The Economic Consequences of Mergers Between Real Estate Agencies and Mortgage Lenders*

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Abstract

This paper examines the effects of joint ownership between real estate agencies and mortgage lenders on consumers, lenders, and the mortgage market. Using a novel dataset linking homebuyers, agencies, and lenders, I analyze over 100 mergers with a differences-in-differences strategy. After mergers, lenders double their loan share within jointly owned agencies, but broader market shares remain unaffected. Buyers using jointly owned lenders pay 9 basis points higher interest rates, an additional $225 annually. However, credit characteristics, delinquency rates, and transaction speed show no significant changes.

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1 Introduction

The years following the financial crisis saw a wave of technology-oriented non-banks, referred to as "FinTech" gaining significant market share in mortgage lending (Buchak et al. (2018), Fuster et al. (2019)).[1] Many of these non-bank lenders have subsequently merged with real estate agencies, who can refer prospective borrowers to specific lenders so as to overcome the fact that non-bank lenders do not have the pre-existing checking and savings account customers of traditional banks. The welfare effects of these mergers are theoretically ambiguous. On the one hand, these mergers may benefit buyers by passing along some of the savings that come from increased efficiency, facilitate communication between the lender and the real estate agent that can reduce the time necessary to close or even increase the likelihood that a deserving buyer will be approved.[2] On the other hand, increased market power from a merger between a real estate agency and mortgage lender may have negative consequences for buyers. Prior literature has documented that real estate agents influence the decisions of buyers, which means that mergers could lead to buyers being charged higher rates, as observed in auto lending.[3][4] Ultimately, the impact of these mergers on borrowers depends on the relative magnitudes of any efficiency gains and any increase in market power.

The purpose of this paper is to quantify the impact of mergers between real estate agencies and mortgage lenders on lender market shares, mortgage interest rates, time to close, and marginal cost. In addition, I examine whether any changes in those outcomes could be due to changes in the

[1] See Jiang (2023) for a model of the vertical relationships between non-bank and traditional bank lenders, Jiang et al. (2020) and Irani et al. (2020) for discussions of the capital structures of banks and non-banks, Cherry et al. (2022) on bank vs. non-bank debt forebearance, and Agarwal et al. (2023) for a discussion of how non-banks affect the transmission of monetary policy.

[2] See Berger et al. (1999) for a discussion on the potential efficiency gains from mergers in the financial sector.

[3] See Lopez et al. (2019) for a discussion about agents selling a home directing buyers to particular lenders and potential crowd-out effects, and Barwick et al. (2017) for a discussion about real estate agents steering buyers to homes that pay higher commissions.

[4] Grunewald et al. (2020) find that auto lenders affiliated with dealerships charge higher rates.

composition of borrowers.

To do so, I construct a novel data set in which I observe the real estate agency, lender, loan terms, and loan performance for a given house sale, as well as track ownership of lenders and real estate agencies over time. I assemble these data by first merging four CoreLogic data sets. I then hand-match over 100 mergers involving real estate agencies and/or lenders into the merged CoreLogic data to obtain the ownership structure over time. For the over one million housing transactions in this data set I observe the buyer's real estate agency, mortgage lender, loan terms and loan performance, and if the real estate agency and lender are ever merged, including at the time of home purchase.

Using the constructed data set, I estimate the effects of mergers by implementing a staggered differences in differences design that addresses the potential selection bias of which real estate agencies and mortgage lenders decide to merge. I show that my results are robust to the methodology suggested for staggered difference in difference by Sun and Abraham (2021), and in many cases the two way fixed effects estimates are a lower bound on the effect sizes. In addition, I use a structural model to recover marginal cost estimates and test policy counterfactuals.

Simply comparing outcomes before and after a lender and agency are jointly owned is not sufficient, because the firms that decide to merge are unlikely to be randomly selected. To account for this selection, I exploit the frequent mergers that occur between two real estate agencies, known as horizontal mergers. Horizontal mergers between two real estate agencies result in a new joint ownership relationship between a real estate agency and mortgage lender if one of the two real estate agencies horizontally merging is already jointly owned with a lender. I refer joint ownership between a lender and real estate agency that results from such a horizontal merger as "indirect integration". Real estate agency horizontal mergers occur to increase the acquiring agency's real estate

agency market share, and the lender's books are not the primary concern in these mergers.[5] Therefore, horizontal mergers between real estate agencies that result in indirect integration between a real estate agency and mortgage lender are less subject to selection bias. I identify 87 mergers in the data set I construct which lead to indirect integration. I will use the 87 mergers which result in indirect integration as the variation for my staggered differences in differences. Observing 87 mergers in a data set of more than one million housing transactions means that I can include fixed effects for real estate agency, mortgage lender, time, and geography to further alleviate concerns about potential biases of the estimates.

Results indicate that joint ownership with a real estate agency increases a lender's market share. Lenders more than double the share of buyers at a real estate agency they lend to after that lender and real estate agency merge. The lender also gains 0.54 percentage points of market share in a CBSA once they merge with a real estate agency, which is a 16% increase over the average lender's market share due to the fragmented nature of the mortgage market. From the perspective of the lender, merging with a real estate agency allows the lender to grow.

Results also indicate that buyers who use a jointly owned real estate agency and mortgage lender pay 9 basis points higher interest rates on their mortgages, even after accounting for credit characteristics and search behavior.[6] Nine basis points in additional interest amounts to $225 per year on the average loan. This estimate is consistent with the effect sizes found in other literature on price dispersion in mortgage markets.[7]

While the above finding on interest rates indicates that mergers harm borrowers, that effect

[5]While this is an assumption, these horizontal mergers are generally between a large real estate agency with a lending arm and a small, local agency. As such, the merger is not going to dramatically increase the lender's market share or profits even if 100% of clients from the now-merged agency use the lender following the merger. For further discussion of these mergers, see section 4.

[6]Bhutta et al. (2020) find that search behavior is a major determinant of mortgage interest rate.

[7]Bartlett et al. (2021) finds that minority borrowers pay 7 basis points more than white borrowers on average, and 9 basis points is 15% of the total dispersion in the mortgage market found by Bhutta et al. (2020). It is also more than half of the dispersion found in Barwick et al. (2024) for borrowers using agents' preferred lenders.

could be offset if buyers were able to close on their home in a substantively shorter time period. However, I find that buyers who use a jointly owned agency-lender pair close on their home only 1.4 days faster, on a mean of 42 days, which is statistically significant but not economically significant. Moreover, there is no significant reduction in the likelihood that it took more than 45, 60, or 75 days to close on a home.

Fourth, I show that the above results are not due to changes in the credit profiles of borrowers taking out mortgages. Buyers who use a jointly owned real estate agency and mortgage lender have similar FICO scores, loan-to-value ratios, loan amounts, and delinquency rates before and after the merger, suggesting there is no change in the composition of buyers following a merger.

This paper has three main contributions. First, this paper is one of the first to study steering between real estate agencies and mortgage lenders. It is well documented that mortgage lenders steer buyers to loans which are most profitable for them (Guiso et al. (2021), Agarwal et al. (2016)), and that real estate agencies steer buyers to homes which pay higher commissions (Barwick et al. (2017), Woodward and Hall (2012)). However, to my knowledge, Lopez et al. (2019) and Barwick et al. (2024) are the only other papers that link steering between real estate agencies and mortgage lenders. Lopez et al. (2019) study steering by sellers' agents on foreclosed homes in Las Vegas, NV. My data allow me to study a much broader geography, set of outcomes, and sample of home sales. Furthermore, I utilize variation at a level above the home transaction itself, and consider buyers' agents (who buyers are more likely to trust).[8] Barwick et al. (2024) aim to study the referral network of agents regardless of ownership structure, not focusing on mergers directly as I do in this paper.[9]

[8] Lopez et al. (2019) look at probability of using the suggested lender and cash sales, but not closing speed or interest rate.

[9] Barwick et al. (2024) examine how steering affects mortgage rates, but do not differentiate between legally codified relationships and relationships that are more quid pro quo or informal. They utilize an instrumental variable approach based on the concentration in the mortgage market.

Second, this paper offers a novel channel to explain the price dispersion in mortgage pricing. Prior literature has documented that mortgage prices vary even for identical borrowers, which is puzzling given the relatively homogeneous product offering (Bhutta et al. (2020)). Subsequent papers have posited explanations for this dispersion, but a substantial residual remains unexplained (Bartlett et al. (2021), Bhutta and Hizmo (2021)).Results in this study indicate that mergers explain 15% of price dispersion in mortgage markets.

Third and finally, I contribute to the discussion on whether, and how policy makers should regulate mergers involving banks or non-banks, as well as the consequences of the rise of non-banks and integration in the financial sector. I study far more mergers and outcomes than the other papers in this literature with a broad set of potential outcomes. The prior literature has shown that mergers in financial industries can have costs and benefits and influence pricing behavior (Berger et al. (1999), Stroebel (2016), Robles-Garcia (2019)). Related papers, such as Buchak et al. (2018), have documented the rise of non-banks in spheres traditionally occupied by banks.[10] Other papers have discussed the consequences of the rise of non-bank lenders on several topics, including the transition of monetary policy and financial stability (Agarwal et al. (2023),Jiang et al. (2020), and Irani et al. (2020)).

The rest of this paper is organized as follows. Section 2 provides institutional background for the setting of my paper. Section 3 presents survey evidence exploring the interaction between real estate agents, mortgage lenders, and borrower search behavior. Section 4 discusses a merger case study. Section 5 discusses my data; Section 6 presents the reduced form identification strategy, and Section 7 presents the results, and Section 8 concludes.

[10]For a more general discussion of complementary goods mergers among non-financial products see Akgün et al. (2020), Choi (2008), and Ershov et al. (2018).

2 Institutional Background

2.1 Real Estate Agencies

This paper requires institutional background on real estate agencies, mortgage lenders, and the mortgage market. Beginning with real estate agencies, real estate agencies employ real estate agents to work with home buyers and sellers. 86% of buyers in the United States used a real estate agent in 2020.[11] Buyers are generally satisfied with the quality of the service they receive from their real estate agent; 89% of buyers said they would use the same agent again or recommend the agent to others when asked.[12] During the 2011-2019 years this paper studies, buyers' agents are paid out of the sellers' agents' commission when the buyers purchase homes, so agents are consequently not paid until after their clients close on a home .[13] Besides helping buyers find a home and negotiate the purchase price, real estate agents often recommend providers of related services to their clients, such as title companies and lenders.

Real estate agents cannot receive kickbacks from any firm the agents recommend to their clients under the Real Estate Settlements Procedure Act (RESPA), but agents are allowed to share expenses if the real estate office and another firm share things such as advertising or office space. Companies have violated this RESPA previously; the CFPB sued Rocket Homes and The Jason Mitchell Group in December 2024 for an illegal kickback scheme as well as Freedom Mortage in August 2023 for paying more than cost sharing to Revolve Realty. Similarly, ReMax has been fined for a kickback scheme with a mortgage lender.[14]

[11] See: here

[12] See: here

[13] Recent 2023 and 2024 court rulings may change the compensation structure for real estate agents, but the compensation structure was fixed during the timing of this paper.

[14] See: here and here and here. Note that the case against Rocket Homes was dropped in January 2025 following a change in administration.

2.2 Mortgage Lenders

Moving to mortgage lenders, mortgage lenders can attract consumers directly through their retail channel, but lenders can also work with mortgage brokers. Mortgage brokers are third party agencies that lenders can contract with to find more borrowers. Mortgage brokers contract with several lenders and receive a commission from a lender when a buyer chooses that lender to originate their loan. Thus, borrowers using a mortgage broker receive loan terms from several lenders, while borrowers using a lender's retail channel will recieve only loan terms from one lender without additional search.

87% of buyers financed a home purchase with a mortgage in 2021.[15] The vast majority of mortgages in the United States are fixed rate mortgages, meaning that the rate on the mortgage will remain constant for the duration of the loan. Loans in the United States can either be originated through banks or non-bank lenders. Non-bank lenders originate the loans through lines of credit they hold with traditional banks (called warehouse lines). After origination, the non-bank lender then securitizes and sells the loan. In the post-crisis era, most loans are backed by the Federal Housing Administration (FHA) or government sponsored entities, Fannie Mae and Freddie Mac. The FHA, Fannie Mae, and Freddie Mac provide detailed guidance on the maximum value of a loan depending on the average home price in an area. In addition, the agencies give lenders a matrix of "Loan-Level Pricing Adjustments," which are increases to the interest rate lenders must charge based on the borrower's loan-to-value ratio (LTV) and credit (FICO) score.

Mortgage brokers originated over half of loans in the United States prior to the 2008 financial crisis. Following federal regulations that made mortgage brokers less profitable, many mortgage brokers went out of business, and by 2019, mortgage brokers originated only 19% of loans in the United States. For lenders, the decline in the market share of mortgage brokers means lenders

[15] See: here

cannot rely on mortgage brokers to help the lender find borrowers. Lenders must find another way to find borrowers, especially non-bank lenders who lack depository customers.

At the same time the share of borrowers finding loans through mortgage brokers is declining, residential real estate agencies are merging with lenders and related services. Home purchases and mortgages are complementary goods; these two goods go hand in hand as the majority of buyers finance their home purchase with a mortgage. Thus, mergers between residential real estate agencies and lenders can be profitable for both parties. Residential real estate agencies provide a set of customers for lenders who can no longer rely on mortgage brokers, and bringing a lender in house could simplify the loan search process for buyers, allowing buyers to close on a home, and the agent to get paid, more quickly.

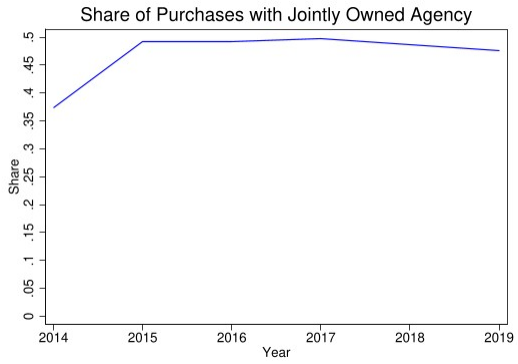
While this paper focuses on mergers between lenders and residential real estate agencies, real estate agencies are also merging with other industries involved of the home buying process, such as title insurance. Gino Blefari, CEO of HomeServices of America, which owns multiple lenders, real estate agencies, and title insurance companies, said that "[c]reating a seamless all-inclusive shopping experience for a consumer's real estate transaction – agency, mortgage, title & homeowners insurance is critical for both the best consumer experience and the best path to profitability," suggesting that HomeServices of America sees the complementarities between real estate agencies, lenders, and title insurance companies and that merging improves overall firm performance.[16]

Figures 1, 2, and 3 show how the real estate and mortgage markets have evolved over time. Figure 1 shows what share of home purchases are made using an agency that has a jointly owned lender, also referred to as a sibling lender. Since 2014, the share of home purchases made using a real estate agency with a sibling lender has increased by nearly 25%, and in 2019 almost half of home purchases used an agency with a sibling lender. Agencies that lenders are able to use as a

[16] Source

distribution channel are a large fraction of the market and thus come with a large pool of buyers sibling lenders could attract.

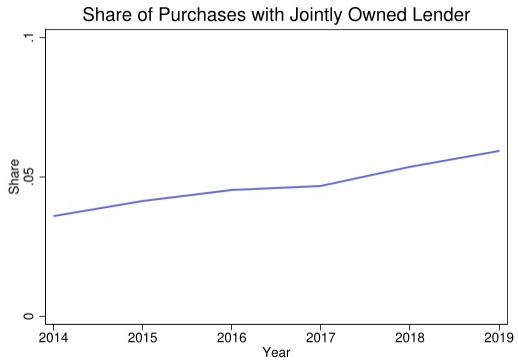
The story is similar when looking at lenders. In Figure 2, we can see that the share of loans originated by lenders merged with agencies has increased from 3.5% in 2014 to 6% by 2019. Although my data end in 2019, the share of loans originated by lenders with sibling real estate agencies has continued to increase in the intervening years. While real estate agencies with sibling lenders are large players in the market, the lenders have considerably smaller market share. The small market share of lenders is consistent with state-level licensing to originate mortgages representing a high barrier to entry for lenders. Most lenders are geographically concentrated in at most a handful of states.



Notes: Figure shows share of home purchases which use a real estate agency that has a sibling lender at time of home purchase, regardless if lender originated the mortgage for that purchase or not.

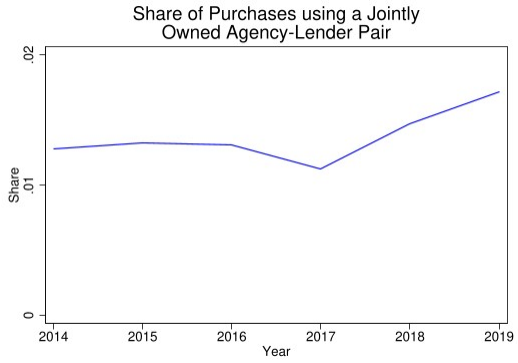
Figure 1: Share of Home Purchases with Conglomerate Agency

In Figure 3, I show the share of home purchases using a merged agency-lender pair, the purchases and related loan originations that I am most interested in studying. The share of home purchases that are using a merged agency-lender pair is still small at just 2% of my data in 2019. However, while 2% of all buyers is a small fraction, that is 33% of the market share of merged lenders, indicating that a sibling real estate agency is an important distribution channel for these



Notes: Figure shows share of purchase loan originations which use a lender that has a sibling real estate agency at time of home purchase, regardless if agency was involved in the transaction or not.

Figure 2: Share of Loans Originated by Conglomerate Lender



Notes: Figure shows share of home purchases which use a jointly owned agency-lender pair for home purchase and mortgage financing.

Figure 3: Share of Purchases using Conglomerate Agency - Lender Pair

lenders. Furthermore, this does not reflect the state-level licensing of agents and lenders. Figure **??** shows that the share of buyers using a jointly owned agency-lender pair rises to over 10% of buyers when taking availability of a jointly owned lender into account.[17] Several high-profile mergers between agencies and lenders in the years following this graph suggest that the share of home purchases using a merged agency-lender pair has and is likely to grow over time.[18]

2.3 How Do Buyers Choose Lenders?

The National Survey of Mortgage Originations (NSMO) is a quarterly survey conducted by the Federal Housing Finance Authority and the Consumer Financial Protection Bureau asking recent home buyers a variety of questions about their home purchase and mortgage acquisition process. Questions include topics such as buyers' understanding of mortgage terms, house price expectations, and how the buyer chose a lender.

When asked to select which features were not at all, somewhat, or very important to them when selecting a mortgage, 34% of buyers said that the recommendation of their real estate agent was somewhat or very important.[19] Moreover, 17% of buyers were introduced to their lender by an interested third party such as the buyer's builder or real estate agent. With respect to search, nearly half (49%) of buyers report only seriously considering one lender.

When restricting the survey data to first-time home buyers, 58% valued their real estate agent's

[17] Figure **??** shows what fraction of buyers using a jointly owned agency choose a sibling lender, conditional on a sibling lender holding a license in that state prior to 2017. Lenders licensed after 2017 are excluded due to a large geographic expansion in later years which leads to a lower fraction due to new market entry. Figure for all years available upon request.

[18] For example, Redfin, a real estate company, and Rocket Mortgage merged in July 2025. Rocket was the third largest mortgage lender in the US in 2024.

[19] Other options include: rate (98%), lender reputation (71%), prior relationship with the lender (57%), local lender (50%), used lender before (39%), recommendation of a friend (36%), and lender is a friend (14%).

recommendation, and 33% of first-time buyers were introduced to their lender through an interested third party. Similar to the general population, 47% of first-time buyers only seriously look at one lender.

When looking at low credit score borrowers, even more, 64% of borrowers found their agent's recommendation somewhat or very important, 18% of low credit score borrowers were introduced by an interested third party, and 51% of low credit score borrowers only seriously consider one lender.

Taken together, the NSMO survey results indicate that, especially for low credit score and first-time home buyers, the recommendation of a buyer's real estate agent influences the lender the buyer ultimately chooses. As a result, mergers between lenders and real estate agents have the potential to affect the lender buyers choose by changing what lenders the agent recommends to include or prioritize the agent's sibling lender. Thus, a real estate agency merging with a lender will likely increase the number of buyers coming to the lender from that agency. The effects on overall lender market share are unclear, however. If the lender treats these borrowers as perfect substitutes for other borrowers coming from non-merged real estate agencies, then overall market share will not increase, only the market share from the sibling real estate agency. However, if the lender treats the sibling borrowers as additional customers, without completely substituting away from buyers coming from agencies with whom they are not merged, then both the lender's market share within their sibling agency and the lender's overall market share will increase.

Unfortunately, the public NSMO data do not include interest rate, so cannot speak to price effects. However, the lack of search by approximately half of borrowers leaves borrowers open to unknowingly paying higher prices as a result of integration between real estate agencies and lenders.

3 Theoretical Discussion

To understand how real estate agencies merging with lenders would affect interest rates, consider the following discussion beginning with the borrower.

3.1 Borrowers

Borrowers select the lender from their choice set that maximizes their utility. The indirect utility borrower i receives from loan ℓ originated by lender L at time t is:

$$V_{iL\ell t} = \alpha r_{iL\ell t} + \beta x_{iL\ell t} + \epsilon_{iL\ell t} \tag{1}$$

In the absence of search costs, buyers will consider all lenders in their area. However, as discussed above in section 2, buyers face search costs and so consider a limited set of lenders, often only one or two. Denote the borrowers consideration set by C_{it}

3.2 Lenders

Lenders are profit-maximizing. Lender L originating loan $\ell(i)$ originated to borrower i at time t earns profit on that loan of:

$$\Pi_{L\ell(i)} = r_{L\ell(i)} - \kappa_{L\ell(i)} \tag{2}$$

Where $r_{L\ell(i)}$ is the interest rate on the loan, and $\kappa_{L\ell(i)}$ is the cost of the loan.[20]

Assuming there N_t borrowers in the market at time t, and there is some probability that each matches with lender L, $P\left(match_{Li}\right)$, then lender L's expected profit in market t can be written as:

[20]This cost includes both marginal and fixed costs for simplicity.

$$E\left[\Pi_{L\ell(i)}\right] = \int_0^{N_t} \left(r_{L\ell(i)} - \kappa_{L\ell(i)}\right) P\left(match_{Li}\right)\, di \tag{3}$$

Assuming lenders choose rates such that the rate is always greater than the cost (reasonable for profit maximizing lenders), then all else equal, increasing the probability a lender and borrower match will increase the lender's expected profits.

$P\left(match_{Li}\right)$ is zero for any lender not in C_{it} for borrower i, and so lender L's first concern is appearing in C_{it}. As borrowers often consider the lender recommended by their real estate agent, becoming a lender an agent recommends increases the lender's chances of being included in C_{it}. Call the probability lender L is recommended by a given agent a $P\left(recommended_{aL}\right)$.

3.3 Agents

Agents work on many transactions and rely on prior experiences when recommending lenders to buyers. Since agents in this time frame are paid a percentage of the sale price when the buyer purchases a home, the agent would like the process to move as quickly as possible and for the buyer to purchase as expensive a home as possible.

In the absence of joint ownership and since kickbacks are illegal, agents are going to recommend lenders who originate loans quickly and with low rates which allow borrowers to afford a more expensive home and increase the agent's commission. $P\left(recommended_{aL}\right)$ is therefore a function of the historical rates and speed offered by lender L to agent a's clients. $P\left(recommended_{aL}\right)$ is increasing in speed $s_{a(L)}$ (faster lenders are more likely to be recommended), and decreasing in prior interest rates $r_{a(L)}$:

$$P\left(recommended_{aL}\right) = f\left(r_{a(L)}, s_{a(L)}\right) \tag{4}$$

The prior equations illustrate the trade-off for lenders: if a lender offers a prospective borrower a higher rate, it increases their profit on that loan, but it decreases the probability that they will be recommended by that real estate agent in the future, and consequently reduces the probability the lender will appear in future borrowers' choice sets.

Now consider how the probability of an agent recommending a lender changes when the lender and agent share a parent company. Now, $P\left(recommended_{aL}\right)$ is also a function of the sibling relationship between lender L and agent a. The sibling relationship allows for corporate directives or bonuses to be paid to agents based on the performance of the lender so long as the bonuses are not directly tied to the agent recommending the lender. Therefore $P\left(recommended_{aL}\right)$ is increasing in the joint ownership $j_{a(L)}$, of L and a:

$$P\left(recommended_{aL}\right) = f\left(r_{a(L)}, s_{a(L)}, j_{a(L)}\right) \tag{5}$$

As $P\left(recommended_{aL}\right)$ is increasing in $j_{a(L)}$, $f\left(r_{a(L)}, s_{a(L)}, j_{a(L)} = 1\right) > f\left(r_{a(L)}, s_{a(L)}, j_{a(L)} = 0\right)$; the probability of agent a recommending lender L is strictly higher for all interest rates and speeds when agent a and lender L are jointly owned. Furthermore, since the agent can now recoup some lost income from a slower or cheaper (due to higher rate) sale in the form of corporate bonuses for recommending a sibling lender, $\frac{\delta P(recommend_{aL})}{\delta r_{a(L)}}$ and $\frac{\delta P(recommend_{aL})}{\delta s_{a(L)}}$ are closer to zero in the presence of joint ownership than otherwise.

An increase in $P\left(recommended_{aL}\right)$ increases the probability a lender appears in a borrower's choice set, increasing the lender's market share at the now jointly owned agency. If this increases the total number of matches the lender makes, it will also increase the lender's overall market share. Furthermore, the smaller decline in probability of recommendation stemming from a higher rate will lessen the trade-off the lender faces, and lead the lender to charge higher rates to borrowers

coming from the sibling agency. Importantly, this affect should only arise for borrowers from the sibling agency. As the incentives for agents from non-sibling agencies have not changed, the effect of a higher rate on future recommendations is stronger and so lenders will not raise interest rates on borrowers using non-jointly owned real estate agents.

4 Data

No pre-existing data set contains all the necessary pieces to the consequences of mergers between real estate agents and mortgage lenders: lender, real estate agency, and loan characteristics. Furthermore, corporate ownership structure plays a vital role in studying the consequences of mergers but is not readily matched to the lender, real estate agency, and loan characteristics for each loan-home purchase observation. Thus assembling the data for this project is no small feat. The final data set represents a contribution to the field as it is useful for projects beyond this one. In all files, I restrict my sample to 2011-2019 so as to avoid contamination from either the 2008 financial crisis or the COVID-19 pandemic.

CoreLogic Deeds Data The CoreLogic Deeds data include details on residential properties at the time of sale, including the characteristics of the property, the deed transfer, and most notably for this project, the mortgage used to purchase the home. The mortgage details include, among others, the loan amount, the start date, loan term, interest rate, loan purpose and type, and lender. While all variables appear at least once in the data set, some, most notably interest rate, are missing the vast majority of the time. Lender name, however, is well populated, allowing me to see the lender who issued the loan. I will also restrict my analysis to purchase loans, since purchases are when borrowers are most directly involved with a real estate agent, and when the influence

coming from mergers between lenders and agencies is likely strongest. In comparison, at the point of refinancing, borrowers are not working directly with a real estate agent. While the decision of a refinancing lender may be correlated with the the original choice of lender, the actual link is less clear and I leave studying the effect of mergers beteween real estate agencies and mortgage lenders on refinancing loans to future research.

CoreLogic MLS Data CoreLogic also provides the Multiple Listing Service (MLS) data set which covers the MLS feeds for 138 MLSes across the United States. Similar to Zillow, a home listing on the MLS contains all fields from the listing of a home: list price, transaction price, date sold, date listed, home characteristics such as number of bedrooms and bathrooms, address, square footage, etc. It also contains information on the buyer's real estate agent, including the real estate agent's name and agency at the time of sale.[21] I will use the terms agent and agency interchangeably.

CoreLogic LLMA Originations Data The CoreLogic Loan-Level Market Analytics (LLMA) Originations data come from a large loan servicer and contain individual loan characteristics at origination, including the interest rate, amount, origination month and year, property type, loan type, loan term, location, borrower credit score (FICO score) at origination, and loan-to-value-ratio (LTV) at origination. The key variables I use from the LLMA data are the loan interest rate, borrower FICO score, and borrower LTV ratio.

CoreLogic LLMA Events Data The CoreLogic LLMA Events data track the major performance events of a loan including the date of the first 30, 60, and 90 day delinquency, the first date of a

[21]For this project, I utilize the agency as opposed to the individual agent. In cases of mergers, directives to recommend a given lender are likely to come from the parent company and affect all agents. Second, in cases where a team of agents work with a buyer, it is not clear who the purchase should be attributed to from the team. It is far more obvious which agency is responsible.

bankruptcy filing, and the first date of foreclosure filing. I use the LLMA Events data to compare the performance of loans by merged lender-agent pairs and those by other lenders who may have less soft information on which to base a lending decision.

CompuStat Capital IQ Transactions Data I use the CompuStat Capital IQ Transactions Data to identify mergers and infer ownership structure. The CompuStat Capital IO Transactions data set records information on all mergers and acquisitions for "private and public companies, investment firms, educational institutions, foundations, trade associations and government institutions" back to 2000: the target, the acquirer, the transaction date, and additional details. I identified all relevant transactions by hand.[22] Due to the large number of real estate offices in the country, not all mergers are widely publicized but do appear in CompuStat regardless of if the company is privately or publicly held. I am able to see mergers of entire companies as well as mergers or acquisitions of single offices. To the best of my knowledge, my data set is the most comprehensive that tracks mergers and acquisitions of solely real estate firms.

Home Mortgage Disclosure Act Data The Home Mortgage Disclosure Act (HMDA) public use data are redacted loan-level data provided to the federal government by lenders in order to ensure fair lending practices. Across all years of data, the HMDA data include borrower characteristics such as race and gender. For the last two years of my sample, the HMDA data also include loan fees and discount points.[23] Loan fees are fees paid at origination to the lender, and in most cases are a function of the loan amount. Discount points are an additional fee paid at origination in order to reduce the interest rate on the loan. While two years of data are a limited time to view discount

[22]The similar nature of many real estate company names makes a fuzzy match or other algorithmic approach impossible.

[23]The addition of loan fees and discount points is due to a 2015 change in the reporting requirements which required reporting the additional variables beginning in 2018.

points and origination fees, it does provide some insight into other monetary considerations for borrowers beyond the interest rate, and the possible points-fees trade-off as documented in Bhutta and Hizmo (2021).

Summary statistics are reported in Table 1. I winsorize loan amount, time to close, and interest rate at the 5 and 95th percentiles to remove outliers. Just over half of my data come from purchases made with real estate agencies that ever have a sibling lender. Such a large share of purchases made with agencies that ever have a sibling agency occurs because the largest real estate firms in the United States are the ones that tend to have lending arms. However, only 5% of my sample uses a lender which ever merges with a real estate agency. I believe the share of buyers using lenders that are ever jointly owned is low due to three factors: first, lenders obtain licenses to originate mortgages in each state separately, and so not every lender is licensed in every state even if their eventual parent company has real estate agents in that state; secondly, because the large bank lenders do not have real estate agent arms, lenders with real estate agent arms are primarily non-bank lenders; and third, because lenders that merge later in the sample period are going to realize less growth from the merger within my sample window. 2% of purchases use a lender and agent pair that are ever merged, even if the lender and agent were not merged at the time of the purchase and origination.

Looking at the ownership structure at the time of origination, 32% of buyers use a real estate agency that has a sibling lending arm, while 5% use a lender that has a real estate agency sibling company. Again, 1.4% of borrowers use a merged agency-lender pair. This is not conditional on a lender being licensed in a given state, meaning the share of borrowers with the option to use a merged agent-lender pair who do so is larger than 1.4%. Nearly 40% of loans in my sample are classified as coming from an agent preferred lender, a definition I will explain in Section 6.2. The average interest rate is 4.08%, reflecting the fact that interest rates were generally low in the post-

crisis study period of 2011-2019. The average FICO score in my sample is 736, with an average loan-to-value ratio (LTV) of 87%.

Table 1: Summary Statistics

	Mean	**Std. Dev**	**Min**	**Max**
Agent Ever Merged	0.5	0.5	0	1
Lender Ever Merged	0.05	0.21	0	1
Agent/Lender Ever Merged	0.02	0.12	0	1
Agent Merged	0.44	0.5	0	1
Agent/Lender Merged	0.01	0.12	0	1
Lender Merged	0.05	0.21	0	1
Agent Preferred Lender	0.37	0.48	0	1
Interest Rate	4.08	0.45	3.25	5.00
FICO Score	735	55	300	900
LTV Ratio	87	14	1	200
Time to Close	41	16	7	88

Notes: Real estate Office/Lender Ever Merged equals one if a buyer's real estate agent and mortgage lender are ever merged, regardless of if they were at the time of the buyer's purchase and origination. Real estate office preferred lender equals one if the lender meets the criteria I define for likely being a lender recommended by the buyer's real estate agent.

4.1 Characterizing Mergers

I classify the mergers involving real estate agencies I observe in my data set based on whether there is a lender involved. I observe a total of 137 mergers involving at least one real estate agency. Of those, 87, or the majority, occur between two agencies where at least one agency has a lending arm. These are the mergers which result in what I call "indirect integration." A new agency gains an affiliated lender as a result of an agency-agency merger. Another 48 of the mergers are between two real estate agencies when neither one has a lending arm at the time of the merger. The mergers between two real estate agencies where neither agency has a lending arm do not cause indirect integration. Finally, I observe 2 cases where a lender and an agency merge directly. This includes

one case where two agencies with lending arms merge with each other.

Comparing the two types of agency-agency merger, agencies without sibling lenders have approximately the same market share regardless of if they are involved in a transaction that involves a lender or not. On average real estate agencies without lending arms involved in mergers have a 3-4% market share.

The agencies acquired, either by agencies with a lending arm or agencies without, have small market shares that operate in local areas, or in rare cases regional ones. Often these firms consist of a single office. The acquiring firms, especially those with lending arms, tend to be agencies with a national presence where the acquired agency represents a small fraction of the acquiring agency's business.

Following my sample period, there have been high-profile mergers of real estate agencies and mortgage lenders. Readers are perhaps most aware of the merger between Rocket Homes and Redfin, announced in early 2025. Rocket Homes includes the mortgage arm Rocket Mortgage, the largest lender in the United States in 2024, resulting in a sibling relationship between Redfin and Rocket Mortgage. However, even Rocket had only a 7.9% market share at their peak in 2020.[24] That also does not separate Rocket's refinancing market share from its purchase market share, and refinancing plays a much larger role in Rocket's business model than purchase loans. Rocket Homes also included a realty arm (formerly branded as In-House Realty) as of 2018, so the Rocket-Redfin merger would fall in the first row of this table.

[24] Source: Wall Street Journal

Table 2: Merger Breakdown Statistics

	N	Avg. Mkt Share	Std. Dev of Mkt. Share
Agency-Agency with Lender	87	0.04	0.06
Agency-Agency No Lender	48	0.03	0.03
Agency-Lender	2	0.001	0.0001

Notes: Agency-Agency with Lender mergers are those where one of the two real estate agencies merging has a sibling lender. Agency-Lender mergers are those where a lender and agency merge directly (ie: there is no second agency engaged in a horizontal merger). The average market share represents the average market share of the acquired firm.

5 Case Study

I will now present a case study to examine one merger closely for additional implications of mergers between real estate agencies and mortgage lenders beyond the consequences I test for in the reduced form and structural analyses. In this case study I especially want to look for suggestive evidence of geographic expansion following a merger. As a result, I have chosen a large merger of two multi-state agencies for this case study where the acquired firm actually has a lending arm. It is important to note that this is not the normal merger in my data set; indeed there are only two such mergers during this time period. The vast majority of mergers are of small real estate agencies being acquired by large real estate agencies with lending arms.

The real estate services subsidiary of a large conglomerate, BigFirm acquired AgencyA in July 20XX.[25] BigFirm's acquisition of AgencyA gave BigFirm significant residential real estate agency market share in portions of the United States. LenderA, a mortgage company and a subsidiary of AgencyA, was acquired along with AgencyA by BigFirm. Popular press and the company announcements of the merger suggest that the main reason for the merger was BigFirm gaining market share in the residential real estate agency market. Indeed, if the acquisition of LenderA was mentioned at all, it was later in the article, often as an afterthought.

[25] Identifying details have been removed.

Following the merger, BigFirm and it's subsidiary real estate agencies were jointly owned with LenderA. Prior to the merger with AgencyA, BigFirm owned LenderB from a previous merger with AgencyB.[26] I will ignore LenderB for the purposes of this case study.[27]

I begin by plotting the share of buyers who used LenderA to originate their mortgage, grouped by AgencyA buyers, all other BigFirm buyers, and all other buyers in Figure 4. Prior to its merger with BigFirm, LenderA originated very few loans for home purchases made with any agencies other than AgencyA, consistent with the idea that AgencyA buyers were directed to LenderA even before the merger with BigFirm as AgencyA and LenderA were already jointly owned. Following the merger with BigFirm, there is no change in the number of mortgages LenderA originates to buyers from real estate agencies not owned by BigFirm, while the share of loans AgencyA originates to buyers from real estate agencies owned BigFirm share increases significantly.

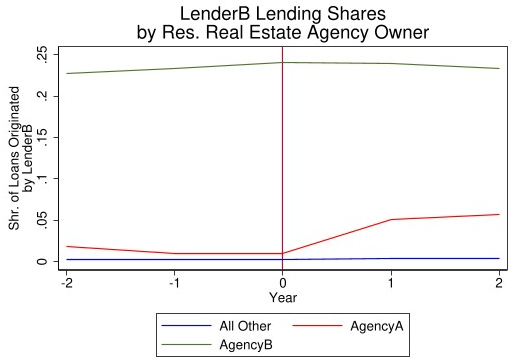
Figure 5, I depicts a map of the market shares of BigFirm's real estate agencies in 20XX, the year it acquired AgencyA and LenderA. BigFirm owned real estate agencies in most states in the year of the merger between AgencyA and BigFirm, with significant market shares in the Mid-Atlantic states as well as Minnesota, Missouri, and Kansas.

Figure 6 shows the market share of LenderA in each state in 20XX, the year LenderA was acquired by BigFirm. LenderA had non-zero market share in only five states: Texas, Pennsylvania, Virginia, Maryland, and Delaware, reflecting the fact that Lender A only had a license to operate in those five states in 20XX.

Lastly, in Figure 7, I report the market shares of LenderA in each state two years after LenderA is acquired by BigFirm. Two years after the merger, LenderA was licensed and lending in considerably more states, and had gained sizable market share in some states, especially those where

[26] BigFirm has several subsidiary real estate agencies. For the purposes of this case study, I will use BigFirm to refer to all residential real estate agencies which were a subsidiary of BigFirm real estate services subsidiary in a given year.

[27] Ignoring LenderB is not a major issue; LenderB was a very geographically concentrated lender, and wound down their origination business in my sample.



Notes: Figure shows LenderA loan share at BigFirm agencies, AgencyA agencies, and all other agencies. Years are relative to merger year, denoted at 0 and with red line.

Figure 4: LenderA Loan Share by Real Estate Agency Owner

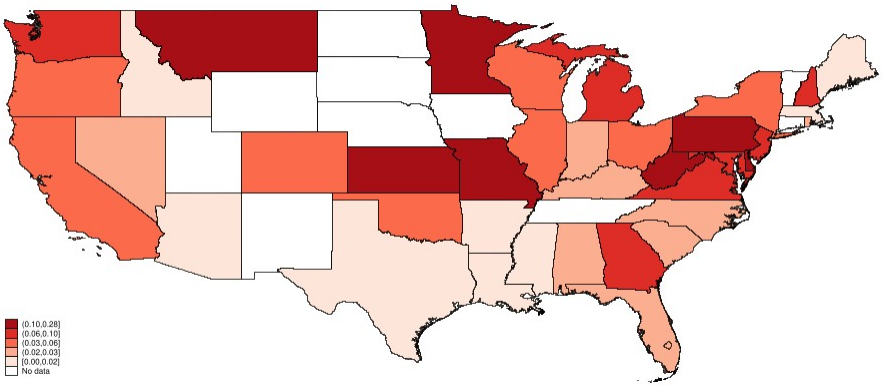
BigFirm already had a real estate agency presence.

Figures 5, 6, and 7 together suggest that LenderA expanded the most into the states where BigFirm had a substantial presence already. Thus, bringing LenderA in-house to BigFirm influenced the geographic expansion of LenderA.

6 Reduced Form Specification

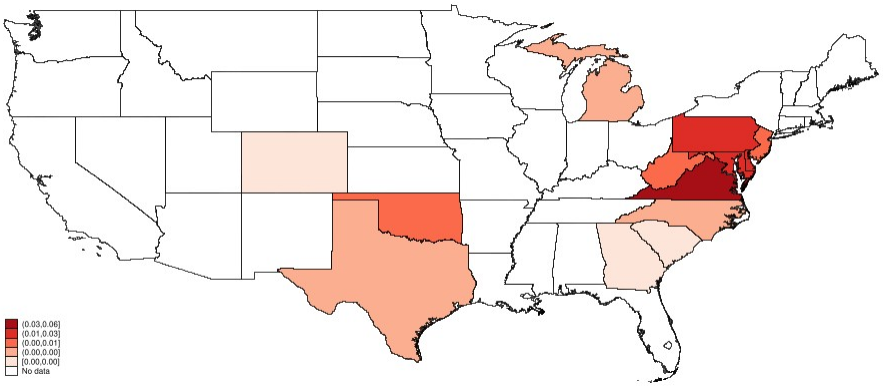
6.1 Identification

In this paper, I am concerned with studying the economic consequences of mergers between real estate agencies and mortgage lenders for lenders and borrowers. To fix ideas, return to the 20XX merger between BigFirm and AgencyA discussed earlier. When BigFirm acquired AgencyA, AgencyA owned LenderA. Following the merger between AgencyA and BigFirm, is LenderA more likely to lend to buyers from BigFirm than before BigFirm was LenderA's parent company? How does BigFirm's acquisition of LenderA affect the characteristics of the buyers coming to LenderA from BigFirm? How does LenderA's merger with BigFirm affect the loans buyers from



Notes: Figure shows BigFirm's market share in each state immediately prior to acquiring AgencyA and LenderA. Darker states have higher market shares for BigFirm.

Figure 5: BigFirm Agency Market Shares in Merger-Year by State



Notes: Figure shows LenderA's market share in each state immediately prior to being acquired by BigFirm. Darker states have higher market shares for LenderA.

Figure 6: LenderA Market Shares in Merger-Year by State

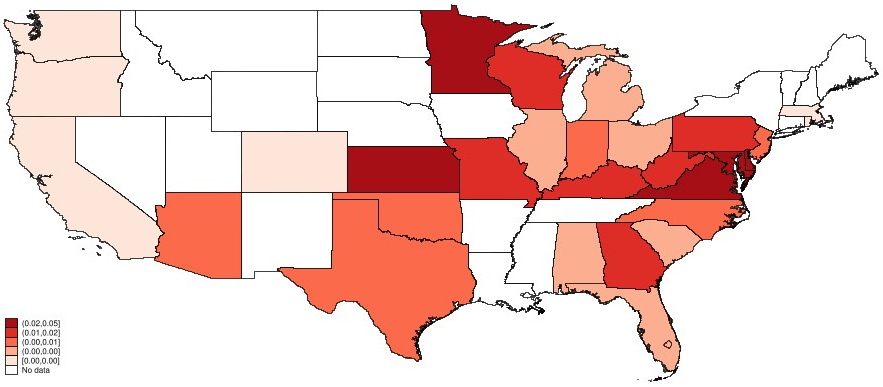


Figure 7: LenderA Market Shares Two Years Post-Merger by State

Notes: Figure shows LenderA's market share in each state two years after acquisition by BigFirm. Darker states have higher market shares for LenderA.

BigFirm obtain?

The ideal experiment to estimate the causal effects of mergers between mortgage lenders and real estate agencies would be to randomly assign joint ownership between real estate agencies and lenders for a period of time, and then reassign ownership links to other real estate agency and lender pairs. Because randomly assigning and reassigning ownership structures is not a feasible research design, I will use a staggered differences in differences which exploits plausibly exogenous variation in ownership structure stemming from mergers and acquisitions.

Not all real estate agencies and mortgage lenders engage in merger activity, and not all mergers between real estate agencies and mortgage lenders that do occur occur at the same time. Therefore, there are groups of mortgage lenders who:

1. Are not merged with any real estate agency at the beginning of my sample, but are merged with a real estate agency at the end of my sample.

2. Are merged with a real estate agency for the duration of my sample.

3. Do not merge with any real estate agency for the duration of my sample.

Furthermore, there are buyers who use a given real estate agency and mortgage lender before and after the lender and agency merge because buyers have a choice in what agency-lender pair they use.

I use the variation in lender-agency pairs chosen by buyers and merger activity in a staggered difference in difference. Specifically, I consider mergers which occur between two real estate agencies that incidentally result in joint ownership between a lender and real estate agency, what I refer to as "indirect integration".

Continuing with the example from the case study, I compare borrower characteristics and loan outcomes for mortgages originated by LenderA to borrowers using BigFirm real estate agents before BigFirm and LenderA merge to borrowers who use LenderA and BigFirm after BigFirm and LenderA merge in July 20XX. The borrowers who use BigFirm and LenderA before the July 20XX merger use an agency-lender pair that is not jointly owned while borrowers who use BigFirm and LenderA after the two firms merge use an agency-lender pair that is jointly owned.

The key assumption is in the motivation for the merger. If BigFirms's desire to expand its real estate agency business drove BigFirm to acquire AgencyA, and BigFirm acquiring LenderA was incidental to the merger between AgencyA and BigFirm, then BigFirm and LenderA are indirectly integrated. From the perspective of LenderA, its merger with BigFirm is exogenous to LenderA's books, but merging with BigFirm changes how LenderA acquires customers and which markets LenderA expands into, as seen in the case study. I will make use of mergers like that between BigFirm and AgencyA which indirectly integrate real estate agencies and lenders. To further control for lender or agent-specific effects, I include fixed effects in all my specifications.

The first threat to causality with using variation stemming from indirect integration is that buyers who use merged agency-lender pairs are distinct from others, even after controlling for observables, and that unobservables drive the effects I find, not mergers between real estate agencies

and mortgage lenders. To address this, I propose the following solution. First, I assume that buyers sequentially select a real estate agent and then a mortgage lender. Real estate agents often offer buyers a list of suggested lenders, and anecdotal evidence indicates that lenders on that list are more likely to return buyer calls, so it is likely that buyers do indeed begin with a real estate agent and then search for a lender. Even if buyers first choose a lender, it does not invalidate the effects I find, merely changes the interpretation. Now, instead of the agent referring buyers to a lender, it is the lender referring buyers to an agent. Either way, joint ownership is the channel allowing the referrals between real estate agents and lenders.[28]

I further assume buyers pick a real estate agent based on characteristics of the agency/agent, **not** due to the presence of a sibling lender. Agents often provide a list of recommended services to buyers, including recommended mortgage lenders, regardless of merger status. Furthermore, many merged firms do not share common names, making it unlikely that buyers would be aware of the relationship between a given real estate agency and mortgage lender.[29] Thus, buyers select agents on criteria other than sibling lenders, and a merger with a lender would not influence the type of buyers choosing a given real estate agency. I will further validate this assumption by showing that borrowers do not change on any observables following a merger between a real estate agency and mortgage lender.

A second threat to identification is the potential for lenders to broadly change their strategies after a merger. If a lender changes its pricing strategy after a merger not just for borrowers who use the lender's new sibling agency, this would invalidate my results. While I cannot empirically test for this, there are several facts which lead me to argue that lenders are not changing their strategy except for borrowers who use the new sibling lender. First, the market shares of the average

[28]The set-up of my model requires that buyers choose an agent first, but the reduced form results do not.

[29]Merged firms often advertise for each other on their websites. However, they refer to each other as "partner" or "preferred," the text stating the nature of the relationship is fine print at the bottom, and likely ignored by most buyers.

lender in my data set is 3.3%. This falls well below standard understandings of when firms are able to exert market power. Second, reviewing FTC and DOJ filings show no records of either agency attempting to stop one of these mergers, suggesting that competition authorities are also unconcerned about market power. Third, I estimate the effect of these mergers on lender market shares at the CBSA level and find modest 0.54 percentage point gains in market share for lenders which, while significant for an individual lender are not going to dramatically change the lender's pricing power. I address this further in the robustness checks.

The final threat to identification in this paper is misattributing the mechanism. Buyers who use a merged lender-agent pair are less likely to search for a lender, while buyers who go to a merged firm and **do not** use the sibling lender are more likely shopping around. The prior literature demonstrates that price dispersion is prevalent in consumer financial markets, and that search mitigates the dispersion [Bhutta et al. (2020), Woodward and Hall (2012)]. Thus, failing to control for search behavior could lead to mistakenly finding that mergers cause a change in interest rates when in fact it is a result of lack of search. To remedy this, I construct a proxy for lack of search, which I discuss below.

6.2 Proxy for Search (or Lack Thereof)

Most real estate agencies offer buyers a list of recommended lenders. I proxy for the list of recommended lenders supplied by real estate agents based on the lenders I observe buyers choosing. Survey data shows that buyers pay attention to agent recommendations, and therefore agent suggested lenders will originate more loans to borrowers from an agency recommending that lender than the lender's overall market share would suggest. Therefore, I will use lender overall market shares and within-agency lending shares to construct the following measure of if a lender was likely recommended by the buyer's agent:

1. Within a real estate agency-year, calculate what share of loans each lender originates, conditional on originating at least one purchase loan. That is, lenders who do not originate any loans at an agency are not considered.

2. Within a CBSA-year, calculate lender market shares, conditional on a lender having a non-zero market share in that CBSA-year.

3. Define a lender as "recommended" by an agency if the lender's loan share within that agency is more than two standard deviations above the lender's loan share within the CBSA, **and** the lender originated at least eight loans in the CBSA-year.[30]

In other words, I define a lender as recommended by an agency if I can reject the null hypothesis that the lender's share of loans within the CBSA-year and agency-CBSA-year are the same at the 95% confidence level. Using this criterion, 39% of loans in my sample are from agency recommended lenders, and 92% of loans which come from jointly owned pairs meet this criteria.

I will use this proxy for steering to restrict my sample when I look at borrower-level outcomes: borrower characteristics, time to close, and prices (interest rates).

7 Results

7.1 Lender Market Shares: Within Agency

I first examine if and how mergers between real estate agencies and mortgage lenders change the within real estate agency market share of lenders. I expect the within-agency share for the merged lender to increase at it's sibling real estate agency post-merger if mergers lead real estate agencies

[30] Eight represents the bottom decile of lender-CBSA-year loan counts in my data. I have experimented with adjusting this threshold and the results are robust.

to direct clients to the agency's sibling lender and this recommendation is influential. To test if mergers affect within-agency market share, I will use the specification:

$$Share_{ijkt} = \beta_0 + \beta_1 Treat * Post_{ijt} + \beta_2 Treat_{ij} + \gamma X_{ijkt} + \epsilon_{ijkt} \tag{6}$$

Here, $Share_{ijkt}$ is the share of purchases at agency i made with loans from lender j in CBSA k at time t, the time of loan origination. $Treat * Post_{ijt}$ is equal to one if agency i and lender j are merged at time t. $Treat_{ij}$ takes the value one if agency i and lender j are ever merged during my sample. X_{kt} is a vector of fixed effects including CBSA and year, along with other fixed effects in some columns.

Results can be found in Table 3. Before controlling for lender and agent fixed effects, the $Treat$ coefficient is negative and highly significant, but after controlling for lender and agent fixed effects in column (2), the magnitude drops and is statistically insignificant. There is no difference in the within-agency market share of lenders who will merge with a given real estate agency and the within-agency market share of a lender who will never merge after controlling for lender and agency-specific effects.

The coefficient on $Treat * Post$ is 0.15 in column (2), which indicates that following a merger, the share of loans originated by the sibling lender of a real estate agency increases by 15 percentage points above the mean of 0.133.

Merged lenders obtaining a larger market share from their sibling real estate agency post-merger is consistent with the idea that mergers change the referral pattern of real estate agencies. Following a merger, an agency refers more clients to its sibling lender that before the agency and lender were merged.

Recent literature has shown that staggered difference in difference specifications with two-way

fixed effects are subject to unequal weighting of treatment cohorts, and that traditional two way fixed effects models do not recover the average treatment effect. Thus, I employ the method suggested by Sun and Abraham (2021) as well.[31] This method reports a coefficient for each relative-to-treatment time dummy included in the regression, which I aggregate to an average treatment effect. The last row of the table reports the average of the event study coefficients. The results using Sun and Abraham (2021) are stronger than standard staggered difference in difference. Now the coefficient on $Treat * Post$ is 0.28, or 28 percentage points and is consistent with the event study plot found in Figure 8.

While the effect on within-agency shares is interesting in its own right, it also provides the first stage result for later loan-level analysis. It demonstrates that mergers change the referral pattern of agents in a way that affects which lenders buyers choose. First, as agents now have an "inside track" to the lender, agents may use this to help borrowers who otherwise struggle to get a loan; however, agencies may instead use this to "cream skim" and send only the best borrowers to their sibling lender. Second, the lender may price loans to borrowers coming from a lender's sibling real estate agency higher as the lender has a form of market power over the home buyer stemming from the lack of search on the part of buyers and the merger between the lender and real estate agency.

I will investigate the consequences of mergers on the characteristics of borrowers and the interest rate in subsequent sections.

7.2 Lender Market Shares: CBSA Level

In addition to market share effects at the real estate agency level, mergers between real estate agencies and mortgage lenders may have an effect on the overall market shares for lenders. If, for

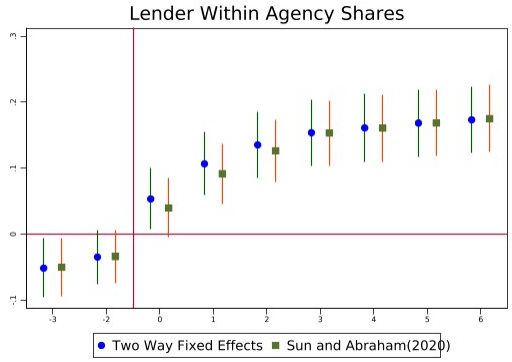
[31] Another common staggered difference in difference methodology is that proposed by Callaway and Sant'Anna (2021). The large number of fixed effects in my analysis make their approach infeasible at this time.

Table 3: Within-Agency Lender Shares

	(1)	(2)
Treat*Post	0.15***	0.15***
	(0.014)	(0.012)
Treat	-0.10***	-0.0094
	(0.011)	(0.0095)
Sun & Abraham (2020)	0.29***	0.28***
	(0.04)	(0.04)
FE	CBSA, Year	CBSA, Year, Lender,Agency
R-squared	0.11	0.61
N	3,176,993	3,176,993

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is a lender's loan share within a CBSA-year-real estate agency. Unit of observation is a lender-agency-CBSA-year. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for all lender-agency pairs which merge at any point in time. Standard errors are clustered at the agency level.



Notes: Dependent variable is a lender's loan share within a CBSA-year-real estate agency. Unit of observation is a lender-agency-CBSA-year. Treat*Post coefficients are plotted. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Standard errors are clustered at the agency level.

Figure 8: Lender Agency Market Shares Event Study Plot

example, mergers make lenders more efficient, this may allow lenders to process more loans in the same amount of time and attract more customers. Then, the lender's market share overall would increase.

To test if mergers increase lenders' overall market shares, I use the following specification:

$$Share_{jkt} = \beta_0 + \beta_1 Treat * Post_{jt} + \beta_2 Treat_j + \gamma X_{jkt} + \epsilon_{jkt} \tag{7}$$

The left-hand side is the lender market share in a given CBSA-year, while $Treat * Post_{jt}$ and $Treat_j$ turn on if the lender is merged with *any* real estate agency at time t or at *any* point in time, respectively. This way, I am comparing lender market shares when a lender is always merged to lenders who merge at some point in my sample. The results for this can be found in Table 4.

There are no significant differences in lender market shares following a merger with a real estate agency until I add in lender fixed effects. With the addition of lender fixed effects, merging with a real estate agency results in a market share increase for a lender of 0.54 percentage points on average. The average lender market share in my sample is 3.3% overall, meaning that a 0.54 percentage point increase in market share represents a 16% increase in market share, which is significant for the lender.[32] The fact that the increase in market share from a merger is only significant after the introduction of lender fixed effects is likely because lenders expand following mergers, as seen by the expansion of LenderA in the case study following the merger with BigFirm. Lenders who recently expanded into new markets would have lower market share as they get established.

The event study plot version can be found in Figure 9. The results here are considerably noisier than in the within-agency plots in Figure 8, in large part due to the relatively sparse data, especially after fixed effects are incorporated. However, the general pattern of the results match the results in

[32]The market share for lenders who are ever jointly owned is 3.8% on average, so 0.54 percentage points represents a 14% increase in market share.

the tables, and there are not obvious pre-trends. My results are even stronger after correcting for the biases of the two way fixed effects estimator, the effect on lender market share increases to 0.7 percentage points (21% of average lender market share and 18% of the average market share for lenders who are ever merged with a residential real estate agency).

A 16% increase in market share is significant for the lender, but has relatively little impact on the overall market structure. While the jointly owned lender gains significant market share with respect to where it started, the lender does not dominate the market after a merger with a real estate agency. The broader market implications of this increase in market share are unclear. On the one hand, this additional market share could represent loans that would otherwise be provided by other lenders, and thus be business stealing by the now merged lender. Alternatively, if merging makes the lender more efficient so that it is profitable to originate more loans, the newly merged lender could gain market share without taking clients from other lenders. In this case, overall access to credit in the market will increase.

7.3 Interest Rate

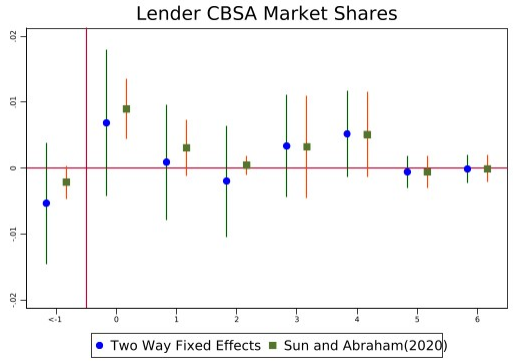
Interest rates are the "price" for mortgages and could be manipulated by lenders if joint ownership with a real estate agency confers market power to a lender. Prior work by Bhutta et al. (2020) documents that borrowers who apply to multiple lenders pay 7 basis points less on average, and that "seriously considering" 3 or more lenders reduces rates by 9.5 basis points on average. I want to ensure that any effect of mergers between real estate agencies and mortgage lenders on interest rates I find is not caused by lack of search on the part of the buyers using merged pairs, but rather the ownership structure of the firms itself. Thus, I restrict my sample to only loans I flag as "agent recommended" as discussed in Section 6.2. Furthermore, in my main analysis, I restrict to loans

Table 4: CBSA Lender Market Shares

	(1)	(2)
Treat*Post	-0.0012	0.0054*
	(0.0021)	(0.0029)
Treat	0.0051***	
	(0.00072)	
Sun & Abraham (2020)	-0.001	0.007*
	(0.003)	(0.004)
FE	CBSA,Year	CBSA,Year,Lender
R-squared	0.63	0.64
N	415,764	415,764

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is a lender's market share within a CBSA-year. Unit of observation is a lender-CBSA-year. Treat*Post represents the coefficient of interest and equals one if the lender is merged with any agency at that point in time. Treat equals one for all lenders which are merged with an agency at any point in time. Standard errors are clustered at the lender level.



Notes: Dependent variable is a lender's market share within a CBSA-year. Unit of observation is a lender-CBSA-year. Treat*Post coefficients are plotted. Treat*Post represents the coefficient of interest and equals one if the lender is merged with any agency at that point in time. Standard errors are clustered at the lender level.

Figure 9: Lender CBSA Market Shares Event Study Plot

coming from the lender's retail channel, as theory suggests those are the buyers affected by joint ownership. Full sample results are available in the internet appendix.

The results for interest rate can be found in Table 5. All columns include lender, agency, CBSA, state, and year fixed effects, and I report the $Treat * Post$ coefficient from the Sun and Abraham (2021) methodology at the bottom of each column. The results are robust to Sun and Abraham (2021), and the event study plot can be found in Figure 10. The coefficient on $Treat * Post$ is positive and highly significant. Buyers who use a merged lender-agency pair and go directly to the lender pay 8 basis points more on average for their loan, consistent with the idea that buyers going to the retail lender who don't search are most likely to be affected by the merger. When including FICO score and LTV in column (2), this increases to 9 basis points.

An interest rate effect of 9 basis points is quite large in the context of the literature. 9 basis points is similar to the premium paid by black borrowers compared to white borrowers found by Bartlett et al. (2021). Nine basis points is also approximately 15% of the dispersion between the 10th and 90th percentile of rates found by Bhutta et al. (2020). While their difference is significantly larger, they further document that search reduces this dispersion substantially. In the case of my finding, I am analyzing a subset of consumers who were unlikely to search. Thus, the 9 basis point effect I find is not due to changes in shopping behavior of consumers, but solely the relationship between the lender and real estate agent the buyer happened to choose. This is not a fee for the convenience of not having to find a lender; most real estate agents will offer lender recommendations to consumers, so the convenience premium is removed by studying only borrowers who do not search.[33] Furthermore, for affected buyers, nine basis points represents an extra $225 per year in interest payments. In high cost of living areas, such as the Washington, DC metro, where loan amounts are higher, this rises to $289 per year. The per-year cost of using a

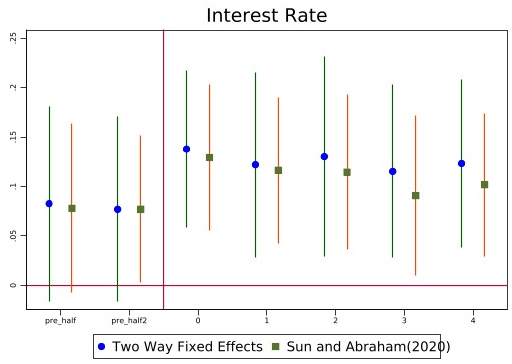
[33]The way in which agents recommend lenders to buyers is interesting in its own right, but I leave that analysis for a future paper.

Table 5: Interest Rate

	(1)	(2)
Treat*Post	0.079***	0.087***
	(0.019)	(0.017)
Treat	-0.054***	-0.065***
	(0.019)	(0.017)
FICO*LTV		0.011***
		(0.0001)
FICO Score		-0.11***
		(0.001)
LTV		-0.074***
		(-0.001)
Sun&Abraham(2020)	0.122**	0.122***
	(0.036)	(0.038)
FE	CBSA,Year	CBSA,Year
	Lender,Agency	Lender,Agency
R-squared	0.43	0.45
N	813,284	807,732

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the loan interest rate. Unit of observation is a loan matched to a home purchase. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for any lender-agent pairs which ever merge. Standard errors are clustered at the agency level.



Notes: Dependent variable is the loan interest rate. Unit of observation is a loan matched to a home purchase. Treat*Post coefficients are plotted. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Standard errors are clustered at the agency level.

Figure 10: Interest Rate Event Study Plot

jointly owned agent-lender pair will grow as home prices continue to rise.

7.4 Time to Close

Borrowers might be willing to pay a higher rate for a loan which borrowers believe will be processed more quickly. In particular, in hot housing markets, the ability to receive financing quickly can be the difference between having an offer accepted and not. Merged firms might be able to originate loans more quickly due to the easier communication between lenders and agents.

I proxy for the time it take a borrower to obtain financing through details about the timing of transaction milestones. I observe both the date a property was under contract, that is the day that the home had an offer accepted and was no longer up for sale, and the close date, the date on which the paperwork for the sale was signed and the home formally transfers from one owner to the next. I take the difference between these two values to obtain the length of time it takes for the property to move from under contract to closed, "time to close". I use time to close as my left hand side variable in Table 6. In column (1), I use time to close directly. In column (2), I use the probability

that a purchase takes more than 45 days to close, 60 days in column (3), and 75 days in column (4). I use only loans flagged as agent referred and obtained through the lender's retail channel, which is the sample that accounts for search intensity and which is most likely to be affected by a merger between real estate agencies and mortgage lenders. I trim time to close at the 5 and 95 percentiles.

Beginning with column (1), using a merged pair reduces the time to close by 1.4 days or 3% of the mean. However, buyers may be less concerned with small changes in the level of time to close but far more concerned with avoiding a lengthy delay. Thus, I in columns (2) through (4) I put a dummy variable equal to one if the time to close is more than X days on the left hand side, making this a linear probability model. There is a 2.5 percentage point reduction in the probability that it takes more than 30 days for a purchase to close when using a merged lender-agent pair, but this is difference is not statistically significant. Moving to column (3) the effect for buyers going through the retail channel is statistically insignificant at 2.1 percentage point reduction in the probability it takes more than 45 days to close. In column (4), there a statistically significant reduction in the probability it takes more than 60 days to close of 1.9 percentage points.

Less than two days on a mean of 41 days is not a large effect, nor are any of the linear probability model results large. Thus, if there is any efficiency gain for buyers from choosing a lender merged with their real estate agency, it is not through faster closing times.

8 Robustness Checks

Below, I run a series of robustness checks to verify the results above, in particular the positive effect on interest rates. I first check that borrowers are not changing across the merger before testing for differential effects on paying points or origination fees and running placebo tests.

Table 6: Time to Close

	(1)	(2)	(3)	(4)
	Days	30+ Days	45+ Days	60+ Days
Mean	42.0	0.72	0.35	0.16
Treat*Post	-1.2*	-0.022	-0.021	-0.019**
	(0.63)	(0.020)	(0.019)	(0.009)
Treat	0.81	0.032	0.017	-0.005
	(0.71)	(0.022)	(0.022)	(0.012)
Sun & Abraham (2020)	1.05	0.029	0.010	0.019
	(2.56)	(0.036)	(0.072)	(0.040)
FE	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year
	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency
R-squared	0.31	0.23	0.24	0.22
N	793,231	793,231	793,231	793,231

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the number of days between a home under contract and the home closing (column (1)), or indicator for if it took more than 30 days (column (2)), 45 days (column (3)), or 60 days (column (4)) to close. Unit of observation is a loan matched to a home purchase where loan is originated through the retail channel. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for any lender-agency pairs which ever merge. Standard errors are clustered at the agency level. All columns include CBSA, Year, Lender, and Agency fixed effects.

8.1 Borrower Characteristics

Real estate agents and the agencies they work for have a considerable amount of information about their buyers and each buyer's ability to repay a loan. Thus, real estate agents can act as conduits of information between lenders and borrowers. A merger between a real estate agency and a lender legally codifies the information channel between the two, making information exchange even easier. There are two possible uses for information sharing between real estate agents and mortgage lenders: assisting marginal borrowers or cream skimming. First, if an agency has soft information about prospective borrowers that lead the agency to believe that a borrower is a "better" risk than the borrower's credit information may suggest, the agency can communicate this information to the lender and help the borrower get a loan. Marginal borrowers would be more likely to get loans from jointly owned agency-lender pairs if agents are communicating about soft information in this way. Second, the agency could selectively decide to refer only the best clients to its sibling lender, or cream-skim, if a merger results in an agent feeling financially invested in the performance of her sibling lender once the lender and agency merge.

Cream skimming or aiding marginal borrowers is more plausible following a merger than before the agency and lender are jointly owned. Now the agency and lender are working for the same parent company, and as such their incentives are aligned. Without the merger, the agency is primarily interested in getting a loan for its clients, not necessarily how well the clients will be able to repay, and likewise the lender is not interested in how easy it is for the agency to make a sale, so the lender is unlikely to want to "go the extra mile" to originate a loan. With the merger, both the lender and agency have reason to care about the others' goals, making cream skimming and/or aiding marginal borrowers possible.

If borrower characteristics change as a result of the merger, this could explain the higher post-merger interest rates I identify. Higher quality borrowers would likely have lower interest rates,

making the the positive effect I find an understatement of the true effect. On the other hand, lower quality borrowers would have higher rates, confounding the effects I find.

I report results for three ex-ante characteristics of borrowers: loan amount, FICO score at origination, and loan-to-value ratio in Table 7. In addition, I report results for ex-post loan performance, specifically the probability loans are 30, 60, and 90 days delinquent, to check if there is information about default probabilities unobservable to the econometrician but observable to the lender that are influencing interest rates as found by Stroebel (2016) for mortgages on new construction homes. Because borrower characteristics may be correlated with search behavior, I report the specifications keeping only loans which I flag as agent referred and from the retail channel as discussed in the beginning of the empirical specification discussion. The full sample results are available in the appendix.

Results for ex-ante borrower characteristics and ex-post loan performance can be found in Table 7. All six columns suggest that neither the ex-ante borrower characteristics, nor ex-post loan performance are different before and after a lender-agency merger. Thus, I find no evidence of cream-skimming or soft information helping marginal borrowers. If there were cream-skimming, I would expect an improvement in the borrower characteristics after merger. On the other hand, if there were soft information helping marginal borrowers get loans who would otherwise be denied, I would expect the quality of borrower to decline following the merger.

Looking at Table 7, neither story appears to hold. The coefficient on loan amount is small in magnitude and statistically insignificant. The coefficient on LTV is similarly small and insignificant, at 2.2, or just under a 3% change. Similarly, the average FICO score in my data set is 735, but the coefficient on $Treat * Post$ is 10 points. While this is marginally significant, it does not represent a large change in the credit score of borrowers.

Moving to the loan performance results in columns (4) through (6), I again find no significant

difference coming from a lender-agency merger. The performance of loans does not change with merger status, which is further evidence that a merger between a real estate agency and lender does not lead to soft information changing what type of borrowers are getting loans.

Taken together, the results in Table 7 indicate that the positive interest rate effect I find is not due to a change in borrower characteristics either ex-ante observable or ultimate delinquency rates.[34] Lenders are not cream-skimming or helping marginal borrowers after the merger, and borrower characteristics cannot explain why borrowers pay more following a merger.

8.2 Points Paid

One way that my identifying assumption would be violated is if borrowers not exposed to a merged lender-agent pair behave differently than the borrowers exposed to a merged lender-agent pair. I have shown in Section 8.1 that borrowers using merged lender-agent pairs and borrowers not using merged lender-agent pairs do not differ substantially on observable borrower characteristics that are plausibly determined prior to the loan contract (namely, loan amount, FICO score, and loan-to-value ratio), nor do the two groups of borrowers differ on ex-post loan performance. However, borrowers can decide to pay points at origination, where borrowers trade an upfront fee (called "discount points") in exchange for lowering the interest rate on the loan. Bhutta and Hizmo (2021) document that the apparent gap in interest rates paid by white vs. minority borrowers can be explained by the fact that white borrowers tend to pay more points in exchange for a lower interest rate.

If borrowers who use merged lender-agent pairs after the merger are paying fewer points than their pre-merger counterparts, I would misidentify the higher post-merger interest rates as being

[34] Default rates are similarly insignificant although not reported in the table.

Table 7: Borrower Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Amount	LTV	FICO	30 Days	60 Days	90 Days
Mean	254,484	87.00	735	14.2%	7.8%	5.8%
Treat*Post	1,004	-2.2	10**	-0.0006	-0.0018	0.0046
	(6,658)	(1.8)	(4.3)	(0.0081)	(0.0058)	(0.0038)
Treat	-17.681**	2.4	-11**	0.015	0.0051	-0.0036
	(7,830)	(1.8)	(4.7)	(0.011)	(0.0082)	(0.0062)
FICO*LTV				-0.000025***	-0.000021***	-0.000018***
				(6.6e-07)	(5.0e-07)	(4.4e-07)
FICO Score				0.00054***	0.00081***	0.00080***
				(0.000058)	(0.000044)	(0.000038)
LTV				0.020***	0.017***	0.015***
				(0.00051)	(0.00039)	(0.00034)
Sun& Abraham (2020)	33,814**	-8.78***	16.02***	-0.0824*	-0.0220	-0.0497
	(14,645)	(1.76)	(5.54)	(0.0422)	(0.0404)	(0.0377)
FE	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year
	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency
R-squared	0.54	0.21	0.19	0.17	0.15	0.14
N	599,293	813,174	807,865	807,868	807,868	807,868

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is loan amount (column (1)), loan-to-value ratio (column (2)), FICO (credit) score at origination (column (3)), or indicator for if loan is ever 30 days delinquent (column (4)), 60 days delinquent (column (5)), or 90 days delinquent (column (6)). Unit of observation is a loan matched to a home purchase where loan is originated through the retail channel. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for any lender-agency pairs which ever merge. Standard errors are clustered at the agency level.

due to the merger when in fact the higher rates are due to a change in borrower behavior.

Unfortunately, the LLMA data do not include points paid. However points paid are reported in HMDA data beginning in 2018 following a rule change in 2015. I merge in HMDA and observe both the interest rate and points paid for the last two years of my data. Sample size prevents me from restricting to just agent referred lenders, however earlier versions of my results were robust to either sample, so that is not driving these results.

In Table 8, I make points paid the dependent variable in columns (1) through (3). The first two columns are for all loans, while the third column restricts to just retail channel loans. Beginning with the first column, we see that the coefficient on $Treat * Post$ is both very small in magnitude and insignificant. This holds with the inclusion of credit metrics in column (2), and when restricting the sample to just retail loans in column (3). All in all, a change in buyer behavior with respect to points paid cannot explain the higher interest rates I find for buyers using a merged agent-lender pair.

8.3 Total Origination Costs

It is possible that after the merger, buyers pay lower origination costs in exchange for higher interest rates. While the LLMA data do not include origination costs, the same rule change which required lenders to report any discount points paid also required lenders to report total origination costs. I use the last two years of my data to test for differences in total origination costs by merged and unmerged lender-agent pairs.

I report these results in Table 9. In columns (1) and (2) I include all loans while column (3) considers only retail channel loans. Beginning with column (1), there is no relationship between origination costs and merged status. I continue to find a null effect when including credit score, loan-to-value ratio, and the interaction of loan-to-value ratio and credit score in column (2) and

Table 8: Discount Points

	(1)	(2)	(3)	(4)
Treat*Post	1.2e-08	1.4e-08	-2.3e-09	-6.0e-09
	(4.8e-08)	(5.6e-08)	(5.8e-08)	(5.8e-08)
Treat	-1.9e-08	-2.3e-08	-7.4e-09	-2.4e-09
	(4.7e-08)	(5.5e-08)	(5.8e-08)	(5.8e-08)
FICO*LTV		6.4e-12***		9.3e-12***
		(5.7e-13)		(6.5e-13)
FICO		-7.6e-10***		-9.4e-10***
		(5.1e-11)		(5.8e-11)
LTV		-6.0e-09***		-8.1e-09***
		(4.3e-10)		(5.0e-10)
Sample	All	All	Retail	Retail
FE	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency
R-squared	0.14	0.15	0.14	0.14
N	690,167	651,645	469,841	469,293

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the amount of discount points paid at origination. Unit of observation is a loan matched to home purchase. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for all lender-agency pairs which merge at any point in time. Standard errors are clustered at the agency level.

when subsetting to retail channel loans in column (3). In all three specifications the coefficient on $Treat*Post$ is insignificant. Furthermore, the coefficient on $Treat$ is also insignificant, suggesting that even before the merger buyers using eventually merged lender-agent pairs were not paying different origination costs than other buyers. In short, origination costs do not explain the interest rate effects I find in Table 5.

8.4 Heterogeneity

I test for heterogeneity in the effect of joint ownership over the distribution of the interest rate. It is possible that lenders are able to mark-up loans to borrowers using the lender's sibling agency differently at different points of the interest rate distribution. For example, buyers paying high baseline rates may be more sensitive to additional interest rate increases, and thus their relatively elastic demand leads lenders to charge lower premiums at the high end of the interest rate distribution. Alternatively, buyers at the high end of the interest rate distribution may actually be less elastic, as they are already selecting to buy a house at a higher interest rate. If buyers at high baseline interest rates are more inelastic, lenders will charge higher premiums to these borrowers. To test for heterogeneity in the effect of joint ownership at different interest rates, I run a quantile regression equivalent to column (2) in Table 5. I estimate this model at each percentile from 1% to 99%, and I plot the coefficients on $Treat * Post$ in Figure 11.

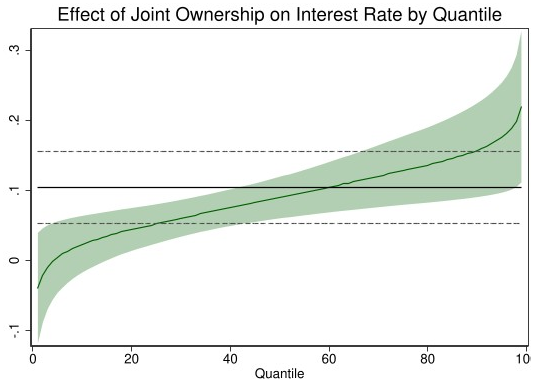
The solid horizontal line in Figure 11 shows the coefficient in column (2) of Table 5, with the dashed lines showing the 95% confidence interval. The figure shows that the effect of joint ownership on the interest rate increases with the quantile of interest rate examined. In the right tail of the distribution, the effect of joint ownership on interest rate is quite small, and not statistically different than zero. However, at the median, the effect is similar to that reported in Table 5 column (2). As the interest rate increases, the effect of joint ownership grows, and is more than 20 basis

Table 9: Total Origination Costs

	(1)	(2)	(3)	(4)
Treat*Post	251	84	185	39
	(317)	(379)	(459)	(455)
Treat	-223	-82	-204	-94
	(308)	(364)	(440)	(433)
FICO*LTV		-0.19***		-0.22***
		(0.0049)		(0.0057)
FICO		12***		16***
		(0.42)		(0.48)
LTV		165***		188***
		(3.7)		(4.3)
Sample	All	All	Retail	Retail
FE	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency
R-squared	0.29	0.33	0.33	0.35
N	714,475	674,194	481,761	481,177

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the total origination costs. Unit of observation is a loan matched to home purchase. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for all lender-agency pairs which merge at any point in time. Standard errors are clustered at the agency level.



Notes: Regressions run at each quantile. Dependent variable is interest rate. Unit of observation is a loan matched to a home purchase where loan is originated through the retail channel. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for any lender-agency pairs which ever merge. Standard errors are clustered at the agency level.

Figure 11: Quantile Regression of Joint Ownership on Interest Rate

points at the 99th percentile. This suggests that for buyers paying higher than median interest rates, the effect of using a jointly owned agency-lender pair is actually larger than 9 basis points, and that the magnitude of the effect increases with the interest rate.

8.5 Placebo Test

In Table 5, I show that buyers who use the retail channel to obtain their mortgage pay higher interest rates, consistent with the story that buyers who use the retail channel are most captured by the one-stop shopping model and thus charged the higher rate by lenders.

By similar logic, buyers who use a mortgage broker should be the least captured by a merged agency-lender pair, and I would not expect there to be an effect of using a merged agency-lender pair for buyers who obtain a loan through a mortgage broker. To that end, running my specification on buyers who use the mortgage broker distribution channel is a placebo test.

I report the effect of using a merged agency-lender pair on interest rate for buyers using a mort-

gage broker in Table 10. As can be seen, the point estimate is negative, suggesting that buyers who use mortgage brokers pay *less* following a merger between real estate agency and mortgage lender. The negative effect is consistent with the idea that mortgage brokers present loan options from multiple lenders, so the lender does not have market power stemming from the merger in the same way. However, these results should be interpreted cautiously, as the sample size is considerably smaller.

8.6 Only Agency-Agency Mergers

Another concern with my identification strategy is that mergers do not occur randomly. Specifically, residential real estate agencies and mortgage lenders will strategically decide to merge in a way that changes lender behavior.

As discussed previously, the majority of the mergers I study are between a larger real estate agency with a lending arm and a small real estate agency where the merger is not going to confer a large degree of market power on the lender. However, in the main results I include a few mergers where the lender is part of the acquired agency. Below I redo my main specification removing the mergers where the lender is part of the acquired firm. As can be seen, this has no effect on the results. That is, it is not mergers where the lender is acquired (and lender strategy is most likely to change) that are driving my results.

9 Conclusion

In the post-crisis era, technologically adept non-bank lenders have a significant presence in the mortgage market. Recent literature has worked to examine the consequences of increasing market

Table 10: Interest Rate for Mortgage Broker Intermediated Loans

	(1)
Treat*Post	-0.52***
	(0.18)
Treat	0.069
	(0.16)
Sun&Abraham(2020)	-0.44
	(0.057)
Sample	Mtg.Broker
FE	CBSA,Year
	Lender,Agent
N	6,797

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the loan interest rate. Unit of observation is a loan matched to home purchase. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for any lender-agent pairs which ever merge. Standard errors are clustered at the agency level.

share for non-bank lenders on a variety of economic outcomes but has remained relatively silent on how relationships between non-bank lenders and other players in the real estate market may influence both mortgage market structure and borrower outcomes. In this paper, I study the consequences of mergers between non-bank lenders and real estate agencies on lender market shares and a variety of borrower outcomes.

I construct a novel data set of home purchases matched to the loans which funded the home purchases, and use the 100+ mergers I hand-matched in a staggered difference in difference design that exploits mergers which indirectly integrate lenders and real estate agencies. I find that real estate agents from jointly owned firms direct clients to their agency's sibling lender, and that lender market shares more than double at the lender's sibling real estate agency following a merger. I next find that mergers between real estate agencies and mortgage lenders do not substantially reduce competition in the mortgage market, with lenders only gaining about 0.54% market share

Table 11: Only Agency Mergers

	(1)	(2)	(3)	(4)
	Lender CBSA Share	Within Agency Share	Interest Rate	Interest Rate, Retail Only
Treat*Post	0.0072**	0.14***	0.086***	0.089***
	(0.0013)	(0.011)	(0.0091)	(0.014)
Treat		-0.0096	-0.093***	-0.090***
		(0.0082)	(0.014)	(0.016)
FICO*LTV			0.000041***	0.000041***
			(6.7e-07)	(7.5e-07)
FICO			-0.0049***	-0.0049***
			(0.000059)	(0.000067)
LTV			-0.030***	-0.030***
			(0.00052)	(0.00058)
Sample			All	Retail
FE	CBSA, Year, Lender	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency	CBSA, Year, Lender, Agency
R-squared	0.62	0.61	0.43	0.45
N	414,265	3,175,875	1,056,558	796,412

* 0.10 ** 0.05 *** 0.01

Notes: Treat*Post represents the coefficient of interest and equals one if the lender is merged (column (1)) or if a lender and agent are a merged pair (columns (2) through (4). Treat equals one for any lender-agent pairs which ever merge. Standard errors are clustered at the lender level in column (1) and at the agency level in columns (2) through (4).

on average.

Using a merged lender-agency pair increases the rate affected borrowers pay by 9 basis points, with larger effects at higher quantiles of the interest rate distribution. Borrowers using jointly owned agency-lender pairs do not close on their homes more quickly, nor do borrowers using merged pairs differ on observable ex-ante creditworthiness or ex-post loan performance from other borrowers. The 9 basis points appears purely due to the market power a sibling lender has on the borrowers from the lender's sibling real estate agency.

Real estate agencies and mortgage lenders are generally studied separately, despite both lender and agents being intimately involved in the home buying process. I study the consequences of mergers between two portions of the home buying process, real estate agencies and mortgage lenders, in a low interest rate environment. In the years following my data, interest rates rose considerably, and mergers between real estate agencies and mortgage lenders continue to occur. The effects found in this paper likely represent a lower bound on the ultimate effects as more real estate agency and mortgage lender mergers occur and in a high interest rate environment where remaining borrowers may be more inelastic. Finally, new policy regulations which allow an individual licensed as both a real estate agent and mortgage lender to operate in both capacities and receive compensation for each task may further strengthen the ties between jointly owned lenders and real estate agencies, and thus the consequences for borrowers.[35] Future study will be necessary to examine how the consequences of mergers between non-bank lenders and real estate agencies change as non-bank lenders continue to grow, new mergers occur, and the macroeconomic conditions and regulatory environment evolve.

[35]The FHA proposed allowing dual compensation in early 2023.

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Internet Appendix

A Merging the Data

A.1 MLS to CoreLogic Property Data

I begin by matching the CoreLogic MLS data to the CoreLogic Property data. I first merge on APN and county FIPS code. However, there are a number of properties in the MLS which do not have APN numbers. Thus, I take all unmerged properties in both the MLS and Property data after the APN and FIPS code merge, and merge them on address text.

After the first merge, I have a data set of basic property characteristics merged to the MLS data, including APN number, FIPS, and tax account number. Now, I can merge the data to the CoreLogic Mortgage data on APN, FIPS and tax account number. This is an imperfect merge, and APN, FIPS and tax account number do not uniquely identify observations. To avoid inflating the size of my data set by double counting observations, I use a random number generate to drop all but one of each combination of APN, FIPS and tax account number.

Now, I have a data set of MLS listings matched to property records, including the mortgage provider. I now clean the names of the real estate agencies and lenders. This is a nontrivial process, requiring much hand checking. However, without this, it is not possible to have consistent firm names.

A.2 Merging in the LLMA Data

There are very few unique identifiers in the LLMA data that are shared with my MLS-CoreLogic Property data set. I merge first on origination year-month, loan amount, and zip code. Then, I use

a random number generator to keep one observation of each of the observations matched on these three variables.

I next take the unmatched LLMA and MLS-CoreLogic Property data, and merge on just year-month and zip code. Again, I use a random number generator to keep a unique observation from each match.

After merging in the LLMA Originations data, it is easy to merge in the events data. There is a unique loan-level identifier which can be matched.

A.3 Merging in the HMDA Data

Similar to the other inexact matching steps, I iteratively match the HMDA data, relaxing the match quality with each iteration. Data are first matched between the CoreLogic Property Records and HMDA on tract, exact loan amount, and lender name. Then, a random number generator is used to keep one observation from each match. Next, the data are matched just on tract and exact loan amount, and a unique observation from each match is kept. Next, the loan amount is allowed to vary sequentially more each iteration from $\pm\$1,000$ up to $\pm\$10,000$ in increments of 1,000. At each iteration, the previous two steps are repeated. That is, first tract, loan amount, and lender name are used. Then, after a unique observation is kept lender name is dropped and the process is repeated with just tract and loan amount before moving on to the next iteration with a higher loan range.

B Results for All Agent Preferred Loans

Below, I report the same borrower and loan-level outcomes I report in the main paper, but keeping all loans I flag as agent preferred, instead of just the retail channel loans. In general, the results

are robust to including more loans: there is little to no impact on time to close, ex-ante borrower characteristics, or ex-post loan performance.

The one set of results which do substantively change are those on interest rate in Table B3. Here, the coefficient on $Treat * Post_{jlt}$ is positive and significant in my main sample before including credit characteristics, but not when looking at all loans. The insignificant effect in column (1) and marginally significant result in column (2) is consistent with the fact that the full sample includes distribution channels that are unlikely to be subject to price effects from the merger, such as mortgage brokers, which will attenuate the effect size.

Table B1: Time to Close

	Days	30+ Days	45+ Days	60+ Days
Mean	42.0	0.72	0.35	0.16
Treat*Post	-2.0***	-0.034***	-0.032*	-0.014
	(0.54)	(0.013)	(0.019)	(0.011)
Treat	1.6**	0.035**	0.025	-0.0012
	(0.61)	(0.014)	(0.022)	(0.013)
FE	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year
	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency
R-squared	0.29	0.22	0.22	0.20
N	1,132,834	1,132,834	1,132,834	1,132,834

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the number of days between a home under contract and the home closing (column (1)), or indicator for if it took more than 45 days (column (2)), 60 days (column (3)), or 75 days (column (4)) to close. Unit of observation is a loan matched to a home purchase. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for any lender-agency pairs which ever merge. Standard errors are clustered at the agency level. ALl columns include CBSA, Year, Lender, and Agency fixed effects.

Table B2: Borrower Characteristics

	Amount	LTV	FICO	30 Days	60 Days	90 Days
Mean	$254,484	87.00	736	14.2%	7.8%	5.8%
Treat*Post	-8,356	-0.38	6.9***	-0.00079	0.0043	0.0018
	(6,161)	(0.84)	(2.4)	(0.0082)	(0.0058)	(0.0036)
Treat	1,268	-0.030	-5.2*	0.0050	-0.0050	-0.0060
	(6,710)	(0.84)	(2.7)	(0.010)	(0.0079)	(0.0056)
FICO*LTV				-0.000025***	-0.000022***	-0.000019***
				(5.4e-07)	(4.2e-07)	(3.7e-07)
FICO Score	0.00050***	0.00084***	0.00083***			
				(0.000049)	(0.000037)	(0.000032)
LTV				0.020***	0.017***	0.015***
				(0.00042)	(0.00032)	(0.00028)
FE	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year	CBSA,Year
	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency	Lender,Agency
R-squared	0.52	0.20	0.18	0.17	0.14	0.13
N	835,405	1,162,098	1,072,172	1,072,003	1,072,003	1,072,003

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is loan amount (column (1)), loan-to-value ratio (column (2)), FICO (credit) score at origination (column (3)), or indicator for if loan is ever 30 days delinquent (column (4)), 60 days delinquent (column (5)), or 90 days delinquent (column (6)). Unit of observation is a loan matched to a home purchase. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for any lender-agency pairs which ever merge. Standard errors are clustered at the agency level.

Table B3: Interest Rate (Mean = 4.09%)

	(1)	(2)
Treat*Post	0.026	0.054*
	(0.032)	(0.030)
Treat	-0.021	-0.041*
	(0.033)	(0.025)
FICO*LTV		0.000042***
		(6.7e-07)
FICO Score		-0.005***
		(0.0001)
LTV		-0.030***
		(0.001)
Sun&Abraham(2020)	0.067***	-0.032
	(0.009)	(0.034)
Sample	All	All
FE	CBSA,Year	CBSA,Year
	Lender,Agency	Lender,Agency
R-squared	0.41	0.43
N	1,162,386	1,162,386

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is loan interest rate. Unit of observation is a loan matched to a home purchase where loan is originated through the retail channel. Treat*Post represents the coefficient of interest and equals one if the lender and agency are a merged pair. Treat equals one for any lender-agency pairs which ever merge. Standard errors are clustered at the agency level.

C Robustness Checks

C.1 Additional Fixed Effects

Below, I report the interest rate result using CBSAxYear fixed effects, FIPSxYear fixed effects, and Zip-Year fixed effects. In general, the results are robust to the fixed effects specification I choose, and of similar magnitude.

Table C1: FIPS-Year Fixed Effects

	(1)	(2)	(3)	(4)
Treat*Post	0.021	0.037	0.069**	0.079***
	(0.039)	(0.036)	(0.028)	(0.025)
Treat	-0.0085	-0.019	-0.040	-0.052**
	(0.039)	(0.037)	(0.029)	(0.026)
FICO*LTV		-0.000012***		0.00004***
		(1.5e-06)		(7.4e-07)
FICO		0.00018		-0.0049***
		(0.00013)		(0.00007)
LTV		0.011***		-0.030***
		(0.0011)		(0.0006)
Sample	All	All	Retail	Retail
R-squared	0.42	0.47	0.44	0.46
N	1,188,913	1,095,474	829,938	824,220

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the loan interest rate. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for any lender-agent pairs which ever merge. Standard errors are clustered at the agency level. Fixed effects included in all columns are FIPSxYear, FIPS, Year, Lender, Agency.

Table C2: CBSAxYear Fixed Effects

	(1)	(2)	(3)	(4)
Treat*Post	0.020	0.044	0.071**	0.081***
	(0.040)	(0.034)	(0.028)	(0.024)
Treat	-0.0088	-0.024	-0.041	-0.053**
	(0.040)	(0.035)	(0.029)	(0.026)
FICO*LTV		0.000041***		0.000042***
		(6.5e-07)		(7.4e-07)
FICO		-0.0049***		-0.0049***
		(0.000057)		(0.000066)
LTV		-0.030***		-0.030***
		(0.00050)		(0.00057)
Sample	All	All	Retail	Retail
R-squared	0.41	0.44	0.44	0.46
N	1,189,092	1,095,646	830,157	824,442

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the loan interest rate. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for any lender-agent pairs which ever merge. Standard errors are clustered at the agency level. CBSAxYear, CBSA, Year, Lender, Agency.

Table C3: ZipxYear Fixed Effects

	(1)	(2)	(3)	(4)
Treat*Post	0.036	0.053*	0.074***	0.087***
	(0.042)	(0.031)	(0.019)	(0.015)
Treat	-0.033	-0.050	-0.056**	-0.067***
	(0.044)	(0.034)	(0.028)	(0.025)
FICO*LTV		0.000039***		0.000039***
		(9.2e-07)		(1.0e-06)
FICO		-0.0047***		-0.0047***
		(0.000081)		(0.000091)
LTV		-0.028***		-0.028***
		(0.00070)		(0.00078)
Sample	All	All	Retail	Retail
R-squared	0.44	0.46	0.46	0.48
N	622,278	572,097	428,953	425,511

* 0.10 ** 0.05 *** 0.01

Notes: Dependent variable is the loan interest rate. Treat*Post represents the coefficient of interest and equals one if the lender and agent are a merged pair. Treat equals one for any lender-agent pairs which ever merge. Standard errors are clustered at the agency level. ZIPxYear, ZIP, Year, Lender, Agency.