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The Impact of Rising Interest Rates, Bank Deposit Betas, and Credit Risk

Abby Craig, Jarrett Grose, Justin Tersoglio,
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Abstract

Inflation of the U.S. dollar drove the Federal Reserve Board to enact four interest rate hikes of 0.75% and additional smaller hikes between March 2022 and April 2023. This paper examines how interest rate hikes affect bank deposit betas and credit risk for community banks, hot money banks, and alternative lending institutions based on data from March 2022 to April 2023. After analyzing data from the Federal Reserve Economic Database, this research found that bank deposit betas increase as interest rates rise, that community banks' betas increase at a slower rate than hot money banks' betas, and that the level of borrower risk is higher in financial technology (fintech) platforms compared to traditional banks. These findings are relevant to regulators and policymakers because fintech defaults could impact traditional banks, necessitating that the Federal Deposit Insurance Corporation and other financial regulators monitor the effects of rising interest rates on the banking industry to avoid a run on banks.

Introduction

Following two years of near-zero interest rates, the Federal Reserve Board (the Fed) has implemented interest rate hikes, driven by inflation of the U.S. dollar, that are impacting the U.S. economy (FDIC, 2023). The annual inflation rate in 2022 was 7.7%, and the Fed raised the interest rate by 0.75% increments four times since March 2022 (FDIC, 2023). Interest rate increases lead to increased deposit betas, which are measures of how banks change interest rates on deposits in response to changes in market rates, as a result of annual percentage yields (APYs) increasing at a different rate than the federal funds rate. For banks to remain competitive, they must raise rates on deposit accounts.

Understanding this relationship is especially pertinent given the prolonged stimulus that banks received during 2020 through COVID-19 relief programs, which left banks flush with cash reserves (Pitcher et al., 2022). This funding allowed banks to maintain prices on money market accounts, allowing more banks to offer higher APYs in the hopes of attracting blocks of funding (Stovall & Vanderpool, 2017). A potential problem could emerge: banks with more non-loan and asset liquidity available may be at an advantage to offer a higher APY, allowing them to retain “sticky” deposits, in which customers keep deposits at the bank and allow said bank to keep this money on the balance sheet. This set of conditions, along with rising interest rates that are allowing larger deposit beta margins, puts pressure on the community banking sector to compete for customers seeking out the highest APY for savings, which are often found on financial technology (fintech) platforms. This creates a need for oversight from the Federal Deposit Insurance Corporation (FDIC) to avoid a bank run and raise confidence in the nation’s banking systems. To understand the relationship between rising interest rates, bank deposit betas, and credit risk, and to inform our policy recommendations, we created two hypotheses and a sub-hypothesis:

Hypothesis 1a (H1a): If interest rates increase, then deposit betas will also increase across all banks.

As the federal funds rate increases, banks will increase the APYs on their deposits to maintain competition with other banks. However, some banks raise their interest rates faster than others. This leads to our next

hypothesis:

Hypothesis 1b (H1b): If interest rates increase, then the deposit betas for community banks will increase at a smaller rate than the deposit betas of hot money banks.

The rise in interest rates affects high-risk borrowers’ chances of repaying their debts (Adrian, 2023). If a mass quantity of high risk borrowers default on their loans, an impact on the stability of financial institutions is expected. This leads to our final hypothesis:

Hypothesis 2 (H2): If interest rates increase, alternative lending institutions will incur higher credit losses than banks.

Methodology and Empirical Analysis

H1a: If interest rates increase, deposit betas will also increase across all banks.

To test this hypothesis, we calculated national deposit betas on savings accounts and examined their reaction to the rapid rise of the federal funds rate, as shown in Figure 1. To calculate the deposit betas used in this study, we divided the change in deposit interest rates by the change in the federal funds rate (Kang-Landsberg et al., 2022). We found this information using the National Deposit Rates and federal funds rate data taken from the Federal Reserve Economic Data (FRED; FDIC, 2023). Using bimonthly certificate of deposit (CD) APYs from the FRED and interest expenses divided by total deposits (FDIC, n.d.; FDIC, 2024), we first calculated deposit rates (Federal Reserve Bank of St. Louis, 2024a; Federal Reserve Bank of St. Louis, 2024b; Federal Reserve Bank of St. Louis, 2024c). Market rates were calculated from the bimonthly federal funds rate. We then used the equation below to calculate bimonthly deposit betas (the amount deposit yields change per 1% increase in the federal funds rate) from October 2021 to February 2023.

$$\beta_{\text{Deposit}} = \frac{\Delta \text{Deposit Rate}}{\Delta \text{Market Rate}}$$

Figure 1: The Rise of Bimonthly Market Deposit Betas from October 2021 to February 2023 for Savings Accounts

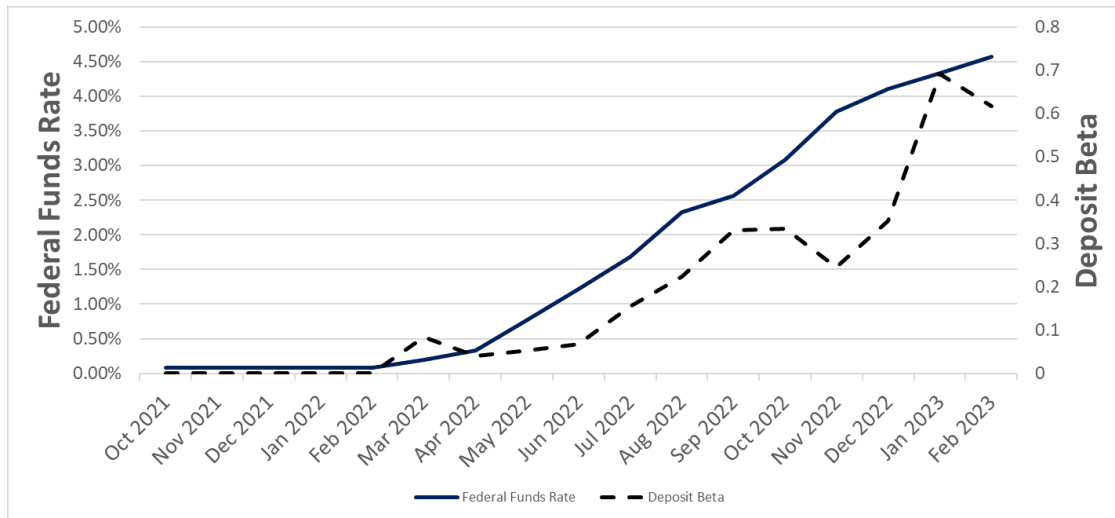
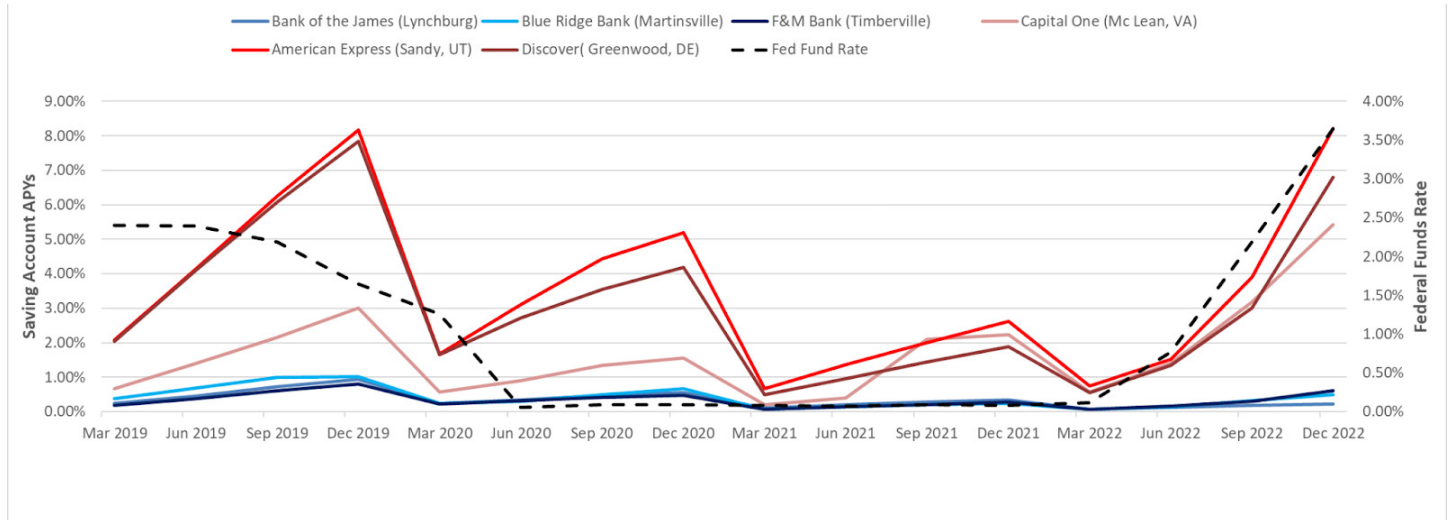


Figure 2: Comparison Between Hot Money Banks' and Community Banks' Most Recent APYs (11/17/2022)



H1b: If interest rates increase, the deposit betas for community banks will increase at a smaller rate than the deposit betas of hot money banks.

To test if hot money banks' deposit betas increased faster than community banks' did during the period of interest rate hikes, we needed to find account APYs. We used a sample of six banks, comparing the savings account APYs for the top three hot money banks with those of three community banks. This data was drawn from the labeled banks' most up-to-date APYs on savings posted on their websites and is reflected in Figure 2.

To test whether these hot money banks raised rates in response to the Fed's interest rate hikes, we needed a backlog of bank APYs for the 15 quarters between

March 2019 and September 2022. However, this data is not publically compiled, so we collected it using reports found on the Federal Financial Institutions Examination Council (FFIEC) Central Data Repository's Public Data Distribution website (FFIEC Central Data Repository's Public Data Distribution, n.d.). To calculate APYs, we searched through reports to find the total interest paid on savings including money market deposit accounts (MMDAs), which typically pay higher interest to investors. The total interest paid on savings was then divided over the total deposits of savings and MMDA accounts, which provided us the quarterly interest percentage of savings and MMDA accounts. Table 1 represents a historic backlog of quarterly APYs.

Table 1: Comparing APYs of Hot Money Banks vs. Community Banks

Hot Money Bank	Hot Money Bank APY	Community Bank	Community Bank APY
Capitol One	3.00%	Blue Ridge	0.10%
Discover	3.00%	F&M	0.25%
American Express	2.75%	Bank of the James	0.10%

Table 2: Minimum Credit Scores for Fintech Lenders

	Upstart	SoFi	Lending Club	Prosper	Funding Circle	Avant	Lending Tree	Affirm	Klarna	Afterpay
Min Credit Score	300	None	600	560	660	580	600	None	None	None

H2: If interest rates increase, then Fintech lending platforms will experience higher credit losses than traditional banks.

To test this hypothesis, we examined the riskiness of traditional bank borrowers versus fintech platform borrowers by examining minimum credit scores, as seen in Table 2. The data used to capture the risk demographics of the fintech platforms' borrowers comes from the business models of fintech lending platforms. These risk demographics were gathered from company websites and data from the Federal Reserve on the lending strategies of traditional banks during periods of high interest rates. Ideally, we would test this hypothesis with data on the credit rating of those who borrow from fintech lending platforms and compare that to the credit rating demographics of those who borrow from traditional banks. Since this data is not publicly available, we chose to use the company website and Federal Reserve data as a proxy. Table 2 represents an aggregation of official statements of credit score minimums from each lending platform in November 2022. In Table 2, some platforms are marked with "none," including fintech platforms that do not state their minimum credit scores but also those with no minimum credit score requirement.

Figure 3 shows an analysis of the investors' expected future cash flows (FCF) of both fintech lending platforms and traditional banks. We chose to test the expected FCF based on the theory that expected FCF determines stock prices (Jansen, 2021). The data used to analyze the investors' expected cash flow from each entity comes from exchange-traded funds (ETF) returns found on Yahoo Finance, which tracks fintech lenders and banks of varying sizes (Yahoo! Finance, n.d-a). Figure 3 uses data from Yahoo Finance to track

stock returns and FRED to track the Federal Funds Rate (FDIC, 2023). Because there is no portfolio that tracks fintech lenders, we isolated the fintech lending holdings of a fintech ETF (FINX) and calculated weighted average of their performances through time (Yahoo! Finance, n.d.-b).

Findings

H1a: If interest rates increase, deposit betas will also increase across all banks.

For our first hypothesis, we determined that as interest rates rise, deposit betas rise as well. Increased interest rates led to higher deposit betas because APYs rise at a different rate than federal funds do. As banks receive more federal funds, they must raise rates on deposit accounts to remain competitive. Figure 1 shows that as interest rates increase, deposit betas also increase for all banks. This means that for every interest rate hike the Federal Reserve implements, the bank will increase its interest rate on deposits.

Hypothesis 1b (H1b): If interest rates increase, then the deposit betas for community banks will increase at a smaller rate than the deposit betas of hot money banks.

Our sample, shown in Figure 2, consisted of three hot money banks and three community banks, utilizing each bank's posted APRs from November 17, 2022. Figure 2 reflects the most up-to-date APYs found, showing a significant difference in interest payouts between hot money and community banks. The average APY for savings accounts in the U.S. was 0.21% as of November 11, 2022 (Burnette, n.d.). The top 10 hot money banks that offer above-average interest rates

Figure 3: Bank Credit Losses for Banks vs Fintech Lenders

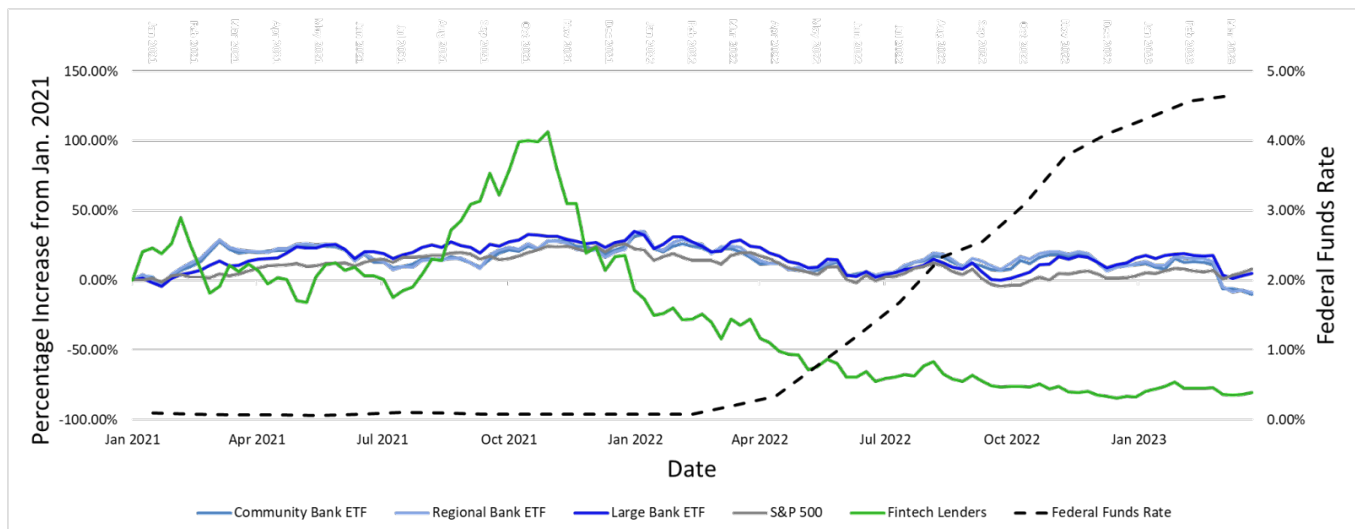


Table 3: Comparing Deposit Betas for Community and Hot Money Banks During Periods of High Interest

Date	Community Bank Deposit Beta	Hot Money Bank Deposit Beta	Federal Funds Rate
3/31/2022	-5.44	-40.55	0.0012
6/30/2022	0.11	1.23	0.0077
9/30/2022	0.09	1.37	0.0219

for deposits had an average APY of 3.16% (Abbott, 2022). These hot money banks are those which compete with one another on a dollar-for-dollar basis to retain customers. For every hike in interest rates, the bank must also raise its payout on accounts to retain customers. This may harm community banks in the future as users may decide to transition to another institution at which they could receive a higher APY.

Table 1 demonstrates that when interest rates began to rise between March 2019 and September 2022, both community banks and hot money banks saw rising APYs. This is especially noticeable when the federal funds rate is increasing, or at a rate above zero. Table 1 also shows how APYs for hot money banks are rapidly rising in comparison to community banks, which have a much slower rate of increase. This data supports *H1b*, as there is a significantly higher rise in deposit betas for hot money banks when federal funds rates begin to increase compared to the rise in deposit betas for community banks. This rapid escalation in deposit betas is attributed to the drastic spikes in hot money banks' APYs seen in Table 1. In September of 2022, community banks had a deposit beta of 0.09 while hot money banks had a deposit beta of 1.37 (Table 3). The sizable margin between these

values is especially important when considering how quickly hot money bank deposit betas increased. Figure 3 depicts rapid increases in hot money banks' deposit betas beginning in March 2022, which surpass community bank deposit betas by the end of June 2022. The reason hot money bank deposit betas are floating around -40 during March 2022 can be seen in Figure 1, where near the end of March 2022, hot money banks simultaneously dropped the APYs on their savings accounts in reaction to a 0.01 drop in the federal funds rate, resulting in a dramatic drop in their deposit betas. This means that not only did hot money banks' betas increase faster than community banks', but that community banks traditionally do not increase their APYs even as the federal funds rate increases.

Hypothesis 2 (H2): If interest rates increase, then alternative lending institutions will incur higher credit losses than banks.

The data used to capture the risk level of borrowers demonstrates that fintech platforms lend to riskier recipients than traditional banks do. Table 2 shows that most fintechs have a minimum credit score around the range of 580–619 (which is considered subprime

by the Consumer Financial Protection Bureau [CFPB]), revealing that most fintech lenders are willing to lend to extremely risky borrowers (CFPB, n.d.). In addition to the information presented in Table 2, the New York Federal Reserve has found that 43% of Buy Now Pay Later (BNPL) users have a credit score below 620 (Aidala et al., 2023), and the Atlanta Federal Reserve found that more than a third of all BNPL users have fallen behind on their payments at least once (Lott, 2021). The lower requirements of fintech lending platforms show that these platforms have accepted a high level of risk in who they award loans out to; a person with a credit score between 580–619 is likely to default or not make payments on their loans. This risk-acceptance is likely due to the influence of some sub-industries in fintech that are able to transfer the risk of lending capital to outside investors. In contrast, banks bear full responsibility for every lending-related action and so, will be forced to act carefully and conservatively in the market, while fintech platforms will feel comfortable taking on even more risk as the lenders bear all of the transaction-related consequences.

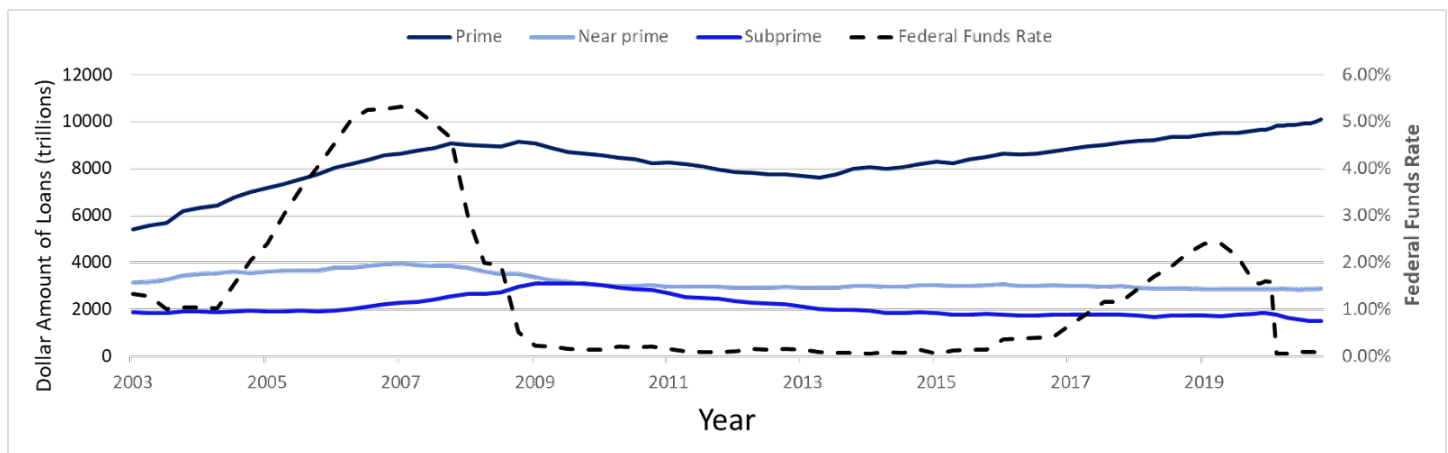
Fintech platforms’ willingness to take on increased risk is mainly found in peer-to-peer (P2P) lending, where companies acquire lenders through their website to purchase a loan from a bank on behalf of the borrower. According to Dr. Rainer Lenz (2016), writing for the *European Journal of Risk Regulation*, these investors receive the cash flows of the loan, minus the fees the P2P platform charges, which on average are 1%. This risky lending strategy comes with consequences such as “certain sustainability threats, increased level

of non-performing loans, and the related social and economic problems” (Taujanskaitė & Milčius, 2022, p. 13).

Further widening the risk discrepancy between fintech lenders and traditional banks, we found that traditional banks are restricting who they lend to in response to these higher interest rates. This can be seen in Figure 4, which displays the distribution of debt by credit risk category (prime, near prime, and subprime) as well as how the federal funds rate affects this distribution. In this figure, prime refers to borrowers with a credit score above 729, near prime refers to borrowers with a credit score between 620 and 729, and subprime refers to borrowers with a credit score below 620. Figure 4 demonstrates that from 2003 to 2020, banks have altered their loan portfolios by increasing the amount of prime loans they approve in periods of high interest. This data supports the idea that lending to riskier borrowers during a period of higher interest rates will increase defaults for P2P lenders, leaving the lenders with less loan volume in the short term and stunted loan growth in the long term due to a damaged reputation (Lenz, 2016; Taujanskaitė & Milčius, 2022).

While credit losses pose a significant threat to the fintech industry, it is likely that the traditional banking industry will also be impacted by these credit losses as the two industries are interconnected. One example of this interconnection is automatic debit payments of BNPL loans. The CFPB (n.d.) has reported that “nine in ten BNPL payments are made with debit cards,” and “in the case of a borrower not having enough capi-

Figure 4: Comparing the Rise in Federal Funds Rate to the Dollar Amount of Loans by Credit Risk Rating by Year



tal to continue payments of the loan, an automatic debit payment will result in an overdraft." While this could be a rare scenario, it has been shown that customers have an increased likelihood of overdraft fees after a first BNPL purchase, and are also more likely to experience increases in credit card and interest fees (deHaan et al., 2023). This is likely a result of BNPL "encouraging borrowers to make purchases they otherwise wouldn't have without it" (Greene, 2022). This overspending could tighten many borrowers' budgets, making them more likely to default on loans taken from both fintech and traditional banks, thus causing financial stress on both fintech lending platforms and traditional banks.

Dividend streams demonstrate that market confidence in traditional banks is much higher than that in fintech lending platforms. This can be seen in Figure 3, which represents the expected credit losses of fintech platforms compared to those of traditional banks, showing that traditional bank ETFs outperformed the fintech lending portfolio over the period of 2021–2023. One example of poor fintech portfolio performance occurred on November 9, 2021, when the P2P lending platform Upstart was down 19% (Yahoo! Finance, 2024) and had to be halted. Another example comes from SoFi Inc., where the company faced a similarly unfavorable market performance. SoFi's non-interest expense increased 65.1% year-over-year to \$498.43 million for the third quarter, ending on September 30, 2022 (Banchur, 2022). In this same time period, bank stock performances remained relatively steady compared to the rest of the market with the rise of interest rates.

As we have seen the decreases in fintech lending stock prices as interest rates increase (as traditional bank prices remain fairly stable), we can use the FCF theory explored by Jansen (2021) to infer that this is due to investors growing pessimism on fintech lenders' future cash flows. We can infer investor pessimism is largely due to forecasted credit losses with how high fintech platforms' risk tolerance is, as higher risk borrowers are more likely to default as rates increase. This data suggests both that investors are more optimistic about the FCF of traditional banks over fintech lending platforms, and that fintech defaults could harm banks.

Conclusion

Overall, our findings suggest that rising interest rates lead to higher deposit betas and that deposit betas increase faster at hot money banks than at community banks. As a result, rising interest rates would have increased negative impacts on fintech platforms versus traditional banks due to fintechs' high level of lender risk. Additionally, fintech lenders are expected to see more defaults than traditional banks because interest rate hikes make high-risk borrowers less likely to repay loans. These results are significant to regulators because modern circumstances are different from other periods of high interest; the rapid interest rate hikes were a response to the inflation caused by shocks to food and energy prices combined with supply-chain disruptions and increased demand for durables.

The results indicate that the FDIC will need to monitor banks' responses to CAMELS score ratings and traditional banks' partnerships with hot money banks. Since the FDIC uses the CAMELS rating system, which measures a bank's capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk, it can monitor the decisions of banks made in reaction to increased interest rates and deposit betas (Jones & Gaul, 2021). For example, as deposit betas increase, banks will see higher interest expenses, which would decrease their retained earnings and therefore capital adequacy. To compensate, banks might perform more risky lending, hurting their asset quality. The FDIC must ensure that banks' asset-liability committees limit banks' exposure to fixed rate assets during times of increasing interest rates, preventing the devaluation of the banks' assets and avoiding pressure on their ability to cover deposits. The FDIC must also monitor partnerships between fintech companies and community banks, which are common since fintechs provide smaller banks with competitive advantages that allow them to keep pace with larger banks. These partnerships also allow fintechs to use these banks as a source of loans. The FDIC must monitor these to maintain stability due to the fintech platforms' risk of default.

Another implication of the slower increase of deposit betas at community banks versus fintechs is that users could be incentivized to transfer money from

community banks to fintechs, where they could obtain higher APYs. However, this could force fintechs to continuously increase their APYs to match the federal funds rate. Meanwhile, community banks may experience loss of liquidity due to decreased deposits, but their core deposits would not be affected by APYs. Community banks' ability to increase earnings on loans while keeping interest expenses on deposits low would allow them to maintain their liquidity and increase their earnings in comparison to hot money banks.

One limitation of this paper is the lack of data due to the currency of events and restrictions of using publicly available data. Since these interest rates were relatively recent, signs of economic turmoil can be hard to identify at this point, indicating a need for future research.

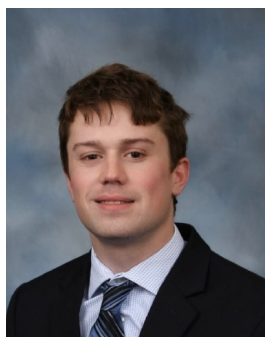
Authors' Note

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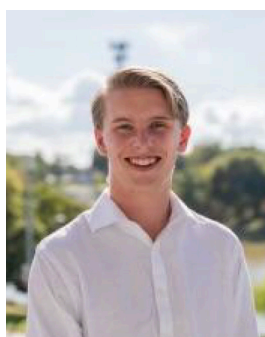
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