Risk in the Shadows: Leverage and Liquidity in Nonbanks*

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Abstract

Nonbank mortgage companies (NMCs) use high levels of short-term leverage, a fact that has led to concerns about their individual fragility and systemic risk. We find that NMCs also hold very risky assets, with revenue growth ranging from –26% to +128% at the 10th-90th percentile. Surprisingly, we also observe extremely low bankruptcy rates. We address this puzzle by examining the dynamics of NMCs' costs following negative shocks. Our findings show that NMCs have the flexibility to quickly and substantially reduce both their operating expenses and financing costs (interest expense and debt levels). These dynamics lower their credit risk compared to what static measures of leverage and asset risk suggest. Our results provide support for recent dynamic capital structure theory emphasizing the key role of collateral as a commitment device.

Keywords: shadow banks, mortgage market, dynamic capital structure, collateral, systemic risk.

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1 Introduction

Nonbanks dominate the U.S mortgage market, accounting for nearly 60% of all originations in 2021. Given their massive role, the potential risks posed by the nonbank sector have attracted attention from academics and policymakers alike (Kim, Laufer, Stanton, Wallace, and Pence, 2018). Distress among nonbanks could translate into credit supply disruptions and contagion in the financial system, heightening the urgency to understand risks posed by this rapidly growing industry. The chief concerns — solvency and liquidity risk — stem from risk assessments based on their funding structure: nonbanks are highly levered with a significant proportion of their debt being short maturity. We argue, however, that such an assessment is incomplete without a characterization of nonbank *asset* risk and its interplay with their financial policy. For instance, a large literature in capital structure has theorized and documented a trade-off between asset risk and financial leverage (e.g., Choi and Richardson, 2016). Do the highly-levered funding structures of nonbanks reflect low asset risk? What does the interplay between nonbank assets and liabilities tell us about their overall risk profile? In this paper, we use detailed data on nonbank mortgage companies during 2011-2021 to answer these questions.

We begin with new facts on nonbanks' asset risk that call into question the viability of the business model. First, alongside high levels of financial leverage — average debt-to-assets ratio of about 72% — nonbanks have extremely high asset volatility. Year-over-year (YoY) revenue growth for nonbanks ranges from about -26% (10th percentile) to +128% (90th percentile) and asset growth ranges from -32% to +103%. Figure 1 plots asset risk, measured as net income volatility in Panel A and revenue volatility in Panel B, against average debt-to-assets ratios for the 30 Fama-French industries, showing a strong negative relationship. Nonbank mortgage companies are a stark outlier with high asset risk *and* high financial leverage. Since nonbanks are lightly regulated, this fact cannot be attributed to typical regulatory distortions relevant for traditional banks (deposit insurance, implicit

subsidies, etc.). High asset risk combined with high financial leverage would seem to suggest a very high incidence of financial distress. We find the opposite. Despite 38% (35%) of firm-years having negative asset (revenue) growth and over 25% of firm-years having asset and revenue drops larger than 11%, we use hand-collected data to find that less than 1% of these firms fail or enter severe financial distress during our entire ten-year sample period. This figure is much lower than industries with similar asset volatility, whose average annual bankruptcy rates are in the range of 6% to 19% (Hillegeist, Keating, Cram, and Lundstedt, 2004) even though those industries have lower financial leverage.

To shed light on how high asset risk, high financial leverage, and low default rates coexist, we study nonbank risk from a dynamic standpoint. First, we document significant within-industry variation in nonbank business models — "Originators" primarily originate loans for rapid sale to Fannie Mae, Freddie Mac, or Ginnie Mae securitization markets, and "Servicers" primary function is to collect payments from borrowers to remit to investors, and, if necessary, engage in renegotiation and loss mitigation. While both types of nonbanks face high asset risk, a high level of short-maturity leverage is *not* a uniform feature across the whole industry. Originators are much more highly levered than Servicers (75% debt-to-assets versus 47%) with a larger share of that debt being short-term debt facilities (83% vs. 23%), so the puzzle of high asset risk co-existing with high leverage is most stark for the origination business. Our results show that, despite high leverage, Originators are able to quickly and substantially reduce both operating and financing costs in response to declining revenue. Understanding these overlooked dynamics is key for the accurate assessment of risk. Highly-levered, short-maturity funding structures of Originators may be alarming when viewed through a static lens, but the flexibility to adjust debt levels and operating costs means that high leverage need not translate into high fragility. While not as financially nimble as Originators, we show that Servicers instead account for risk — especially liquidity risk — by using less debt and holding very large cash balances.

Next, we dig deeper into the underlying economics of Originators which allows them to

rapidly adjust debt levels in downside scenarios. Almost all of their debt is collateralized by the very same mortgage loans they originate. This feature means that much of Originators' borrowing is often limited by the extent and quality of this collateral which is primarily determined by mortgage-market-level business conditions. Due to the tight link between specific collateral and its debt, originators can credibly commit to reducing debt levels in response to negative shocks, lowering the expected costs of financial distress. When business opportunities decline, there are fewer mortgage loans available to be pledged as collateral, placing a natural limit on the level of borrowings. This role of collateral in lowering distress costs supports recent theoretical work on dynamic capital structure. DeMarzo (2019) models collateral as a commitment technology allowing firms to capture the benefits of leverage and maintain higher ex-ante debt levels. In the limiting case where firms can fully commit to future leverage reductions in a downside scenario, the model predicts that firms will be entirely debt financed because the trade-off with financial distress disappears. A striking prediction is that very *high* levels of debt can be compatible with *low* expected costs of financial distress if firms can credibly commit to reducing borrowings when asset values fall. To our knowledge, we are the first paper to provide empirical support to this insight — despite high asset risk and very high levels of debt financing, very few nonbanks fail.

Our study uses novel, detailed panel data on 527 nonbank firms (458 Originators, 40 Servicers, and 29 Diversified between origination and servicing) from 2011-2021. These firms originate over 85% of *nationwide* nonbank mortgages and service over $5 trillion of unpaid balance in the U.S. by 2021. Asset volatility for nonbank mortgage companies is driven by mortgage interest rate fluctuations, which vary significantly (over 200 basis points) during our sample period. There is wide within-industry variation in asset composition, capital structure, and liquidity policies across nonbank mortgage companies, a fact that has yet to receive much attention in the academic literature (Kim, Pence, Stanton, Walden, and Wallace, 2022). We show substantial differences in their respective liability structures: while Originators have an average debt-to-assets ratio of 75%, the average level for Servicers is

significantly lower at 47%. Unlike highly-regulated traditional banks, the financial policy of nonbanks is largely market-driven, reflecting an endogenous choice based on asset composition. While the largest component (68%) of Originator assets is high-quality collateral in the form of mortgage loans (Held-for-Sale), Servicers' assets chiefly consist of a heterogeneous mix of cash (32%), mortgage servicing rights (MSRs) at 26%, and receivables at 19%. MSRs are less liquid and less easily collateralizable relative to HFS securities held by Originators. DeMarzo (2019) suggests that limited access to collateral-based borrowings leads to lower total debt levels for firms and reduces their ability to benefit from leverage. Indeed, we find that the availability of collateralizable assets is strongly linked to financial policy in the nonbank industry: Originators with their greater access to high quality collateral (primarily loans that are to be sold to the Agencies) can effectively manage risk through secured borrowing, allowing them to lower debt levels in a downside scenario.

To examine the degree to which nonbanks respond to negative revenue shocks, we first examine their operational flexibility. Firms with a higher proportion of their costs that are fixed (i.e., high operating leverage) are inherently riskier because they have less ability to reduce costs to offset falling revenues. We estimate firm-level panel regressions of changes in operating costs on changes in revenue, flexibly allowing for differing degrees of responsiveness according to whether shocks are severe (revenues falling more than -15%) or moderate (negative revenue growth). Within the nonbank industry, we find that the cost structure of Originators is highly flexible, indicating low operating leverage. When faced with a severe negative shock, we find that Originators reduce operating costs by 8.7% for a 10% larger drop in revenue. Servicers, however, are about half as flexible, lowering costs by 4.6% in response to a 10% drop in revenue. For comparison, the corresponding estimate is 3.3% for traditional banks (who have similar financial leverage) and not statistically different from zero for a sample of non-financial firms with similar high asset risk. Thus, a static picture of nonbanks' risk ignores key differences in their flexibility to adjust on the operating cost margin.

We next turn to financial flexibility. Nonbank mortgage companies are highly levered, but are they able to adjust their capital structure and financing expenses following negative shocks? We find that debt-to-assets ratios are remarkably stable over time despite mortgage rates varying over a 200bps range during our sample period. The average Originator (Servicer) debt-to-assets ratio remains in a range between about 70%–80% (40%–50%) throughout most of the sample. Our firm-level examination of financial flexibility to downside shocks reveals a high degree of financial flexibility — when confronted with severe revenue shocks, a 10% larger drop in revenue for Originators is accompanied by an 8.2% reduction in debt levels and a 9.5% drop in interest expenses. Thus, despite very high leverage, Originators rapidly reduce their debt when business declines. This is largely a consequence of nonbank Originators using warehouse lines of credit with high-quality collateral (e.g., GSE-eligible mortgage loans). This structure leads to rapid, flexible growth and reduction in collateralized debt commensurate with the changes in volume of the origination business. These empirical results lend support to the predictions about the relationship between collateral and leverage from recent dynamic capital structure theory (DeMarzo, 2019).

Servicers also exhibit the ability to reduce financing costs in response to a negative revenue shock, though to a lesser extent than Originators. In times of severely negative revenue shocks, a 10% larger drop in revenue corresponds to Servicers reducing their debt levels by 7.8% and interest expenses by 4.7%. Our results show that, along both cost dimensions (operating and financing), they are comparatively less flexible than Originators yet more flexible than banks or nonfinancial firms of comparable asset risk. We find, however, that Servicers appear to compensate for this lower level of flexibility by funding themselves with significantly more equity (equity-to-assets ratio of 53%) and having a starkly different liquidity policy. Unrestricted Cash (i.e., unencumbered by any contracts) constitutes about 27% of Servicers' assets, a figure that is much larger than Originators (11%) and ranks them above all but one of the Fama-French 30 industries.

Finally, we compute nonbanks' unrestricted cash balance divided by total daily expenses

("days-cash-on-hand") as a key measure of operating liquidity. Originators carry a mean (median) of 104 (52) days-cash-on-hand while Servicers carry 256 (97) days of cash on hand. We estimate the sensitivities of this operating liquidity measure to severe negative shocks and find that a 10% larger drop in revenue is associated with 4.8% and 5.2% *increases* in days cash on hand for Originators and Servicers respectively. This sensitivity estimate indicates that when nonbanks are hit with negative shocks, they are able to sufficiently lower their expenses — operational and financial — to the extent that their effective operating liquidity, as measured by days cash on hand, does not decline. The corresponding estimate is lower for banks and insignificant for non-financial firms of similar risk. We also provide evidence showing Servicers' ability to use short-term debt to bridge liquidity gaps that come from Servicers' obligation to advance payments to investors when borrowers are delinquent.

In sum, our paper shows that accounting for firm dynamics has significant implications for the assessment of nonbank risk. A static picture of fragility based on high leverage levels is incomplete without an assessment of whether and to what extent nonbanks can adjust their costs and debt levels in a downside scenario. The dynamics of nonbank operations, capital structure, and liquidity policies are key to reconciling the puzzling coexistence of high asset risk, high leverage, and low default rates. To our knowledge, this empirical setting is the first to examine the dynamics of non-bank leverage, presenting features of DeMarzo (2019)'s dynamic capital structure theory in sharp relief. Our evidence lends support to the view of collateral as a commitment device, which in turn plays a critical role in the capital structure choice of nonbanks.

From a policy standpoint, our findings inform the debate on capital and liquidity regulation of financial institutions. Regulators and academics alike have expressed concerns regarding high, short-term funded leverage, and calls to impose bank-style capital regulation appear impending. To assess these calls, however, we need to account for the fact that the financial policies of nonbanks are governed by market forces to a much greater extent than traditional banks. Ignoring nonbank operating and financial dynamics can potentially

overstate the true degree of risks nonbanks pose to themselves and the financial system.

2 Related Literature

Jiang, Matvos, Piskorski, and Seru (2020) study financial policy decisions of shadow banks and contrast them with those of traditional banks. They find that shadow bank leverage, while still quite high, is lower and more diverse than those of banks. They attribute differences in capital structure to deposit insurance subsidies available only to banks. We complement their analysis of nonbank leverage and capital by providing an assessment of nonbank risk that appeals to recent theories in dynamic capital structure. We also highlight key differences in Originators' and Servicers' drivers of business prospects and capital structure heterogeneity. We document the sensitivity of nonbank operating cost structure to changes in revenues (operating leverage) and find that banks also have higher operating leverage relative to nonbanks. This fact speaks to the role of market forces in managing risk since nonbanks are substantially less regulated.

Kim et al. (2018) argue that nonbanks are vulnerable to liquidity pressures due to their fragile funding structures. They draw parallels with the Global Financial Crisis of 2008 where several nonbank financial institutions failed due to a sudden drying up of liquidity in short-term financing markets. The paper highlights the fact that the lack of systematic data has prevented researchers and regulators from accurately assessing the risks of the nonbank industry. We take a step towards addressing this gap by assembling an extensive panel of firm-level nonbank financial data from 2011-2021. To the best of our knowledge, ours is the first paper to analyze the business risk and operating leverage choices of distinct nonbank business models that shed light on their financial policy and liquidity profile. Together, our results form a critical input for gauging risks in this sector.

Recent work has studied how liquidity shocks to mortgage servicers can affect their

behavior toward borrowers with respect to loss mitigation, forbearance, and foreclosure. Aiello (2022) studies an earlier setting — servicing of loans in the private-label MBS market around the global financial crisis — and finds that mortgage servicers facing greater advance payments as a fraction of their loan portfolio balance are more likely to pursue foreclosures and modifications at the expense of MBS investors. Our sample setting differs substantially from Aiello (2022) as we study our data from the post-crisis period. Further, our data allow us to use balance-sheet level data rather than only loan portfolio data to look at dynamic firm-level adjustments (e.g., draw on lines to credit) in response to increases in advance payments. Cherry, Jiang, Matvos, Piskorski, and Seru (2022) study the ability of mortgage servicers to provide debt relief to borrowers during the COVID-19 pandemic and find that, at the onset of the COVID pandemic, nonbanks offered forbearance at a lower rate than banks, and that better-capitalized nonbanks offered more forbearance than those with higher leverage. Our study examines a broader sample period that includes the time they study, and we differentiate Originators from Servicers, shedding light on the flexibility of these distinct business models (with starkly different capital levels). We also provide more granular evidence on the various ways that nonbanks adjust to shocks by adjusting both operations and financial structure.

Our setting also provides a unique context for examining whether recent theories of dynamic capital structure find empirical support in the data. These models view collateral as a first-order determinant of firm financial policy (DeMarzo, 2019; Donaldson, Gromb, and Piacentino, 2020). In DeMarzo (2019), collateral functions as a credible commitment device that can lower the costs of financial distress because firms can commit to reducing debt in a downside scenario. This commitment allows firms to capture leverage benefits. Under full commitment, DeMarzo (2019) shows that the trade-off with financial distress disappears, leading to 100% financial leverage. A key insight from this model is that high debt levels can be compatible with low costs of financial distress under an effective commitment technology. Our results are the first to provide evidence supporting this prediction.

3 Data Sources and Mortgage Business Classification

3.1 Data Sources

Our nonbank financial data come from mortgage call reports (MCR) filed with the California Department of Financial Protection and Innovation. All mortgage companies that hold a state license or state registration through the Nationwide Multistate Licensing System & Registry (NMLS) are required to complete an MCR. The "Residential Mortgage Loan Activity" portion of the MCRs contains detailed quarterly lending, servicing, mortgage loan officer production data for activities in California. Our focus, however, is on the "Financial Conditions" reports. These filings have detailed *company-wide* balance sheets, income statements, and cash flow statements. If the company has any activity in California, we see their entire financial picture, and all Fannie Mae and Freddie Mac Seller/Servicers or Ginnie Mae Issuers must submit their full financial conditions quarterly.

Our final sample spans 2011q1-2021q3 and includes 527 unique firms. Figure A.1 presents our sample coverage over time and shows that nonbanks in our sample originate over 80% of nationwide nonbank originations by the end of the sample period. In 2020, for example, our sample captures 84% of all nonbank originations in the U.S. Given the dominance of nonbanks in this market, this translates to 48% of all nationwide originations (including banks, credit unions, etc.). These shares are even larger for government-insured loans (FHA, VA) where the nonbanks in our sample originate 75% of all nationwide originations by 2020. While we observe firm financial for the full sample period, the nationwide servicing data that includes the number and amounts of mortgages serviced begins in 2015q1. Our data mirror the broader growth in nonbank mortgage servicing. The unpaid balance on mortgages serviced by our sample firms grew from about $2.5 trillion in 2015 to over $5 trillion by the end of our sample, which exceeds 40% of the unpaid balance on all mortgage loans nationwide.

3.2 Business models within the nonbank industry

Business models within the nonbank mortgage industry are sufficiently different to warrant a sub-industry classification. We describe the two primary lines of business — originate-to-distribute and servicing — and discuss our classification based on these distinct models.

3.2.1 Originators

The business of origination begins with identifying borrowers, either directly or through brokers, and making the approval decision. Once the lender locks a rate for the borrower, the lender typically hedges their interest rate risk through the forward TBA markets or interest rate options on treasuries. To fund the loan at closing, lenders typically draw down on warehouse lines of credit using the loan itself as collateral.[1] The loan typically remains on the lenders balance sheet for a very short time, with the median warehouse period of only 17 days in our sample. There is little uncertainty about whether nonbank lenders will be able to sell the loan because the eventual buyers of the vast majority of nonbank lending are Fannie Mae, Freddie Mac, or Ginnie Mae ("the agencies").[2] Once the loan is sold, the nonbank repays their drawn warehouse line of credit.

Originators generate most of their revenues from origination fees and gains-on-sale of loans. Gain-on-sale includes the premium the buyer paid above the principal amount, the net effect of the Originator's interest rate hedges, and the fair value of the originated mortgage servicing rights (MSRs) associated with the loan. Net gains range from lows of about zero following the end of the refinancing boom of 2013 to over 200bps of principal amount per loan (about $5,500) during the peak of 2020q3.[3]

We classify nonbanks as "Originators" if their median origination fees and gain-on-sale

[1] Kim et al. (2018) provide an extensive description of warehouse lending.

[2] The collateral used by the nonbanks is typically high quality and has little warehousing risk. This stands in contrast to lower quality loans that fed the private-label securitization market during the run-up to the financial crisis.

[3] www.nationalmortgagenews.com/news/mortgage-profits-were-a-little-less-spectacular-in-q1-2021

constitute more than 75% of their total income during the sample. We have 458 Originators in our sample, with examples being Rocket Mortgage and loanDepot.

3.2.2 Servicers

Servicers' primary earning assets are mortgage servicing rights. The responsibilities associated with MSRs primarily include receiving payments from borrowers and, in turn, forwarding payment to investors, tax authorities, and insurance companies. Servicers are compensated with a contractual set of cash flows for the life of the loan, which is typically specified as a percentage of the remaining unpaid loan balance. For example, if the servicing fee is 25 basis points for a loan with a balance of $200,000, the income would be $500 per year. Servicers are also responsible for dealing with delinquent borrowers which may entail forbearance, renegotiation, or foreclosure. Servicers can earn additional income through late fees and incentive fees for coordinating loan workouts.

The servicing business faces two primary risks: prepayment risk and delinquency risk. Borrowers' prepayment rates increase when mortgage interest rates fall because of the strong financial incentives to refinance. Refinancing ends the stream of mortgage servicing fees. Thus, as prepayment risks increase, the value of MSRs decreases. Similarly, falling prepayment risk drives up MSR valuations.

While changes to prepayment risk directly drive Servicers' valuation, delinquency risk primarily affects Servicers' liquidity. When borrowers are delinquent, Servicers must still forward the promised payments to investors, tax authorities, and insurance companies. The Agencies ultimately reimburse Servicers for bearing these costs, but there is a delay in timing. Fannie and Freddie limit the time when Servicers must advance principal and interest to four months, but Servicers of Ginnie Mae pools must advance payments for the life of the loan which can last several months or even years depending on the speed of resolution or

foreclosure.[4]

We classify nonbanks in our sample as "Servicers" if their servicing income typically exceeds 75% of total income. We have 40 Servicers, with examples being Ocwen and Select Portfolio Servicing. We classify the remaining 29 mortgage companies with both origination and servicing businesses as "Diversified" (examples include PennyMac and Nationstar).

4 How do assets and financial policies differ across business models?

Panel A of Table 1 presents the asset composition of nonbanks. Column (1) begins with statistics for the full sample (including diversified mortgage companies), while columns (2)-(4) refers to Originators, Servicers, and the difference between the two, respectively. The summary in Column (2) focusing on Originators broadly matches the reported figures in Jiang et al. (2020), who use data on nonbanks from mortgage call reports filed in Massachusetts and Washington merged with HMDA. Column (3) presents statistics for Servicers, and column (4) shows large economic and statistical differences between Originators and Servicers. Held-for-sale (HFS) securities dominate Originators' assets at 68%, whereas mortgage servicing rights form the largest earning asset for Servicers at 26%. These assets have very different risk profiles as well. The majority HFS assets of Originators are very liquid with Agencies as ready buyers, and HFS remain on the balance sheet for a very short time between origination and sale. In contrast, Servicers' main earning assets (MSRs) are harder-to-value, less liquid, and have longer maturity. Consistent with a precautionary motive reflecting a higher risk profile of assets (Bates, Kahle, and Stulz, 2009; Acharya, Almeida, and Campello, 2007), Servicers hold greater liquidity (27% of their assets are unrestricted cash) compared to Originators (11%). This new fact about substantial cash buffers is one of several that gets

[4]Kim et al. (2022) provides a more detailed and comprehensive description of these costs and difference across the loans serviced for GSE and Ginnie Mae.

masked when we aggregate different business models as one "nonbank" industry.

Column (5) presents summary statistics for Diversified nonbank mortgage companies. By virtue of having a mix of origination and servicing activities, their asset account shares largely fall between those of Originators and Servicers. One notable difference is that the average diversified nonbank is larger than their less-diversified counterparts.

Panel B of Table 1 presents summary statistics on nonbanks' funding structure. Originators are funded by a substantially higher proportion of debt than Servicers (75% vs 47%). Figure 2 plots the empirical distribution of Originators and Servicers with traditional banks also included for reference. Average leverage levels across business models are vastly different, revealing that high leverage is not a uniform feature in the nonbank mortgage industry. The differences in leverage across business models can be understood in the context of the variation in asset composition reported in Table 1A. Leverage levels reflect an endogenous choice based on asset risk. The higher debt levels of Originators reflect their use of high-quality collateral — the Originators' loans serve as collateral for their warehouse borrowing facilities. With lower-quality collateral, Servicers have lower overall debt levels, consistent with theory's predictions.

Considering the composition of debt, 83% of originators' debt is short-term lines of credit compared to 23% in short-term debt facilities for Servicers. For Servicers, the substantially higher equity share of funding, longer-term debt structure, and cash buffer may compensate for the risks present in relatively illiquid and volatile MSRs and mitigate funding fragility concerns related to solvency and liquidity.

We also present summary statistics on the composition of income and expenses across nonbank business models in Table 2. Originators earn the majority of their income from origination fees (23%) and gain-on-sale (67%) while servicing-related income is 89% of income for Servicers. Across all types of nonbanks, personnel expenses are the largest expense category, constituting 57% and 41% of expenses for Originators and Servicers, respectively.

Other interest expenses (unrelated to warehouse credit lines) are 6.6% for Servicers compared to about 0.7% for Originators.

Overall, the analysis in this section reveals substantial heterogeneity across business models in nonbank mortgage companies. Originators fund their assets with very high leverage that is dominated by short-term debt. Servicers, however, have substantially lower leverage, longer-term funding structure, and higher cash buffers relative to Originators. These differences, at least in the cross section, suggest these financial policies are driven by heterogeneity in their respective compositions of assets.

5 Asset volatility and the drivers of business risk

We have argued that understanding nonbank asset risk is essential to having a more complete picture of the riskiness of these firms. In this section, we first discuss what drives variation in nonbanks' businesses and then document new facts on nonbank asset volatility.

5.1 Mortgage Interest Rates and Nonbanks' Growth

The key driver of business risk for nonbank mortgage companies is the level and changes in mortgage interest rates. Movements in mortgage interest rates have the opposite effect on the two main nonbank business models. Figure 3a plots the time series of year-over-year (YoY) changes in the mortgage interest rates and YoY percent change in median revenue for nonbank mortgage companies for each business model. This figure reveals a strong negative relationship between interest rates and Originators' revenue growth. Falling rates precipitate large mortgage origination volumes primarily because of refinancing incentives. Servicers, on the other hand, have a positive but weaker relationship with changes in interest rates. Rising interest rates slow down loan prepayment rates while increasing the value of mortgage servicing rights. Figure 3b plots their respective revenue growth as a function of

YoY mortgage interest rate changes. Appendix Figure A.2 presents similar figures examining asset growth. A one percentage point increase in mortgage interest rates corresponds to a 36% (30%) decrease in revenue (assets) for Originators. Servicers, however, experience a 11% (12%) increase in revenue (assets) following a one percentage point increase in mortgage interest rates. In sum, Originators' prospects are strongly negatively related to changes in mortgage interest rates while Servicers' business is weakly positively related to interest rate changes.

5.2 How volatile are nonbanks' businesses?

To illustrate the degree of nonbanks' business volatility, Figure 4 plots the density of annual revenue growth for nonbanks with traditional banks shown for reference. Appendix Figure A.3 presents the corresponding plot for asset growth. The figure shows that nonbanks' revenue is very risky: revenue growth from the 10th to 90th percentile ranges from –32% to +128% for Originators and –27% to +116% for Servicers, with similar ranges for asset growth.

As a point of reference, we also plot the density of growth for traditional banks. Banks are also very highly levered but differ in terms of their subsidized deposit funding, implicit government safety nets, heavier regulation, and more diversified assets. Banks' revenue (asset) growth is substantially less risky than their nonbank counterparts with the 10th to 90th percentile ranging from –10% to +20% (–3% to +18%). The contrast is remarkable when comparing banks to Originators because both have particularly high financial leverage, asset volatility for Originators is much higher despite their lacking the safety nets enjoyed by traditional banks.

These new facts about the high degree of nonbank asset risk in the context of high financial leverage present a puzzle. Figure 5 summarizes this by plotting net income volatility (Panel a) and revenue volatility (Panel b) against leverage and shows that Originators, in

particular, are in the upper-right quadrant of the typical volatility-leverage relationship found in other industries in the economy. The evidence suggests that a static trade-off view of capital structure may be insufficient to explain nonbanks' leverage choices. A potential way to reconcile these facts would be if nonbanks default at a very high frequency, a claim that we investigate next.

5.3 Nonbank failures

For context, the typical default rates for industries with high asset volatility in the range comparable to that of nonbanks (such as Coal, Precious Metals, Petroleum and Natural Gas, and Healthcare) tend to be from 6% to 19% (Hillegeist et al., 2004). Given that firms in these industries tend to maintain lower leverage levels given their higher asset risk, these default rates provide an approximate lower bound on what notions of the standard static trade-off theory would predict for nonbanks.

To examine nonbank default rates, we hand-collect data for every nonbank that drops out of our sample from regulatory documents in the National Mortgage Licensing System (NMLS) and internet searches. The primary reasons for firms dropping out of our sample are that a) the nonbank is acquired or merged (63 firms), b) the nonbank is still active, but no longer operating in California, and hence did not file a mortgage call report (59 firms), or c) the nonbank's license was revoked (39 firms – many for fraud or discriminatory lending practices). Despite significant fluctuation in mortgage interest rates and thus revenues, only *two* of our 527 firms dropped out because of bankruptcy or receivership during our 10-year sample.

We acknowledge the possibility that some acquired firms could also be severely financially distressed prior to acquisition. If true, we might expect above-average increases in leverage and negative revenue growth prior to default. However, only four firms in our sample experienced such dynamics prior to their acquisition. For a majority of acquired firms, there

is no evidence of severe distress prior to acquisition in our sample. Further, the acquisition of distressed entities suggests that some of the deadweight costs of financial distress were avoided.

To sum, our results so far have shown that both Originators and Servicers have (1) very high asset risk, (2) high debt-to-asset ratio with a large share of short-term debt particularly for Originators, and (3) very low default rates. To understand how these three facts coexist, we next examine nonbanks asset and financial dynamics.

6 Nonbank's Operating and Financing Dynamics

The static analysis of nonbank risk leads to a key question: How do nonbanks respond to negative shocks? Understanding downside dynamics can potentially help reconcile the combination of high asset risk and financial risk with low default rates. Further, how nonbanks respond to negative shocks is of first-order importance for regulators and policymakers interested in ensuring stability of credit supply (Originators' health), cash flows to investors in mortgage-backed securities (Servicers' health), and broader financial system stability. In this section, we study nonbanks' dynamics to shed light on these issues. First, we study the operating cost structure of nonbanks (operating leverage) and document new facts about the operating flexibility of nonbanks. Next, we study the financing dynamics of nonbanks to examine whether and to what extent they make capital structure adjustments in the face of negative shocks.

6.1 Research Design

To estimate operating and financial flexibility, we distinguish between 3 degrees of revenue shocks: positive ($\Delta \log(Revenue) > 0$), moderately negative shocks ($\Delta \log(Revenue) \in [0, -15\%]$), and severely negative shocks ($\Delta \log(Revenue) < -15\%$). We estimate a spline

regression of changes in log (operating or financing) costs on contemporaneous changes in log operating revenue, with knots at $\Delta \log(Revenue)$ equal to -0.15 and 0. Our regression set up is similar in spirit to research studying nonfinancial firms' operating leverage (Anderson, Banker, and Janakiraman, 2003; Chen, Harford, and Kamara, 2019) except ours allows firms' response to positive shocks, moderately negative, and severely negative shocks to be different. Specifically, we use OLS to estimate the following spline regression:

$$\begin{aligned}\Delta \log(Cost_{it}) =& \alpha + \psi \left(\min[\Delta \log(Revenue_{it}), -0.15]\right) \\ &+ \phi \left(\min[\Delta \log(Revenue_{it}) + 0.15, 0.15] * \mathbb{1}_{[\Delta \log(Revenue_{it}) > -0.15]}\right) \\ &+ \gamma \left(\Delta \log(Revenue_{it}) * \mathbb{1}_{[\Delta \log(Revenue_{it}) > 0]}\right) + \epsilon_{it} \end{aligned} \tag{1}$$

This way of specifying the regression allows us to directly observe the respective sensitivities for each region of shocks. We are most interested in $\hat{\psi}$, which estimates the percent change in costs for a one percent larger drop in revenue conditional on the firm facing a severely adverse scenario. A higher $\hat{\psi}$ indicates a more flexible downside cost structure. Similarly, the estimate $\hat{\phi}$ estimates cost flexibility for moderate negative shocks.

We not only estimate these regressions for Originators and Servicers, but we also provide estimates for traditional banks and high-risk non-financial firms. The comparison with banks and high-volatility non-financial firms provides benchmarks for the nonbank flexibility estimates along two distinct dimensions of risk. Traditional banks are not only in the mortgage lending space (though they are substantially more diversified in their business lines) but they also maintain high leverage levels. Thus, to the extent leverage captures financial risk, traditional banks are similar to non-banks along this dimension. High-volatility non-financial firms — defined as nonfinancial firms in Compustat with revenue volatility higher that 20% — are similar on the asset risk dimension. Further, unlike traditional banks, the financial

policy of both nonbanks and non-financial firms is governed by market forces, making them comparable to each other along that dimension.

Our empirical aim is to estimate how key operating and financing variables change in response to changes in business conditions, as measured by revenue. A causal interpretation requires us to assume that revenue conditions drive changes in operating and financial policies in nonbanks, and not vice versa. We discuss the nature and plausibility of such alternate explanations of our main results following the presentation of our main empirical results.

6.2 Operating Flexibility

With $\Delta \log(\textit{Operating Expenses})$ as the dependent variable, Table 3 presents coefficient estimates of regression equation (1) for out four sub-samples: Originators (column 1), Servicers (column 2), traditional banks (column 3) and high-volatility non-financial firms (column 4). The results in Table 3 show that Originators have the highest operating flexibility in a severely adverse scenario: a 10% larger drop in revenue corresponds to an 8.7% change in costs. The corresponding figures for Servicers, traditional banks, and high-risk non-financials are 4.6%, 3.3%, and -0.3%, respectively.

Figure 6 presents the operating flexibility graphically with our fitted regression estimates in Panel (a) and a (less parametric) binscatter plot in Panel (b), which shows our results are not driven by the particular choice of the placement of the spline knots. The ability of Originators to sharply reduce costs in the face of falling revenues sheds light on our main puzzle: Originators use operating flexibility as a mechanism to lower the probability of financial distress while maintaining high leverage in the face of high asset volatility. The largest operating cost category for both Originators and Servicers is personnel expenses. Originators may be more flexible to manage such costs in business downturns through loan officer layoffs and reduced bonus compensation because of lower volume. Servicing costs such as receiving loan payments, forwarding payments to investors, etc. are based on the

stock of mortgages. Thus, even in the face of declining business conditions, their ability to shed labor costs may be lower.

In sum, nonbanks substantially cut operating costs in the face of negative revenue shocks, and this ability is especially keen for Originators. This operational flexibility can mitigate solvency concerns in the face of high asset volatility and high financial leverage. Next, we examine financial leverage from a dynamic standpoint and contrast those findings with the seemingly concerning picture of risk implied by a static assessment.

6.3 Financial Flexibility

The static picture of high nonbank leverage can be concerning because high financial leverage, all else equal, is often associated with greater risks of financial distress. For highly-levered firms, relatively small drops in asset values can render a firm insolvent or create debt overhang problems if the firm cannot reduce its leverage. Recent work in dynamic capital structure theory has pointed out that the degree to which these concerns are warranted depends on factors relating to the debt structure including the level of debt, how the debt is collateralized, and its maturity (DeMarzo, 2019). In the end, the degree of risk posed by high levels of leverage is an empirical question that depends on whether firms can reduce debt in response to drops in revenue.

Figure 7 plots the firm-level average debt-to-assets ratio over time along with changes in mortgage interest rate for reference. Despite substantial variation in asset values and business prospects (as shown earlier in Figure 3a), the average leverage ratio for Originators remains in a band from about 70% and 80% for most of the sample. The collateralized nature of short-term debt allows debt usage to move virtually in lock-step with their asset growth, keeping the debt ratio somewhat stable. As shown earlier in Table 1, Servicers' debt is more tilted toward longer-term debt, which is inherently less responsive to variation in asset values. As a consequence, debt-to-assets ratios fluctuate relatively more for Servicers, but

Figure 7 shows they also remain stable ranging from 40% to 50% for most of the sample with the exception of average leverage ratios increasing to 56% during the onset of the COVID-19 crisis.

To formally examine the extent of nonbank funding flexibility, we use the same regression framework in equation (1) where our dependent variable is now the change in the level of debt (Table 4a) and then interest expense (Table 4b). Again, our focus is particularly on the sensitivity to severely negative revenue shocks. Columns (1)–(4) of Table 4a presents the estimates for Originators, Servicers, traditional banks, and high-volatility non-financial firms respectively, where $\Delta \log(Debt)$ is the dependent variable. Both types of nonbanks demonstrate a high degree of downside flexibility with a 10% decline in revenue corresponding to an 8.2% reduction in debt for Originators and a 7.8% debt reduction for Servicers in the severe negative shock region. In contrast, traditional banks and non-financial firms have debt levels that are relatively insensitive to drops in revenue.[5] Figure 8 presents these estimates graphically with our fitted regression estimates in Panel (a) and a binscatter plot in Panel (b). These figures illustrate the remarkable ability of nonbank mortgage companies to reduce leverage even in the face of very large negative shocks.

Table 4b repeats the estimation using interest expense as the dependent variable. Again, both types of nonbanks prove very sensitive to large downside shocks with a 10% decline in revenue corresponding to a 9.5% reduction in interest expense for Originators and a 4.7% reduction in interest expense for Servicers, though the results for Servicers are not statistically significant.[6] We also note that the Originators' exceptionally high degree of flexibility on the downside is occurring in a rising interest rate environment when their refinancing business is drying up and financing costs are rising.

[5]It is also striking to note that the financial flexibility of banks is quite asymmetric – responses to upside are stronger than those to declines in revenue. Admati, DeMarzo, Hellwig, and Pfleiderer (2018) argue that, despite high leverage, banks may be especially prone to resisting leverage reductions.

[6]The results are statistically significant when computing heteroskedasticity robust standard errors, but not when clustering by firm. However, with only 40 servicers, there may be concerns that too few clusters can bias estimates of standard errors (e.g., see Cameron and Miller, 2015).

A key reason that Originators are so responsive to changes in business conditions is the nature of their borrowing. The vast majority of their debt is directly collateralized by high-quality mortgages in their originate-to-distribute pipeline. As consumer demand falls, Originators' pipeline shrinks as mortgages are sold to investors and their corresponding debt declines. These results support the theoretical predictions in DeMarzo (2019) that ascribe a central role for collateral in determining capital structure dynamics. To our knowledge, this evidence is among the first to show dynamic adjustment of collateralized leverage simultaneously leading to high leverage and an ex-ante decrease in expected financial distress costs.

6.3.1 Alternative explanations

Our empirical tests examine how nonbanks quickly and substantially reduce their financing costs in the face of declining revenues. An alternative explanation is reverse causality: if nonbanks are unable to raise funds (i.e., facing financial constraints), they may have reduced ability to generate origination or servicing revenue.

It is unlikely that financial constraints can fully explain the results for Servicers given their relatively lower levels of financial leverage and high cash balances. During our sample period the industry average unrestricted cash-to-assets is only below 20% for two quarters, and net debt (debt minus cash divided by total assets) is usually around 20% and never exceeds 30%. Moreover, Servicers' business face downturns when interest rates are falling which makes drawing down on lines of credit less expensive. Thus, it seems that insufficient access to financial resources is unlikely to be the cause of lower Servicing revenue.

Originators, however, hold relatively less cash, so financing frictions may have more scope to bind their investment decisions. Specifically, borrowing constraints could lower Originators' ability to close loans and thus cause a decline in revenues. To investigate the possibility that Originators' become credit constrained at times when industry prospects are falling,

we plot examine their credit line utilization (drawn credit divided by total credit available on open lines of credit). Figure 9 presents the time series of credit line utilization rates during our sample along with changes to mortgage interest rates for reference. Throughout the sample, we observe that most credit utilization remains stable between 30% to 70% with no time period when the 90th percentile of Originator when their utilization exceeded 90%. This fact works against the notion that Originators face financial constraints during our sample period. In fact, Figure 9 shows that credit utilization is *lower* during periods of high interest rates — when business conditions are poorer for originators — suggesting these are periods when financial constraints loosen. This provides further evidence that originators flex their borrowings *in response* to changing business conditions rather than financial constraints causing lower revenue.

In sum, Originators are extremely flexible in adjusting to severe downside shocks using both operating and financial flexibility, and this is especially apparent when compared to traditional banks and high volatility nonfinancial firms. Servicers are also flexible though to a lesser degree, which may lead to lingering concerns of whether and how Servicers take further measures to account for severe downside risk. This motivates our next set of tests where we examine nonbanks' liquidity policies and dynamics.

6.4 Liquidity

All else equal, high asset risk and high leverage can lead to greater liquidity concerns and a stronger precautionary motive for cash (Acharya et al., 2007; Bates et al., 2009). In Figure 10, we plot each Fama-French industry's average cash-to-assets ratio as a function of its overall downside flexibility — including both operating and financial expenses — for severe shocks ($\hat{\psi}_{total\ expenses}$ in equation 1). The figure shows an overall negative relationship between downside flexibility and cash. Notable for our purposes is that Servicers hold more cash than nearly all other industries with a cash-to-assets ratio of 27%, and they lie well

to the northwest of the fitted liquidity-risk relationship in the economy.[7] These results are consistent with Servicers recognizing their relative inflexibility and holding more cash as a buffer.

To further understand the dynamics of nonbanks' liquidity position, we next estimate our baseline flexibility regressions (equation 1) with a measure of operating liquidity as the dependent variable. We measure nonbanks' ability to have sufficient liquidity by scaling their unrestricted cash balance by their expenses. We compute a firm's "days-cash-on-hand" as the current unrestricted cash balance divided by daily expenses. This measure captures how many days-worth of expenses can be covered with the current cash balance. Originators carry a mean (median) or 104 (52) days-cash-on-hand while Servicers carry 256 (97) days of cash on hand. The reason this is a sharp measure is because, as we have shown earlier, nonbanks are able to reduce their expenses during negative revenue shocks. Whether the firm finds itself in a liquidity crisis depends on the relative rate at which cash falls compared to expense reductions, and this is what days-cash-on-hand aims to measure. Table 5 presents the results. The large *negative* coefficient indicates that nonbanks' operating liquidity actually *increases* during times of falling revenue. For severe shocks to revenue, a 10% larger drop in revenue corresponds to a 4.8% and 5.2% increase in days-cash-on-hand for Originators and Servicers, respectively. Thus, while nonbanks' cash balances are being drawn down during revenue declines, the expenses are being reduced at rates such that operating liquidity does not fall.

Servicers also require liquidity to make principal and interest payments (advances) to investors on behalf of delinquent borrowers. Although they are ultimately paid back by the Agencies (thus, advances are recorded as an asset), borrower delinquency can impose short-term liquidity problems on Servicer balance sheets. Kim et al. (2022) argue that the key liquidity issue in mortgage servicing is whether Servicers can finance their advances with cash, unsecured loans, or credit lines collateralized by assets such as MSRs. Motivated by

[7]For all of the liquidity analysis, we use nonbanks' *unrestricted* cash balance, which excludes escrow funds for payment of mortgagors' taxes, insurance, and related items, or other fiduciary funds.

this argument, we examine how Servicers' balance sheet responds to increases in advances. First, we find virtually no relationship between nonbanks' cash-to-assets ratio and advances. In Appendix Table A.1, we regress debt-to-assets, long-term debt, short-term debt, and credit line utilization. The table shows that increases in advances are funded by increases in short-term debt. For those in our sample with credit line data, we also find increases in credit line utilization, suggesting that firms draw down credit lines to fund their liquidity gaps.

Our results clearly demonstrate the availability of various margins of adjustment for Servicers who face liquidity shocks. While our sample period includes substantial swings in the prospects of servicers, we acknowledge the caveat that our sample does not include extreme events such as the massive, widespread defaults during the global financial crisis.

7 Conclusion

Nonbank mortgage companies now have a dominant role in the U.S. mortgage market. We present new facts about the riskiness of these firms, showing that when viewed from a static lens, their highly-levered financial policy does not appear to correspond to their high level of asset volatility. We show that this combination of high asset risk with high financial leverage, however, does not lead to a high frequency of nonbank failures. Thus, the traditional static trade-off theory of capital structure does not describe these patterns well.

We resolve this puzzle by empirically showing how dynamics matter in the assessment of risk. We show evidence that nonbanks are highly flexible in reducing their operating costs and financial leverage in response to declining business conditions. We find that it is not that nonbanks (originators, in particular) are resilient *despite* high levels of short-term funded debt, but rather *because* of it. The reason stems from the high-quality collateralized nature of their short-term debt. Warehouse lines of credit, which form the bulk of Originator liabilities,

are secured by mortgage loans that are typically on their balance sheet a short time and have ready buyers in the Agencies (e.g., Fannie Mae). This collateralization enables and enforces flexibility for nonbanks to borrow less when revenues drop, and also allows them scale up debt during periods of higher demand. Our evidence is consistent with a key argument in DeMarzo (2019) that collateral functions as a commitment device between the firm and its creditors, facilitating high leverage but with low default risk. Long-term debt, which is typically not collateralized, is far less flexible to perform this function. We find that Servicers — who do not have such high-quality collateral to commit — have relatively lower leverage and hold more liquidity to mitigate negative shocks.

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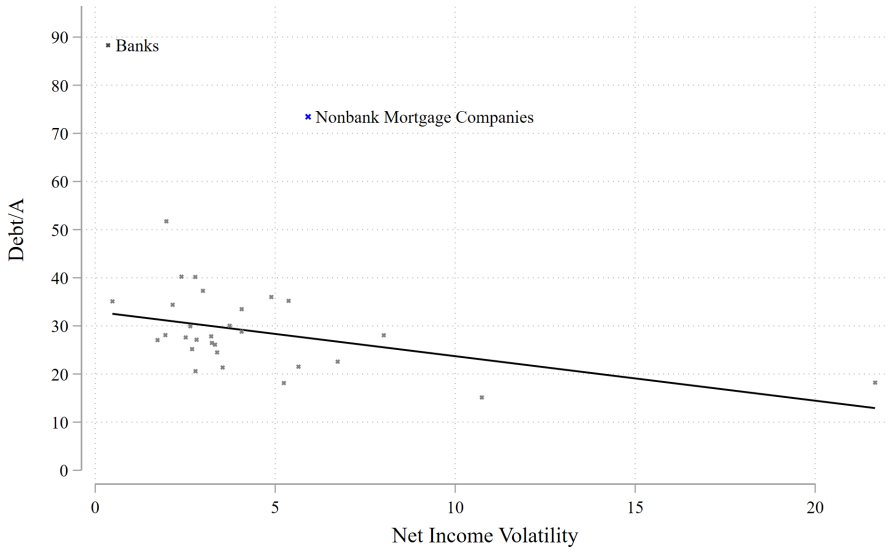
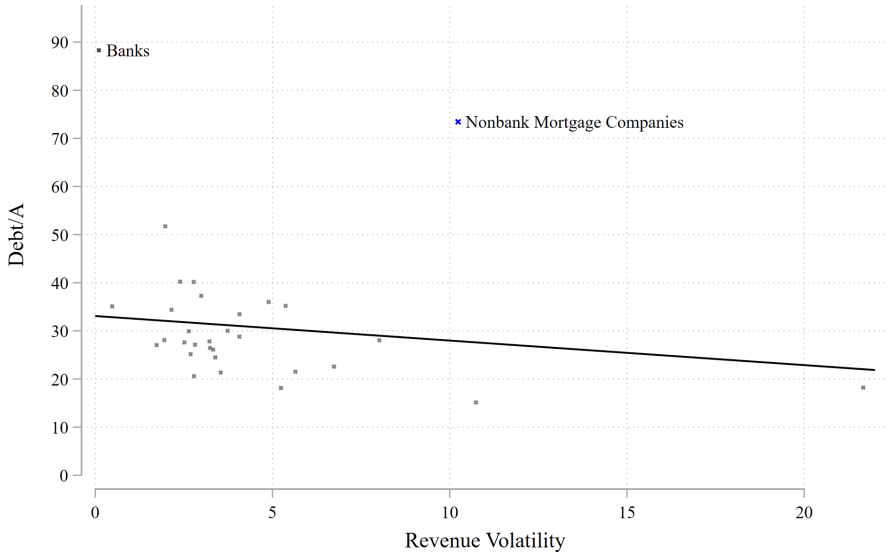


(a) Leverage and Net Income Volatility



(b) Leverage and Revenue Volatility

Figure 1: Leverage and Cash Flow Risk
This figure plots the average debt-to-assets ratio against the average net income volatility (Panel a) and revenue volatility (Panel b) using the trailing four years. Each marker represents one of the Fama-French 30 industries, traditional banks, or nonbank mortgage companies, and the line is a linear fit of the data from the Fama-French 30 industries.

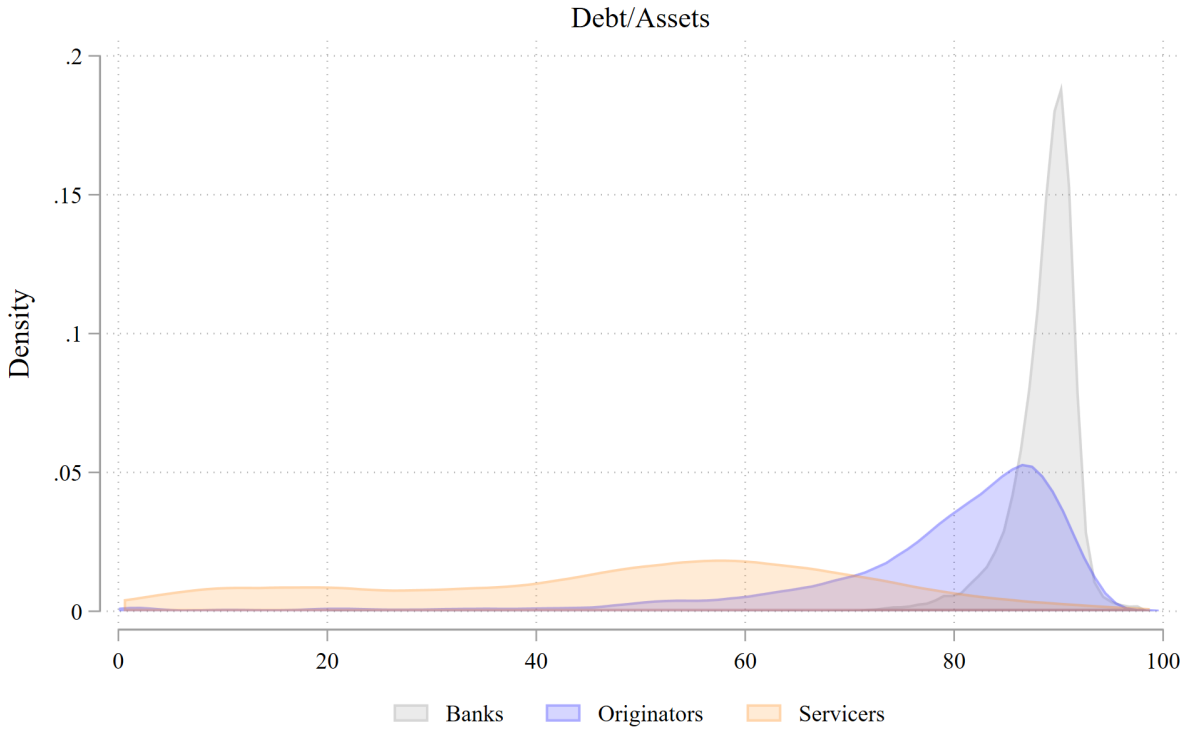
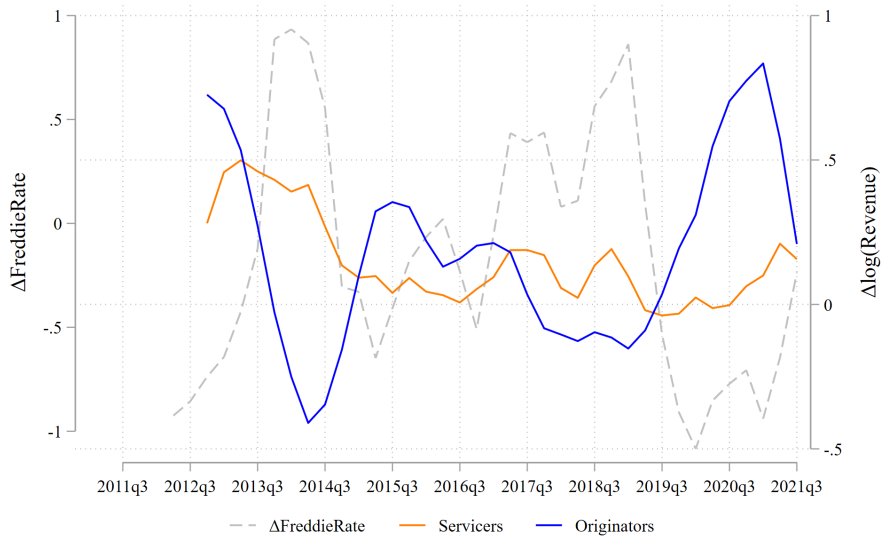
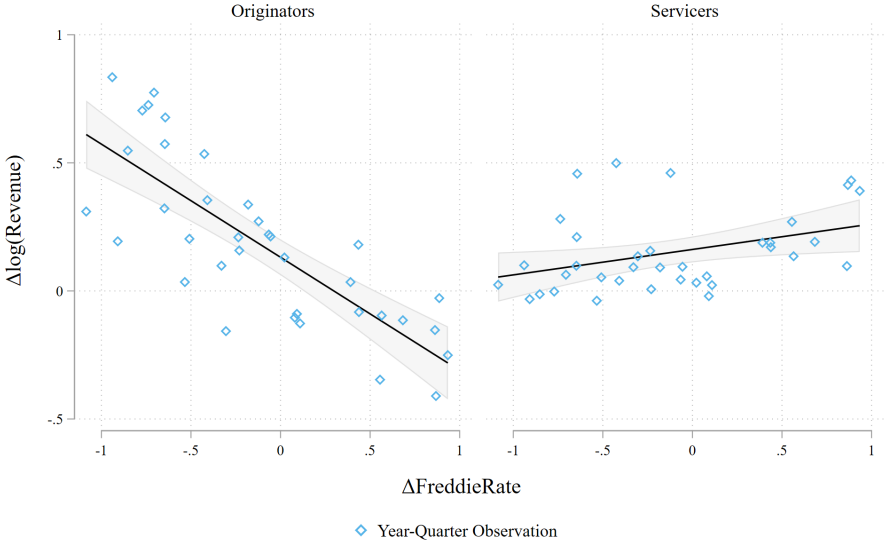


Figure 2: Variation in Leverage Across Business Models
This figure presents the density of leverage ratios (debt-to-assets) for traditional banks, Originators, and Servicers.



(a) Time Series of Changes in Interest Rates and Nonbank Revenue Growth



(b) Nonbank Revenue Growth on Changes in Mortgage Interest Rates

Figure 3: Mortgage Interest Rates and Revenue Growth
These figures plot the relationship between the annual percentage point change in mortgage interest rates (as measured by the Freddie Mac 30-year fixed rate) and median log change in revenue for Originators and Servicers, respectively. Panel (a) presents these figures as a time series, and Panel (b) directly plots the median log change in revenue against changes in the mortgage interest rate for Originators (left panel) and Servicers (right panel).

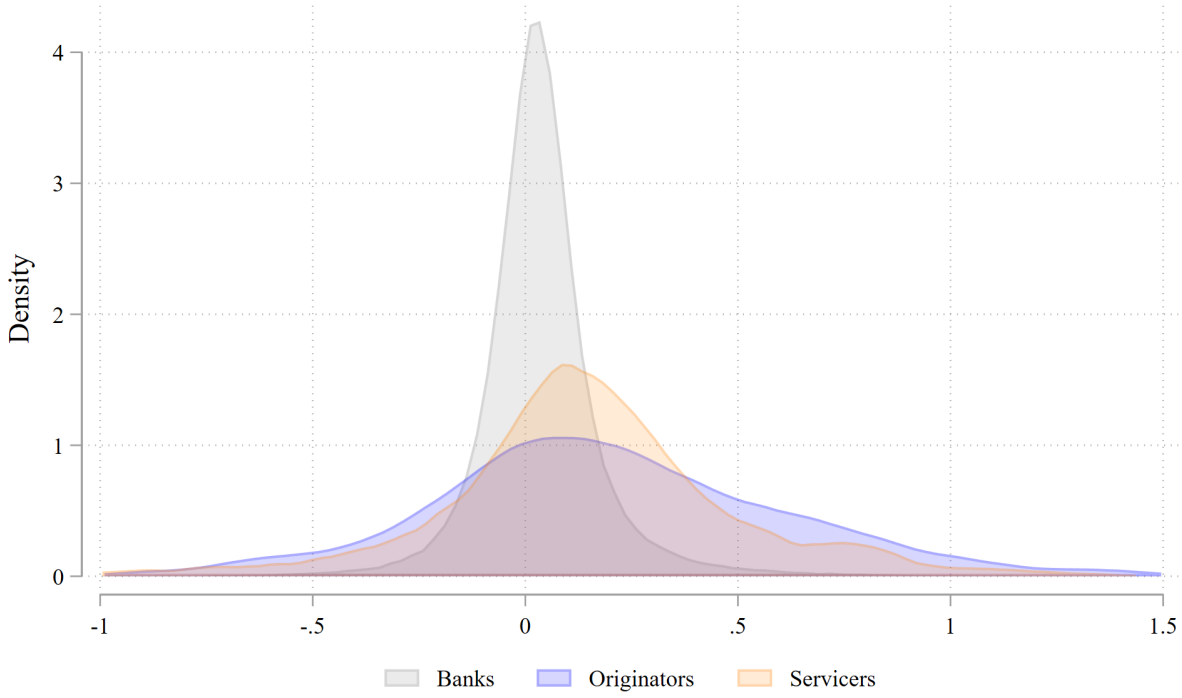
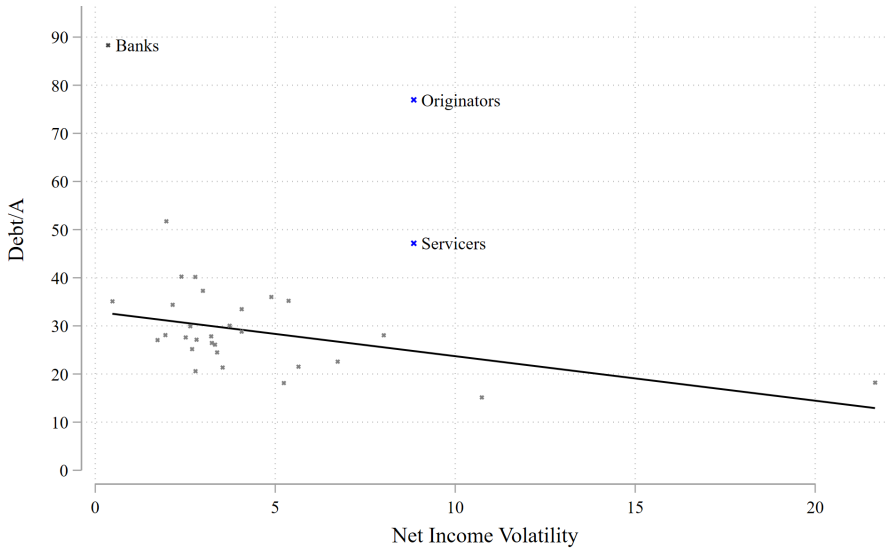
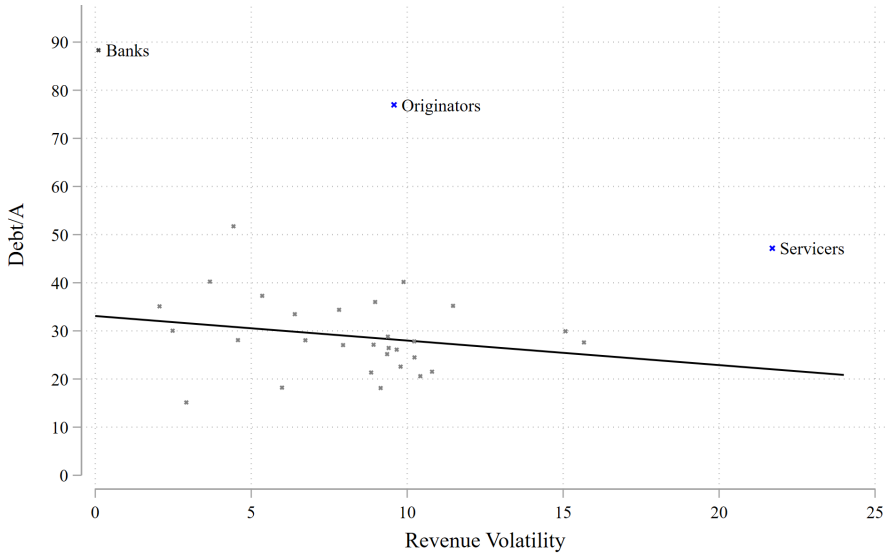


Figure 4: Nonbanks' Business Risk: Revenue Volatility
This figure presents the density of annual change in log(Revenue) for traditional banks, Originators, and Servicers.

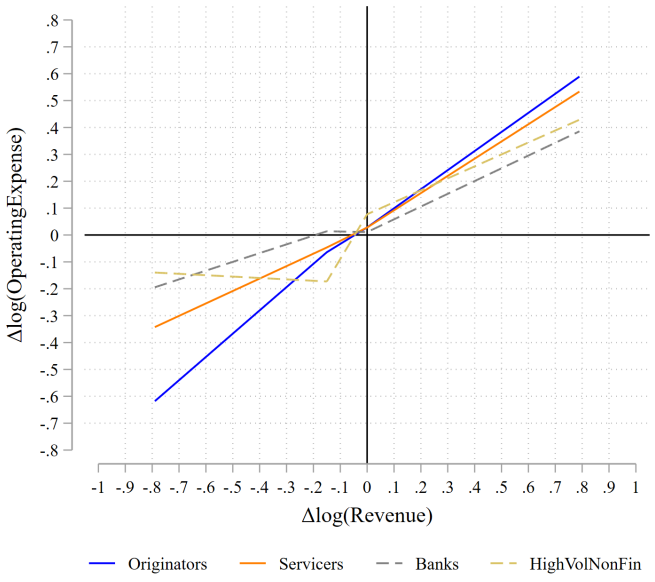


(a) Leverage and Net Income Volatility

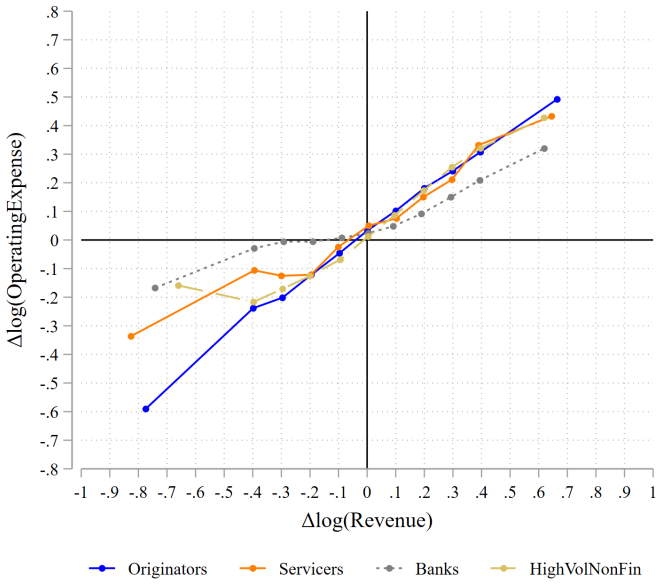


(b) Leverage and Revenue Volatility

Figure 5: Income Volatility and Leverage By Business Model
This figure plots the average debt-to-assets ratio against the average net income volatility (Panel a) and revenue volatility (Panel b) using the trailing four years. Each marker represents one of the Fama-French 30 industries, traditional banks, Originators, and Servicers, and the line is a linear fit of the data from the Fama-French 30 industries.



(a) Fitted Regression Coefficients



(b) Binscatter Plot

Figure 6: Operating Flexibility
This figure plots the relationship between log changes in operating expenses and log changes in operating revenues for Originators, Servicers, traditional Banks, and high-volatility non-financial firms. Panel (a) plots the fitted regression coefficients from Table 3, and Panel (b) presents a binscatter plot.

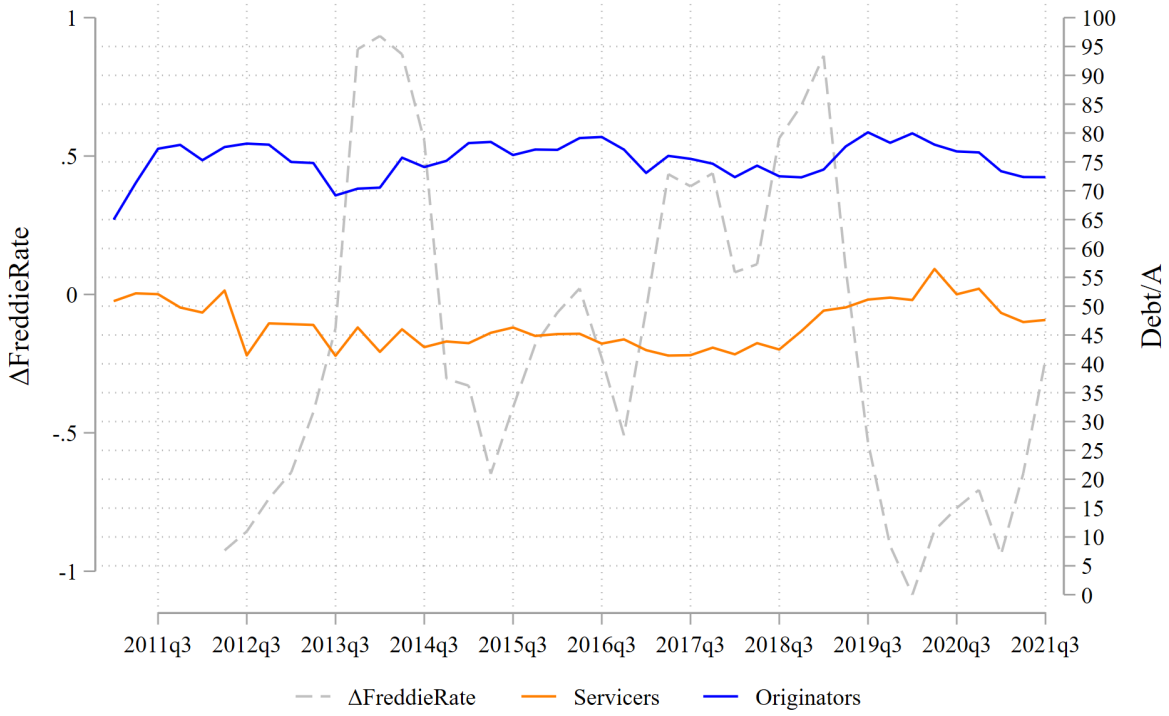
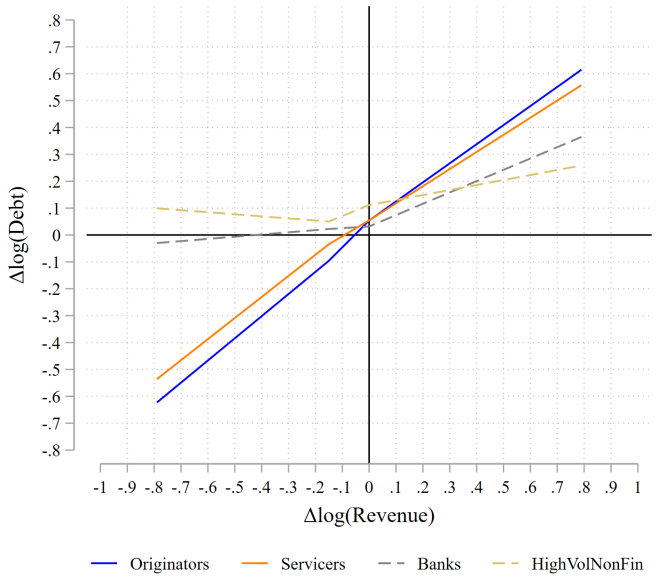
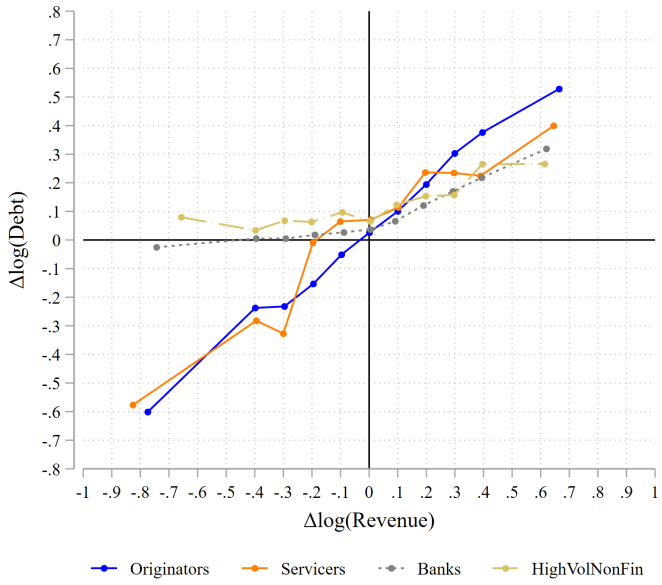


Figure 7: Nonbank Capital Structure Over Time
This figure plots the average debt-to-assets ratios for Originator and Servicers over time. The Panel also includes the year-over-year change in mortgage interest rate (ΔFreddieRate), which Section 5.1 shows is a key driver of business prospects.



(a) Fitted Regression Coefficients



(b) Binscatter Plot

Figure 8: Financial Flexibility
This figure plots the relationship between log changes in debt and log changes in operating revenues for Originators, Servicers, traditional Banks, and high-volatility non-financial firms. Panel (a) plots the fitted regression coefficients from Table 4, and Panel (b) presents a binscatter plot.

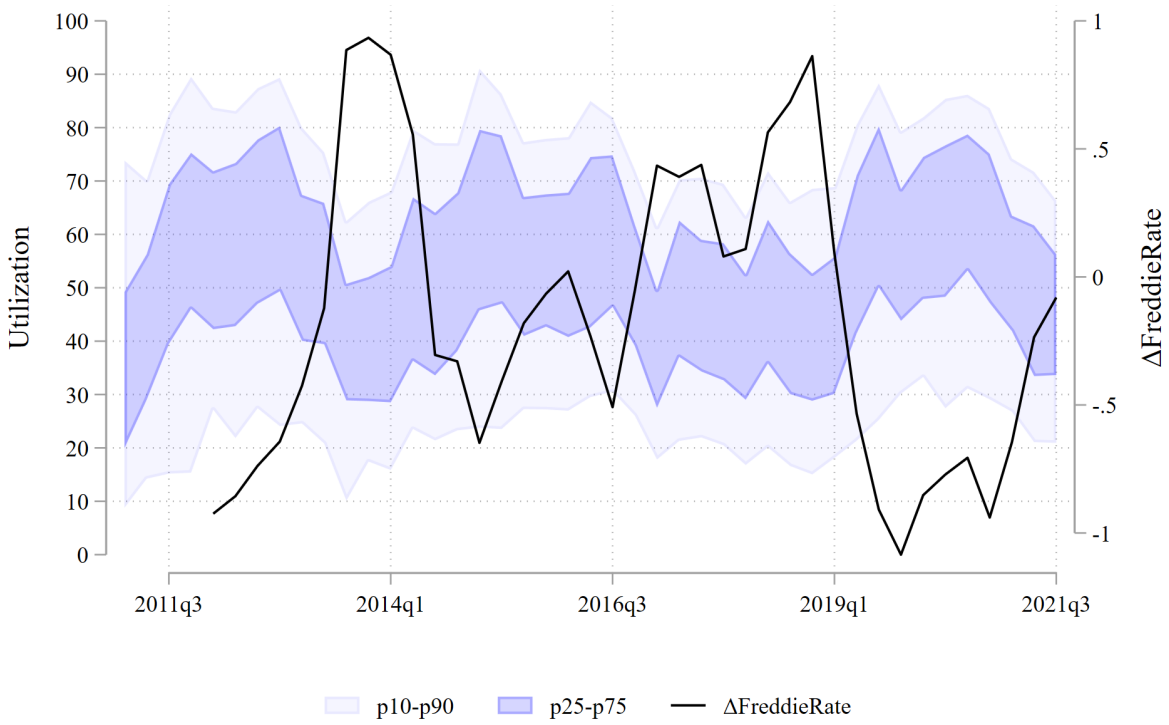


Figure 9: Originators' Credit Line Utilization Over Time
This figure plots the distribution of credit line utilization during the sample period, with light blue representing the 10th to 90th percentile and the darker blue representing the 25th to 75th percentile. Utilization is the amount of total credit drawn divided by the total credit available on the firm. The Panel also includes the year-over-year change in mortgage interest rate (ΔFreddieRate), which Section 5.1 shows is a key driver of business prospects.

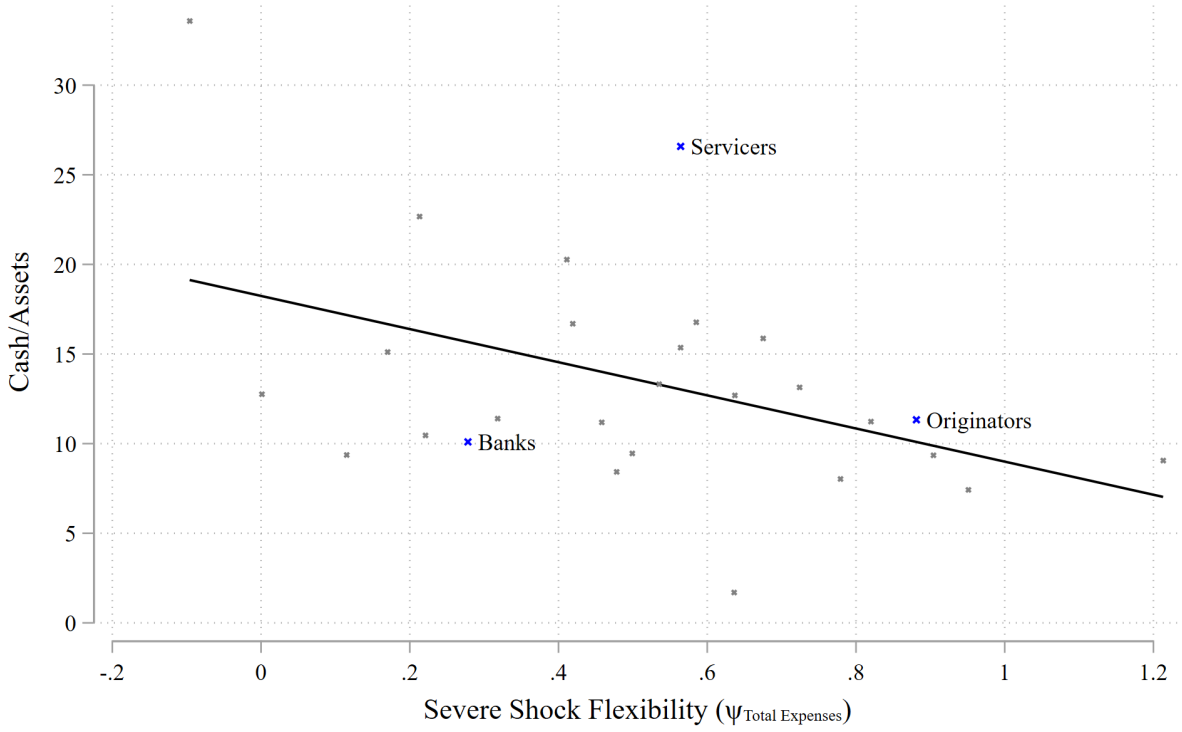


Figure 10: Flexibility and Liquidity
This figure plots the average unrestricted cash-to-assets ratio versus total downside flexibility for the Fama-French 30 industries, traditional banks, Originators, and Servicers along with a linear fit of the data. The estimates for total flexibility are from $\hat{\psi}$ in equation 1, where log changes in total expenses is the dependent variable. We exclude four industries with especially imprecise estimates with standard errors around $\hat{\psi}$ greater than 0.3, the highest of which has average cash-to-assets of 13%.

Table 1: Summary Statistics: Balance Sheet

This table presents summary statistics for the components of the assets (Panel A) and funding (Panel B) on nonbanks' balance sheets as a share of total assets. The sample is quarterly data from 2011q1-2021q3. Each variable is expressed in percentage points as a share of total assets. Variables are winsorized at the 1% level to minimize the potential effects of outliers. *Originators* (column 2) are nonbanks that have greater than 75% of their revenue from origination activities. *Servicers* (column 3) derive over 75% of their revenue from mortgage servicing activities. Column 4 presents the difference between originators and Servicers (*Origs–Servs*), with standard errors clustered at the firm level. *Diversified* (column 5) nonbanks are the remaining nonbanks that derive more than 25% of their revenue from each of origination and servicing activities.

Panel A: Assets

	(1) All	(2) Originators	(3) Servicers	(4) Origs-Servs	(5) Diversified
Assets (millions)	545.11	367.13	538.86	-77.46	2469.60
Share of Assets (pps):					
Cash	14.63	12.80	31.72	-19.21***	17.12
Unrestricted Cash	12.71	11.34	26.59	-15.49***	13.56
Restricted Cash	1.91	1.46	5.13	-3.72***	3.56
Receivables	4.40	3.03	19.33	-16.48***	4.04
Held-for-Sale Securities	60.29	68.03	4.15	63.89***	33.29
Held-for-Inv Securities	2.42	1.67	2.30	0.03	10.72
Mortgage Servicing Rights	8.91	6.05	26.00	-20.05***	22.60
Physical Plant and Equipment	2.27	2.07	5.04	-3.02***	1.65
Other	7.08	6.35	11.45	-5.16***	10.58

Panel B: Liabilities

	(1) All	(2) Originators	(3) Servicers	(4) Origs-Servs	(5) Diversified
Total Debt (pps)	71.84	75.14	46.65	28.99***	61.57
Short-Term Debt	63.68	69.22	27.81	41.41***	40.12
Debt Facilities	55.57	62.19	10.82	51.48***	29.23
Accrued Expenses	3.66	3.27	8.79	-5.60***	2.66
Payables	2.17	1.78	4.28	-2.54***	4.27
Other Short-Term Debt	2.28	1.98	3.92	-1.93**	3.96
Long-Term Debt	8.15	5.92	18.84	-12.42***	21.45
Debt from Related Parties	1.33	0.57	5.48	-4.96***	5.27
Debt from Unrelated Parties	2.04	1.62	5.59	-4.02**	2.93
Servicing Liabilities	0.71	0.25	3.52	-3.29**	2.84
Other Long-Term Debt	4.08	3.47	4.25	-0.15	10.41
Equity	28.16	24.86	53.35	-28.99***	38.43

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Summary Statistics: Income and Expenses

This table presents summary statistics the components of nonbanks' income and expenses. The sample uses the trailing four quarters from 2011q1-2021q3. Each income (expense) variable is expressed in percentage points as a share of total income (expenses). Variables are winsorized at the 1% level to minimize the potential effects of outliers. *Originators* (column 2) are nonbanks that have greater than 75% of their revenue from origination activities. *Servicers* (column 3) derive over 75% of their revenue from mortgage servicing activities. Column 4 presents the difference between originators and Servicers (*Origs–Servs*), with standard errors clustered at the firm level. *Diversified* (column 5) nonbanks are the remaining nonbanks that derive more than 25% of their revenue from each of origination and servicing activities.

	(1) All	(2) Originators	(3) Servicers	(4) Origs-Servs	(5) Diversified
Share of Income (pps):					
Interest Income	6.10	5.74	3.63	2.10*	12.27
Origination	20.10	22.65	-0.22	22.71***	13.35
Gain on Sale	59.61	66.84	2.81	64.32***	39.50
Servicing	12.07	3.06	89.28	-86.40***	30.87
Other Income	1.96	1.48	4.32	-2.76**	4.64
Share of Expenses (pps):					
Warehouse Interest Expense	4.88	5.38	0.31	5.09***	4.19
Nonwarehouse Interest Expense	1.67	0.68	6.63	-5.84***	7.07
Personnel	54.58	57.47	40.65	16.58***	38.40
Occupancy, Equipment, Technology	6.84	6.65	9.96	-3.35***	5.79
Administrative and Other	31.89	29.68	42.37	-12.54***	44.46

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Operating Flexibility

This table presents estimates from a spline regression of log changes in annual operating costs on log changes in operating revenue using annual data as of Q3 of each year. The spline regression is presented in equation 1 and uses knots at Δlog(Revenue) equal to -0.15 and 0, and is coded such that the estimates below represent the elasticity of costs to revenue for each respective region (severe negative shock, moderate negative shock, and positive shock). *Operating Costs* are the total non-interest expenses, *Revenue* is the total revenue excluding mortgage servicing rights revaluations. The columns represent regression estimates on the sample of Originators (1), Servicers (2), traditional banks (3), and all Compustat non-financial firms with revenue volatility higher than 20% (*HighVolNonFin*). Variables are winsorized at the 1% level to minimize the potential effects of outliers, and standard errors are clustered at the firm level.

	(1) Originators	(2) Servicers	(3) Banks	(4) HighVolNonFin
Δ log(Revenue) $< -.15$	0.87***	0.46**	0.33***	-0.05
	(<0.01)	(0.03)	(<0.01)	(0.25)
Δ log(Revenue) $\in [-.15, 0]$	0.62***	0.50	-0.02	1.67***
	(<0.01)	(0.22)	(0.14)	(<0.01)
Δ log(Revenue) > 0	0.71***	0.64***	0.47***	0.44***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Constant	0.07***	0.02	0.06***	-0.18***
	(<0.01)	(0.78)	(<0.01)	(<0.01)
N	7,466	680	212,959	7,810
R^2	0.77	0.46	0.21	0.42

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Financial Flexibility

This table presents estimates from a spline regression of log changes in debt (Panel A) or interest expense (Panel B) on log changes in operating revenue using annual data as of Q3 of each year. The spline regression is presented in equation 1 and uses knots at Δlog(Revenue) equal to -0.15 and 0, and is coded such that the estimates below represent the elasticity of costs to revenue for each respective region (severe negative shock, moderate negative shock, and positive shock). *Debt* is the total debt outstanding, *Interest Expense* is the total interest expenses over the past year, *Revenue* is the total revenue excluding mortgage servicing rights revaluations. The columns represent regression estimates on the sample of Originators (1), Servicers (2), traditional banks (3), and all Compustat non-financial firms with revenue volatility higher than 20% (*HighVolNonFin*). Variables are winsorized at the 1% level to minimize the potential effects of outliers, and standard errors are clustered at the firm level.

Panel A: Debt

	(1) Originators	(2) Servicers	(3) Banks	(4) HighVolNonFin
Δ log(Revenue) $< -.15$	0.82***	0.78***	0.08***	-0.08
	(<0.01)	(<0.01)	(<0.01)	(0.25)
Δ log(Revenue) $\in [-.15, 0]$	1.00***	0.59	0.06***	0.41**
	(<0.01)	(0.33)	(<0.01)	(0.01)
Δ log(Revenue) > 0	0.71***	0.64***	0.42***	0.19***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Constant	0.03	0.08	0.03***	0.04
	(0.11)	(0.44)	(<0.01)	(0.16)
N	7,472	680	213,072	6,108
R^2	0.60	0.31	0.25	0.01

Panel B: Interest Expense

	(1) Originators	(2) Servicers	(3) Banks	(4) HighVolNonFin
Δ log(Revenue) $< -.15$	0.95***	0.47	-0.00	-0.08
	(<0.01)	(0.24)	(0.95)	(0.34)
Δ log(Revenue) $\in [-.15, 0]$	0.75***	0.52	1.72***	0.22
	(<0.01)	(0.65)	(<0.01)	(0.22)
Δ log(Revenue) > 0	0.56***	0.96***	0.53***	0.26***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Constant	0.10***	-0.02	-0.29***	0.02
	(<0.01)	(0.92)	(<0.01)	(0.56)
N	7,175	449	212,407	6,182
R^2	0.46	0.25	0.13	0.01

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Liquidity Response to Shocks

This table presents estimates from a spline regression of log changes in operating liquidity on log changes in operating revenue using annual data as of Q3 of each year. The spline regression is presented in equation 1 and uses knots at Δlog(Revenue) equal to -0.15 and 0, and is coded such that the estimates below represent the elasticity of costs to revenue for each respective region (severe negative shock, moderate negative shock, and positive shock). *Days Cash on Hand* is the ratio of unrestricted cash to total daily expenses, *Revenue* is the total revenue excluding mortgage servicing rights revaluations. The columns represent regression estimates on the sample of Originators (1), Servicers (2), traditional banks (3), and all Compustat non-financial firms with revenue volatility higher than 20% (*HighVolNonFin*). Variables are winsorized at the 1% level to minimize the potential effects of outliers, and standard errors are clustered at the firm level.

	(1) Originators	(2) Servicers	(3) Banks	(4) HighVolNonFin
Δ log(Revenue) $< -.15$	-0.48***	-0.52**	-0.14***	-0.01
	(<0.01)	(0.02)	(<0.01)	(0.88)
Δ log(Revenue) $\in [-.15, 0]$	-0.17	-0.55	-1.06***	-0.85***
	(0.35)	(0.42)	(<0.01)	(<0.01)
Δ log(Revenue) > 0	0.16***	-0.28***	-0.04***	-0.09**
	(<0.01)	(<0.01)	(0.01)	(0.03)
Constant	-0.07**	0.04	0.18***	0.19***
	(0.01)	(0.78)	(<0.01)	(<0.01)
N	7,429	678	212,828	6,895
R^2	0.02	0.07	0.01	0.01

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix

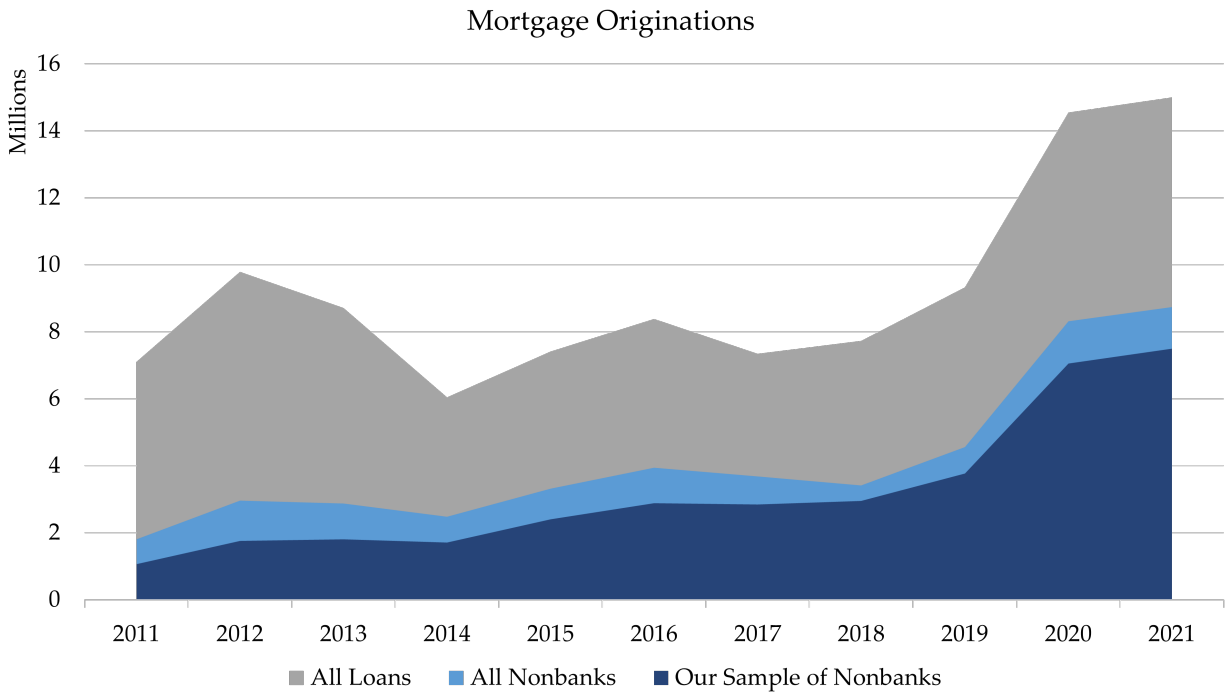
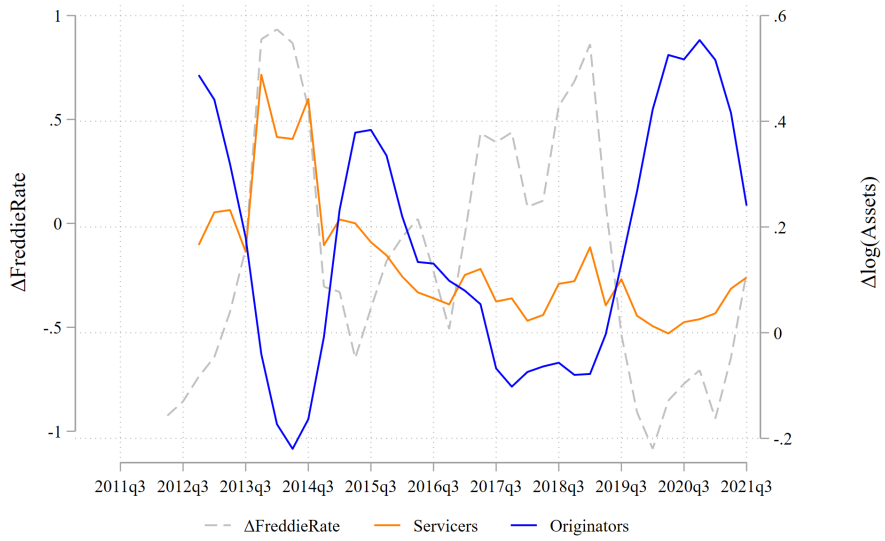
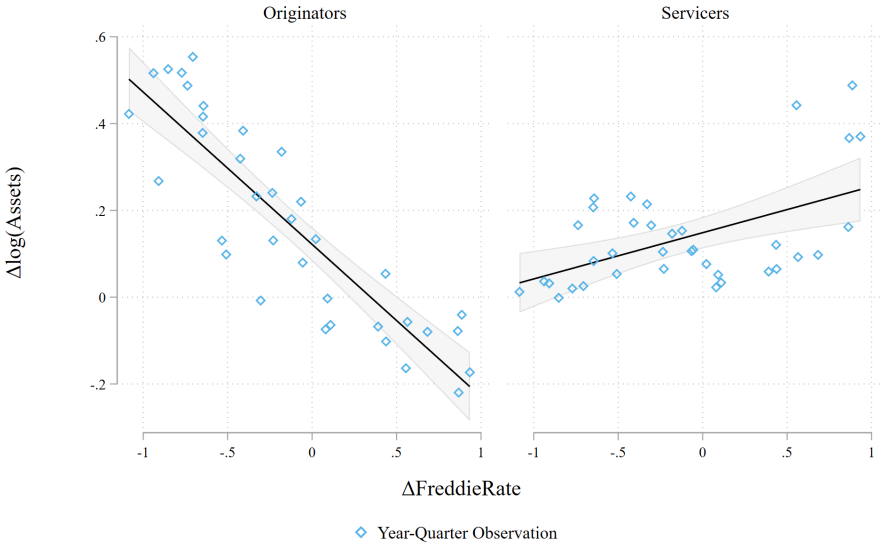


Figure A.1: Sample Coverage
This figure presents the number of all new loan originations in the US during our sample period that are recorded in the HMDA database (gray), the total number of loans originated by nonbanks (light blue), and the number of loans originated by nonbanks lender in our sample that we could match to HMDA (dark blue).



(a) Time Series of Changes in Interest Rates and Nonbank Asset Growth



(b) Nonbank Asset Growth on Changes in Mortgage Interest Rates

Figure A.2: Mortgage Interest Rates and Asset Growth
These figures plot the relationship between the annual percentage point change in mortgage interest rates (as measured by the Freddie Mac 30-year fixed rate) and median log change in assets for Originators and Servicers, respectively. Panel (a) presents these figures as a time series, and Panel (b) directly plots the median log change in assets against changes in the mortgage interest rate for Originators (left panel) and Servicers (right panel).

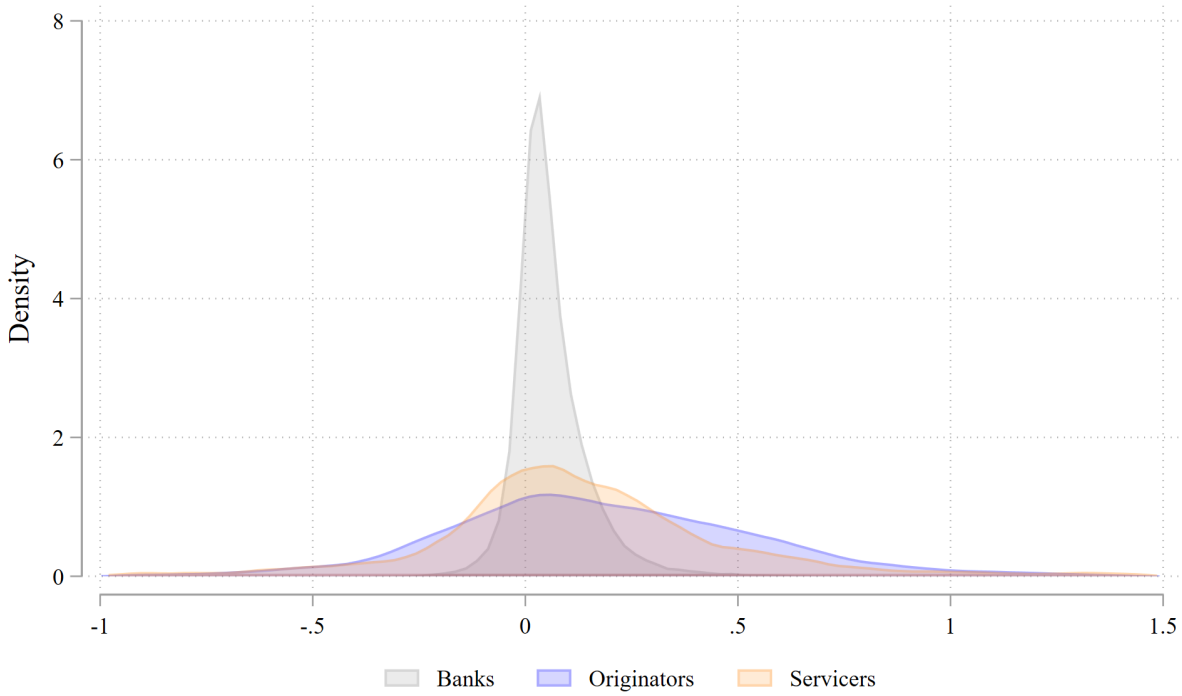


Figure A.3: Nonbanks' Business Risk: Asset Volatility
This figure presents the density of annual change in log(Assets) for traditional banks, Originators, and Servicers.

Table A.1: Funding Servicer Advances

This table presents estimates from a panel regression of various funding sources on changes in servicing advances. *Debt* is the total debt outstanding, *Longterm Debt* and Short-term Debt are the portions of debt dues in more or less than one year, respectively. *Credit Util* is the amount of drawn as a share of total available credit available on lines of credit. *Advances* are the receivables that come from making payments to cover principal and interest payments, taxes and insurance payments, and foreclosure advances relating to loans serviced made on behalf of mortgagors and mortgage investors. All specifications include year-quarter and firm fixed effects. Variables are winsorized at the 1% level to minimize the potential effects of outliers, and standard errors are clustered at the firm level.

	(1) Debt/A	(2) Long-term Debt/A	(3) Short-term Debt/A	(4) Credit Util
Advances/Assets	0.17***	-0.11**	0.28***	0.46**
	(<0.01)	(0.02)	(<0.01)	(0.02)
MSRs/Assets	0.05*	0.12***	-0.06**	-0.31***
	(0.05)	(<0.01)	(0.03)	(<0.01)
Receivables/Assets	-0.11***	-0.19***	0.09**	-0.28***
	(<0.01)	(<0.01)	(0.02)	(<0.01)
N	878	878	878	324
R^2	0.67	0.65	0.57	0.63

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$