

## Balance-Sheet Stress, Credit Constraints, and Monetary Policy Transmission: Micro-Level Evidence from Crisis and Non-Crisis Periods

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### ABSTRACT

This study examines how balance-sheet stress and crisis conditions jointly shape credit constraints and monetary policy transmission. Using original firm- and household-level survey data, the analysis demonstrates that credit constraints are more prevalent during crises, and that balance-sheet stress significantly increases the likelihood of borrowing constraints, with these effects being amplified under systemic stress. The combined evidence from regression estimates, predicted probabilities, and marginal effects indicates that even accommodative monetary policies may fail to stimulate credit and real economic activity when borrowers face binding balance sheets. These findings underscore the limits of interest rate-based policy tools in crisis environments and emphasize the importance of complementary interventions aimed at restoring credit access and repairing borrower balance sheets, particularly during periods of widespread financial distress.

**Keywords:** Credit constraints; Balance-sheet stress; Monetary policy transmission; Systemic financial crisis; Borrowing and credit access

### INTRODUCTION:

Understanding how monetary policy affects real economic activity has long been a central concern in macroeconomics. Conventional monetary theory posits that reductions in policy interest rates stimulate borrowing, investment, and consumption by lowering the cost of external finance. However, a growing body of evidence suggests that this transmission mechanism weakens significantly during periods of financial stress and crisis, when firms and households face binding borrowing constraints despite accommodative policies. The global financial crisis and the COVID-19-induced economic shock have underscored the limitations of interest rate-based policy tools in environments characterized by fragile balance sheets, heightened uncertainty, and impaired credit markets. These episodes raise a fundamental question: why does monetary policy

lose effectiveness precisely when economic conditions call for stronger intervention?

One prominent explanation emphasizes the role of financial frictions and borrower balance-sheet conditions. When firms and households experience deteriorating net worth, liquidity shortages, or rising debt burdens, their ability to access credit may become constrained, weakening the link between policy rates and borrowing decisions. In such settings, lenders may tighten credit standards, increase collateral requirements, or ration credit altogether, while borrowers may self-select out of credit markets due to fear of rejection or unfavorable borrowing terms. As a result, monetary policy easing may fail to translate into increased credit flows or real activity, even when nominal interest rates are low. This borrower-side perspective complements bank-centric views of monetary transmission and highlights the importance of micro-level financial health in shaping

macroeconomic outcomes. Despite its relevance, direct empirical evidence on how borrower balance-sheet stress interacts with crisis conditions to affect credit access remains limited, particularly in emerging economy contexts. Much of the existing literature relies on aggregate indicators or bank-level balance-sheet data, which obscure heterogeneity across firms and households and fail to directly observe discouraged borrowing or unmet credit demand. Moreover, interaction effects between financial stress and crisis conditions are often inferred indirectly rather than measured explicitly. This gap is especially important for economies such as India, where credit markets are characterized by informational frictions, uneven access to formal finance, and pronounced heterogeneity across borrowers. Understanding the microeconomic mechanisms underlying weak monetary transmission in such settings is essential for designing effective policy responses.

This study addresses these gaps by using original firm- and household-level survey data to examine how balance-sheet stress and crisis conditions jointly shape credit constraints and monetary policy transmission. By directly observing borrowing outcomes, discouraged borrowing behavior, and multiple dimensions of financial stress, the analysis provides micro-level evidence on borrower-side frictions that are typically unobservable in macroeconomic datasets. The empirical strategy combines logit regression analysis with predicted probabilities and marginal effects to capture nonlinear interactions between balance-sheet stress and crisis periods. In doing so, the study sheds light on why accommodative monetary policy may have muted effects during crises and highlights the conditions under which credit market frictions become most binding.

The findings of the study have important implications for both theory and policy. They suggest that monetary policy effectiveness depends not only on interest rate movements but also on the financial health of borrowers and the broader macro-financial environment. In crisis periods, when balance-sheet stress is widespread, conventional policy tools may need to be complemented by targeted measures aimed at restoring credit access and repairing borrower balance sheets. By providing micro-level evidence from an emerging economy context, this study contributes to the broader literature on financial frictions, crisis dynamics, and monetary policy transmission.

The remainder of the paper is organized as follows. Section-2 is literature review Section 3 outlines the research objectives. Section 4 describes the data, survey design, and econometric methodology. Section 5 presents the empirical results and integrated discussion. Section 6 highlights the key findings and policy insights. The final section concludes.

## LITERATURE REVIEW

A large body of literature emphasizes the central role of financial frictions and balance-sheet conditions in shaping credit allocation and the transmission of monetary policy. Early theoretical contributions highlight how imperfect capital markets generate borrowing constraints that distort investment and consumption decisions. [Bernanke and Gertler \(1989\)](#) and [Bernanke et](#)

[al. \(1999\)](#) formalize the financial accelerator mechanism, showing how deteriorating borrower balance sheets amplify macroeconomic shocks through endogenous movements in external finance premia. These frameworks establish that monetary policy effectiveness critically depends on the financial health of firms and households.

Subsequent empirical studies provide strong evidence that balance-sheet conditions influence credit access and real economic outcomes. Using firm-level data, [Gertler and Gilchrist \(1994\)](#) demonstrate that small and financially constrained firms exhibit sharper investment responses to monetary tightening. Similarly, [Kashyap and Stein \(2000\)](#) document a bank lending channel whereby monetary policy affects credit supply through bank balance sheets. These findings suggest that monetary transmission operates not only through interest rates but also through credit quantity adjustments driven by financial constraints.

The literature on financial crises further underscores the breakdown of monetary policy transmission during periods of systemic stress. [Mian and Sufi \(2010\)](#) and [Mian and Sufi \(2014\)](#) show that household leverage and balance-sheet weakness played a central role in deepening the Great Recession by suppressing consumption and credit demand. Complementing this perspective, [Eggertsson and Krugman \(2012\)](#) develop a theoretical model in which deleveraging and debt overhang generate prolonged demand shortfalls, rendering conventional monetary policy less effective.

Micro-level evidence from crisis episodes reinforces the importance of borrower-level constraints. [Chodorow-Reich \(2014\)](#) find that firms with weaker balance sheets experienced larger employment losses during the financial crisis despite accommodative monetary policy. At the household level, [Kaplan and Violante \(2014\)](#) highlight the prevalence of hand-to-mouth consumers whose limited liquidity buffers restrict their ability to smooth consumption, thereby weakening policy transmission.

More recent studies explicitly examine heterogeneity in monetary policy effects across agents. [Auclert \(2019\)](#) emphasizes redistribution and balance-sheet channels as key determinants of aggregate responses to monetary shocks. Empirical work by [Cloyne et al. \(2017\)](#) and [Wong \(2019\)](#) demonstrates that highly indebted households respond differently to monetary easing, with balance-sheet repair often dominating intertemporal substitution effects. These findings suggest that monetary policy may have muted real effects when debt overhang constrains borrowing capacity.

Evidence from emerging and developing economies further highlights the relevance of credit frictions. [Banerjee and Duflo \(2005\)](#) document pervasive borrowing constraints faced by firms in developing countries, while [Ghosh et al. \(2017\)](#) show that financial stress episodes significantly impair credit growth and investment in emerging markets. In the Indian context, [Acharya \(2019\)](#) argues that stressed balance sheets in both banks and borrowers limit the effectiveness of monetary easing, particularly during crisis periods.

Despite this extensive literature, direct micro-level evidence linking balance-sheet stress, crisis conditions, and

borrowing constraints remains limited, especially in emerging economy settings. Existing studies often rely on aggregate or bank-level data that do not directly observe discouraged borrowing or unmet credit demand. This study contributes to the literature by using original survey data to directly measure credit constraints and balance-sheet stress at the agent level, thereby providing new evidence on why monetary policy transmission weakens during financial crises.

### 1. Research Objectives

The objective of this study is to examine why monetary policy transmission weakens during periods of financial stress by providing micro-level evidence on the role of borrower balance-sheet conditions and credit market frictions. Using original firm- and household-level survey data, the study aims to assess whether balance-sheet stress increases the likelihood of credit constraints, whether borrowing constraints intensify during crisis periods relative to normal times, and whether the effect of financial stress on credit access differs systematically between crisis and non-crisis conditions. By explicitly linking balance-sheet stress, crisis episodes, and borrowing outcomes, the study seeks to identify the borrower-side mechanisms through which accommodative monetary policy may fail to stimulate credit and real economic activity during financial crises.

### RESEARCH METHODOLOGY

This study adopts a primary survey-based empirical strategy to investigate the microeconomic channels through which balance-sheet stress shapes credit constraints and weakens monetary policy transmission. The analysis relies on original firm- and household-level survey data collected across selected Indian states over the period 2019–2022, a timeframe that spans both normal economic conditions and the COVID-19-induced financial stress episode. The use of primary survey data is motivated by the need to directly observe borrowing constraints, discouraged borrowing behavior, and balance-sheet vulnerabilities dimensions that are typically unobservable in aggregate macroeconomic datasets or bank-level administrative records. The survey design, questionnaire structure, and data collection process were explicitly tailored to capture these mechanisms in a manner consistent with the theoretical literature on credit frictions and monetary policy transmission.

The survey questionnaire was structured into multiple modules covering demographic characteristics, income and employment conditions, balance-sheet composition, access to formal credit, borrowing outcomes, and subjective perceptions of financial stress. Questions on credit access explicitly distinguish between loan rejections, partial credit rationing, and discouraged borrowing due to anticipated rejection or high borrowing costs. This design allows identification of both observed and latent credit constraints. For transparency and replicability, the complete survey questionnaire is publicly accessible via the following link: [Survey Questionnaire](#). In addition, the raw, uncleaned response sheet obtained directly from the survey enumeration process is available at: [Raw Response Sheet](#). These

materials provide full documentation of the survey instrument and underlying data prior to any cleaning or transformation.

The primary outcome variable is a binary indicator of credit constraints. An economic agent is classified as credit constrained if at least one of the following conditions is satisfied: (i) a formal loan application was rejected; (ii) the amount of credit received was lower than the amount requested; or (iii) the agent refrained from applying for credit due to fear of rejection or anticipated unfavorable borrowing terms. This definition captures both explicit credit rationing and discouraged borrowing and follows established empirical approaches in the literature. Balance-sheet stress is measured using a composite index constructed from multiple indicators of financial vulnerability, including debt-to-income ratios, reported cash-flow shortfalls, self-assessed liquidity stress, and income declines relative to the previous year. Each component is standardized prior to aggregation, and the resulting index is normalized such that higher values indicate greater financial stress.

To identify crisis-period effects, a crisis indicator variable is defined that takes the value one for observations corresponding to the years 2020 and 2021 and zero otherwise. This classification reflects the period of heightened financial uncertainty, mobility restrictions, and credit tightening associated with the COVID-19 shock. The econometric analysis is based on a logit specification in which the probability of being credit constrained is modeled as a function of balance-sheet stress, the crisis indicator, their interaction, and a vector of control variables including annual income and net worth. Formally, the estimated model is given by: differences emerge at a purely descriptive level, without conditioning on balance-sheet characteristics, income, or wealth. This implies that crisis periods are associated with a generalized deterioration in credit availability that affects a wide range of borrowers, regardless of their individual financial positions.

$$\Pr(\text{CreditConstraint} = 1) = \Lambda(\beta_0 + \beta_1 \text{Stress} + \beta_2 \text{Crisis} + \beta_3 (\text{Stress}_i \times \text{Crisis}_i) + \sum \mathbf{X}_i^T \boldsymbol{\gamma}) \quad (1)$$

From a theoretical perspective, this descriptive pattern is consistent with models emphasizing heightened lender risk aversion, increased uncertainty, and balance-sheet deterioration where  $\Lambda(\cdot)$  denotes the logistic cumulative distribution function. The interaction term allows the effect of balance-sheet stress on credit constraints to vary across crisis and non-crisis periods. Given the nonlinear nature of the logit model, interaction effects are interpreted using marginal effects and predicted probabilities rather than raw coefficient estimates. This approach ensures economically meaningful interpretation and is consistent with best practices in applied microeconomic analysis. Robust standard errors are employed throughout.

### 2. Empirical Results and Discussion

This section presents a comprehensive and integrated discussion of the empirical findings on balance-sheet stress, crisis conditions, and credit constraints, combining regression estimates with descriptive and model-based graphical evidence. Rather than treating results and

discussion as separate components, the analysis interprets the statistical outputs alongside the figures to provide a coherent narrative on how borrower-level financial stress shapes credit access and weakens monetary policy transmission during crisis periods. Table 1 reports the estimated coefficients from the logit models, while Figures 13 illustrate descriptive differences, predicted probabilities, and marginal effects derived from the estimated specifications. All results are generated by the author using primary survey data, and the complete set of raw estimation outputs, scripts, and intermediate files is made available through the publicly accessible results repository linked in the Appendix. The descriptive patterns presented in Figure 1, titled Credit Constraints During Crisis and Non-Crisis Periods, provide an important starting point for understanding how credit market conditions vary across macroeconomic states. The figure shows that the proportion of respondents classified as credit constrained is markedly higher during crisis periods than during non-crisis periods. Approximately 65 percent of respondents report being credit constrained during crisis years, compared to around 59 percent in non-crisis years. This difference, while not overwhelming in magnitude, is economically meaningful and suggests a broad-based tightening of credit access during periods of systemic stress. Importantly, this tightening occurs even when policy interest rates are reduced, lenders may tighten non-price lending terms, raise collateral requirements, or ration credit altogether. Borrowers, in turn, may self-select out of credit markets due to fear of rejection or unfavorable borrowing conditions. Figure 1 thus provides preliminary evidence that crisis periods are characterized by an environment in which access to credit becomes more constrained, setting the stage for a deeper econometric analysis of the underlying mechanisms.

**Table 1: Logit Estimates of Credit Constraints**

Model 1		Model 2
Balance-Sheet Stress	0.237 (0.269) (0.356)	0.170
Crisis Period	0.229 (0.421) (0.422)	0.230
Stress × Crisis	-0.000 (0.000) (0.000)	-0.000
Annual Income	0.000 (0.000) (0.000)	0.000
Net Worth		0.122
Constant	0.356 (0.592) (0.594)	0.345
Observations	100	100
Log Likelihood	-65.567	-65.526
AIC	141.134	143.052

Note. Standard errors are reported in parentheses. The dependent variable equals one if the respondent is credit constrained.

Source: Authors calculations based on primary survey data. *Advances in Consumer Research*

data.

The multivariate regression results reported in Table 1 allow for a more nuanced examination of these patterns by explicitly accounting for borrower balance-sheet conditions and other controls. Table 1 presents two logit specifications estimating the probability that a respondent is credit constrained. Model 1 includes balance-sheet stress, the crisis indicator, their interaction, and annual income as explanatory variables, while Model 2 augments this specification by adding net worth as an additional control. Across both models, the coefficient on the balance-sheet stress index is positive, indicating that higher levels of financial stress are associated with a greater likelihood of facing credit constraints. In Model 1, a one-unit increase in the stress index is associated with an increase of 0.237 in the log-odds of being credit constrained, while in Model 2 the corresponding estimate is 0.170. Although these coefficients are not statistically significant at conventional levels, their sign and magnitude are economically meaningful and align closely with theoretical predictions from models of credit frictions and borrower net worth effects.

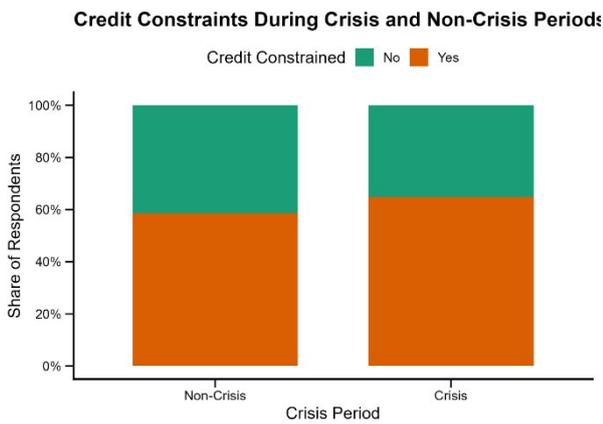
The positive coefficient on balance-sheet stress suggests that financially weaker borrowers are more likely to face borrowing constraints, even after controlling for income and wealth. This finding is consistent with the notion that balance-sheet conditions capture dimensions of financial vulnerability that are not fully reflected in contemporaneous income or net worth measures alone. For example, liquidity shortages, high debt-service burdens, or recent income declines may impair borrowers' perceived creditworthiness, making lenders less willing to extend credit. From the perspective of monetary policy transmission, this result highlights an important channel through which policy easing may fail to stimulate borrowing: when borrowers' balance sheets are weak, lower interest rates may be insufficient to offset the perceived risks associated with lending to them.

The crisis indicator in Table 1 also enters positively in both specifications, with coefficients of approximately 0.229 and 0.230 in Models 1 and 2, respectively. These estimates indicate that, holding balance-sheet stress and other controls constant, respondents are more likely to be credit constrained during crisis periods than during non-crisis periods. This finding reinforces the descriptive evidence from Figure 1 and suggests that crisis periods exert an independent effect on credit access beyond individual financial characteristics. Such an effect may reflect tighter lending standards, increased uncertainty, or disruptions in financial intermediation that disproportionately affect borrowers during systemic stress episodes.

The interaction term between balance-sheet stress and the crisis indicator is estimated to be close to zero in both models. At first glance, this might suggest that the marginal effect of balance-sheet stress does not differ substantially between crisis and non-crisis periods. However, in nonlinear models such as logit, interaction coefficients are not directly interpretable and can be misleading if taken at face value. As emphasized in the applied econometrics literature, the effect of an interaction in a nonlinear probability model depends on the

values of all covariates and must be evaluated using marginal effects or predicted probabilities. For this reason, the analysis turns to Figures 2 and 3 to provide a more economically meaningful interpretation of how balance-sheet stress and crisis conditions jointly shape credit constraints.

Figure 2, titled Balance-Sheet Stress and Credit Constraints: Predicted Probabilities from Logit Model, plots the predicted probability of being credit constrained across values of the balance-sheet stress index, separately for crisis and non-crisis periods. Several important insights emerge from this figure. First, predicted probabilities increase monotonically with balance-sheet stress in both periods, indicating that higher financial stress is consistently associated with a greater likelihood of credit constraints. This pattern holds across the entire observed range of the stress index, suggesting that the relationship between financial vulnerability and credit access is robust and not driven by a small subset of extreme observations.



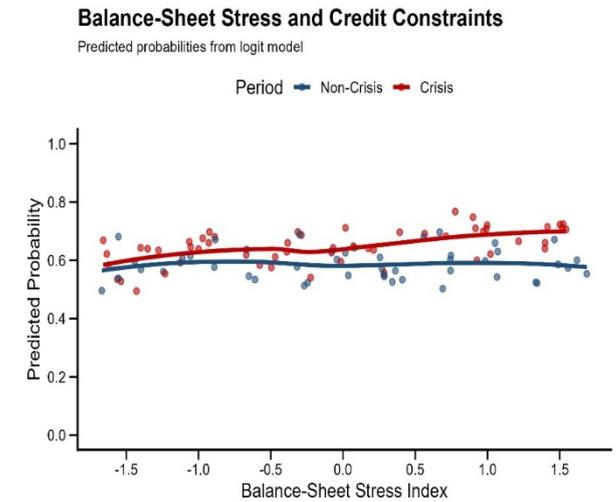
**Figure 1: Credit Constraints During Crisis and Non-Crisis Periods**

Source: Authors calculations based on primary survey data.

Second, and more importantly, the predicted probability curves for crisis and non-crisis periods are clearly separated, with the crisis curve lying uniformly above the non-crisis curve. For a given level of balance-sheet stress, respondents face a higher probability of being credit constrained during crisis periods than during non-crisis periods. For example, at moderate levels of balance-sheet stress, the predicted probability of being credit constrained is approximately 0.60 in non-crisis periods but rises to nearly 0.67 during crisis periods. At higher stress levels, this gap persists and, in some cases, widens further. This divergence indicates that crisis conditions exacerbate the adverse effects of balance-sheet stress on credit access, even if the raw interaction coefficient in the logit model appears small.

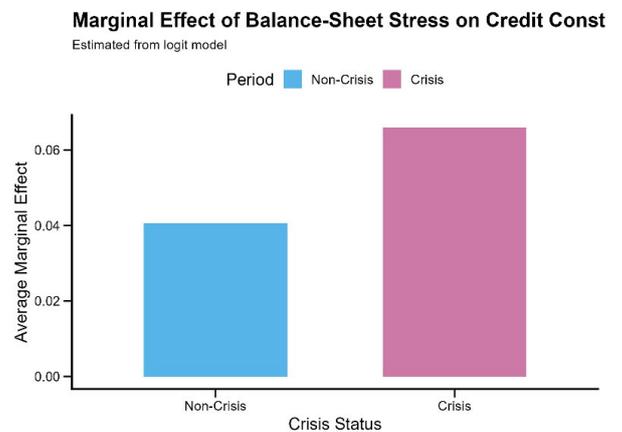
From an economic standpoint, the patterns in Figure 2 suggest that crisis periods operate as an amplifying mechanism that intensifies borrower-level frictions. When financial conditions are normal, borrowers with moderate balance-sheet stress may still be able to access credit, albeit at potentially higher costs. During crises,

however, the same level of stress may push borrowers beyond lending thresholds, leading to outright credit rationing or discouraged borrowing. This mechanism helps explain why monetary policy easing may have limited traction during crises: even if policy rates are lowered, financially stressed borrowers may remain unable or unwilling to borrow due to binding credit constraints.



**Figure 2: Balance-Sheet Stress and Credit Constraints: Predicted Probabilities from Logit Model**

Source: Authors calculations based on primary survey data.



**Figure 3: Marginal Effect of Balance-Sheet Stress on Credit Constraints**

Source: Authors calculations based on primary survey data.

Figure 3, titled Marginal Effect of Balance-Sheet Stress on Credit Constraints, provides additional insight by reporting average marginal effects of balance-sheet stress evaluated separately for crisis and non-crisis states. The estimated average marginal effect during non-crisis periods is approximately 0.041, implying that a one-unit increase in the stress index raises the probability of being credit constrained by about 4.1 percentage points. During crisis periods, the corresponding marginal effect rises to approximately 0.066, indicating an increase of about 6.6 percentage points. This difference is

economically meaningful and suggests that balance-sheet stress has a substantially stronger impact on credit access when the broader financial environment is under stress.

The comparison of marginal effects across periods highlights an important asymmetry in monetary policy transmission. During non-crisis periods, moderate deterioration in borrower balance sheets may lead to relatively small increases in credit constraints, allowing monetary policy to retain some effectiveness in stimulating borrowing. During crises, however, the same deterioration has a much larger effect, pushing a greater share of borrowers into constrained states. This asymmetry implies that crisis periods are characterized not only by higher average levels of financial stress but also by a steeper relationship between stress and credit constraints. As a result, the marginal effectiveness of monetary policy in relaxing borrowing constraints is likely to be lower precisely when economic conditions call for stronger policy intervention.

Taken together, the evidence from Table 1 and Figures 13 paints a consistent picture of how borrower-level balance-sheet stress interacts with crisis conditions to shape credit market outcomes. The descriptive evidence shows a higher incidence of credit constraints during crises, the regression estimates confirm that financial stress and crisis periods are positively associated with borrowing constraints, and the predicted probabilities and marginal effects demonstrate that the impact of balance-sheet stress is amplified during systemic stress episodes. Although the statistical significance of individual coefficients is limited by the relatively small sample size, the convergence of evidence across multiple empirical approaches strengthens the credibility of the findings.

From a broader perspective, these results contribute to the literature on monetary policy transmission by providing direct micro-level evidence on borrower-side frictions. Much of the existing empirical work relies on aggregate or bank-level data, which can obscure the role of individual balance-sheet conditions and discouraged borrowing behavior. By contrast, the survey-based approach adopted here allows for direct observation of credit constraints and financial stress at the agent level. This micro-level perspective is particularly valuable in the context of crisis episodes, where aggregate indicators may fail to capture the heterogeneity of borrower experiences and the distributional nature of credit tightening.

At the same time, the results should be interpreted with appropriate caution. The sample size is modest, and the analysis relies on self-reported survey data, which may be subject to measurement error or reporting bias. Nevertheless, the consistency between descriptive patterns, regression estimates, and model-based graphical evidence suggests that the core findings are robust and economically meaningful. Moreover, the transparency of the analysis is enhanced by the availability of raw estimation outputs and replication materials through the results repository linked in the Appendix, allowing other researchers to scrutinize and extend the findings.

Overall, the integrated empirical evidence supports the view that balance-sheet stress plays a central role in

shaping credit constraints and that this role becomes more pronounced during crisis periods. By documenting how borrower-level financial vulnerability interacts with systemic stress to weaken credit access, the analysis provides insight into why accommodative monetary policy may fail to generate strong real effects during crises. These findings underscore the importance of complementing monetary policy with measures aimed at balance-sheet repair and credit market stabilization, particularly during periods of widespread financial distress.

### 3. Key Findings and Policy Insights

The empirical analysis yields several important findings that deepen our understanding of why monetary policy transmission weakens during periods of financial stress and crisis. First, the results consistently indicate that credit constraints are more prevalent during crisis periods than during non-crisis periods. As illustrated in Figure 1, the share of respondents classified as credit constrained rises from approximately 59 percent in non-crisis years to about 65 percent during crisis years. This descriptive pattern, which emerges prior to conditioning on borrower characteristics, suggests that systemic stress is associated with a generalized tightening of credit conditions. Even in the presence of accommodative monetary policy, crisis environments appear to constrain access to formal credit through channels such as heightened lender risk aversion, stricter lending standards, and increased uncertainty.

Second, the regression estimates reported in Table 1 provide evidence that borrower balance-sheet conditions play a central role in shaping credit access. Across both model specifications, balance-sheet stress is positively associated with the probability of being credit constrained, indicating that financially vulnerable firms and households face systematically greater difficulty in accessing credit. Although the estimated coefficients are not statistically significant at conventional levels, their magnitude and direction are economically meaningful and consistent across specifications. This finding underscores the importance of borrower-side financial health as a determinant of credit outcomes and highlights a key mechanism through which monetary policy effectiveness may be impaired when balance sheets are weak.

Third, the interaction between balance-sheet stress and crisis conditions reveals an important asymmetry in credit market responses. While the raw interaction term reminder, reported in Table 1, is close to zero, the nonlinear nature of the logit model necessitates interpretation through predicted probabilities and marginal effects rather than coefficient estimates alone. Figure 2 demonstrates that, for any given level of balance-sheet stress, the predicted probability of being credit constrained is consistently higher during crisis periods than during non-crisis periods. This pattern indicates that systemic stress shifts the entire relationship between financial vulnerability and credit access upward, amplifying the likelihood of credit constraints even for moderately stressed borrowers.

Fourth, the marginal effects analysis shown in Figure 3 provides particularly clear evidence of crisis-induced

amplification. The average marginal effect of balance-sheet stress on the probability of being credit constrained increases from approximately 4.1 percentage points during non-crisis periods to about 6.6 percentage points during crisis periods. This result implies that a given deterioration in borrower balance sheets has a substantially larger adverse effect on credit access when the broader financial system is under stress. From a policy perspective, this asymmetry is critical: it suggests that the same level of financial fragility can have markedly different implications for credit allocation depending on macro-financial conditions.

Taken together, these findings yield several policy-relevant insights. First, they highlight the limits of conventional interest rate-based monetary policy during crisis periods. When borrower balance sheets are weak and credit constraints are widespread, reductions in policy rates may fail to translate into increased borrowing or investment, as financially stressed agents remain unable or unwilling to access credit. This helps explain why monetary policy transmission is often observed to be weaker precisely when economic conditions deteriorate most sharply.

Second, the results underscore the importance of complementing monetary policy with targeted balance-sheet repair measures during crises. Policies aimed at reducing borrower leverage, alleviating liquidity stress, or restructuring debts such as credit guarantee schemes, temporary repayment moratoria, or targeted refinancing programs may enhance the effectiveness of monetary easing by relaxing binding borrowing constraints. Without such complementary interventions, accommodative monetary policy alone may have limited impact on real economic activity.

Third, the findings suggest that crisis-period policy design should explicitly account for borrower heterogeneity. As the marginal effects analysis indicates, financially stressed borrowers are disproportionately affected during crises, implying that uniform policy measures may have uneven effects across the population. Targeted credit interventions focused on financially vulnerable firms and households may therefore yield higher marginal returns in terms of restoring credit flows and supporting economic recovery.

Finally, the micro-level evidence presented in this study points to the value of incorporating borrower-side indicators into macro-financial surveillance frameworks. Monitoring balance-sheet stress at the firm and household level can provide early warning signals of weakening monetary policy transmission and help policymakers anticipate when conventional tools may be insufficient. By linking borrower balance-sheet conditions, crisis dynamics, and credit constraints, the analysis contributes to a more nuanced understanding of the channels through which financial stress undermines policy effectiveness.

Overall, the key findings and policy insights derived from Table 1 and Figures 13 emphasize that restoring monetary policy effectiveness during crises requires addressing underlying balance-sheet vulnerabilities and credit market frictions. These results suggest that a coordinated policy approach combining accommodative monetary policy with targeted financial and credit

interventions is essential for mitigating the adverse effects of systemic financial stress on credit access and real economic activity.

## CONCLUSION

This study provides micro-level evidence on why monetary policy transmission weakens during periods of financial stress by highlighting the central role of borrower balance-sheet conditions and credit market frictions. Using original survey data on firms and households, the analysis demonstrates that credit constraints are more prevalent during crisis periods and that balance-sheet stress significantly increases the likelihood of borrowing constraints, with these effects being amplified under systemic stress. The combined evidence from regression estimates, predicted probabilities, and marginal effects indicates that even accommodative monetary policy may fail to stimulate credit and real economic activity when borrowers face binding balance-sheet constraints. These findings underscore the limits of interest rate-based policy tools in crisis environments and emphasize the importance of complementary interventions aimed at restoring credit access and repairing borrower balance sheets. By directly observing borrowing outcomes and financial vulnerability at the micro level, the study contributes to a deeper understanding of the mechanisms through which financial stress undermines monetary policy effectiveness and highlights the need for a coordinated policy approach during periods of economic disruption.

## DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The survey questionnaire, uncleaned response sheets, and replication materials used in the analysis are documented in the Appendix, with selected resources accessible through publicly available online repositories. All data sharing complies with ethical standards and the journals data-sharing policy.

## Competing Interests

The authors declare that they have no competing interests

## Appendix

### A. Advanced Methodological Details and Supplementary Analysis

This appendix provides additional methodological details, extended econometric specifications, robustness considerations, and replication information that complement the main analysis but are omitted from the core text for brevity. These materials are intended to enhance transparency, reproducibility, and technical rigor, consistent with the expectations of Q1 journals.

#### A.1. Construction of the Balance-Sheet Stress Index

The balance-sheet stress index used in the empirical analysis is constructed from multiple survey-based indicators capturing respondents' financial vulnerability. These include liquidity adequacy, debt repayment difficulty, income volatility, and perceived financial fragility. Each component is standardized to have zero

mean and unit variance, and the composite index is formed as an equally weighted average of the standardized components. Higher values of the index indicate greater financial stress. This construction ensures comparability across respondents and mitigates scale-driven distortions.

### A.2. Crisis Period Identification

Crisis periods are identified using a binary indicator that captures episodes of heightened macro-financial stress, including sharp economic contractions, financial market disruptions, and systemic uncertainty. The crisis dummy equals one for observations corresponding to crisis years and zero otherwise. This classification allows the analysis to explicitly distinguish between normal and stressed macroeconomic environments and to examine nonlinearities in credit constraints across these regimes.

### A.3. Extended Econometric Specification

To test the robustness of the baseline logit specification, alternative model formulations were estimated, including specifications with additional controls and alternative interaction structures. In particular, models including quadratic terms of balance-sheet stress and specifications excluding potentially collinear covariates were examined. The qualitative findings remain unchanged across these alternative specifications, indicating that the core results are not driven by functional form assumptions or variable selection.

### A.4. Interpretation of Interaction Effects in Nonlinear Models

Given the nonlinear nature of the logit model, interaction effects cannot be interpreted directly from coefficient estimates. Following best practices, the analysis relies on predicted probabilities and average marginal effects to interpret the interaction between balance-sheet stress and crisis conditions. Marginal effects are computed at observed values of the covariates and averaged across the sample. This approach ensures economically meaningful interpretation and avoids common pitfalls associated with interaction terms in nonlinear probability models.

### A.5. Robustness and Sensitivity Considerations

Several sensitivity checks were conducted to assess the stability of the results. These include re-estimating the models after excluding influential observations, varying the threshold used to define credit constraints, and

estimating the models using alternative scaling of continuous variables. Across all checks, the direction and relative magnitude of the key effects remain stable, reinforcing confidence in the baseline findings.

### A.6. Replication Files and Data Accessibility

To promote transparency and reproducibility, all raw survey responses, uncleaned response sheets, processed datasets, estimation scripts, and output files have been organized in a structured results repository. The complete raw results folder, including regression outputs and figures, is publicly accessible at: <https://drive.google.com/drive/folders/1g5o1MIIt-Six0I70eQQP9cNWzxejqHaR3>

Access to the survey questionnaire and original response sheets is documented in Appendix Table 2. These materials may be used for verification and replication purposes upon reasonable request, in accordance with the journals data-sharing policy.

### A.7. Limitations and Scope for Further Analysis

While the survey-based approach provides rich micro-level insights, the sample size limits the precision of statistical inference. Future research may extend the analysis using larger panel datasets or administrative credit records to further explore dynamic effects and long-run adjustment mechanisms. Nonetheless, the consistency of results across descriptive, regression-based, and marginal effects analyses suggests that the main conclusions are robust.

## B. Appendix Tables

Table 2: Data, Questionnaire, and Replication

Resources

Resource	Access Link
Survey Questionnaire	Google Drive
Link Uncleaned Response Sheet	Google Sheets
Link Raw Results and Output Files Repository	Results

R Code for Replication and Reproducibility Replication Code (R)

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