The Rise of Nonbanks and the Quality of Financial Services: Evidence from Consumer Complaints[*]

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Abstract

We show that as nonbanks' market share increases in a local residential mortgage market, the quality of mortgage services in the market improves. Two instrumental variable analyses exploiting (1) stress tests conducted by the Federal Reserve, and (2) mortgage industry surety bonds required by each state confirm this finding. We find evidence that as nonbanks grow their market share, they develop a specialty in servicing lower-income borrowers and increase investment in technology, leading to improved service quality. This improvement in service quality is more salient in counties with a higher percentage of minority populations.

Keywords: Product quality, Mortgage lending, Banks, Nonbanks

JEL classification: G21, G28, L13, L15

1   Introduction

Nonbanks, including FinTech lenders, have been growing rapidly since the recovery from the Global Financial Crisis (GFC). In particular, nonbanks have achieved a substantial presence in the U.S. residential mortgage market. For example, in 2018, they accounted for 47% of the mortgage originations and 35% of the post-origination mortgage servicing.[1] This substantial growth of nonbanks raises one important question: How does the expansion of nonbanks in the mortgage market impact consumer welfare?

Focusing on the origination stage of mortgages, the existing literature examines this question by investigating the effects of nonbanks on consumers' access to and the cost of mortgages. Specifically, the literature provides evidence that nonbanks increase credit access for riskier and less creditworthy borrowers, whereas the evidence regarding the effects on the cost of mortgages is mixed (e.g., Buchak et al. 2018; Jagtiani et al. 2021).

In this paper, we attempt to shed light on this question by examining the quality of financial services associated with mortgages, not only at the origination stage but also at the post-origination servicing stage. Our goal is to understand the evolution of service quality in a local residential mortgage market as nonbanks increase their presence in this market. Such evidence complements the findings of prior studies in two important dimensions. First, it extends our understanding of the impact of nonbanks' growth on consumer welfare beyond the origination stage of mortgages. Second, it sheds light on the interplay of the quantity and quality of financial services accompanying the rise of nonbanks. Such evidence should be especially relevant for policymakers and regulators, considering the ongoing discussions on the regulation of nonbanks.

Ex ante, it is not obvious whether and in which direction the service quality of the mortgage industry would change as nonbanks increase their share in the mortgage market. If nonbanks' increased market share is purely a result of regulatory arbitrage, service quality

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[1]These nonbanks' market shares are computed based on a sample of mortgage lenders that are included in both the Home Mortgage Disclosure Act (HMDA) and Mortgage-Backed Securities OnLine (eMBS) datasets.

facing consumers in the mortgage market could deteriorate due to the less regulatory oversight of nonbanks compared to that of traditional banks (Fuster et al., 2021).[2] However, as their market share grows, if nonbanks learn to better serve their customers through, for example, developing a specialty in servicing certain types of customers or investing in advanced technology, then service quality facing consumers in the mortgage market could improve.

Our analysis relates the quality of financial services associated with mortgages in a county to the market share held by nonbanks in the county's residential mortgage market. Admittedly, measuring the quality of financial services is challenging and subjective. The specific angle that we take to measure the service quality in the mortgage market follows recent literature that utilizes mortgage-related complaints filed with the Consumer Financial Protection Bureau (CFPB) (e.g., Begley and Purnanandam 2021). These complaints capture an important and unique aspect of financial service quality in the residential mortgage market—the direct feedback from mortgage borrowers about their poor experiences with financial institutions. Typically, these complaints are the results of issues that customers could not obtain a resolution from financial institutions before the CFPB intervenes. Based on these complaints, our measure of service quality is the complaint ratio, which is the number of mortgage-related complaints filed with the CFPB divided by the number of outstanding mortgages in the local market.

We follow prior literature (e.g., Buchak et al. 2018) and define nonbanks as lenders other than traditional deposit-taking banks. Our measure of nonbanks' market share is based on loan-level mortgage origination data from HMDA and is calculated as the dollar amount of mortgages originated by nonbanks divided by the total dollar amount of mortgages originated in the county. Although the CFPB data include both origination complaints and post-origination servicing complaints, we do not differentiate between nonbanks' share of mortgage originations and that of post-origination servicing. This empirical choice is appropriate because, despite the fact that comprehensive data on mortgage servicing are

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[2]Using data on Consumer Financial Protection Bureau (CFPB) supervision and enforcement, Fuster et al. (2021) find that tighter regulatory oversight improves servicing practices.

not available, nonbanks' market share of mortgage originations and that of post-origination servicing in the local mortgage market are highly (above 90%) correlated.[3]

We find that as nonbanks' market share increases in a county, the mortgage-related complaint ratio in the county decreases. This effect is economically large—a one standard deviation increase in nonbanks' market share is associated with a 12% reduction in the mortgage-related complaint ratio in the county. Of course, nonbanks' choices to expand business in specific counties are not random and also complaint ratios in a given county may change for other reasons. We carefully design our empirical tests to mitigate these endogeneity issues. First, we include county fixed effects to absorb any time-invariant county characteristics. For instance, counties may have different complaint ratios because they differ in their residents' willingness or ability to file complaints; to the extent that the average willingness or ability of a county's residents to file complaints is stable, county fixed effects absorb this potential heterogeneity. County fixed effects also alleviate the concern that some uncontrolled time-invariant county characteristics drive both nonbank market share and complaint ratio. Second, we include year fixed effects to mitigate the concern that our results are due to potential time trends in complaint ratios and nonbank market shares. Year fixed effects are especially important if we consider the possibilities that consumers become more familiar with the CFPB and therefore file more complaints over time, or that financial institutions become better at avoiding having complaints filed against them over time.

Third, we use two complementary instrumental variable (IV) strategies to address potential concerns that time-varying county characteristics or local economic dynamics may explain our result. In both IV analyses, we focus on the within-county change in nonbanks' market shares and examine its effect on the within-county change in complaint ratios. The first IV analysis exploits Federal Reserve's stress tests, which increase regulatory burdens for

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[3]Using various samples, we show that the correlation between nonbanks' market share of mortgage originations and that of post-origination servicing is over 90%. Although nonbanks mostly use the originate-to-distribute model of lending, they frequently remain the servicing entity after the sale of mortgages to various third parties. Even in situations where nonbanks sell mortgage servicing rights, they typically sell those rights to other nonbanks. Therefore, mortgages that are originated by nonbanks are likely serviced by nonbanks. Please see Section 3.2 for more discussions.

tested banks and result in a reduction in lending, including residential mortgages, provided by these banks(Covas 2017; Cortés et al. 2020). This reduction in mortgage originations by stress-tested banks may facilitate the expansion of nonbanks in the local mortgage market. Therefore, nonbanks' market share is likely to increase more aggressively in counties with a higher ex ante exposure to stress-tested banks, *ceteris paribus*. For this IV analysis, we use counties' ex ante exposure to stress-tested banks as an instrument for the change in nonbanks' market shares. The second IV analysis exploits the variation in mortgage industry surety bonds required by each state. The amount of surety bond reflects the costs of conducting mortgage business in the state and the difficulties in entering the mortgage market of the state. Therefore, nonbanks are likely to expand more aggressively in states with a lower surety bond requirement, *ceteris paribus*. For this IV analysis, we use states' mortgage industry surety bond requirement as an instrument for the change in nonbanks' market shares. We find that counties that have a higher ex ante exposure to stress-tested banks or that reside in states with a lower amount of surety bond requirement experience higher growth in nonbanks' market shares during our sample period, and subsequently, these counties experience a larger reduction in their mortgage-related complaint ratio.

We note that stress tests and surety bonds may have a direct impact on service quality. To meet the exclusion restriction, we carefully design our IV strategies to include two features. First, as we emphasized earlier, we focus on the *within-county change* in nonbanks' market shares and examine its effect on the *within-county change* in complaint ratios. Second, we construct the two instruments using information that is years preceding our sample period. As a result of these two features, even if the two IVs may directly influence the *level* of service quality, they are not expected to have a direct influence on the *change* in service quality during our sample period.

In addition, we conduct several robustness analyses to strengthen our identifying assumption. For the first IV, we carry out two exercises to control for possible direct effects of stress tests on service quality. First, because stress tests may directly affect the changes

in complaint ratios during the early years following the inception of stress tests, we limit our investigation to later years of our sample period. Second, because the number of stress tested banks increase significantly after 2013, we limit our sample to counties whose ex ante exposure to stress-tested banks is not affected by the inclusion of more banks in the stress tests after 2013. For the second IV, to alleviate the concern that county characteristics may be correlated with state-level mortgage regulations, we limit our investigation to small counties in each state because such counties are not likely to determine state-level mortgage regulations. Our finding survives all the above robustness tests.

To investigate the reasons for the reduced county-level complaint ratio, we first compare the complaint ratios between nonbanks and traditional banks. We find that the average complaint ratio of nonbanks is much higher than that of traditional banks. Therefore, the cross-sectional difference in the complaint ratios between nonbanks and traditional banks cannot explain the reduced county-level complaint ratio as nonbanks' market share increases.

Rather, we find that the complaint ratio of nonbanks decreases as their market share in the county increases, contributing to the overall reduction in the complaint ratio in the county. Specifically, focusing exclusively on mortgage complaints against nonbanks, we find that a one standard deviation increase in nonbanks' market share is associated with an 18% reduction in the complaint ratio of nonbanks in the county. We confirm this finding using the two IV strategies.

We explore two potential mechanisms behind the reduction in nonbanks' complaint ratio as they gain a greater market share. First, we investigate whether nonbanks are likely to develop a specialty in servicing certain types of borrowers as their market share increases. Supportive of this conjecture, we find that nonbanks become increasingly focused on lower-income borrowers as their market share increases. Specifically, as nonbanks' market share increases in the local mortgage market, their average borrower income becomes lower and the dispersion of their borrowers' incomes becomes smaller. Previous literature documents that the average borrower income of nonbanks is lower than that of traditional banks (Buchak

et al. 2018). Our finding is novel and extends the prior finding by showing that as nonbanks increase their market share, their customers become even more concentrated among lower-income borrowers. Similar to the private debt funds that specialize in providing loans to distressed companies and helping them restructure out of distressed situations, our evidence suggests that specialization allow nonbank mortgage lenders to develop a deeper understanding of lower-income borrowers' needs and to be better equipped to solve these customers' issues, resulting in fewer complaints (Hernandez et al. 2015). Critical to this mechanism is whether nonbanks indeed become better at servicing lower-income borrowers. By examining detailed complaint issues, we find that complaints against nonbanks about issues related to difficulties in making mortgage payments—complaints that are likely filed by lower-income borrowers—are significantly reduced as nonbanks' market share increases. Taken together, the evidence is consistent with the idea that, as their market share increases, nonbanks develop a specialty in offering better mortgage solutions to lower-income borrowers.[4]

Second, we investigate whether nonbanks are likely to invest in technology to improve their service quality as their market share increases (Fuster et al. 2019). We test this conjecture by first examining nonbanks' incentives to invest. Specifically, because the marginal cost of technology investment is decreasing, nonbanks in a local county may have more incentives to invest in technology if their market shares increase not only in the focal county but also in the entire nation, allowing them to take advantage of the economies of scale. Using a two-stage regression model, we find evidence that the increased market share of nonbanks in a county is positively associated with their incentives to invest, resulting in a lower complaint ratio for nonbanks in the county. Lending support to this mechanism, we find that as nonbanks' market share increases in a county, nonbanks' use of technology (proxied by nonbanks' demand for employees with technology-related skills) indeed increases. Furthermore,

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[4]Our interpretation should not be severely biased by the lower financial literacy of lower-income borrowers. We have shown that borrowers of nonbanks are not less likely to complain than borrowers of traditional banks, although the average income of nonbanks' borrowers is lower than that of traditional banks' borrowers. Also, prior literature shows that there are more mortgage-related complaints in areas with a higher proportion of poor populations (Begley and Purnanandam 2021).

we find that complaints against nonbanks about issues related to the payment process—complaints that are likely resolved by upgrading technologies deployed in online payment platforms—are significantly reduced as nonbanks' market share increases. Collectively, the evidence suggests that nonbanks invest more in technology to improve their service quality as their market share increases.

Shifting away from nonbanks, we continue our investigation into the evolution of mortgage-related complaint ratios by examining traditional banks. We find that the mortgage-related complaint ratio of traditional banks also decreases as nonbanks' market share increases in the county, contributing to the overall reduction in the complaint ratio of the local mortgage market. This result is potentially due to lender specialization following the rise of nonbanks. We find that traditional banks' average borrower income increases as nonbanks' market share increases in the county. Considering that higher-income borrowers are likely of higher credit quality and are less likely to receive low-quality services that result in filing complaints (Begley and Purnanandam 2021), the evidence does not necessarily indicate an improvement in traditional banks' service quality; rather, it may be the case that as nonbanks' market share increases in a county, traditional banks in the county become increasingly focused on higher-income borrowers, resulting in a lower complaint ratio for traditional banks. The increased average income of traditional banks' borrowers and the decreased average income of nonbanks' borrowers together suggest that nonbanks and traditional banks become increasingly specialized in different types of borrowers as nonbanks grow in size. Importantly, this lender specialization benefits lower-income borrowers without hurting higher-income ones.

Finally, we examine whether the improvement in service quality is more likely to benefit marginalized borrowers, such as minorities. Previous studies show that in the mortgage market, minorities are more likely to face discrimination in both accessing mortgages and receiving high-quality mortgage services (e.g., Munnell et al. 1996; Bartlett et al. 2022; Begley and Purnanandam 2021). We find that the effect of the increased market share held by nonbanks on mortgage-related complaints is stronger for counties with a higher

percentage of minority populations. This finding highlights the role of nonbanks in alleviating discrimination in the quality of services received by minorities in the mortgage market.

Taken together, our findings speak to the collection of recent studies on the consequences of the rise of nonbanks. This literature shows that the growth of nonbanks is important in substituting for bank lending when credit supply from banks contracts. In particular, the funding provided by nonbanks is critical for small business lending and homeownership by low-income households (e.g., Buchak et al. 2018; Gopal and Schnabl 2022; Gete and Reher 2021). The literature also shows that the growth of nonbanks may reduce the resilience of the credit market during market-wide stress because nonbanks lack access to insured liabilities (e.g., Irani et al. 2021; Drechsler et al. 2022). We complement this strand of literature by showing that, when evaluating the welfare impact of nonbanks' growth in the mortgage market, there is a positive effect on the service quality in the mortgage market; this channel of welfare improvement is particularly important for minority consumers.

Our findings also provide new evidence on the interplay between the quantity and quality of financial services using the nonbank industry as a laboratory. Closely related to our paper is Begley and Purnanandam (2021). Focusing on the Community Reinvestment Act (CRA), they show that when banks increase the quantity of mortgage supply due to regulatory requirements, their service quality (proxied by consumer complaints) declines. Their finding suggests that banks trade off the quantity of credit supply for the quality of such services. In contrast, our evidence suggests that when the mortgage supply increases due to market forces, financial institutions are able to develop relevant expertise and upscale investment, resulting in improved service quality. This contrasting evidence together is policy-relevant because, at the time of writing, policymakers are considering overhauling the CRA to encompass nonbanks.[5]

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[5]For example, please see https://www.wsj.com/articles/powell-highlights-slower-recovery-for-low-wage-and-minority-workers-11620065926.

2   Related Literature

Nonbanks, i.e., financial intermediaries that provide banking services but do not rely on deposits as a funding source, have experienced marked growth in the consumer lending market since the recovery from the GFC. The consequences of this expansion have been of great interest to regulators and policymakers. So far, the literature documents both positive and negative effects of a growing nonbank industry. Regarding the positive effects, the literature shows that nonbanks play an important role in supplying credit, especially when credit supply by traditional deposit-taking banks is constrained. For example, Buchak et al. (2018) and Irani et al. (2021) show that, in response to the increased regulatory burdens, such as higher capital requirements, banks are likely to reduce credit supply while nonbanks are likely to fill in the gaps. By examining small business loans, Gopal and Schnabl (2022) show that lending by nonbanks substitutes for the reduction in lending by banks after the GFC. The literature also shows that nonbanks provide credit access for borrowers with lower credit quality (Buchak et al. 2018; Gete and Reher 2021; Jagtiani et al. 2021). Regarding the negative effects, theory suggests that nonbanks may impose significant fragility on the financial system because they lack insured liabilities in their funding structure (e.g., Plantin 2015). Empirically, Irani et al. (2021) show that, during the GFC, loans originated by nonbanks with relatively liquid liabilities were less likely to be rolled over and those loans also experienced greater price volatility. Our study contributes to this strand of literature by exploring a different dimension—the quality of financial services received by mortgage borrowers—to assess the consequences of the nonbank industry's expansion.

To understand the consequences of nonbanks' presence, a collection of studies examine the extent to which nonbanks improve or impair the overall efficiency of the financial system (Philippon 2016). For example, focusing on the role of Fintech lenders in the Paycheck Protection Program (PPP) during the Covid-19 pandemic, the literature documents both positive and negative effects of Fintech lenders on allocating credit. On the one hand,

Erel and Liebersohn (2022) show that Fintech complements banks during the pandemic by expanding financial services to ZIP codes where traditional banks do not have a strong presence. On the other hand, Griffin et al. (2022) show that misreporting is higher among FinTech loans than other loans in the PPP program. Furthermore, in the mortgage market, Gete and Reher (2021) show that nonbanks increase ZIP code-level home ownership, suggesting that nonbanks complement traditional banks by serving low credit quality borrowers. Our findings suggest that one channel through which nonbanks could improve the efficiency in the mortgage market is to improve service quality by developing expertise in servicing lower-income borrowers. This evidence is consistent with the market trend of the mortgage servicing industry, which indicates that nonbanks have increasingly focused on acquiring specialty and delinquent servicing (Hernandez et al. 2015).

Our empirical investigation benefits from the prior literature on the impact of market concentration on banks' lending behavior. Petersen and Rajan (1995) show that lenders are more likely to invest in building relationships with their borrowers if the credit market is concentrated because it is easier for these lenders to internalize the benefits of lending relationships. Giannetti and Saidi (2019) show that lenders' credit concentration in an industry helps the industry receive more credit in distress because their lenders internalize negative spillovers when fire sales are likely to ensue (also see Saidi and Streitz 2021). Complementary to this literature, our study suggests that when nonbanks have a concentrated market share in a local residential mortgage market, they have more incentives to make investments to improve their service quality to customers because they are likely to internalize the benefits of future business.

Another strand of literature that provides important guidance to our research agenda and the interpretation of results is the literature on scale economies in the financial sector. The existing literature supports the notion that the banking industry significantly benefits from scale economies (Hughes and Mester 2013). The benefits have become even more salient in recent years because of the high costs associated with adopting advanced technology in

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the banking industry, such as computing, telecommunication, automation, machine learning, and artificial intelligence (Mester 2010). In recent years, the U.S. banking industry has spent over \$100 billion annually on technology investment.[6] Fuster et al. (2019) show that advanced technology plays an important role in improving the operational efficiency of mortgage lenders. Our study provides evidence consistent with the notion that a large market share allows nonbanks to take advantage of scale economies in funding and utilizing advanced technology, reducing the likelihood of consumer complaints.

Our study is closely related to the recent literature that goes beyond the quantitative measure of financial services and focuses on the quality of financial services. Using the CFPB data, Sedunov (2020) shows that consumer satisfaction is higher in counties with more small banks; Begley and Purnanandam (2021) show that mortgage-related complaints are higher in areas with a higher proportion of poor and minority borrowers and in areas targeted by the CRA. Using fraud conducted by financial advisers, Gurun et al. (2018) show that trust plays a critical role in the investment advisory industry; Egan et al. (2019) show that misconduct among financial advisers is extensive in the United States and unsophisticated consumers are the targets. Focusing on an important trend in the consumer lending market—the rise of nonbanks, we provide evidence that the expansion of nonbanks' market share has a positive effect on the service quality received by consumers in the mortgage market.

Our study is also related to the literature on discrimination facing minorities in the financial markets. This literature shows that minorities are more likely to be denied access to mortgages (Munnell et al. 1996), more likely to receive inferior financial services (Begley and Purnanandam 2021), more likely to experience debt collection judgments (LaVoice and Vamossy 2019), and less likely to achieve financial restitution after disputing financial services (Haendler and Heimer 2021). Recent studies explore whether nonbank lenders can alleviate discrimination against minorities. By examining interest-rate decisions in the mortgage market, Bartlett et al. (2022) show that Fintech lenders reduce, but do not eliminate,

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[6]Please see https://www.wsj.com/articles/technology-is-banks-new-battleground-11568114378.

discrimination against Latinx/African-American borrowers, possibly because algorithms and big data enable Fintech lenders to extract rents. By examining approval rates in the mortgage market, Giacoletti et al. (2021) show that nonbanks are more likely to have equal treatment of White and Black mortgage applicants than traditional deposit-taking banks. Our findings add to this strand of literature by shedding light on the potential of nonbanks to alleviate discrimination in the quality of services facing minorities in the mortgage market.

3   Data and sample

3.1   Data

We obtain mortgage-related complaints from the CFPB. After the GFC, the DFA established the CFPB as a platform for consumers to file complaints against financial institutions with regard to a wide range of financial products, such as credit reports, debt collection, student loans, and mortgages. The CFPB has considerable authority to conduct investigations of the complaints. The resulting gathered facts are used to identify violations of federal consumer financial law and may be used in a public enforcement action. Since its inception until 2020, the CFPB has received over 1.5 million consumer complaints and provided over $13 billion in consumer relief.

Among the complaints filed with the CFPB, 17% are related to mortgages. The majority of these complaints concern post-origination mortgage servicing (such as payment processing, loan modification, loan collection, and foreclosure) rather than mortgage originations. For most complaints, the CFPB reports the five-digit ZIP code of the filing consumer. For some complaints, the CFPB also includes a brief narrative of the complaint; in these cases, the last two digits of the ZIP code are removed to protect the consumer's anonymity. We restrict our analysis to only complaints with five-digit ZIP codes reported in the CFPB, to accurately match complaints in a county with the market share of nonbanks in the county. Our analysis, therefore, includes mortgage-related complaints that are associated with a

five-digit ZIP code. We aggregate ZIP code-level complaints at the county level.

Information on mortgage loans comes from the HMDA dataset, which provides substantial coverage of the U.S. residential mortgage market.[7] The HMDA data contain detailed information on loan applications and originations, including the application year, application outcome, loan amount, loan type, loan purpose, the location of the mortgaged property, the income and demographic information of applicants, and lender identity. We classify HMDA lenders into traditional deposit-taking banks and nonbanks by using the Avery file, following Jagtiani et al. (2021).

To construct our sample, following Loutskina and Strahan (2009), we keep only conventional home purchase loans originated for owner-occupied 1-to-4 family housings;[8] we drop loans with missing information on loan size, applicant income, or location. We also drop loans smaller than $10 thousand or larger than $10 million. We exclude mortgages insured by the Federal Housing Administration (FHA) and mortgages guaranteed by the U.S. Department of Veterans Affairs (VA). This empirical choice is due to two reasons. First, FHA and VA loans are different from other mortgages in that they are issued to lower credit quality borrowers with explicit guarantee/insurance provided by government agencies; these differences per se are likely to lead to different service outcomes for FHA and VA loans compared with those for other mortgages.[9] Second, nonbanks are the dominant mortgage originators for these loans during our sample period, reaching 80% by 2016 (Jagtiani et al., 2021); by comparison, in the conventional mortgage loan market, nonbanks originated 45% of the mortgages in 2016. Therefore, mixing the FHA and VA loan market with the conventional mortgage loan market would complicate the interpretation of the results about mortgage service quality. Nonetheless, we include FHA and VA loans in a robustness test.[10]

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[7]Avery et al. (2007) estimate that the coverage is about 80% in 2006.

[8]If we include all mortgages (including refinancing loans, loans for houses that are non-owner occupied, and loans for multi-family houses) in the sample, our main results remain robust.

[9]Confirming this conjecture, we find that although FHA and VA loans comprise 25% of the overall mortgage market in 2016, there are only 12.6% of the complaints filed against FHA or VA loans in 2016 in the CFPB database.

[10]Please see 4.1 for details.

Regarding other data used in our analyses, we obtain county-level income per capita from the Bureau of Economic Analysis (BEA), county-level unemployment rates from the Bureau of Labor Statistics (BLS), and county-level minority populations from the 2010 Census files.

3.2   Sample and main variables

Our sample includes 149,291 complaints filed between 2012 and 2018.[11] Table 1 shows the distribution of issues associated with these complaints. Besides examining the total number of complaints, we also differentiate between complaints about the post-origination mortgage servicing and complaints about mortgage originations. Complaints about the post-origination mortgage servicing include complaints tagged by the CFPB under the following five categories: "Loan modification, collection, foreclosure," "Loan servicing, payments, escrow account," "Settlement process and costs," "Struggling to pay mortgage," and "Trouble during payment process." Complaints about mortgage originations include complaints tagged by the CFPB under the following four categories: "Application, originator, mortgage broker," "Applying for a mortgage or refinancing an existing mortgage," "Credit decision / Underwriting," and "Closing on a mortgage." Four out of the top five issues in the sample are related to post-origination mortgage servicing. Less than 10% of the complaints are related to mortgage originations. For a county to be included in our sample, we require the median number of complaints in the county during our sample period to be at least one; as a result, our sample for the county-level analyses includes 7,178 county-year observations.[12]

Our measure of service quality is the county-year complaint ratio, which is defined as the number of complaints scaled by the number of outstanding mortgages. The scaling variable is the number of outstanding loans in a year rather than the number of loans originated in that year because, as shown in Table 1, many complaints are associated with the servicing of mortgages that may be originated in previous years. We proxy a county's outstanding

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[11]Our sample period starts in 2012 because it is the first year with full-year coverage in the CFPB dataset.

[12]Our results are robust to (1) requiring the median number of complaints in the county during our sample period to be more than one, or (2) including all counties with at least one complaint during the sample period.

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mortgages using the number of federal tax filings in the county with mortgage interest payments. For robustness, we alternatively use the total number of mortgages originated in that county during the last five years as a proxy for the county's outstanding mortgages.

Table 2 shows that an average county-year reports 19 complaints out of 29,304 outstanding mortgage loans, resulting in a complaint ratio of 0.05%. We observe a large cross-sectional variation in complaint ratios with an interquartile range from 0.02% to 0.07%.

Nonbanks' market share for a county-year is calculated as the dollar amount of mortgages originated in the county in year *t-1* by nonbanks over the dollar amount of mortgages originated in the county in year *t-1* by all lenders. For robustness, we compute an alternative measure of nonbanks' market share using the number of mortgages rather than the dollar amount of mortgages. Figure 1 shows that there is a secular increase in the market share of nonbanks in the mortgage market after the GFC. The average market share of nonbanks in our sample is 32% with an interquartile range from 20% to 43%.

It is important to note that our measure of nonbanks' market share is based on information about mortgage originations. In interpreting our results, we use nonbanks' market share of mortgage originations as a proxy for nonbanks' overall market share of the mortgage industry, including both originations and post-origination servicing. This empirical choice is due to two considerations. First, comprehensive data on mortgage services are not available, making it impossible to conduct empirical analysis using granular observations.

Second and more importantly, nonbanks' market share of mortgage originations and that of post-origination servicing in the local mortgage market are highly correlated, making the use of origination information appropriate in measuring nonbanks' overall presence in the mortgage market. For example, using a sample of mortgages sold to Freddie Mac and still outstanding during our sample period (i.e., 2012–2018), the top left panel of Figure 2 shows the relationship between nonbanks' nationwide market share of mortgage originations and

that of post-origination servicing. The correlation between the two series is 0.99.[13,14] The remaining panels of Figure 2 provide bin scatter plots, which show the relationship between nonbanks' market share of mortgage originations and that of post-origination servicing at various geographical levels. Specifically, we group nonbanks' market shares of mortgage originations into 10 bins for the state-level panel and 100 bins for the Metropolitan statistical areas (MSA) level and ZIP-code level panels; we plot the average nonbank market share of mortgage originations and that of post-origination servicing for each bin. Across all three panels, we see a close alignment of nonbanks' market shares of these two businesses.[15] Therefore, although nonbanks mostly use the originate-to-distribute model of lending, they often time remain the servicing entity for a sizable portion of the loans they sell.

Furthermore, during our sample period, traditional banks were limited in their ability to purchase mortgage servicing rights from nonbanks due to the Basel III capital requirements (Lux and Greene 2015). Therefore, in our sample, mortgages that are originated by nonbanks are likely serviced by nonbanks. Because the interpretation of our findings is based on the market share of all nonbanks in a county, rather than the market share of individual nonbanks in the county, the transfer of mortgage servicing rights between nonbanks should not impact our interpretation.

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[13]This sample is from Freddie Mac Single Family Loan-Level Dataset. The dataset reports the sellers of mortgages and we assume these sellers as the originators of the mortgages.

[14]We also use a sample of mortgage lenders that are included in both the HMDA and eMBS datasets between 2016 and 2018, and we find similar results; nationwide, the correlation between nonbanks' market share of mortgage originations and that of post-origination servicing is 0.99. We thank You Suk Kim for providing this matched sample.

[15]Within this sample of loans sold to Freddie Mac, the servicing rights of 32% of the loans remain held by the originating nonbanks; for the loans that the servicing rights are not held by the originating nonbanks, 57% are sold to another nonbank for servicing. These statistics imply that, in this sample, 71% ($32\% + 68\% \times 0.57 = 71\%$) of the loans that are originated by nonbanks are still serviced by nonbanks.

4 Nonbanks' market share and mortgage service quality

The goal of our empirical analysis is to understand the effects of nonbanks' market share in a county on the quality of financial services associated with mortgages in the county. In this section, we provide evidence that nonbanks' market share in a county is negatively associated with the mortgage-related complaint ratio in the county. We conduct two instrumental variable analyses to support a causal link between the increase in nonbanks' market share and the decrease in the mortgage-related complaint ratio.

4.1 Ordinary least squares (OLS) regression

We start our analysis by estimating the following regression model as the baseline specification:

$$Complaint\,ratio_{c,t} = \beta Nonbank\,share_{c,t-1} + \gamma Controls_{c,t-1} + \delta_c + \eta_t + \epsilon_{c,t}, \qquad (1)$$

where the dependent variable is the county-level complaint ratio, which is the total number of complaints in county c in year t scaled by the number of outstanding mortgage loans in the county in that year. $Nonbank\,share_{c,t-1}$ is the market share of nonbanks in the county's residential mortgage market in year t-1. We focus on nonbank market share in the preceding year because we are interested in the effect of the most recent nonbank market share on the complaint ratio. Although some complaints (especially the ones about post-origination mortgage servicing) could be against mortgages originated years ago, the most recent market share of nonbanks is relevant for the service quality received by consumers, not the market share when the mortgages were originated years ago. $Controls_{c,t-1}$ includes county income per capita and unemployment rates to absorb time-varying differences in economic conditions across counties. δ_c indicates county fixed effects and controls for the

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unobserved time-invariant differences across counties. η_t indicates year fixed effects and controls for the time trend of complaint ratios and macro-level shocks that may affect the complaint ratio. Standard errors are clustered at the county level.

Table 3 presents the baseline estimation results. Column (1) shows that as the market share of nonbanks in a county's mortgage market increases, the complaint ratio decreases. The economic meaning of the coefficient is that, following a one standard deviation increase in the market share of nonbanks, the complaint ratio decreases by 0.006 percentage points, which is a 12% reduction from the average county-level complaint ratio.[16] In columns (2) and (3), we classify complaints into complaints about post-origination mortgage servicing and those about mortgage originations, respectively. The results show that nonbanks' market share is negatively associated with only complaints about post-origination mortgage servicing, not those about mortgage originations. This evidence suggests that our main finding is due to the reduction in complaints about the post-origination mortgage servicing rather than mortgage originations. This result may not be surprising since the majority of the mortgage-related complaints filed with the CFPB are about post-origination mortgage servicing. Nonetheless, this finding highlights an important distinction between our study and the existing studies that focus on the origination stage of mortgages to understand the impact of nonbanks on the mortgage market.

We conduct a battery of robustness tests. First, we use an alternative measure of the complaint ratio, where a county's outstanding mortgages are proxied by the total number of mortgages originated in that county during the last five years. Second, we use an alternative measure of nonbanks' market share based on the number of mortgages rather than the dollar amount of mortgages. Third, to examine whether the results are driven by large nonbanks, we exclude Quicken Loans (i.e., the nonbank with the largest amount of loan originations in our sample) and the top 3 nonbanks, respectively. Fourth, we drop observations from 2012 to limit the impact of GFC on the result. The negative association between the complaint

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[16]$0.1638 \times 0.037 = 0.006; 0.006/0.05 = 12\%$

ratio and nonbanks' market share survive all the robustness tests. These results are reported in Tables A2 to A5. In additional robustness tests, we (1) include all mortgages (including refinancing loans, loans for houses that are non-owner occupied, and loans for multi-family housings) in calculating nonbanks' market share, (2) include FHA and VA loans in the sample, (3) require the median number of complaints in the county during our sample period to be more than one, (4) include all counties with at least one complaint during the sample period, and (5) include the ratio of minority population as an control variable. Our main results remain robust.[17]

4.2 Instrumental variable analysis

Nonbanks' presence in a county is not random. Besides time-invariant county characteristics, time-varying county characteristics and local economic dynamics may affect nonbanks' decisions to expand in specific counties. Therefore, although we include county fixed effects in the OLS regression, the presence of unobserved time-varying county characteristics may be correlated with both the market share of nonbanks in the county and the complaint ratio of the county, resulting in biased estimates. To address this identification challenge, we conduct two instrumental variable (IV) analyses.

4.2.1 Instrumental variable analysis: stress tests

The first IV analysis exploits the stress tests implemented by the Federal Reserve. The DFA requires Federal Reserve to conduct annual stress tests starting from 2009 to assess if large bank holding companies have sufficient capital to absorb losses under several stress scenarios. Covas (2017) shows that stress tests impose disproportionately high capital requirements on residential mortgages. Buchak et al. (2018) suggest that banks reduce mortgage lending in order to build capital buffers required by regulations, facilitating the expansion of nonbanks' market share.[18] Therefore, nonbanks' market share is likely to increase more

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[17]The results from these tests are not tabulated but available upon request.

[18]Please also see Irani et al. (2021), Chernenko et al. (2022), and Begley and Srinivasan (2022).

aggressively in counties with a higher ex ante exposure to stress-tested banks, *ceteris paribus*.

For this IV analysis, we use counties' ex ante exposure to stress-tested banks as an instrument for the change in nonbanks' market shares in the local residential mortgage market. Specifically, we calculate the IV as the county's mortgage market share in 2008 (i.e., the year right before the inception of stress tests) held by banks that would be subject to stress tests during our sample period.[19] This IV analysis examines whether the instrumented within-county change in nonbanks' market shares between 2012 and 2018 affects the within-county change in the complaint ratios during the same period.

We recognize that stress tests may directly affect the service quality in the local mortgage market through two channels. First, stress tests may affect the service quality of tested banks because of the increased regulatory oversight. Second, stress tests may further affect the service quality of non-tested banks through peer effects or market competition. However, these considerations should not result in a violation of the exclusion restriction in our empirical setup because our sample period starts in 2012, which is years after the inception of stress tests (i.e., 2009).[20] During our sample period, the impact of stress tests on service quality is likely already incorporated in the observed level of service quality. Therefore, although the ex ante exposure to stress-tested banks may have a direct effect on the level of service quality in the local mortgage market soon after the inception of stress tests, it should not influence the within-county changes in service quality years after the inception of stress tests through channels other than its impact on the evolution of lender composition (i.e., banks versus nonbanks) in the county. In addition, we conduct two robustness tests of this IV strategy to ensure our interpretation is not contaminated by the direct impact of stress tests on service quality provided by banks and nonbanks. The details of these robustness tests are discussed at the end of this subsection.

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[19]This IV approach is similar to the one used in Begley and Srinivasan (2022).

[20]Prior to the passage of DFA in 2010, the Federal Reserve initiated the Supervisory Capital Assessment Program (SCAP) in 2009 to conduct stress tests on large U.S. bank holding companies.

We estimate the following regression model:

$$Complaint\,ratio_{c,\Delta(2018-2012)} = \beta Nonbank\,share_{c,\Delta(2017-2011)} + \gamma Controls_{c,\Delta(2017-2011)} + \epsilon_c,$$

(2)

where $c, \Delta(2017-2011)$ indicates the within-county change in variables from 2011 to 2017, and $Nonbank\,share_{c,\Delta(2017-2011)}$ is instrumented by counties' ex ante exposure to banks subject to stress tests.

Table 4 presents the regression results. The result from the first-stage regression (column 1) shows that counties with a higher ex ante exposure to stress-tested banks indeed experience higher growth in nonbanks' market share. Consequently, the result from the second-stage regression (column 2) shows that these counties witness a larger reduction in the mortgage-related complaint ratio. In column (3), we confirm that the results hold if we restrict complaints to only those related to post-origination mortgage servicing. Regarding the size of the coefficients, the IV estimates suggest a much larger effect of nonbanks' market share on the complaint ratio than the OLS estimates.

To strengthen our identifying assumption and ensure that our IV results are not due to the direct impact of stress tests on service quality, we conduct two robustness tests. First, we focus on a more recent change in complaint ratios (i.e., changes between 2014 and 2018). Considering that any possible direct effects of stress tests on service quality may take time to appear, the changes in complaint ratios during the early years of the stress tests may be partially due to stress tests directly. However, this is less likely to be a concern if we focus on changes in complaint ratios during the later years of our sample period. The results reported in Panel A of Table 5 show that our findings remain robust when we focus on this more recent change in complaint ratios.

Second, we limit our sample to counties, whose ex ante exposure to stress-tested banks is not influenced by the inclusion of more banks in the stress tests in the later years of our sample period. Because the number of stress-tested banks increased significantly in

2014,[21] some counties' exposure to stress-tested banks experienced a large increase after 2013, which may affect the service quality in these counties and hence the within-county change in complaint ratios that we focus on in our estimation. This should not be a concern if we drop counties with ex ante exposure to banks that have only become a participant in stress tests after 2013. The results reported in Panel B of Table 5 show that our findings remain robust when we use this subsample of counties.

4.2.2 Instrumental variable analysis: mortgage industry surety bonds

The second IV analysis exploits the variation in mortgage industry surety bonds required by each state. These requirements are imposed in order to protect mortgage borrowers against dishonest lending practices. To conduct mortgage business in a state, mortgage professionals, such as mortgage brokers, lenders, originators, and servicers, need to apply for licenses from the state and are required to abide by all state laws and regulations. In particular, as part of the licensing application, mortgage professionals (i.e., the principals) are required to post surety bonds through a surety bond company. In case of noncompliance (such as predatory lending behavior), surety bond company will promptly pay for all costs and damages and then seek full compensation, including expenses, from the principals. The annual premium charged by the surety bond company is determined by the amount of surety bond required, the expected value of claims against the principal, and the probability of collecting full compensation from the principal. As a result, before issuing the bond, the surety bond company may conduct detailed screening of the bond applicants, making surety bond a significant barrier to entry in states with a high amount of surety bond requirement, especially for entities with few years in the business (Kleiner and Todd (2009). Therefore, the amount of surety bond required in a state reflects the costs of conducting mortgage business in the state and the difficulties in entering the mortgage market of the state. This implies that nonbanks should expand more aggressively in states with lower surety bond

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[21]Pre-2014, stress tests on average include 19 BHCs; since 2014, stress tests on average include more than 30 BHCs.

requirements, *ceteris paribus* (the relevance condition).

For this IV analysis, we use states' minimum amount of surety bond imposed on mortgage brokers as an instrument for the change in nonbanks' market shares in the local residential mortgage market.[22] Same as the first IV strategy, this IV analysis examines whether the instrumented within-county change in nonbanks' market shares between 2012 ante 2018 affects the within-county change in the complaint ratios during the same period. One might argue that the level of surety bond requirement of a state may reflect the overall toughness of the state's mortgage regulations, which might have a direct effect on the level of service quality in the mortgage industry of the state. However, surety bond requirements should not affect the within-county changes in service quality as long as there are no changes in these regulations over time (the exclusion condition). Therefore, for this IV analysis, we restrict our sample to states that have not experienced any changes in the amount of bond required since 2010.[23]

We re-estimate equation (2) but use the log amount of the mortgage broker surety bond required by each state to instrument for $Nonbank_{c,\Delta(2017-2011)}$. Table 6 presents the regression results. Column (1) reports the result from the first-stage regression. It shows that counties that reside in states with a lower amount of surety bond requirement experience higher growth in nonbanks' market share. These counties, as shown in the results from the second stage regression reported in column (2), witness a larger reduction in the mortgage-related complaint ratio subsequently. Column (3) shows that the results hold if we restrict complaints to only those related to post-origination mortgage servicing.[24]

This second IV also helps us to address one potential endogeneity concern present in the first IV. It is possible that a county's characteristics may determine its ex ante exposure

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[22]Surety bonds imposed on mortgage brokers are the most prevalent across states compared to those imposed on other mortgage professionals; such information, therefore, provides a clear comparison of the costs of conducting mortgage business across states. Typically, the amount of surety bond imposed on mortgage lenders and servicers is usually the same as that imposed on mortgage brokers.

[23]To identify states with no changes in surety bond requirement for mortgage brokers during our sample period, we collect each state's mortgage broker surety bond requirement at the time of writing (i.e, September 2021) and compare it with the mortgage broker surety bond requirement as of 2010 available here.

[24]The results in this table are robust to clustering standard errors at the state level.

to stress tested banks. If these county characteristics are also correlated with the *changes* in nonbank market share and complaint ratio, the coefficient estimate of the first IV analysis may be biased. A similar concern is less likely to exist for the second IV because the characteristics of a single county should not determine the surety bond requirement of the entire state. Nonetheless, we strengthen this identifying assumption by conducting a robustness test, where we limit our investigation to counties that are not likely to influence state-level mortgage regulations. Arguably, large counties in a state carry a greater weight in influencing the state's regulation. If so, the characteristics of these large counties may be correlated with the state's surety bond requirement. Therefore, in the robustness test, we repeat the surety bond IV analysis but exclude large counties in the state, i.e., counties with a population in the top decile or quintile within each state. The results are reported in Table 7 and our finding remains robust.

5 Evaluate potential explanations for the improved service quality

In this section, we explore the explanations for the improved service quality accompanying the rise of nonbanks in the local residential mortgage market. We also investigate whether the effect of nonbanks' market share on service quality differs across counties based on the percentage of minority populations.

5.1 Complaint ratio: nonbanks vs. traditional banks

One potential explanation for the decrease in the complaint ratio is that the complaint ratio of nonbanks is lower than that of traditional banks on average. If so, the increase in nonbanks' market share in a county would reduce the complaint ratio in the county. To examine whether this is the case, we conduct a univariate comparison of complaint ratios between nonbanks and traditional banks that are located in the same county. We find that

the average complaint ratio of nonbanks (0.46%) is much higher than that of traditional banks (0.27%). This comparison suggests that the cross-sectional difference between the complaint ratios of nonbanks and that of traditional banks cannot explain the reduced county-level complaint ratio as nonbanks' market share increases.

We interpret this finding as consistent with the differences in borrower characteristics between nonbanks and traditional banks documented in prior literature. As shown in Buchak et al. (2018), nonbanks are more likely to serve riskier, less creditworthy, and lower-income borrowers. Considering that such borrowers are more likely to have difficulties in making mortgage payments, and therefore, more likely to file a complaint (Begley and Purnanandam 2021), it is not surprising that nonbanks have higher complaint ratios than traditional banks on average. These findings are also consistent with the differences in business models between nonbanks and traditional banks. It is typical for nonbanks to finance their entire originations through securitization and the originate-to-distribute model; whereas traditional banks still hold between 30% and 50% of their originations on their balance sheets (Buchak et al. 2018). As a result, traditional banks may be more concerned with loan performance, and consequently, more incentivized to provide good services.

Overall, the result indicates that the reduction in the complaint ratio following an increase in nonbanks' market share is not due to the cross-sectional difference in complaint ratios between nonbanks and traditional banks.

In Figure 3, we plot the evolution of the average complaint ratio during our sample period separately for traditional banks and nonbanks. The graph indicates that, although nonbanks on average have higher complaint ratio, the complaint ratios for both types of lenders reduce significantly during our sample period when there is a substantial increases in nonbank market share. In particular, towards the end of our sample period, the gap in complaint ratio between these two types of lenders has closed. Therefore, the decrease in complaint ratio for both types of lenders may drive our main finding and we formally test this conjecture in Sections 5.2 and 5.3.

5.2 Nonbanks' market share and mortgage-related complaints against nonbanks

5.2.1 OLS and IV analysis

In this section, we examine if the complaint ratio of nonbanks decreases as their market share in the county increases, contributing to the overall reduction in the complaint ratio in the county. To do so, we exclude the complaints against traditional banks and calculate the county-level complaint ratio for nonbanks, which is the number of complaints against nonbanks divided by the number of outstanding loans originated by nonbanks. Since the federal tax filings do not let us distinguish between mortgages granted by nonbanks and those granted by traditional banks, we proxy the denominator by the total number of mortgages originated by nonbanks in the county during the last five years.

We conduct both the OLS and the IV analyses. Table 8 reports the regression results. The OLS estimates reported in column (1) show that as nonbanks hold a larger market share in a county, their complaint ratio in the county decrease—a one standard deviation increase in nonbanks' market share is associated with a 0.083 percentage point reduction in nonbanks' complaint ratio. This magnitude of reduction is economically meaningful as it represents 18% of the average county-level complaint ratio for nonbanks.[25] Columns (2) and (3) report the results from the IV regressions using the two IV strategies discussed in Section 4.2. The results show that the instrumented change in nonbanks' market shares is associated with a reduction in nonbanks' complaint ratio. The results (reported in columns (4)-(6)) remain similar if we focus on only complaints about the post-origination mortgage servicing.

One might wonder if these results are due to the transfer of mortgage servicing rights from nonbanks to traditional banks. Although the information on the transfer of mortgage servicing rights is not available to us, we do not believe that the transfer of mortgage servicing

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[25]The average county-level complaint ratio for nonbanks is 0.46%.

rights from nonbanks to traditional banks is driving our results. As discussed in 3.2, during our sample period, mortgages that are originated by nonbanks are likely serviced by nonbanks because traditional banks are not likely to buy mortgage servicing rights from nonbanks due to the Basel III capital requirements (Lux and Greene 2015). By contrast, nonbanks, which do not face the same regulations, are more likely to purchase mortgage servicing rights from traditional banks, especially the mortgage servicing rights of lower-quality loans. Therefore, our results, if anything, may underestimate the extent to which the complaint ratio of nonbanks reduces during our sample period.

5.2.2 The mechanisms through which nonbanks reduce their complaint ratio

We explore two mechanisms through which nonbanks may reduce their complaint ratio as they increase their market share. The first mechanism that we explore is product specialization. For example, in the market of business loans, some private debt funds specialize in holding special situation loans, such as distressed loans, and these funds possess expertise in helping businesses restructure to avoid bankruptcy. Similarly, if nonbank mortgage lenders develop a specialty in servicing certain types of borrowers as their market share increases, such specialization may lead to higher-quality services by allowing nonbanks to develop a deeper understanding of their customers' needs and to be better equipped to solve their customers' issues (Hernandez et al. 2015). The second mechanism that we explore is nonbanks' investment in technology. Fuster et al. (2019) show that the adoption of technology play an important role in improving the efficiency of the U.S. mortgage market. If nonbanks make such investments as their market share grows, complaints against nonbanks may decrease as a result.

5.2.2.1 Product Specialization

Regarding the first mechanism, we start by exploring the borrower profiles of nonbanks and estimate the following regression:

$$Outcome_{c,t} = \beta Nonbank\ share_{c,t-1} + \delta_c + \eta_t + \epsilon_{c,t}, \tag{3}$$

where $Outcome_{c,t}$ is either the average income of nonbanks' borrowers in a county-year or the income dispersion of these borrowers (i.e., the interquartile range of borrower incomes scaled by the average income). $Nonbank_{c,t-1}$ is the lagged market share of nonbanks in the county's residential mortgage market. δ_c indicates county fixed effects and η_t indicates year fixed effects.

Column (1) of Table 9 reports the results for the average income. We find a negative and significant coefficient on $Nonbank\ share_{c,t-1}$, indicating that as nonbanks' market share increases in the local mortgage market, the average income of their borrower base decreases. Column (2) shows the result for the income dispersion. We find a lower income dispersion as nonbanks' market share increases. Taken together, the evidence suggests that nonbanks become increasingly focused on lower-income borrowers as nonbanks' market share grows. Prior literature documents that the average borrower income of nonbanks is lower than that of traditional banks (Buchak et al. 2018). Our evidence is different from this literature in that our evidence is not about the difference between the average borrower income of nonbanks and that of banks. Instead, we show that nonbanks' customers become more concentrated among lower-income borrowers as nonbanks' market share increases.

Throughout our paper, we interpret the decreased complaint ratio as evidence of improved service quality. One might argue that lower-income borrowers may be of a lower level of financial literacy so they do not know that they can complain to the CFPB or how to do so. We do not believe that this possibility could bias our results and interpretation in a meaningful way because previous literature shows that there are more mortgage-related complaints

in areas with a higher proportion of poor populations (Begley and Purnanandam 2021). Furthermore, the cross-sectional comparison of complaint ratios between nonbanks and banks in Section 5.1 implies that nonbanks' borrowers are not less likely to file complains although the average borrower income of nonbanks is much lower than that of traditional banks. Importantly, considering poorer populations' higher likelihood to complain documented in the literature, the reduction in average borrower income as nonbanks increase their market share provide further support to our interpretation—as nonbanks' market share increases, their service quality improves.

Critical to this first mechanism is whether nonbanks indeed become better at servicing lower-income borrowers. To shed light on this question, we take a close look at the specific issues of the complaints. Specially, we examine complaints about "Loan modification, collection, foreclosure" and "Struggling to pay mortgage," both of which are related to situations in which borrowers may have financial difficulties in making mortgage payments. In particular, borrowers may not have the financial resources to make mortgage payments based on the original mortgage terms. If nonbanks become more experienced in providing mortgage services to lower-income borrowers, complaints regarding these two issues should be reduced. Column (1) in Table 10 reports evidence supportive of this mechanism. It shows that as nonbanks' market share increases, complaints that are more likely filed by borrowers who lack financial resources are significantly reduced.

Collectively, our evidence suggests that as nonbanks' market share increases, they develop a specialty in servicing lower-income borrowers, hence improving their service quality towards these borrowers. This finding is consistent with the discussion in Hernandez et al. (2015) and Lux and Greene (2015). According to Hernandez et al. (2015), specialization allows mortgage servicers to more efficiently manage loss mitigation efforts, foreclosure and bankruptcy activities; according to Lux and Greene (2015), specialization provides nonbanks with cost advantage in servicing nonperforming loans.

5.2.2.2 Investment in technology

Regarding the second mechanism, we start by examining whether nonbanks' have enhanced incentives to invest in technology as their market share in the county increases. Nonbanks may have heightened incentives to invest if they can take advantage of the economies of scale because the marginal costs of technology investment are decreasing. Therefore, we propose that nonbanks in a local mortgage market should be more motivated to invest in technology if their market shares increase not only in the focal county but also in the entire nation.

We estimate the following two-stage regression:

$$Incentives_{Nonbanks,c,t} = \beta_0 Nonbank\,share_{c,t} + \gamma Controls_{c,t} + \delta_c + \eta_t + \epsilon_{c,t} \quad (1^{st} stage)$$

$$Complaint\,ratio_{c,t} = \beta_1 \widehat{Incentives}_{Nonbanks,c,t-1} + \gamma Controls_{c,t-1} + \delta_c + \eta_t + \epsilon_{c,t} \quad (2^{nd} stage).$$

$$(4)$$

$Incentives_{Nonbanks,c,t}$ is measured by the market share in the nation held by all the nonbanks that originate loans in the county. The national market share is calculated as the dollar amount of mortgages originated by the nonbanks in year *t-1* scaled by the total dollar amount of mortgages originated in the nation in year *t-1*. This variable captures whether nonbanks in the local market increase their presence at the national level while increasing their market share in the focal county, allowing them to take advantage of the economies of scale in technology investment. $Controls_{c,t-1}$ includes county-year level income per capita and unemployment rate. δ_c indicates county fixed effects and η_t indicates year fixed effects.

Table 11 reports the regression results. Column (1) reports the results for the first stage and shows that as nonbanks' market share increases in a county, these nonbanks' market share in the nation increases as well. In other words, the increased presence of nonbanks in a county is not due to a retraction of these nonbanks' market shares in other counties. The second stage result in column (2) suggests that the higher market share at the national level, predicted by the higher market share of nonbanks in the county, is associated with a

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lower complaint ratio for nonbanks in the county. Column (3) shows that the result holds for complaints about post-origination mortgage servicing.

Do nonbanks indeed increase their investment in technology as their market share increases? Using job posting data from Burning Glass Technologies (BGT) during our sample period, we find evidence supportive of this notion. BGT collects the near-universe online job postings. A particularly useful feature of this data is that it compiles the skill requirements in the job postings. If nonbanks increase investments in technology, their demand for employees with technology-related skills should also increase. To examine whether this is the case, we aggregate the number of job postings in a county that require technology-related skills by nonbanks, and regress it on the market share of nonbanks in the county. We categorize a skill as a technology-related skill if it is tagged by the BGT as an information technology (IT) skill or a software skill. Table 12 reports the results. With different specifications, we consistently observe a positive and significant association between nonbanks' market share and their demand for technology-related skills. In terms of economic significance, column (4) indicates that a one standard deviation increase in nonbanks' market share in a county is associated with an increase in the number of nonbanks' job postings in the county that require technology-related skills by 13%. To assess whether the effect on skill requirements is due to a few large fintech lenders, In column (5), we exclude Quicken Loans and Guaranteed Rate Inc., two of the largest fintech nonbanks, and our result remains robust. This evidence suggests that nonbanks' use of technology increases as their market share increases, potentially helping nonbanks provide higher-quality services to their mortgage customers.[26]

Finally, we examine the specific issues of the complaints against nonbanks. Among all the issues listed in Table 1, "Trouble during payment process" is most likely to benefit from investment in technology because this issue is likely resolved by improvements in nonbanks' infrastructure, such as upgrades of the technologies deployed in their online payment plat-

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[26]The positions advertised in these job postings are likely filled because the finance industry has one of the highest vacancy-employment conversion rates probably because wages in the finance industry are higher than those in the other industries (Abis and Veldkamp 2020).

forms. Therefore, if increased investment in technology can at least partially explain our finding, complaints regarding this issue should be reduced as nonbanks increase their market share. Column (2) of Table 10 reports evidence supportive of this mechanism. It shows that as nonbanks' market share increases, complaints that are more likely due to technical issues in the payment process are significantly reduced.

In addition, columns (3) and (4) of Table 10 show that as nonbanks' market share increases, complaints regarding post-origination mortgage servicing that are not related to the two identified mechanisms do not experience significant reductions. The evidence, therefore, provides further support to the two mechanisms that we propose in this paper.

5.3 Nonbanks' market share and mortgage-related complaints against traditional banks

In this section, we study the effect of the increased market share of nonbanks on the complaint ratio of traditional banks. We are interested in understanding if the improved service quality of nonbanks comes at the price of a deterioration in the service quality of traditional banks. We regress the complaint ratio of traditional banks on nonbanks' market share. The complaint ratio of traditional banks is calculated as the number of mortgage complaints against traditional banks divided by the number of outstanding loans originated by traditional banks; the denominator is proxied by the total number of mortgages originated by traditional banks in that county during the last five years.

The results are reported in Table 13. In column (1), we find that the complaint ratio of traditional banks decreases as nonbanks account for a larger market share. Column (2) shows that this result holds using the stress test IV strategy described in Section 4.2. In column (3), we restrict our sample to only traditional banks that have never undertaken a stress test in the IV analysis and our finding remains robust. Column (4) shows that the result also holds when we use the surety bond IV strategy described in Section 4.2. Columns (5) to (8) repeat the above exercises using only complaints about post-origination mortgage

servicing and the results are similar to those reported in the first four columns.

The results from Table 13 imply that the reduced complaint ratio of traditional banks also contributes to the reduced complaint ratio in the county. However, we are cautious to conclude that banks improve their service quality as nonbanks' market share increases. The reason is that the reduced complaint ratio of traditional banks is likely due to the change in the composition of these banks' borrower base. Table 14 shows that as nonbanks' market share increases in the local mortgage market, the average income of traditional banks' borrowers increases albeit the income dispersion does not change. Begley and Purnanandam (2021) show that, on average, higher-income borrowers receive higher-quality mortgage services, hence are less likely to file complaints against their lenders.

The increased average income of banks' borrowers (reported in Table 14) and the decreased average income of nonbanks' borrowers (reported in Table 9) together suggest that nonbanks and banks become increasingly specialized in different types of borrowers as nonbanks grow in size. Importantly, this lender specialization benefits lower-income borrowers without hurting higher-income ones.

5.4 Effects of nonbanks' market share conditional on minority populations

A highly relevant topic among studies on the mortgage market is the treatment of minority borrowers. Previous papers show that minorities are more likely to experience discrimination in the mortgage market in terms of pricing, access to credit, and the quality of mortgage services (e.g., Munnell et al. 1996; Bartlett et al. 2022; Begley and Purnanandam 2021). We contribute to this strand of literature by examining whether the rise of nonbanks in the mortgage market has a disproportionately larger positive effect on the service quality received by minority borrowers.

For this analysis, we estimate the following regression model:

$$Complaint\,ratio_{c,t} = \beta_0 Nonbank\,share_{c,t-1} + \beta_1 Nonbank_{c,t-1} \times Minority\,population_c \tag{5}$$
$$+ \gamma Controls_{c,t-1} + \delta_c + \eta_t + \epsilon_{c,t},$$

where the dependent variable is the county-level complaint ratio. $Nonbank\,share_{c,t-1}$ is the lagged market share of nonbanks in the county's residential mortgage market. $Minority\,population_c$ is the percentage of minority populations in the county from the 2010 Census. We measure the minority population in two ways: the Hispanic population and the Non-white population. All other variables are defined the same as in equation (1). The variable of interest is the interaction term, the coefficient on which implies whether the increased market share of nonbanks has a stronger effect on the complaint ratio in counties with more minorities.

Table 15 reports the results. Across the four columns, the coefficients on the interaction term are all negative and significant at the 1% level, indicating that the effect of the increased market share held by nonbanks on mortgage-related complaints is more pronounced for counties with a higher percentage of minority populations. This finding supports the role of nonbanks in alleviating discrimination in the quality of services received by minorities in the mortgage market.

6   Conclusion

In this paper, we study the consequences of the rise of nonbanks on the service quality in the residential mortgage market. The specific aspect of service quality that we focus on is the mortgage-related complaints filed with the CFPB as a percentage of all outstanding mortgages (i.e., the complaint ratio). We find that as nonbanks increase their market share in a county, the complaint ratio of the county decreases. To verify that the relation between nonbanks' market share and mortgage-related complaints is indeed causal, we conduct two IV analyses. We instrument the change in nonbanks' market shares in the local mortgage market

using (1) the county's ex ante exposure to banks subject to Federal Reserve's stress tests, and (2) mortgage industry surety bonds required by each state. We find that the instrumented increase in nonbanks' market share is associated with a reduction in the mortgage-related complaint ratio.

Despite the fact that nonbanks have a higher complaint ratio than traditional banks on average, we find that nonbanks significantly improve their service quality as their market share increases, contributing to the reduction in the complaint ratio at the county level. For this improvement in service quality, we provide evidence consistent with two explanations. First, as nonbanks increase their market share, they develop a specialty in servicing lower-income borrowers. Second, as nonbanks increase their market share, they make more investments in technology. Moreover, as nonbanks' market share grows, traditional banks increasingly focus on higher-income borrowers, and their complaint ratio decreases as well. We also find that the improvements in service quality are more likely to benefit marginalized borrowers, such as minorities, who are more likely to receive low-quality financial services.

As far as we are aware, our paper is the first to focus on the service quality of mortgages to understand the consequences of nonbanks' expansion on consumer welfare. Focusing on financial products other than mortgages, such as cryptocurrencies and credit cards, existing studies show that nonbank financial companies, fintech companies in particular, may harm consumers (Calem 2022). We find that in the residential mortgage market, although nonbanks on average have a higher complaint ratio than traditional banks, their expansion reduces their complaint ratio, leading to a reduction in the overall complaint ratio at the county level. Our findings suggest that future policies and regulations of nonbanks should consider the effect of market shares on service quality. Our findings echo Philippon (2016) in that the non-traditional part of the financial sector has the potential to improve the efficiency of the financial system.

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Figure 1: Nonbanks' market share

This figure plots the median and inter-quartile range of the county-level nonbank market shares between 2008 and 2018. Nonbanks' market share for a county-year is calculated as the dollar amount of mortgages originated in the county-year by nonbanks over the dollar amount of mortgages originated in the county year by all lenders.
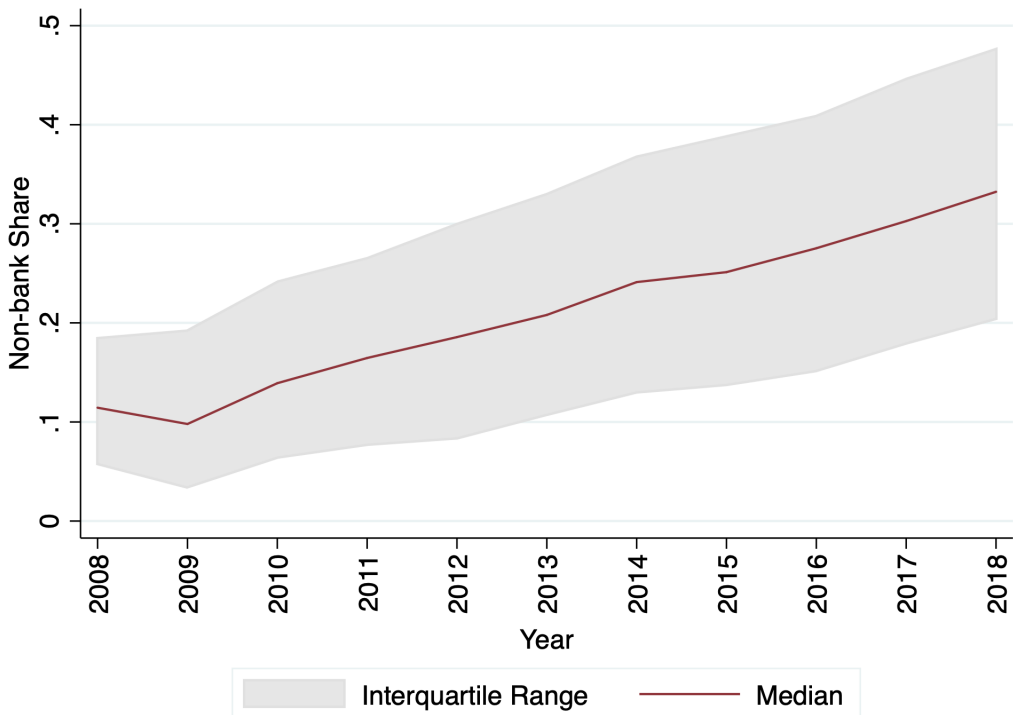
Figure 2: Nonbanks' market share: Originations vs. post-origination servicing

This figure plots the relationship between nonbanks' market share of mortgage origina-
tions and that of post-origination servicing at different geographical levels, using the sam-
ple of mortgages sold to Freddie Mac and still outstanding during our sample period
(i.e., 2012–2018). The top left panel shows nonbanks' nationwide market shares, the
top right panel shows nonbanks' state-level market shares, the bottom left panel shows
nonbanks' MSA-level market shares, and the bottom right panel shows nonbanks' 3-digit
ZIP code-level market shares. We group nonbanks' market shares of mortgage origina-
tions into 10 bins for the state-level panel and 100 bins for the MSA and ZIP-code level
panels, and plot the average nonbank market share of mortgage originations and that of
post-origination servicing for each bin. The market shares are trimmed at the 5% level.
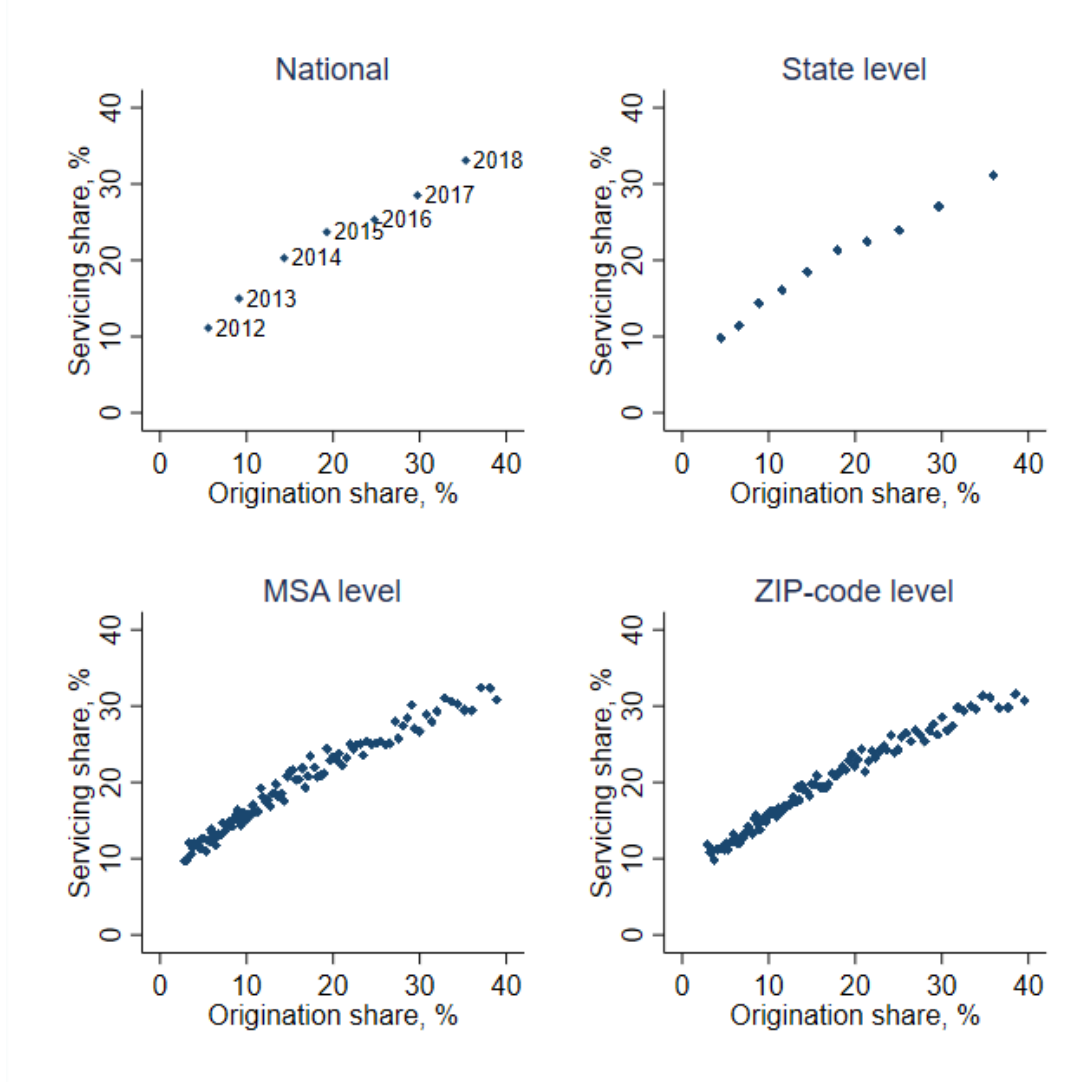
Figure 3: The evolution of complaint ratio: Banks vs. nonbanks

This figure plots the average complaint ratio during our sample period separately for banks and nonbanks. Complaint ratio for banks (nonbanks) is calculated as the number of mortgage-related complaints filed against banks (nonbanks) in a year scaled by all mortgages originated by banks (nonbanks) in the previous five years.
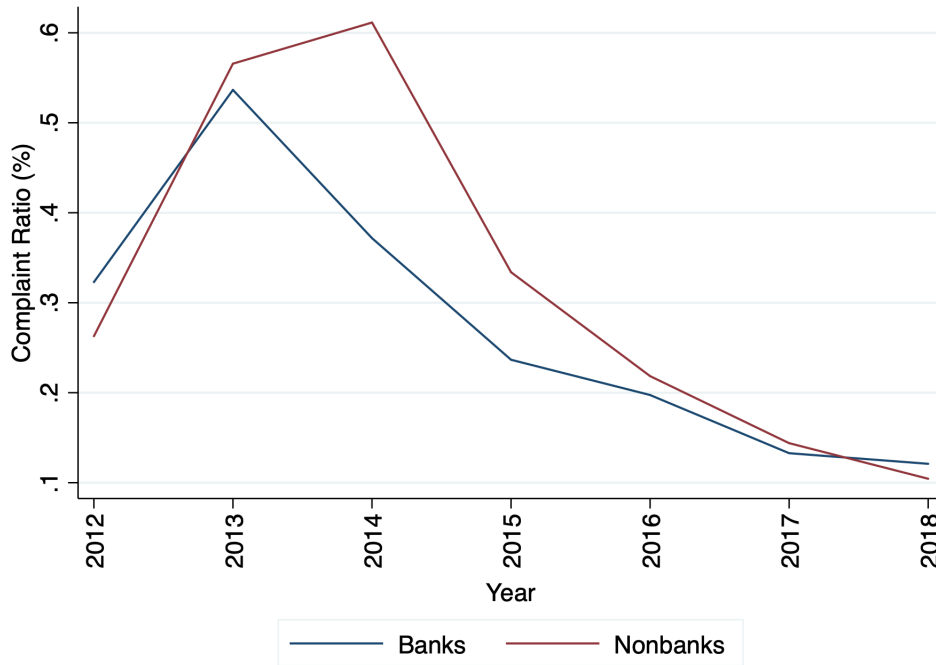
Table 1: Summary statistics: Complaints from the CFPB

This table reports the distribution of issues associated with the mortgage-related complaints filed with the CFPB.

Issue	Frequency	Percent (%)
Loan modification, collection, foreclosure	67,993	45.54
Loan servicing, payments, escrow account	40,985	27.45
Trouble during payment process	9,230	6.18
Application, originator, mortgage broker	8,486	5.68
Struggling to pay mortgage	8,328	5.58
Other	4,479	3.00
Settlement process and costs	4,044	2.71
Credit decision / Underwriting	2,674	1.79
Applying for a mortgage or refinancing an existing mortgage	1,596	1.07
Closing on a mortgage	974	0.65
Issues related to credit report	502	0.34
Total	149,291	

Table 2: Sample summary statistics

The main sample that we use in our analysis is a product of matching county-level complaint data set from CFPB with county-level mortgage market data from HMDA, supplemented with county characteristics from BEA, BLS, and 2010 Census. This table reports the county-year-level summary statistics.

	Mean	SD	25th perc.	Median	75th perc.
Complaint ratio (%)	0.05	0.06	0.02	0.04	0.07
# of complaints	19.47	65.27	1.00	4.00	13.00
# of outstanding mortgages	29,304	57,392	4,550	10,966	29,500
Nonbank market share (%)	32.17	16.38	19.67	30.67	43.39
Income per capita (tho. $)	44.05	13.78	36.15	40.98	48.00
Unemployment rate (%)	5.91	2.26	4.32	5.50	7.05
Mortgage market HHI	0.07	0.05	0.04	0.06	0.09
Hispanic ratio (%)	10.12	12.74	2.89	5.52	11.74
Non-white ratio (%)	17.09	14.51	6.64	12.06	23.22
Obs. (County × Year)	7,178				

Table 3: Nonbanks' market share and mortgage-related complaints

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year. Column (1) includes all mortgage-related complaints; column (2) includes complaints about post-origination mortgage servicing; column (3) includes complaints about mortgage originations. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio		
	(1)	(2)	(3)
	All complaints	Complaints about servicing	Complaints about originations
Nonbank market share	-0.037**	-0.042**	0.005
	(0.017)	(0.016)	(0.005)
log(Income per capita)	-0.056***	-0.046**	-0.009*
	(0.021)	(0.020)	(0.005)
Unemployment rate	0.284***	0.306***	-0.022
	(0.085)	(0.082)	(0.027)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Observations	7,178	7,178	7,178
R-squared	0.568	0.556	0.353

Table 4: IV analysis using stress tests

This table presents the results of a regression model in which we regress the change in county-level complaint ratios from 2012 to 2018 on the change in nonbanks' market shares in the county from 2011 to 2017, which is instrumented by the county's ex ante exposure to banks subject to stress tests. The dependent variable in the first-stage regression is *the change in nonbank market shares.* The dependent variable in the second-stage regressions is *the change in complaint ratios*; *complaint ratio* is calculated as the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year; in column (2), the dependent variable is calculated using all mortgage-related complaints; in column (3), the dependent variable is calculated using complaints about post-origination mortgage servicing. *Stress test exposure* is the percentage of the county's mortgage market that is served by banks subject to stress tests right before the inception of stress tests. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$.

	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Stress test exposure	0.228***		
	(0.028)		
Δ*Nonbank market share*		-0.457***	-0.433***
		(0.090)	(0.085)
Δ*log(Income per capita)*	-0.186***	-0.118***	-0.100**
	(0.058)	(0.042)	(0.040)
Δ*Unemployment rate*	-0.443**	0.115	0.151
	(0.214)	(0.169)	(0.161)
Observations	710	710	710
F-stat	63.80		

Table 5: IV analysis using stress tests: Robustness

Panel A presents the results of the IV analysis using more recent changes in complaint ratio and nonbank market share. The change in county-level complaint ratios is computed for a period from 2014 to 2018 and the change in nonbanks' market shares in the county is computed for a period from 2013 to 2017. Panel B presents the results of the IV analysis excluding counties that have ex ante exposure to banks that are newly added to the stress test list since 2014. The dependent variable in the first-stage regression is *the change in nonbank market shares*. The change in nonbanks' market shares is instrumented by the county's ex ante exposure to banks subject to stress tests. The dependent variable in the second-stage regressions is *the change in complaint ratios*; *complaint ratio* is calculated as the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year; the dependent variable in column (2) of both panels is calculated using all mortgage-related complaints; the dependent variable in column (3) of both panels is calculated using complaints about post-origination mortgage servicing. *Stress test exposure* is the percentage of the county's mortgage market that is served by banks subject to stress tests right before the inception of stress tests. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$.

Panel A	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Stress test exposure	0.126***		
	(0.021)		
Δ*Nonbank market share*		-0.457***	-0.433***
		(0.205)	(0.196)
Δ*log(Income per capita)*	-0.113**	-0.194***	-0.186***
	(0.054)	(0.064)	(0.061)
Δ*Unemployment rate*	-0.191	-0.155	-0.153
	(0.231)	(0.287)	(0.275)
Observations	770	770	770
F-stat	35.11		

Panel B	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Stress test exposure	0.268***		
	(0.043)		
Δ*Nonbank market share*		-0.379***	-0.356***
		(0.135)	(0.129)
Δ*log(Income per capita)*	0.166*	0.082	0.100
	(0.095)	(0.086)	(0.081)
Δ*Unemployment rate*	-0.086	0.336	0.401
	(0.315)	(0.270)	(0.257)
Observations	283	283	283
F-stat	39.46		

Table 6: IV analysis using mortgage industry surety bond requirements

This table presents the results of a regression model in which we regress the change in county-level complaint ratios from 2012 to 2018 on the change in nonbanks' market shares in the county from 2011 to 2017, which is instrumented by the log of the dollar amount of mortgage broker bond required at the state level. The dependent variable in the first-stage regression is *the change in nonbank market shares*. The dependent variable in the second-stage regressions is *the change in complaint ratios*; *complaint ratio* is calculated as the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year; In column (2), the dependent variable is calculated using all mortgage-related complaints; in column (3), the dependent variable is calculated using complaints about post-origination mortgage servicing. *Surety bond requirement* is the average mortgage industry bond requirement in the state (dollars in thousands). *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$.

	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Surety bond requirement	-0.012***		
	(0.003)		
Δ*Nonbank market share*		-0.528**	-0.545***
		(0.207)	(0.204)
Δ*log(Income per capita)*	-0.259***	-0.194**	-0.189**
	(0.066)	(0.076)	(0.074)
Δ*Unemployment rate*	-0.848***	-0.014	0.002
	(0.229)	(0.266)	(0.262)
Observations	536	536	536
F-stat	14.11		

Table 7: IV analysis using mortgage industry surety bond requirements: Robustness

This table presents the results of the IV analysis excluding counties with a population in the top decile (Panel A) or quintile (Panel B) within each state. The dependent variable in the first-stage regression is *the change in nonbank market shares*. The dependent variable in the second-stage regressions is *the change in complaint ratios*; *complaint ratio* is calculated as the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year; In column (2), the dependent variable is calculated using all mortgage-related complaints; in column (3), the dependent variable is calculated using complaints about post-origination mortgage servicing. *Surety bond requirement* is the average mortgage industry bond requirement in the state (dollars in thousands). *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$.

Panel A	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Surety bond requirement	-0.011***		
	(0.003)		
Δ*Nonbank market share*		-0.522**	-0.543**
		(0.241)	(0.238)
$\Delta log(Income\ per\ capita)$	-0.238***	-0.174**	-0.169**
	(0.071)	(0.082)	(0.081)
$\Delta Unemployment\ rate$	-0.812***	-0.030	0.014
	(0.245)	(0.290)	(0.286)
Observations	482	482	482
F-stat	10.42		

Panel B	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Surety bond requirement	-0.010**		
	(0.004)		
Δ*Nonbank market share*		-0.664*	-0.714**
		(0.346)	(0.352)
Δ*log(Income per capita)*	-0.185**	-0.150	-0.150
	(0.081)	(0.096)	(0.098)
Δ*Unemployment rate*	-0.681**	-0.046	-0.052
	(0.272)	(0.353)	(0.360)
Observations	406	406	406
F-stat	6.42		

Table 8: Nonbanks' market share and mortgage-related complaints against nonbanks

This table presents the OLS (columns (1) and (4)) and the second-stage of IV estimates (columns (2)-(3) and (5)-(6)) from the regression of the county-level complaint ratio of nonbanks on nonbanks' market share in the county. Columns (1)-(3) include all mortgage-related complaints; columns (4)-(6) include complaints about post-origination mortgage servicing. In the IV analyses, all variables are within-county changes during our sample period; the change in nonbanks' market shares is instrumented by the county's ex ante exposure to banks subject to stress tests (columns (2) and (5)) and by the log of the dollar amount of mortgage broker surety bond required at the state level (columns (3) and (6)). The dependent variable in columns (1) and (4) is *complaint ratio*, which is the number of mortgage-related complaints filed against nonbanks in a year scaled by all mortgages originated by nonbanks in the previous five years. The dependent variable in columns (2)-(3) and (5)-(6) is *the change in complaint ratios*. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	All complaints			Complaints about servicing		
	OLS	Stress Test IV	Surety Bond IV	OLS	Stress Test IV	Surety Bond IV
	(1)	(2)	(3)	(4)	(5)	(6)
Nonbank market share	-0.507**			-0.512**		
	(0.254)			(0.257)		
Δ*Nonbank market share*		-1.925***	-2.578**		-1.797***	-2.793**
		(0.557)	(1.173)		(0.542)	(1.186)
log(Income per capita)	-0.581			-0.383		
	(0.427)			(0.411)		
Δ*log(Income per capita)*		-0.318	-0.856*		-0.230	-0.857*
		(0.269)	(0.437)		(0.262)	(0.442)
Unemployment rate	2.823*			2.737*		
	(1.468)			(1.450)		
Δ*Unemployment rate*		0.019	-1.156		-0.183	-1.484
		(1.069)	(1.459)		(1.041)	(1.476)
Year FE	Yes	No	No	Yes	No	No
County FE	Yes	No	No	Yes	No	No
Observations	7,178	725	550	7,178	725	550

Table 9: Borrower income of nonbanks

This table presents OLS estimates from the regression of borrower income of nonbanks on nonbanks' market share in the county. The dependent variable in column (1) is *Average Income*, which is the average income of nonbanks' borrowers in the county; the dependent variable in column (2) is *Income dispersion*, which is the interquartile range for the incomes of nonbanks' borrowers in the county scaled by *Average Income*. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Average income	*Income dispersion*
	(1)	(2)
Nonbank market share	-0.069*	-0.070**
	(0.041)	(0.030)
Year FE	Yes	Yes
County FE	Yes	Yes
Observations	7,185	7,178
R-squared	0.81	0.35

Table 10: Detailed complaint issues against nonbanks

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by all mortgages originated by nonbanks in the previous five years. Column (1)includes complaints about "trouble during payment process;" column (2) includes complaints about "loan modification, collection, foreclosure" and "struggling to pay mortgage;" column (3) includes complaints about "loan servicing, payments, escrow account;" column (4)includes complaints about "settlement process and costs." *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio			
	(1)	(2)	(3)	(4)
	Payment Difficulty Complaints	Payment Processing Complaints	Escrow Account Complaints	Settlement Related Complaints
Nonbank market share	-0.352*	-0.106**	-0.040	-0.013
	(0.212)	(0.046)	(0.124)	(0.029)
log(Income per capita)	-0.068	-0.188	-0.152	0.024
	(0.279)	(0.118)	(0.192)	(0.039)
Unemployment rate	1.958	-0.624**	1.161	0.242
	(1.215)	(0.246)	(0.710)	(0.218)
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Observations	7,178	7,178	7,178	7,178
R-squared	0.398	0.403	0.370	0.301

Table 11: Nonbanks' national market share and mortgage-related complaints

This table presents the results from the regression of the complaint ratio on the national market share of the nonbanks that originate loans in the county. The dependent variable in the first-stage regression is *National market share*, which is the summation of national market share of all nonbanks that originate loans in the county. Each nonbank's national market share is calculated as the amount of mortgages originated by the nonbank in the previous year scaled by the total amount of mortgages originated by all lenders in the nation in the previous year. The dependent variable in the second-stage regressions is *Complaint ratio*, which is the number of mortgage-related complaints filed against nonbanks in a year scaled by all mortgages originated by nonbanks in the previous five years. The dependent variable in column (2) is calculated using all mortgage-related complaints; the dependent variable in column (3) is calculated using complaints about post-origination mortgage servicing. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	First stage	Second stage	Second stage
	(1)	(2)	(3)
		All complaints	Complaints about servicing
Nonbank market share	0.069***		
	(0.007)		
National market share		-7.381**	-7.463**
		(3.718)	(3.785)
log(Income per capita)	0.082***	0.026	0.230
	(0.016)	(0.459)	(0.467)
Unemployment rate	-0.278***	0.770	0.661
	(0.053)	(1.781)	(1.717)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Observations	7,178	7,178	7,178
F-stat	84.90		

Table 12: Nonbanks' demand for technology-related skills: Evidence from job posting data

This table presents the OLS estimates from the regression of the aggregate number of job postings that require technology-related skills by nonbanks in a county on nonbanks' market share in the county. The dependent variable is *log(1+number of job postings with technology-related skills)*, which is the log of the total number of job postings that require technology-related skills by nonbanks in a county-year. Column (5) excludes Quicken Loans and Guaranteed Rate Inc., two of the largest fintech nonbanks. *Income per capita* is from BEA. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	log(1+number of job postings with technology-related skills)				
	(1)	(2)	(3)	(4)	(5)
Nonbank market share	1.889***	1.513***	0.813**	0.907**	1.133***
	(0.251)	(0.294)	(0.400)	(0.398)	(0.387)
log(Income per capita)				1.284**	1.264**
				(0.505)	(0.504)
Year FE	No	Yes	Yes	Yes	Yes
County FE	No	No	Yes	Yes	Yes
Observations	3,227	3,227	3,227	3,227	3,183
R-squared	0.060	0.108	0.697	0.698	0.672

Table 13: Nonbanks' market share and mortgage-related complaints against traditional banks

This table presents the OLS (columns (1) and (5)) and the second-stages of IV estimates (columns (2)-(4) and (6)-(8)) from the regression of the county-level complaint ratio of traditional banks on nonbanks' market share in the county. Columns (1)-(4) include all mortgage-related complaints; columns (5)-(8) include complaints about post-origination mortgage servicing. In the IV analyses, all variables are within-county changes during our sample period; the change in nonbanks' market shares is instrumented by the county's ex ante exposure to banks subject to stress tests (columns (2)-(3) and (6)-(7)) and by the log of the dollar amount of mortgage industry bond required at the state level (columns (4) and (8)). The dependent variable in columns (1) and (5) is *Complaint ratio*, which is the number of mortgage-related complaints filed against traditional banks in a year scaled by all mortgages originated by traditional banks in the previous five years. The dependent variable in columns (2)-(4) and (6)-(8) is *The change in complaint ratios*. The sample in columns (1), (2), (4), and (5), (6), (8) includes all banks; the sample in columns (3) and (7) includes banks that are never selected for stress tests. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	All complaints				Complaints about servicing			
	OLS	Stress Test IV	Stress Test IV	Surety Bond IV	OLS	Stress Test IV	Stress Test IV	Surety Bond IV
	(1) All Banks	(2) All Banks	(3) Untested Banks	(4) All Banks	(5) All Banks	(6) All Banks	(7) Untested Banks	(8) All Banks
Nonbank market share	-0.269* (0.158)				-0.282* (0.150)			
Δ*Nonbank market share*		-1.985*** (0.410)	-0.479** (0.186)	-2.711*** (0.982)		-1.848*** (0.389)	-0.342** (0.157)	-2.591*** (0.924)
log(Income per capita)	-0.287** (0.134)				-0.240* (0.125)			
Δ*log(Income per capita)*		-0.789*** (0.198)	-0.219** (0.090)	-1.181*** (0.366)		-0.684*** (0.188)	-0.179** (0.076)	-1.079*** (0.344)
Unemployment rate	3.894*** (0.607)				3.891*** (0.579)			
Δ*Unemployment rate*		0.837 (0.787)	-0.424 (0.357)	-0.049 (1.223)		1.298* (0.746)	-0.289 (0.301)	0.559 (1.149)
Year FE	Yes	No	No	No	Yes	No	No	No
County FE	Yes	No	No	No	Yes	No	No	No
Observations	7,178	725	725	550	7,178	725	725	550

Table 14: Borrower income of traditional banks

This table presents the OLS estimates from the regression of borrower income of traditional banks on nonbanks' market share in the county. The dependent variable in column (1) is *Average Income*, which is the mean value of incomes of traditional banks' borrowers in the county; the dependent variable in column (2) is *Income dispersion*, which is the interquartile range for the incomes of traditional banks' borrowers in the county by *Average Income*. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Average income	*Income dispersion*
	(1)	(2)
Nonbank market share	0.089***	0.027
	(0.031)	(0.026)
Year FE	Yes	Yes
County FE	Yes	Yes
Observations	7,397	7,397
R-squared	0.93	0.40

Table 15: Nonbanks' market share and mortgage-related complaints conditional on minority populations

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county, conditional on the percentage of minority populations. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year. Columns (1)-(2) include all mortgage-related complaints; columns (3)-(4) include complaints about post-origination mortgage servicing. *Hispanic population* and *Non-white population* are from the 2010 Census files; *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio			
	(1)	(2)	(3)	(4)
	All complaints		Complaints about servicing	
Nonbank market share	0.006	0.008	-0.007	0.004
	(0.020)	(0.018)	(0.019)	(0.017)
Nonbank market share × Hispanic population	-0.078***		-0.064***	
	(0.021)		(0.020)	
Nonbank market share × Non-white population		-0.090***		-0.090***
		(0.020)		(0.020)
log(Income per capita)	-0.055***	-0.069***	-0.046**	-0.060***
	(0.021)	(0.021)	(0.020)	(0.020)
Unemployment rate	0.239***	0.250***	0.269***	0.272***
	(0.084)	(0.083)	(0.080)	(0.079)
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Observations	7,178	7,178	7,178	7,178
R-squared	0.570	0.570	0.557	0.559

Appendix

Table A1: Variable descriptions

Variable name	Definition and source
Number of complaints	The number of mortgage-related complaints in a county filed with the Consumer Financial Protection Bureau (CFPB).
Number of outstanding mortgages	(1) The number of federal tax filings with mortgage interest payments in a county in the previous year from the IRS, or (2) the total number of mortgages originated in a county during the last five years from the Home Mortgage Disclosure Act (HMDA) dataset.
Complaint ratio	The number of complaints divided by the number of outstanding mortgages.
Nonbank	Lenders are classified into traditional and nonbanks by using the variable "FORE" in the Avery file. Lenders are defined as nonbanks if FORE is "IMB", and as traditional banks if FORE is one of the followings: FSB, SAL, SSB, CPB, BHC, NAT, NMB, SMB.
Nonbank market share	The dollar amount of mortgages originated by nonbanks in a county in the previous year divided by the total dollar amount of mortgages originated by all lenders in the county in the previous year. All data used in this computation are from the HMDA dataset.
Income per capita	County-level average income per capita from the Bureau of Economic Analysis (BEA).
Unemployment rate	County-level unemployment rate from the Bureau of Labor Statistics (BLS).

Variable name	Definition and source
Stress test exposure	The percentage of the county's mortgage market that is served by banks subject to stress tests right before the inception of stress tests. $Stress\,test\,exposure_{c,t} =$ $$(\frac{\sum_{i \in stress\,test\,banks} mortgage_{i,c,t}}{\sum_{i \in all\,lenders} mortgage_{i,c,t}}) \qquad (6)$$
Mortgage market HHI	The concentration of the mortgage market in a county. $$HHI_{c,t} = \sum_{i \in all\,lenders} w_{i,c,t}^2, \qquad (7)$$ $$where\,w_{i,c,t} = (\frac{mortgage_{i,c,t}}{\sum_{i \in all\,lenders} mortgage_{i,c,t}})$$
Nonbank HHI	The concentration of mortgage market among non-banks. $$HHI_{Nonbanks,c,t} = \sum_{i \in nonbanks} w_{i,c,t}^2, \qquad (8)$$ $$where\,w_{i,c,t} = (\frac{mortgage_{i,c,t}}{\sum_{i \in nonbanks} mortgage_{i,c,t}})$$
National market share	The amount of mortgages originated by nonbanks in the previous year scaled by the total amount of mortgages originated in the nation in the previous year.

Variable name	Definition and source
Average income (Borrowers of nonbanks)	Borrowers' average income for nonbanks in a county. $$Average\,income_{nonbanks,c,t} =$$ $$(\frac{\sum_{b \in nonbank\,borrowers} income_{b,c,t}}{\#\,of\,nonbank\,borrowers\,in\,county\,c\,in\,year\,t}) \quad (9)$$
Income dispersion (Borrowers of nonbanks)	The interquartile range of the income distribution for the nonbanks' borrowers divided by $Average\,income_{nonbanks,c,t}$.
Average income (Borrowers of traditional banks)	Borrowers' average income for traditional banks in a county. $$Average\,income_{banks,c,t} =$$ $$(\frac{\sum_{b \in bank\,borrowers} income_{b,c,t}}{\#\,of\,bank\,borrowers\,in\,county\,c\,in\,year\,t}) \quad (10)$$
Income dispersion (Borrowers of traditional banks)	The interquartile range of the income distribution for the traditional banks' borrowers divided by $Average\,income_{banks,c,t}$.
Hispanic population	The percentage of the Hispanic population in a county from the 2010 Census files.
Non-white population	The percentage of the non-white population in a county from the 2010 Census files.

Table A2: Nonbanks' market share and mortgage-related complaints: Using an alternative measure of outstanding mortgages in computing the complaint ratio

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by all mortgages originated in the previous five years. Column (1) includes all mortgage-related complaints; column (2) includes complaints about post-origination mortgage servicing; column (3) includes complaints about mortgage originations. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio		
	(1)	(2)	(3)
	All complaints	Complaints about servicing	Complaints about originations
Nonbank market share	-0.295***	-0.309***	0.014
	(0.106)	(0.103)	(0.029)
log(Income per capita)	-0.348***	-0.291***	-0.058**
	(0.117)	(0.111)	(0.026)
Unemployment rate	3.035***	3.033***	0.002
	(0.522)	(0.512)	(0.117)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Observations	7,178	7,178	7,178
R-squared	0.638	0.623	0.390

Table A3: Nonbanks' market share and mortgage-related complaints: Using the number of loans instead of the dollar amount of loans in computing nonbanks' market share

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year. Column (1) includes all mortgage-related complaints; column (2) includes complaints about post-origination mortgage servicing; column (3) includes complaints about mortgage originations. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio		
	(1)	(2)	(3)
	All complaints	Complaints about servicing	Complaints about originations
Nonbank market share	-0.051***	-0.054***	0.003
	(0.016)	(0.016)	(0.005)
log(Income per capita)	-0.053**	-0.043**	-0.010*
	(0.021)	(0.020)	(0.005)
Unemployment rate	0.282***	0.306***	-0.023
	(0.086)	(0.082)	(0.027)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Observations	7,178	7,178	7,178
R-squared	0.569	0.557	0.353

Table A4: Nonbanks' market share and mortgage-related complaints: Excluding Quicken Loans and Top 3 nonbanks

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by all mortgages originated in the previous five years. Columns (1)-(3) exclude complaints filed against Quicken Loans; columns (5)-(6) exclude complaints filed against the top 3 nonbanks (i.e., Quicken Loans, United Shore Financial Service, Guaranteed Rate Inc.). The main independent variable is *Nonbank market share*, which is the amount of mortgages originated by nonbanks in a county scaled by the total amount of mortgages originated by all lenders in the county in the previous five years, excluding loans originated by Quicken Loans (columns (1)-(3)) or excluding loans originated by the top 3 nonbanks (i.e., Quicken Loans, United Shore Financial Service, Guaranteed Rate Inc) (columns (5)-(6)). Columns (1) and (4) include all mortgage-related complaints; columns (2) and (5) include complaints about post-origination mortgage servicing; columns (3) and (6) include complaints about mortgage originations *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio					
	Excluding Quicken			Excluding Top 3		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Servicing	Originations	All	Servicing	Originations
Nonbank market share	-0.272**	-0.279***	0.007	-0.281**	-0.285***	0.004
	(0.110)	(0.107)	(0.028)	(0.111)	(0.107)	(0.028)
log(Income per capita)	-0.346***	-0.289***	-0.057**	-0.357***	-0.298***	-0.059**
	(0.117)	(0.111)	(0.026)	(0.118)	(0.112)	(0.026)
Unemployment rate	3.003***	3.017***	-0.008	2.958***	2.979***	-0.015
	(0.524)	(0.515)	(0.116)	(0.522)	(0.514)	(0.117)
Year FE	Yes	No	No	Yes	No	No
County FE	Yes	No	No	Yes	No	No
Observations	7,169	7,169	7,169	7,167	7,167	7,167
R-squared	0.639	0.624	0.390	0.640	0.625	0.390

Table A5: Nonbanks' market share and mortgage-related complaints: Post-2012

This table presents the OLS estimates from the regression of the county-level complaint ratio on nonbanks' market share in the county. The dependent variable is *Complaint ratio*, which is the number of mortgage-related complaints filed in a year scaled by the number of federal tax filings with mortgage interest payments in the county in the previous year. Column (1) includes all mortgage-related complaints; column (2) includes complaints about post-origination mortgage servicing; column (3) includes complaints about mortgage originations. *Income per capita* is from BEA; *Unemployment rate* is from BLS. All variables are defined in Table A1. $***p < 0.01$, $**p < 0.05$, and $*p < 0.1$. Standard errors are clustered at the county level.

	Complaint ratio		
	(1)	(2)	(3)
	All complaints	Complaints about servicing	Complaints about originations
Nonbank market share	-0.056***	-0.061***	0.006
	(0.020)	(0.020)	(0.007)
log(Income per capita)	-0.057**	-0.045*	-0.011
	(0.026)	(0.025)	(0.007)
Unemployment rate	0.337***	0.355***	-0.019
	(0.117)	(0.112)	(0.032)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Observations	6,219	6,219	6,219
R-squared	0.569	0.557	0.369