post period. Relationship is the assignee/mortgage grantee relationship. Standard errors are clustered by year.

Dependent Variable	Log (Total Origination)	Log (No. Mortgages)	Log (Total Origination)	Log (No. Mortgages)
Post x MERS Active	0.103**	0.0974**	-0.210**	-0.159***
	(0.0429)	(0.0396)	(0.0733)	(0.0505)
Post x MERS Active x Broker			0.464***	0.429***
			(0.104)	(0.0830)
Post x Broker			-0.325***	-0.415***
			(0.0883)	(0.0696)
Assignee x Year Fixed Effects	Y	Y	Y	Y
Relationship Fixed Effects	Y	Y	Y	Y
Zip Code x Year Fixed Effects	Y	Y	Y	Y
Observations	33,825	33,904	33,825	33,904
R-squared	0.510	0.530	0.511	0.532

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

Table 7: This table contains results of a mortgage level conditional logit regression grouped by census tract. The data is restricted to mortgages where the assignment grantee is a national institution. An institution is defined as national if it does not just operate locally in New England. The dependent variable - Foreclosed - is a dummy variable taking a value of 1 if the mortgage was subsequently foreclosed and a value of 0 if the mortgage was not foreclosed. MERS Active is a dummy variable taking a value of 1 if the mortgage grantee is MERS active, and a value of 0 if the mortgage grantee is not MERS active in the pre and post period. Post is a dummy variable taking a value of 1 for the year post the year the assignee the mortgage grantee has a relationship with becomes MERS active, and a value of 0 for the year prior to the year the assignee the mortgage grantee has a relationship with becomes MERS active. Lender Type is a dummy variable that takes a value of 1 if the institution has a HMDA lender code 3 (i.e. is a broker), and a value of 0 if the institution has a HMDA lender code 0,1,2, or 5 (i.e. is a bank, or a subsidiary or affiliate of a bank). Standard errors are clustered by year.

Dependent Variable	Foreclosed	
Post x MERS Active	-0.536***	-1.141***
	(0.120)	(0.197)
MERS Active	1.181***	1.266***
	(0.103)	(0.179)
Post	-0.218*	-0.140
	(0.117)	(0.171)
Post x MERS Active x Broker		0.930***
		(0.277)
Post x Broker		-0.265
		(0.250)
Lender Type		0.00259
		(0.192)
MERS Active x Broker		-0.0981
		(0.218)
Observations	116,193	116,193

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

Table 8: This table contains results of a year by census tract regression. The dependent variables are the log of the total number of mortgages and log of the total dollar amount of mortgages originated, and the log of the total number of mortgages foreclosed per year/census tract. MERS Active is a dummy variable taking a value of 1 if the census tract is MERS active which is defined as having greater than 20% of all mortgages registered with the Mortgage Electronic Registration System in that year, and a value of 0 if the census tract is not MERS active defined as having 0% of all mortgages registered with the Mortgage Electronic Registration System in that year. Period is a dummy variable taking a value of 1 for the two years post the census tract becoming MERS active, and a value of 0 for the two years prior to the census tract becoming MERS active. Zip code x year fixed effects are included and standard errors are clustered by zip code.

	Log (No. Mortgages)	Log (Total Origination)	Log (No. Foreclosures)	Loan to Value
Period x MERS Active	0.285**	0.269*	0.0305	0.0216*
	(0.141)	(0.150)	(0.0566)	(0.0124)
MERS Active	-0.0511	-0.0464	0.0241	-0.0183*
	(0.0928)	(0.107)	(0.0315)	(0.0100)
Zip Code x Year Fixed Effects	Y	Y	Y	Y
Observations	3,087	3,081	3,087	2,695
R-squared	0.781	0.701	0.835	0.631

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

Table 9: This table contains results of a year by census tract by lender type regression. The dependent variables are the log of the total number of mortgages, the log of the total dollar amount of mortgages and the log of the total number of mortgages foreclosed originated per year/census tract/lender type. Lender type is a dummy variable that takes a value of 1 if the institution has a HMDA lender code 3, and a value of 0 if the institution has a HMDA lender code 0,1,2, or 5. MERS Active is a dummy variable taking a value of 1 if the census tract is MERS active which is defined as having greater than 20% of all mortgages registered with the Mortgage Electronic Registration System in that year, and a value of 0 if the census tract is not MERS active defined as having 0% of all mortgages registered with the Mortgage Electronic Registration System in that year. Period is a dummy variable taking a value of 1 for the two years post the census tract becoming MERS active, and a value of 0 for the two years prior to the census tract becoming MERS active. Zip code x year and lender type fixed effects are included and standard errors are clustered by zip code.

	Log (No. Mortgages)	Log (Total Origination)	Log (No. Foreclosures)
Period x MERS Active x Broker	0.153**	0.207***	0.0993*
	(0.0719)	(0.0723)	(0.0573)
Period x MERS Active	0.339**	0.299**	-0.0508
	(0.131)	(0.132)	(0.0441)
MERS Active	-0.0511	-0.0464	0.00949
	(0.0928)	(0.107)	(0.0240)
Zip Code x Year Fixed Effects	Y	Y	Y
Lender Type Fixed Effects	Y	Y	Y
Observations	5,516	5,506	5,516
R-squared	0.741	0.637	0.765

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