Do firms react to monetary policy in developing countries?*

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Abstract

This paper examines how firms in developing countries respond to monetary policy changes, focusing on both their perceptions of credit constraints and their borrowing behavior. Using firm-level data from the World Bank Enterprise Surveys (WBES) and a newly constructed database of monetary policy changes, we employ an event study approach to analyze how managers adjust their expectations of credit access in the days following a policy intervention. We complement this with a broader analysis of how annual policy rate changes affect firms' credit applications. Our results show that firms perceive credit access as more restrictive after a policy rate hike, but do not significantly reduce their credit applications. Instead, credit demand increases after a rate cut, highlighting an asymmetric response to monetary policy. We also document substantial heterogeneity, with firms' sensitivity shaped by banking relationships, central bank independence, and financial system characteristics. These results provide new insights into the transmission of monetary policy in developing countries.

Keywords: Monetary policy; financial constraints; firms; developing countries

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1 Introduction

The recurrence of economic crises has led to a global resurgence of inflation, forcing policymakers to find ways to contain inflation without stifling economic activity. Monetary policy is a key instrument in achieving this balance, but its effectiveness in developing countries remains an open question. Transmission mechanisms are weaker in these economies due to factors such as excess liquidity, limited banking competition, and weak credibility of monetary policy. While a large body of empirical work has examined the impact of monetary policy in developing countries, results remain mixed.

This paper takes a novel approach to assessing the effectiveness of monetary policy in developing countries by examining how firms respond both in their perceptions and in their borrowing behavior. Using firm-level data from the World Bank Enterprise Surveys (WBES) and a newly constructed database of monetary policy changes, we employ two complementary approaches. First, we use an event study to assess how managers adjust their expectations of credit access in the days following a policy intervention. Second, we analyze whether these shifts in perception translate into actual borrowing decisions by examining how firms' credit applications respond to annual changes in policy rates.

Our findings reveal that firm managers adjust their perceptions and behavior in response to monetary policy. Using a sample of over 10,000 firms in 39 developing countries, we show that managers surveyed within 3 to 12 days after a policy rate increase are more likely to report credit access as a serious constraint. In addition, using annual data on over 36,000 firms from 76 developing countries, we find that loan applications increase significantly following a policy rate cut.

While both approaches confirm that monetary policy affects firms, the responses are asymmetric: perceptions are more sensitive to monetary tightening, while credit applications are more responsive to monetary easing. This discrepancy likely reflects differences in how firms process monetary policy signals - managers internalize the risks of tighter credit conditions immediately, but actual borrowing decisions depend more on the availability of financing. In addition, methodological constraints may limit the ability to fully capture the effects of monetary tightening on loan applications.

Finally, we also document substantial heterogeneity in firms' responses to monetary policy. Firms with a pre-existing banking relationship are less affected, suggesting that prior access to credit helps buffer against interest rate fluctuations. At the country level, firms in economies with independent central banks, inflation targeting regimes, and less liquid banking systems

exhibit stronger responses to policy changes. These findings underscore the importance of institutional quality and financial system characteristics in shaping monetary policy transmission in developing countries.

Our study makes three key contributions to the literature on monetary policy in developing countries.

First, we offer a novel approach that balances internal and external validity[1] in assessing the effectiveness of monetary policy. Identifying the causal effects of monetary policy is challenging due to the endogeneity of policy decisions. While structural models are commonly used in developing countries [Mishra et al., 2012, 2014, Barajas et al., 2018, Brandao-Marques et al., 2020], they face limitations in low-income contexts where data constraints prevent accurate estimation [Mishra and Montiel, 2013, Li et al., 2019]. Recent studies have improved identification by using narrative approaches [Berg et al., 2019] or large, unanticipated monetary shocks [Willems, 2020], while others use bank-level or credit registry data to track the effects of monetary policy [Bhaumik et al., 2011, Abuka et al., 2019, Bhardwaj et al., 2022]. However, these approaches often sacrifice external validity by focusing on a limited set of countries or extreme monetary events. Our study bridges this gap by combining a short-term event study of firm perceptions, modeled on the discontinuity approach of Nakamura and Steinsson [2018b], with a broader behavioral analysis of credit applications. By reconstructing high-frequency data[2] from firm interviews conducted within days of monetary policy changes, we provide a novel identification strategy that captures short-term adjustments in expectations while maintaining external validity by covering a wide range of policy events of different magnitudes.

Second, we contribute to the growing literature on how monetary policy affects firms' expectations and decisions. Existing research has primarily focused on the supply side of monetary transmission, analyzing how banks adjust their lending in response to policy changes while attempting to control for credit demand shocks [Jiménez et al., 2012, 2014]. However, a significant part of monetary transmission may occur through changes in firm behavior, particularly borrower discouragement, which has been identified as a major source of credit constraints in developing countries [Brown et al., 2011, Léon, 2015]. While a burgeoning literature explores how monetary policy shapes firms' macroeconomic perceptions [Enders et al., 2019, Pinter and Kočenda, 2023] and how these expectations influence real decisions [Coibion et al., 2020, En-

[1]Internal validity can be defined as the degree of confidence that the causal relationship being tested is reliable and not confounded by other factors or variables. External validity refers to the extent to which the results of a study can be generalized to other contexts.

[2]the definition of high frequency differs from papers on developed countries in that we refer to a few days, while they exploit changes in a few minutes.

ders et al., 2022], most studies focus on developed economies. The closest work to ours is Ferrando et al. [2022], which shows that monetary policy in Europe affects firms' investment and employment growth by shaping expectations of future credit availability. We extend this analysis to developing countries, where financial frictions are more severe, and further explore how institutional factors influence firms' sensitivity to monetary policy.

Third, we provide new evidence on firm-level heterogeneity in monetary policy transmission. Much of the literature on developing countries has examined country-level determinants of monetary policy effectiveness [Mishra et al., 2014, Brandao-Marques et al., 2020]), but few studies have investigated firm-level heterogeneity in responses to monetary policy. Existing studies on firm-level differences largely focus on advanced economies, analyzing how monetary policy affects firms differently based on size, leverage, or financial constraints [Gertler and Gilchrist, 1994, Ottonello and Winberry, 2020, Durante et al., 2022, Cloyne et al., 2023]. The study most relevant to ours is Choi et al. [2024], which examines how monetary policy transmission varies across industries using a sample of both developed and developing countries. We go further by showing that even within the same industry, firms with prior banking relationships are significantly less sensitive to monetary policy changes. This suggests that, beyond industry-level effects, firm-specific characteristics play a crucial role in shaping monetary policy transmission in developing countries, a dimension that remains underexplored in the literature. We also confirm that banking system characteristics and institutional factors are crucial.

Our work contributes to the literature on credit access in developing countries, where research on the direct effects of short-term monetary policy remains limited. While several studies examine the crowding out effects of fiscal policy [Cavallo and Daude, 2011, Huang et al., 2020], few examine how monetary policy affects firms' ability to secure financing. We find that monetary policy affects both managers' perceptions of credit constraints and their borrowing decisions. Tightening increases concerns about credit availability, while easing encourages firms to apply for credit. By influencing borrower discouragement, a key obstacle to financing in developing countries, monetary policy plays a crucial role in determining access to credit.

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 presents the perception-based analysis. Section 4 examines the impact on behavior (loan application). Section 5 presents the heterogeneity analysis. The last section concludes.

2 Data

This paper investigates how firm managers react to monetary policy changes in developing countries. We combine firm-level data with information on monetary policy changes.

2.1 Reactions of the managers

Firm-level data are extracted from the World Bank Enterprise Surveys (hereafter WBES). The WBES is a firm-level survey of a representative sample of private enterprises, covering more than 180,000 firms operating in 154 countries (at the time of extraction in October 2022). The WBES provides harmonized questionnaires across countries. The firm data extracted from the WBES allow us to measure two aspects of managers' responses: perceptions of financial constraint and credit application behavior.

In the first part of the analysis, we examine how monetary policy events affect managers' perceptions of credit constraints. We use the following question in the WBES: "*To what extent is access to finance an obstacle to the current operations of this establishment?*" (question *k30* in the WBES). Responses range from 0 (not an obstacle) to 4 (very serious obstacle). The score increases as the perception of credit constraints as an obstacle increases. The dependent variable captures both expected changes in the extensive margin and the intensive margin. Indeed, a manager may adjust her perception after a monetary policy tightening because she expects to be unable to obtain a new loan in the future (extensive margin), but also because credit conditions will be less favorable (intensive margin).

In the second step of the analysis, we examine the behavior of managers in terms of credit application. To do so, we exploit information on credit experience of managers in the year previous the survey. The dependent variable (*Application*) is a dummy equal to one if a firm applied for a loan (regardless of the outcome of the application) and zero if the firm was discouraged from applying despite needing funds. To construct the credit application measure, we follow the approach of Léon [2015] using questions k16 (*Referring again to the last complete financial year, did this establishment apply for any lines of credit or loans?*) and k17 (*What was the main reason why this establishment did not apply for any lines of credit or loans?*) in the WBES. Firms are divided into three groups: applicants, non-applicants, and firms with no need for credit. The latter group of firms is excluded from the analysis.

2.2 Monetary policy data

Information on monetary policy combines existing databases and manual data collection. The first source of data on monetary policy is extracted from the International Financial Statistics (IFS) compiled by the IMF. The IFS report the key policy rate in each country at the end of the year or of the month. We exploit these data in the second step of the analysis (behavior) as we examine whether the likelihood for a firm to apply in year t was related to monetary policy changes from year $t-1$ to year t. Using the interest rate on December 31 of each year, we calculate the difference in basis points during the year t.

However, this approach is no longer feasible for the analysis of perceptions, as we study how managers adjust their expectations in a few days after a monetary policy change (also called an event in this paper). To do so, we need precise information on the day of the event. Unfortunately, the IFS data do not provide such information, and we are unable to identify cross-country databases that report these events for a large number of low- and middle-income countries. We filled this gap by manually collecting monetary policy changes in developing countries over the period 2006-2020. We constructed a new database that identifies an event (i.e., a monetary policy change) as a change in the central bank's policy rate. To build the database, we consulted central bank documentation (press releases, monetary policy bulletins, etc.) to check whether the central bank's policy rate changed during the period. For each event, we collected the following four pieces of information: the exact date of the policy intervention, the new policy rate, the date of the previous rate change, and the previous policy rate. We describe the data collection procedures in Appendix A and the list of events used in the analysis is shown in Table A1.

Before using the hand-collected database on monetary policy changes, we compare hand-collected data on events with monthly IFS. We document that our database is in perfect agreement with the IFS for 94 out of 130 the events considered (72%). For the remaining 36 events, we find a discrepancy, which is mainly explained by a difference in the key policy rate considered (23 events) and an absence of data in the IFS (11 events). Procedures and detailed results are provided in Appendix A.

It should be noted that we focus on policy rates rather than other instruments (money supply, reserve requirements) for two main reasons. First, a growing number of central banks in developing countries are now using market-based instruments [Brandao-Marques et al., 2020]. Second, measuring the intensity of treatment is simplified by using a single measure. It will be complex to find a common measure of intensity with different instruments. By using the

difference in the policy rate before and after the change, we can have a comparable measure. But this choice has shortcomings. We may understate the importance of a change if a central bank not only changes its policy rate but also activates other instruments. In addition, we may miss some changes if a central bank uses non-price instruments but does not change its policy rate. Nevertheless, focusing on the policy rate is a clear, relevant, and transparent way to measure monetary policy events, which explains its use in cross-country papers [Barajas et al., 2018, Brandao-Marques et al., 2020, Willems, 2020].

2.3 Other data

We extract from the WBES a rich set of firm-level variables that serve as controls in regressions in both approaches (perceptions and behaviors). These variables control for firm *size* (number of employees, in logarithms) and firm *age* (number of years between the date of the interview and the year of establishment reported in the WBES, in logarithms). We also include the manager's experience in years (*Experience*). We also add a set of dummies for whether the firm is owned by a woman (*Female*); whether it is foreign-owned (*Foreign*) or state-owned (*State*); whether it is in manufacturing (*Manufacturing*); whether it is part of a multi-plant firm (*Multi-plant*). We also control for exporters (*Export*), defined as firms that send part of their production abroad. We also add three dummies to control for different legal status: *Listed*, *Partnership*, *Sole proprietorship*.

For the perception analysis, we also use two additional pieces of information. First, we extract the exact date of the interview to measure the interval between the previous/next monetary policy change and the interview. Second, we also control for the average value of other obstacles reported by the manager. Some managers are naturally more pessimistic and are more likely to report facing high obstacles on each dimension (finance, electricity, corruption, etc.). There is no reason to believe that the proportion of pessimists is correlated with the monetary policy calendar. However, to avoid such a problem, we control for the average of other obstacles in order to have a proxy for the degree of individual pessimism.[3] This approach allows us to obtain a measure of financial constraints net of other constraints.

In addition, we consider country-level data in the analysis of the application decision. We

[3]We acknowledge that the concept of pessimism is not necessarily the most appropriate one. To measure the average of other constraints, we use 15 perceptions to calculate the average index: business license, corruption, court, crime, electricity, informal sector competition, political instability, labor regulation, land, tax administration, tax rate, telecommunications, trade regulation, transportation, and labor skills. All constraints are constructed using the same Likert scale (from 0 'no constraint' to 4 'very serious constraint'). Note that four business constraints are not included due to lack of observations: macroeconomic instability, zoning restrictions, restrictions on opening hours, and restrictions on pricing and markups.

include the level of GDP growth and inflation to control for macroeconomic activity. We also control for the level of financial development using the ratio of private credit to GDP and the level of income using GDP per capita (in constant USD).

Definition of all variables are provided in Tables C1 (perception analysis) and D1 (behavior analysis) in Appendix.

3 Perception analysis

The first step of the analysis consists on examining how perception of firms' managers of credit constraints is affected by a monetary policy change. To do so, we employ an event study with survey data.

3.1 Empirical strategy

The approach employed here consists of comparing units surveyed shortly before and after a given event, in line with model initiated by Depetris-Chauvin et al. [2020]. In our study, we not only exploit the timing of the event, but also the intensity of the treatment (the amplitude of the change in the policy rate). The estimated model is a difference-in-difference with continuous treatment model as follows:

$$Y_{i,e,d} = \delta_e + \beta_0 Post_{e,d} + \beta_1 Post_{e,d} \times \Delta(IR_e) + \gamma \mathbf{X}_i + \varepsilon_{i,e,d} \tag{1}$$

where i, e, and d denote the firm, the event (defined as a change in the policy rate), and the date of the interview (day), respectively. The dependent variable ($Y_{i,e,d}$) is the manager's perception of access to finance as an obstacle to the current operation of the establishment, ranging from 0 (no obstacle) to 4 (very serious obstacle).

The empirical model is a difference-in-differences framework with a continuous treatment. $Post_{e,d}$ is an indicator variable that takes the value of one if a firm is surveyed after the event and zero otherwise. The amplitude of the monetary policy change ($\Delta(IR_e)$) is measured by the change in basis points of the central bank's policy rate. Our main variable of interest is the interaction between the $Post_{e,d}$ dummy and the amplitude of the monetary policy change $\Delta(IR_e)$.[4]

To restrict the comparison to respondents interviewed before a monetary policy change with those in the same country but interviewed a few days later, we add monetary policy fixed effects

[4]The variable $\Delta(IR_e)$ is absorbed by event fixed effects δ_e and does not enter in level in Eq. 1.

(δ_e). The inclusion of monetary policy dummies is essential for our identification strategy at it will allow us to compare firms operating in the same environment.

Another important decision to ensure identification is the choice of the relevant windows around the event. In this paper, we consider four different windows: 3, 6, 9, and 12 days. Indeed, the literature on the impact of monetary policy changes in industrial countries often considers minutes around the monetary policy decision, thanks to market data [Nakamura and Steinsson, 2018b]. In our setting, however, we cannot have a similar time window because we use survey data. We do our best to balance data availability with the shortest time around an event. By comparing firms observed in a few days before and just after a monetary policy change, we expect the difference to be due only to that event. A change in the key policy rate is rarely decided overnight because of the very rapid deterioration in economic indicators. The exact timing is often determined by institutional factors (such as the calendar of the Monetary Policy Committee). The timing of the interviews is now decided several weeks in advance. There is no reason for monetary policy interventions to influence this. Appendix C describes in details how we proceed to select firms included in the analysis.

We also control for heterogeneity across firms by including a set of individual-level control variables ($\mathbf{X}_i$). The list of control variables is provided in Table C1 in Appendix C.[5] Finally, the baseline analysis uses a linear approach even though the dependent variable is an ordered variable ranging from 0 to 4. The decision to rely on a linear model is twofold. First, the inclusion of many fixed effects induces an incidental parameter risk in a non-linear model. Second, the interpretation of interactions in a non-linear model is complex. Standard errors are clustered at the treatment level, which is the event here.

We expect the coefficient associated with the interaction (β_1) to be positive: when the policy rate rises, firms are more likely to face (or expect to face) difficulties in accessing finance. The opposite is true when the central bank eases monetary policy by lowering its policy rate. Furthermore, we expect that the effect of a change in monetary policy depends also on the intensity of the change. For small changes in policy rates, we do not expect managers to react strongly. However, the larger the change, the larger the effect (both up and down). The absence of a significant coefficient reflects that a change in the transmission of monetary policy is not transmitted to the perceptions of managers. It is important to note that a decision by the Monetary Policy Committee not only affects the money market, but may also convey information about the economy [Nakamura and Steinsson, 2018b, Bauer and Swanson, 2023]. As a result, the

[5] All additional tables and figures related to this section are presented in Appendix C.

estimated coefficient associated with β_1 could be attenuated or even reversed if the information channel dominates. Meanwhile, we expect β_0 to be zero. The coefficient associated with $Post_{e,d}$ merely reflects the effect of being interviewed after an event when the monetary policy change is zero (which is only a hypothetical case in our empirical framework, as we focus exclusively on interest rate changes).

3.2 Descriptive statistics

The analysis is based on four different windows: 3, 6, 9, and 12 days. The number of firms, events and countries considered increases with the length of the window, and we discuss in detail how we construct the different samples based on the windows in Appendix B. The sample includes 1,264 firms from 26 events in 13 countries for the 3-day window; 4,156 firms from 81 events in 32 countries for the 6-day window; 7,794 firms from 116 events in 38 countries for the 9-day window; and 10,128 firms from 130 events in 39 countries for the 12-day window (see Appendix, Table C2, for detail per country).

The descriptive statistics reported in Table 1 show that the average perception score is 1.36 (sd = 1.27). One-third of the enterprises report that access to credit is not an obstacle to their activity, while one-fifth report that it is a serious or very serious obstacle. The distribution of firms by time of event is fairly balanced, with between 51% and 61% of firms interviewed after a monetary policy change (variable *Post*, depending on the window considered). The distribution of firms by type of change is also fairly balanced, with about 40% of firms referring to a restrictive monetary policy (variable *Hike*). On average, we see an interest rate change of minus 11 basis points. However, the overall average is not meaningful as it combines both cuts and hikes. We take a closer look at the distribution of policy rate changes (at the event level) in Appendix (Table C3). There are a total of 130 events. Of these, 45 are monetary tightening events, with an average increase in the federal funds rate of 72 basis points. There are more easing events (85), but they are of smaller amplitude (the average is minus -61 basis points). Almost half (45%) of the events are of limited amplitude (less than 50 basis points in absolute terms). On the other hand, a quarter of the events exceed 100 basis points.

We conclude the discussion of descriptive statistics by reporting balance tests. Indeed, a crucial step in validating the empirical strategy is to test whether the units surveyed before and after the event are similar in terms of their characteristics. We expect the firms to be similar in terms of their observable characteristics. In line with Depetris-Chauvin et al. [2020], to ensure that we are comparing firms related to the same event, we regress each of these variables on the

$Post_{i,e,d}$ dummy, controlling for monetary policy fixed effects (δ_e) and clustering the standard errors at the event level. We report the p-value of each characteristic for the four windows considered in Table 2, indicating that the sample is well balanced.

3.3 Empirical results

Table 3 presents the baseline results. In the different columns, we show the econometric results for different windows considered: 3, 6, 9, and 12 days, respectively. Panel A shows the baseline model as described in Eq. 1, where we interact the *Post* dummy with $\Delta(IR)$. All models include control variables and event fixed effects (full results are shown in Table C4 in Appendix).[6]

The different specifications show a positive and statistically significant coefficient associated with the interaction between the $Post_{e,d}$ dummy and $\Delta(IR_e)$, which is quite stable across different windows. According to this result, firms are more likely to report greater difficulties in accessing credit after a significant change in monetary policy (and vice versa).

However, the results so far represent an average effect, combining both tightening and easing. Firms are unlikely to respond symmetrically to increases and decreases in the policy rate. To test this hypothesis, in Panel B of Table 3 we replace the variation in the policy rate ($\Delta(IR)$) with a dummy that takes the value one when monetary policy is tightened ($Hike = 1$ if $\Delta(IR) > 0$, and 0 otherwise). In this specification, the coefficients associated with the *Post* dummy refer to the effect of monetary easing (when $Hike = 0$) and the interaction between *Post* and *Hike* is the effect of monetary tightening. Results in Panel B are in line with expectations. Coefficients associated with monetary easing are negative (a rate decline reduces the perception of credit constraints) and those with monetary tightening are positive (a rate increase raises the perception of credit constraints). However, we also see that managers do not react symmetrically. They are more likely to adjust their perceptions to an increase in the policy rate. However, the adjustments are smaller and statistically insignificant at the usual threshold for expansionary monetary policy. The economic effect is also significant. The level of perceptions increases between 0.12 and 0.19 (corresponding to between 0.09 and 0.15 standard deviations of the dependent variable). Even disregarding statistical significance, the economic impact of monetary easing is lower, ranging from -0.03 to -0.08.

In the final part of Table 3, we examine whether the relationship between variation in the policy rate differs between hikes and cuts. To do so, we run a triple interaction model

[6]We document that the perception of credit constraints is higher for small and local firms, those in manufacturing, and those with a single plant. We also document that financial constraints are highly correlated with other constraints.

combining the measure of policy rate variation and the dummy for monetary tightening ($Hike$). In the model shown in Panel C, the coefficients associated with $Post$ report the (hypothetical) value of the change in managers' perception when there is a cut, and the double interaction $Post \times \Delta(IR)$ shows how managers adjust their perception as the rate cut increases. As expected, we see that both coefficients are negative, indicating that managers adjust their perceptions to monetary easing, especially when cuts are important. However, both coefficients, as well as their combination for cuts ranging from 0 to 200 basis points, are never statistically significant. For example, as documented in Table C5 in Appendix, a 100 basis point rate cut reduces perceptions between 0.05 and 0.09 (but is never statistically significant). We do the same exercise for monetary tightening, with coefficients associated with $Post \times Hike$ and $Post \times \Delta(IR) \times Hike$. As before, we document that both coefficients have the expected sign (here positive). In other words, not only do managers react to a hike in the policy rate, but their reaction is stronger as the hike increases. For example, a 100 basis point increase in the policy rate increases perceptions by between 0.17 and 0.22 (and is often statistically significant).

We continue the analysis of possible non-linear effects by looking at the time since the last change in monetary policy. Considering that a similar change will be more effective if the central bank has not changed its interest rate for a long time, we take into account the time since the previous event. To do so, we adapt the model presented in panel C of Table 3. We replace the amplitude of the shock ($\Delta(IR)$) by a dummy equal to one if the time since the last event is above a given threshold ranging from 60 days (2 months) to 240 days (8 months).[7] The results, displayed in Table C6, are quite complex to interpret. For monetary easing, the distance since the last change seems to matter only when the previous change was relatively old (more than 150 days). For monetary tightening, the econometric results are not consistent across different windows. In short, we document that, in contrast to the amplitude of the change, the time since the last event is not so crucial.

We then look at how monetary policy affects perceptions over time. So far, we have looked at the period before and after the event as a whole. However, the effect of monetary policy could be delayed or disappear shortly after the event. In addition, there is a concern about the possible anticipation effect, which introduces a damping bias. To address these different issues, we examine the effects of monetary policy changes before and after the event. Figure C1 in the appendix plots the results for the two largest windows (it is rather impossible to plot results for shorter windows). We document that monetary policy changes take little time to materialize.

[7] Including both the rate change and the duration in the baseline framework is not feasible because we are comparing firms that refer to the same event, and both variables are perfectly collinear for the same event.

The effect of monetary policy occurs mainly after three days. One possible explanation is the diffusion of information in the media. Moreover, we do not find an anticipation effect [Miller, 2023]. In fact, we document the opposite for the 12-day window, as perceptions decrease (instead of increasing).

We conclude this section with some robustness checks. Table C7 in Appendix presents a series of sensitivity tests in which we change the measurement of the dependent and interest variables, the econometric method used, and the sample considered.[8] The results are robust, except when we consider alternative treatment variables. In this case, the estimated coefficients are always positive, as expected, but not statistically significant. Regardless of the statistical significance, one standard deviation of MPS or relative measure of $\Delta(IR)$ causes a 20% increase in perception.[9]

In a final part, we conduct a falsification test, which is the ultimate robustness check. A change in monetary policy should primarily, if not exclusively, affect the perception of access to credit as a barrier. We do not expect monetary policy to affect the level of perceived corruption, access to electricity, or political instability. We present results for spurious tests for 15 other obstacles available in the WBES[10], and the average of all other obstacles. We present the results in Table C8 for the four windows considered. As expected, a change in monetary policy does not have a robust effect on other barriers (across the all windows), either collectively or individually.

To sum up, the analysis shows that managers adjust their perception of their credit constraint in the days following a change in monetary policy. This is particularly true of monetary policy tightening. There is no clear effect on monetary policy easing. Finally, we do not find any evidence of an anticipation effect.

[8]Specifically, we replace the absolute value of perception with a relative measure, as done by Cazals and Léon [2023]. For the dependent variable, we consider a relative change in the interest rate instead of an absolute change, and we also consider a measure of the monetary policy surprise index (MPS) computed by Choi et al. [2024]. Choi et al. [2024] exploit the degree of surprise in the anchor currency. The authors estimate the degree of monetary policy surprise by multiplying the initial shock in the country (high-frequency identification) by the degree of capital account openness. Positive values of the MPS indicate monetary contraction, and the index rises with the degree of surprise. However, we are limited in the number of countries for which we were able to collect this specific measure. We then consider an ordered probit model in the fourth column, since the dependent variable is an ordered discrete variable. Finally, we change the sample by considering a sample with overlapping firms (see Appendix C for detail about what is called "overlapping firms") and by excluding crisis periods. In an unreported analysis (available upon request), we dropped country one by one.

[9]The lack of statistical significance for the monetary policy surprises may lie in the sharp reduction in the number of observations (only 20% of our initial sample remains).

[10]The WBES survey asks business owners about 20 different obstacles. One of these is our main dependent variable (access to credit). Four obstacles are not included in our spurious analysis because they are poorly documented (zoning restrictions, macroeconomic instability, hours of operation, and prices)

4 Behavior analysis

The previous analysis documents that managers quickly adjust their perceptions of credit constraints after a change in monetary policy. A closely related question is whether monetary policy affects not only managers' perceptions but also their behaviors. We address this issue in the following by examining how monetary policy changes affect managers' decision to apply for loan.

4.1 Empirical strategy

To examine how monetary policy affects the manager's decision to borrow, we run the following regressions:

$$Y_{ict} = \alpha_c + \beta\Delta(IR_{ct}) + \Gamma C_{ct} + \Omega F_i + \varepsilon_{ict} \tag{2}$$

where i, c, and t refer to firm i in country c in year t (since the questions on credit experience refer to the past year, we identify the past year as the year of interest).

The dependent variable (*Application*) is a dummy equal to one if a firm applied for a loan (regardless of the outcome of the application) and zero if the firm was discouraged from applying despite needing funds. We exclude all firms that did not express a need for funds.

The interest rate variable - $\Delta(IR_{ct})$ - is the change in the policy rate in country c from the end of year $t-1$ to the end of year t. The data are taken from the International Financial Statistics of the IMF. Using the interest rate on December 31 of each year, we calculate the difference in basis points during the year t.

The empirical model also includes country fixed effects (α_c), which allow us to compare firms that operate in the same country but refer to different years. We also control for time-varying macroeconomic variables (C_{ct}) to proxy for economic conditions due to the endogeneity of monetary policy. Thus, we include GDP growth and inflation. We also include the usual proxies for economic development with the logarithm of income per capita and the ratio of domestic credit to the private sector to GDP. These variables are taken from the World Development Indicators. Then, we control for the same set of firm-level control variables (F_i) that in the previous section to account for observable heterogeneity. All variables are described in Table D1 in Appendix D.[11] Standard errors are clustered at the treatment level (country-year).

We expect that the loan application to decrease after an increase in the policy rate and the opposite after a monetary easing. In other words, estimated coefficient β is expected to be

[11] All additional tables related to this section are displayed in Appendix D.

negative.

This methodology provides a structured approach to studying the behavioral effects of monetary policy, but it has two limitations due to the data structure of the dependent variable.[12] First, the dataset only indicates whether a firm applied for a loan in the past year, but does not specify the exact timing of the application. This lack of granularity makes it difficult to determine whether a loan application occurred before or after a monetary policy change within the same year. Second, the analysis focuses exclusively on the extensive margin (i.e., whether firms apply for loans) and does not consider the intensive margin (which includes the terms of the loans obtained). This is an important limitation, as monetary policy is likely to affect not only the decision to seek credit, but also the availability and affordability of credit, such as interest rates and loan amounts. By excluding the intensive margin, the analysis provides an incomplete picture of how monetary policy shapes credit outcomes.

These limitations suggest that the results should be interpreted with caution. The inability to identify the timing of loan applications within a year and the fact that the intensive margin is ignored may lead to a downward bias in the estimated effect of monetary policy, especially during tightening episodes. Firms that applied for credit early in the year, before a monetary policy tightening, may be misclassified as affected by the policy change. This misclassification could dilute the observed effect of interest rate increases on loan applications, leading to a downward bias in the estimated impact of tightening. This problem is less pronounced for monetary easing, as firms in need of credit may decide to apply after a rate cut. Despite these challenges, the results remain valuable because they show that monetary policy affects not only managers' perceptions of credit access but also their actual borrowing behaviour. This is consistent with and strengthens the broader evidence on the real effects of monetary policy.

4.2 Descriptive statistics

The analysis is based on all developing countries for which the WBES provide data on loan applications and policy rates are provided in the IFS. After excluding firms without a need for credit and no information on controls, the sample considers 36,067 firms operating in 76 countries from 2006 to 2020. Details about the composition of the sample by country are given

[12] This approach also has another, albeit minor, limitation. The variable representing the monetary policy change ($\Delta(IR)$) is a simplified measure that captures only the net difference in the policy rate between the beginning and the end of the year. While this approach provides a straightforward summary of monetary policy movements, it overlooks the nuances of intermediate rate changes, such as the number of increases or decreases and their respective magnitudes. Alternative constructions of this variable, such as counting the number of significant rate changes or including their amplitude, could provide additional insights but introduce complexity without fully resolving the main issue discussed in this paragraph.

in Table D2.

The descriptive statistics in Table 4 show that 37% of firms applied for a loan in the year prior to the survey. It is interesting to note that behavior (application) and perceptions are not perfectly correlated and therefore capture different aspects. For example, the proportion of managers who say that access to credit is a serious or very serious obstacle to their business is 32% for non-applicants and 27% for applicants. Conversely, the proportion of managers who say it is not an obstacle is 20% for non-applicants and 29% for applicants.

The average value of $\Delta(IR)$ is negative (-20 bps). However, as before, we examine the distribution of the interest rate variable in detail. In Table D3, we refer to 203 available country years (which is more or less the same as the previous event). We document that there are 56 cases of monetary tightening (the rate at the end of the year is higher than at the end of the previous year), 91 cases of monetary easing, and 56 cases where there is no difference. We document an average increase of 261 bps for hikes and a decrease of 245 bps for cuts. These figures are higher than the events used previously because they refer to cumulative changes within the year.

4.3 Empirical results

Table 5 reports the main empirical results. Columns (1) and (2) report the results from the baseline model using a linear and a probit model, respectively. Column (3) presents the results from the linear model after excluding the country-year pairs with no variation in the policy rate.

Results from columns (1) to (3) document that an increase of $\Delta(IR)$ decreases the likelihood that a firm applied for a loan in the previous year. As expected, the coefficient associated to a change in policy rates is negative and statistically significant at the 5% level. However, the magnitude of the effect is rather limited. A 100 basis point increase in the policy rate reduces the decision to apply for a loan by between 0.8 and 1 percentage point (the average is 37%).[13]

As with perceptions, we are interested in the possible asymmetric response to monetary tightening and easing. Therefore, in column (4) of Table 5, we first include a dummy ($Hike$) that equals one if the country experienced an increase in the policy rate over the year and a second dummy (Cut) that equals one for countries that experienced a cut in the policy rate over the year. This approach allows us to examine the possible heterogeneous effect between tightening and easing of monetary policy. In the last column of the same table, we follow the

[13]Note that the interest rate changes are higher than in our baseline analysis because we are looking at annual changes, as described above. In addition, the full results are shown in table D4 in the appendix. We document that the demand for credit is higher for large and old firms and for firms run by a female and an experienced manager. In addition, exporters and manufacturing firms with multiple plants are more likely to request a loan. However, country-level variables are rarely significant, even if the signs are as expected (increased demand during growth episodes, stable inflation, in financially and economically developed countries).

same approach as in the perception analysis by interacting dummies with the amplitude of the change in order to document how managers react not only to the direction of the change but also to its amplitude.

The result in column (4) of Table 5 suggests that the decision to apply is driven by expansionary rather than contractionary monetary policy. The effect is also economically significant. A reduction in the key rate over the course of the year increases the probability of applying by about 17 percentage points (the fraction of applicants is 37%). The last column allows us to examine the possible different trends in the response to tightening and easing. We document that the response to a cut increases as the value of the decline in the monetary policy rate increases. For example, the probability of a hike increases by 22 percentage points after a 50 bps contraction and by 26 percentage points after a 200 bps contraction. For monetary tightening, we document a slight decrease as the amplitude of rate hikes increases. However, the net effect on loan applications is always statistically insignificant.

Finally, we conclude the analysis by carrying out a series of sensitivity tests, as shown in Table D5. First, we change the dependent variable in column (1). As an alternative, we create a dummy equal to one if the firm purchased a fixed effect (not exclusively its funds). Second, we use the relative variation of the change in the policy rate instead of the absolute change. Third, we play with the sample. We restrict the analysis to the sample used in the perception analysis to check that the results are not driven by the sample.[14] As before, we also restrict the analysis to non-crisis periods. Finally, we conclude the robustness checks by performing falsification tests in columns (5) to (8) of the same table. As before, the objective is to identify managerial decisions that are not expected to be directly related to monetary policy.[15] We consider applications for an electricity connection (column 5), a water connection (6), a telephone connection (7) and whether the firm paid for its security (8). As expected, changes in monetary policy do not affect these decisions.

To sum up, the analysis shows that managers are more inclined to apply for credit after a reduction in the policy rate. However, we do not find a symmetrical effect when monetary policy is tightened.

[14] We only present results for the most restrictive sample (3-day window), but results for other samples (6, 9 and 12 days) are similar (available on request).

[15] For this reason, we do not consider variables such as the export decision or the application for a building permit, as they may be related to access to finance.

4.4 Discussion of differences in results between perceptions and behaviors

The above results suggest that managers are sensitive to monetary policy by adjusting not only their perceptions but also their behavior (decision to apply). However, the results in Tables 3 and 5 are rather contradictory. Indeed, the empirical analysis shows that perceptions of credit constraints are more sensitive to monetary tightening. On the other hand, borrowing behavior is more affected by policy rate cuts. Several arguments can be advanced to justify this apparent contraction between perceptions and behaviors.

A first explanation takes roots in the limitations of the behavior approach described above. A key methodological limitation of the loan application analysis is that it only captures firms that have applied for credit, potentially introducing bias. During monetary easing, many previously unprofitable projects become viable, leading to a surge in applications and amplifying the observed sensitivity to interest rate cuts. In addition, some firms may delay applications in anticipation of further rate cuts, leading to a more concentrated and rapid response to easing. In contrast, if firms anticipate rate hikes, they may preemptively apply early in the year to lock in lower borrowing costs, obscuring the full effect of tightening as later declines in applications go unmeasured. This timing asymmetry can distort the comparison between the effects of monetary tightening and easing.

A second explanation lies in the difference between the two approaches: perception analysis captures both the intensive (e.g., changes in loan terms or borrowing conditions) and the extensive margin (e.g., whether firms have access to credit at all), thus providing a more comprehensive view of the effects of monetary policy. In contrast, the analysis of loan applications focuses exclusively on the extensive margin, examining only whether firms apply for credit or not. Perhaps the decision to apply for credit is only marginally affected after an increase, even if borrowers expect credit conditions to deteriorate. This narrower focus may miss significant adjustments in borrowing conditions or restrictions that affect firms' perceptions without necessarily translating into observable application behavior.

A third explanation could be related to the different (over)reactions to good (easing) and bad (tightening) news. As market participants, managers may adjust their expectations of credit constraints immediately after a tightening, while the response to monetary easing is often slower and less pronounced [Beckers and Bernoth, 2024, Blot et al., 2024].[16] Since perception is a complex outcome of multiple factors, an increase in one of them (here monetary policy) is more likely to translate into an increase in "the score", while an easing of one of them does not

[16] Even in the absence of data, this asymmetry may be exacerbated by the media, which tends to place greater emphasis on tightening, thereby amplifying the signal sent to managers.

translate directly into an adjustment, as other factors are unchanged.

5 Heterogeneity analysis

In the final step of the analysis, we examine factors that weaken or strengthen the transmission of monetary policy to managers (perceptions and behavior). Transmission can be impeded by firm-level and country-level variables. More specifically, firms are more likely to be sensitive to monetary policy if (i) they rely on formal credit to finance their activities and (ii) the transmission of monetary policy is effective in shaping the behavior of lenders (mostly banks in developing countries). In this section, we briefly discuss the empirical approach (subsection 1) and present results for firm-level (subsection 2) and country-level moderators (subsection 3).

5.1 Empirical strategy

To examine how firm- and country-level characteristics may affect the transmission of monetary policy, we use an interaction model between the moderators and the monetary policy variable. Since we consider both perceptions and behavioral analysis, we adjust the equations. 1-2 respectively.

For perceptions, we estimate a triple difference model as follows:

$$\begin{aligned} Y_{i,e,d} = \delta_e &+ \zeta_0 Post_{e,d} \\ &+ \zeta_1 Post_{e,d} \times \Delta(IR_e) \\ &+ \zeta_2 Post_{e,d} \times \Delta(IR_e) \times Z_{i/c} \\ &+ \zeta_3 Post_{e,d} \times Z_{i/c} + \zeta_4 \Delta(IR_e) \times Z_{i/c} + \gamma \mathbf{X}_i + \varepsilon_{i,e,c,d} \end{aligned} \tag{3}$$

where $Z_{i/c}$ is a firm-level (indexed i) or country-level (indexed c) moderator (described below). We control for firm-level characteristics in the set of unit-level control variables ($\mathbf{X}_i$) and for country-level characteristics by adding event dummies (δ_e). We are particularly interested in two coefficients: ζ_1 and ζ_2. The first coefficient (ζ_1) provides the effect of the monetary policy change for firms surveyed after the event when the moderator ($Z_{i/c}$) equals zero. We expect the firm or country characteristics to mitigate (or exacerbate) the effect of monetary policy when $\zeta_2 < 0$ (or $\zeta_2 > 0$). We also include double interactions of the moderating variable with $Post_e$ and $\Delta(IR_e)$, respectively.[17]

[17] Note that the interaction between $\Delta(IR_e) \times Z_{i/c}$ is not included when using country-level characteristics, as it is absorbed by the event fixed effects (both $\Delta(IR_e)$ and Z_c are time-invariant for firms surveyed for the same event e).

For behaviors, the model is simpler as it is an interaction model.

$$Y_{ict} = \alpha_c + \gamma_1 \Delta(IR_{ct}) + \gamma_2 \Delta(IR_{ct}) \times Z_{i/c} + \Gamma C_{ct} + \Omega F_i + \varepsilon_{ict} \tag{4}$$

where $Z_{i/c}$ is the moderator and other variables have been defined previously. The coefficient associated with γ_1 indicates the effect of monetary policy when $Z_{i/c}$ equals 0 and γ_2 indicates whether the transmission of monetary policy is shaped as $Z_{i/c}$ increases.

The exact interpretation of the coefficients ζ_1 and ζ_3 on the one hand and γ_1 and γ_2 on the other hand depends on the measurement of the moderator (sign, binary or continuous variable).

We now turn to the list of moderators. For the firm-level moderator, we consider the usual suspects, such as size, the fact to have several plants, age, whether a firm is foreign-owned, and whether it is owned by a woman. We also consider two additional variables that may proxy for proximity to a formal financial system. On the one hand, we consider audited firms, as this is often required by banks. On the other hand, we examine whether the firm already had a relationship with a bank, using a dummy equal to one if it had a loan during the survey. Except for size and age, all other variables are binary.

The discussion for country-level moderators deserve more attention. It has been emphasized that the transmission of monetary policy in developing countries is shaped by both the characteristics of financial systems and the monetary policy framework.

On the one hand, the existing literature suggests that a limited level of financial system development [**??**], lack of competitiveness [Olivero et al., 2011, Mishra et al., 2014], large presence of foreign banks [**??**], or excess liquidity in the banking system [Chatelain et al., 2003, Saxegaard, 2006] may be important impediments to monetary policy transmission in developing countries. To account for these factors, we consider the following characteristics of financial systems. First, we measure the size of financial systems by the ratio of private credit to GDP (*Priv Credit*). Second, the degree of competition (concentration) is assessed by the share of assets held by the five largest banks (*CR5*). We also take into account the presence of foreign banks by using the share of assets held by foreign-owned banks (*Foreign*). Finally, we construct two proxies to assess the degree of (excess) liquidity in the banking system. In the absence of a direct measure of excess liquidity[18], we use two proxies. First, we proxy excess liquidity in the financial sector by relying on the volume of broad money (M3). However, in order to account for long-run trends and cross-country differences, we do not use the value of M3. Instead, we consider deviations of

[18]Since the first attempt by Saxegaard [2006], there has been a lack of an international measure of bank excess liquidity.

M3 from its long-run level using a Hodrick-Prescott filter to capture the cyclical component of M3. Second, we proxy excess liquidity with the level of remittance inflows, in line with Barajas et al. [2018], who document that countries with relatively high levels of remittances have less effective monetary policy due to remittance-induced excess liquidity. All data are from the World Bank's Global Financial Development Database.

The transmission of monetary policy can also be shaped by the monetary policy framework. The monetary policy framework can be defined as the structures in place that enable and guide the conduct of monetary policy. The monetary policy framework encompasses the legal rules (including the monetary policy regime) and practices that affect the conduct of monetary policy [Unsal et al., 2022]. This framework therefore influences the discretionary power of central bankers as well as the credibility of their decisions. We examine two elements of the monetary policy framework that may shape the influence of monetary policy on managers' perception: independence of central bank and monetary regime. To measure central bank independence, we employ both *de jure* and *de facto* measures. For the former, we use the Central Bank Independence - Extended (hereafter CBIE) developed by Romelli [2022] that increase with the level of independence. However, legal independence proxies may not accurately reflect the practical independence of central banks in less developed countries, where actual practices may deviate from the legal framework [Cukierman et al., 1992]. To proxy *de facto* central bank independence, we employ two measures. First, we compute the turnover ratio that measures the average number of turnovers per year. It ranges from 0 (no turnover) to infinity (theoretically). The turnover ratio is expected to be negatively correlated with the independence. Second, we include a dummy variable for irregular turnover of central bank governors.[19] The variable takes the value one if a governor was replaced before the end of the mandate. Both turnover ratio (TOR) and irregular turnover (Irr. Turn) are extracted from the Dreher et al. [2010] database. We finally turn to the role of the monetary policy regime by considering a dummy variable (called IT) that takes on a value of one if a country is an inflation targeting regime in year t and zero otherwise. Data on the adoption of IT regimes are taken from Rose and Rose [2024].[20]

The list of all (country-level) moderators is provided in Table E1.

[19] Indeed, the turnover measure suffers from two major limitations. First, the turnover rate is influenced by legal constraints (term of office, number of mandates allowed) that are specific to the central bank. Second, a low value may also mean that the central banker fully satisfies the powers that be by following their instructions [Strong and Yayi, 2021]. In other words, the central banker is permanently on the job.

[20] In an unreported analysis, we also examine the impact of the adoption of fiscal rules and exchange rate regimes without documenting any impact.

5.2 Firm characteristics and monetary policy transmission

We begin our exploration of heterogeneity by examining whether firms' sensitivity to policy rate fluctuations varies according to their individual characteristics. The results are presented in Table 6. Panel A refers to econometric results using the perception analysis (12-day window[21]) and Panel B refers to the behavioral analysis (loan application).

The results presented in column (1) document a possible effect of size on the transmission of monetary policy. However, the effect of size is modest. On the one hand, the perception analysis in Panel A fails to identify size as a robust moderator. On the other hand, in Panel B, the coefficient associated with the interaction between $\Delta(IR)$ and size is statistically significant, but its economic effect is modest: the marginal impact of monetary policy increases by only 3% between a firm with no employees and a firm with 20 employees (the median).[22] Moreover, the results from Panel A and Panel B are not consistent. Column (2) includes a dummy for firms with more than one establishment (another proxy for size). We find no effect of this moderator. In the third column of the same table, we also document that the age of the firm has no effect on the transmission of monetary policy.

The results in columns (4) and (5) suggest that the transmission of monetary policy is attenuated for foreign- and female-owned firms. Regardless of the specification retained (Panels A and B), we document that coefficients associated with interaction signal a reduced effect for foreign- and female-owned firms. Indeed, even when the coefficients associated with the interaction are not statistically significant, we document in Appendix Table E4 that foreign-owned and female-owned firms are less affected by monetary policy. However, this finding should be treated with caution, as there is no statistical difference between foreign and domestic firms on the one hand, and female- and male-owned firms on the other. Moreover, for the former, we document that the results are not consistent for different windows of perception analysis, as documented in Table E3.

In the last two columns, we consider measures of proximity to formal banks. We do not document a clear pattern in the difference between unaudited and audited firms. In fact, the results are not consistent across panels A and B. The results in column (7) are more interesting. We document that firms with a prior lending relationship are less affected by changes in monetary policy, although the interaction is not statistically significant in Panel A. In addition,

[21] We only present results from the 12-day window in the main text, but results for other windows are reported in Appendix C.

[22] In Appendix (Table E4), we compute the marginal effect of monetary policy change for firms without employee (Z=0) and firms with a median value of employees (Z=1). We document that marginal effects in Panel B are respectively of -0.000067 and -0.000069.

column (7) of Appendix Table E4 confirms that firms with a prior lending relationship tend to be rather insensitive to changes in monetary policy.

The results presented in this subsection suggest that company characteristics play a moderate role in explaining differences in reaction to changes in monetary policy. However, we find that companies with an existing banking relationship tend to be less affected by monetary policy. This could be explained by the ability of these companies to benefit from having a strong enough relationship with lenders not to be affected by changes in monetary conditions, or their ability to access other sources of financing. Interestingly, the effect is more pronounced when applied to loans. These companies are undoubtedly the first to be served, and therefore the most apt to apply, after a central bank interest rate cut.

5.3 Country characteristics and monetary policy

We then turn to the debate on the factors affecting the effectiveness of monetary policy in developing countries. First, we focus on the characteristics of banking systems in columns (1) to (5) of Table 7. We report results from the analysis of perception in Panel A[23] and of behavior (loan application) in Panel B.

The results presented in column (1) document that the transmission of monetary policy is raised in the deepest banking systems, in line with expectations. Thus, according to the estimates, the effect of monetary policy on the decision to apply is statistically null if the country has a level of financial development below 34% (which is close to the median at 37%). From this value onwards, we note an effect that increases as the level of financial development increases. Thus, the effect of monetary policy is almost tripled when the level of financial development rises from the median to the third quartile (54%). However, we document an absence of impact of financial development in the perception analysis (Panel A).

Columns (2) and (3) show that the industrial structure of banking systems does not matter. Neither the degree of concentration (column 2) nor the share of foreign banks affects the transmission of monetary policy.

We now turn to excess liquidity, which is often cited as a possible explanation for the lack of monetary policy transmission in developing countries. We consider two proxies based on the excess volume of broad money and remittances. We confirm the central role of excess liquidity in explaining the strength of monetary policy transmission. For both specifications based on

[23] As previously, we consider the 12-day window but we report results for other windows in Table E5 in Appendix.

perception (Panel A) and application (Panel B), we document that transmission is reduced in countries with higher levels of liquidity. In Panel A, we document that the positive effect is attenuated when the level of money exceeds its long-run trend (column 4) and when the level of remittances increases (column 5). We find a similar conclusion for loan applications in Panel B. The negative relationship between changes in interest rates and applications is attenuated by the level of liquidity, regardless of the indicators considered. The marginal effects are also far from anecdotal. For example, an increase of one of the measures of excess liquidity based on broad money (one is more or less the value of the difference between the median and the first or third quartile) reduces the effect of monetary policy by between 30% (Panel B) and 55% (Panel A).

We conclude this section by focusing on how institutional factors, such as central bank independence and the monetary policy regime, affect the transmission of monetary policy. In columns (6) to (8), we document that central bank independence is central to ensuring the transmission of monetary policy. Regardless of the measure of independence considered (*de facto* or *de jure*) and the dependent variables considered (perceptions and applications), we find that monetary policy is more effective in countries with independent central banks. In detail, we document in column (6) that the effect of monetary policy is not different from zero when CBIE equals 0 (non-independent central banks). Meanwhile, the effect of monetary policy becomes zero when the turnover ratio or the irregular turnover dummy equals one (non-independent central banks) in columns (7) and (8).

In the last column of the same table, we also document that monetary policy transmission is more effective in inflation-targeting countries. For other countries, we do indeed find a lack of managerial response.

This subsection documents that monetary policy transmission is enhanced when banks are not overly liquid and central bank decisions are credible because they are independent and operate under an inflation targeting regime.

6 Conclusion

The transmission of monetary policy in developing countries remains a controversial issue, particularly in the context of rising inflation. Many empirical studies using macroeconomic time series have struggled to identify significant effects, raising the question of whether this reflects genuine policy ineffectiveness or limitations in methodology and data [**?**Li et al., 2019]. Recent

research using large monetary shocks or single country case studies has challenged the conventional wisdom [Abuka et al., 2019, Willems, 2020, Bhardwaj et al., 2022], but these studies often lack external validity due to their focus on specific events or contexts.

This paper takes a novel approach to assessing the effectiveness of monetary policy by focusing on firms' perceptions and borrowing behavior. Using firm-level data from the World Bank Enterprise Surveys and a newly constructed database of monetary policy changes, we employ an event study methodology to compare managers surveyed just before and just after a policy change. We complement this short-term analysis with a broader behavioral study of how annual policy rate changes affect firms' borrowing.

Our results show that monetary policy affects both firms' perceptions and their borrowing behavior, but in an asymmetric manner. Using an event study, we find that managers in developing countries perceive credit constraints as more severe following a policy rate hike, with no evidence of anticipation effects. However, while firms adjust their expectations after a tightening, they do not significantly reduce their loan applications. Instead, analysis of annual loan application data shows that firms are more likely to apply for loans after a policy rate cut, suggesting that monetary easing has a stronger impact on actual borrowing decisions than tightening.

We also document substantial heterogeneity in firms' responses. Firms with pre-existing banking relationships are less sensitive to changes in monetary policy, as prior access to credit insulates them from fluctuations in borrowing conditions. At the macro level, policy transmission is stronger in countries with independent central banks, inflation targeting regimes, and less liquid banking systems, while banking depth and competition play a more limited role. These results highlight the importance of institutional quality and financial system characteristics in shaping the effectiveness of monetary policy in developing countries.

Our study provides new evidence on how monetary policy affects firms in developing countries, albeit unevenly. More broadly, this paper is among the first to use reconstructed high-frequency data to assess monetary policy transmission in these economies, an approach widely used in advanced economies [Nakamura and Steinsson, 2018a]. We believe that this method holds great promise for future research on how short-term policy interventions affect low- and middle-income economies.

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Tables

Table 1: Perception analysis - Descriptive Statistics

	3-day		6-day		9-day		12-day		All	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Min	Max
Perception	1.186	1.215	1.365	1.275	1.358	1.274	1.369	1.283	0	4
Post	0.606	0.489	0.563	0.496	0.529	0.499	0.516	0.500	0	1
Hike	0.415	0.493	0.404	0.491	0.384	0.486	0.385	0.487	0	1
$\Delta(IR)$	-6.226	147.2	-10.49	115.7	-11.62	110.6	-11.63	107.7	-300	550
Size	99.80	254.6	92.13	261.6	91.20	262.7	90.23	256.6	1	4700
Age	17.35	13.65	18.33	14.78	18.58	14.97	18.66	15.19	0	220
Female	0.309	0.462	0.352	0.478	0.349	0.477	0.345	0.475	0	1
Manag exp.	16.63	10.77	17.51	11.00	17.81	10.88	17.82	10.89	0	50
Foreign	0.055	0.227	0.062	0.241	0.068	0.252	0.066	0.249	0	1
State	0.006	0.074	0.011	0.102	0.011	0.106	0.011	0.102	0	1
Listed	0.025	0.155	0.047	0.211	0.042	0.201	0.042	0.201	0	1
Partnership	0.206	0.404	0.183	0.387	0.169	0.375	0.171	0.377	0	1
Sole Prop.	0.320	0.467	0.278	0.448	0.257	0.437	0.262	0.440	0	1
Multiplant	0.146	0.353	0.144	0.351	0.148	0.355	0.145	0.352	0	1
Export	0.226	0.419	0.236	0.425	0.248	0.432	0.245	0.430	0	1
Manufacturing	0.679	0.467	0.627	0.484	0.614	0.487	0.615	0.487	0	1
Other Const.	1.120	0.775	1.229	0.800	1.227	0.797	1.240	0.803	0	4
Obs.	*1,264*		*4,156*		*7,794*		*10,128*			

The table reports summary statistics of variables used in the baseline model. See Table **??** for the variable definitions. Firms data come from the World Bank Enterprise Survey (WBSE). Data on monetary policy are hand-collected from reports of Central banks.

Table 2: Perception analysis - Balance test

Firm characteristic	3 days	6 days	9 days	12 days
Size	0.652	0.604	0.744	0.972
Age	0.229	0.342	0.128	0.128
Female	0.889	0.361	0.428	0.619
Manag Exp	0.947	0.341	0.339	0.327
Foreign	0.111	0.912	0.975	0.868
State	0.869	0.976	0.813	0.830
Listed	0.830	0.805	0.838	0.939
Partnership	0.423	0.177	0.511	0.135
Sole Prop.	0.753	0.371	0.424	0.917
Multiplant	0.393	0.827	0.450	0.501
Export	0.900	0.126	0.646	0.365
Manufacturing	0.416	0.142	0.537	0.443
Other constraints	0.214	0.895	0.905	0.645

The table presents the balance tests comparing pre- and post-event respondents. The p-value reported are obtained from the regressions of each variable on the treatment dummy, *Post*, while controlling for event fixed effects and clustering the standard errors at the event level. We display p-value for each window considered (3, 6, 9, 12 days) in the four column.

Table 3: Perception analysis - Baseline model

Window →	3	6	9	12
Panel A: Baseline model				
Post	-0.00627	0.03312	0.02247	0.02457
	[-0.08]	[0.72]	[0.62]	[0.77]
Post × $\Delta(IR)$	0.00051**	0.00058**	0.00063**	0.00042*
	[2.15]	[2.10]	[2.48]	[1.73]
Panel B: Tightening vs. easing				
Post	-0.08449	-0.03948	-0.05409	-0.02635
	[-0.92]	[-0.92]	[-1.46]	[-0.67]
Post × Hike	0.19056	0.16502*	0.17801**	0.11799*
	[1.30]	[1.87]	[2.61]	[1.97]
Panel C: Non-linearities between tightening and easing				
Post	-0.07433	-0.04264	-0.06693	-0.04702
	[-0.61]	[-0.81]	[-1.37]	[-0.89]
Post × $\Delta(IR)$	0.00013	-0.00005	-0.00020	-0.00031
	[0.20]	[-0.08]	[-0.38]	[-0.76]
Post × Hike	0.15070	0.13662	0.15076*	0.10369
	[0.83]	[1.26]	[1.76]	[1.35]
Post × $\Delta(IR)$ × Hike	0.00015	0.00046	0.00073	0.00079*
	[0.21]	[0.74]	[1.33]	[1.73]
Obs.	1264	4156	7794	10128
Event	26	81	116	130
R2	0.26	0.27	0.27	0.28

The dependent variable is the perception of access to finance as an obstacle by the manager. The table reports the estimates of our baseline model (Eq. 1) in Panel A. *Post* is a dummy equal to one if the firm was surveyed after the event and $\Delta(IR)$ is the change of key policy rate in basis points. In Panel B, we replace $\Delta(IR)$ by a dummy equal to one if $\Delta(IR) > 0$ (Hike). In Panel C, we employ a triple interaction model with Post, $\Delta(IR)$, and the dummy for monetary tightening (Hike). Other variables are described in Table C1. All estimates are based on OLS regressions technique and include event fixed effects (defined as a monetary policy change). Robust t-value in parentheses are clustered at the event level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table 4: Behavior analysis - Descriptive Statistics

Variable	Obs.	Mean	Std. Dev	Min	Max
Application	36,067	0.371	0.483	0	1
$\Delta(IR)$	36,067	-20.03	330.1	-1750	3450
Size	36,067	93.35	479.7	0	64000
Age	36,067	16.81	13.99	0	195
Female	36,067	0.314	0.464	0	1
Manag Exp	36,067	17.16	10.46	0	50
Foreign	36,067	0.046	0.211	0	1
State	36,067	0.006	0.074	0	1
Listed	36,067	0.049	0.216	0	1
Parnership	36,067	0.196	0.397	0	1
Sole Proprietorship	36,067	0.348	0.476	0	1
Multiplant	36,067	0.143	0.350	0	1
Export	36,067	0.220	0.414	0	1
Manufacturing	36,067	0.592	0.492	0	1
GDP GROWTH	36,067	5.074	2.700	-5.534	25
INFLATION	36,067	7.423	5.352	-1.537	59.22
PRIVATE CREDIT	36,067	40.16	23.83	2.180	134.1
GDP PER CAPITA (LOG)	36,067	8.058	0.833	5.721	9.388

The table reports summary statistics of variables used in the baseline model. See Table D1 for the definitions and sources of each variable.

Table 5: Behavior analysis - Baseline model

	(1)	(2)	(3)	(4)	(5)
$\Delta(IR)$	-0.00008**	-0.00007**	-0.00010**		
	[-2.52]	[-2.49]	[-2.20]		
Cut				0.170***	0.201***
				[4.92]	[6.25]
Hike				0.066	0.103
				[1.41]	[1.40]
Cut $\times$ $\Delta(IR)$					0.00028***
					[3.36]
Hike $\times$ $\Delta(IR)$					-0.0001***
					[-2.77]
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm CV	Yes	Yes	Yes	Yes	Yes
Country CV	Yes	Yes	Yes	Yes	Yes
Obs.	36,067	34,748	27,861	36,067	36,067
Country-year	203	203	147	203	203
R^2	0.265		0.285	0.270	0.271

The dependent variable is a dummy equal to one if a firm applied for a loan in the year previous the survey. The table reports the estimates of our baseline model in columns (1) to (3) using linear model on the full sample (column 1), probit model on the full sample (column 2) and linear model on restricted sample to positive change in column (3). In column (4), we replace $\Delta(IR)$ by the dummy $Hike$ equal to one if $\Delta(IR) > 0$ and the dummy Cut equal to 1 if $\Delta(IR) < 0$. In the last column, we employ an interaction model with $\Delta(IR)$ and dummies for monetary tightening (Hike) and monetary easing (Cut). Other firm- and country-level variables are described in Table D1. All estimates are based on OLS regressions technique and include country fixed effects (defined as a monetary policy change). Robust t-value in parentheses are clustered at the event level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table 6: Heterogeneity analysis - firm characteristics

Z →	Size	Multi-plant	Age	Foreign	Female	Audited	Has a loan
Var. type →	Cont.	Dummy	Cont.	Dummy	Dummy	Dummy	Dummy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Perception analysis							
Post * D(IR)	0.000473*	0.000346	0.000308	0.000434*	0.000554*	0.000399	0.000533*
	[1.72]	[1.19]	[0.73]	[1.79]	[1.69]	[1.41]	[1.72]
Post * D(IR) * Z	-0.000001	0.000544	0.000006	-0.000221	-0.000560	0.000009	-0.000426
	[-0.60]	[0.91]	[0.42]	[-0.21]	[-1.25]	[0.02]	[-0.88]
Observations	10,128	10,128	10,128	10,128	10,128	9,877	9,956
Panel B: Behavior analysis							
D(IR)	-0.00007**	-0.00008***	-0.00008**	-0.00008***	-0.00008***	-0.00008***	-0.00011**
	[-2.20]	[-2.65]	[-2.57]	[-2.63]	[-2.83]	[-2.92]	[-2.53]
D(IR) * Z	-0.000000**	0.000001	0.000000	0.000033	0.000027	0.000021	0.000103**
	[-2.35]	[0.34]	[0.06]	[1.53]	[1.56]	[1.09]	[2.08]
Observations	36,037	36,037	36,037	36,037	36,067	35,416	36,010

The dependent variable is the perception of access to finance as an obstacle by the manager in Panel A and a dummy equal to one if a firm applied for a loan in the year previous the survey in Panel B. The table reports the coefficients ζ_1 and ζ_3 of Eq. 3 in Panel A and coefficients γ_1 and γ_2 of Eq. 4 in Panel B. Each column considers a specific firm-level moderator and we indicate also the type of the variable (continuous or binary). All estimates are based on OLS regressions technique and include other control variables, fixed effects (event in Panel A and country in Panel B) and additional interactions described in Eq. 3 in Panel A. Robust t-value in parentheses are clustered at the event/country level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table 7: Heterogeneity analysis - country characteristics

	Financial system					Institution and credibility			
Z $\to$	Priv credit	CR5	Foreign	Money (M3)	Rem.	CBIE	TOR	Irr. Turn.	IT
Var. type	Cont.	Cont.	Cont.	Cont.	Cont.	Cont.	Cont.	Dummy	Dummy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Perception analysis									
Post * D(IR)	0.00032	0.00250*	0.00059	0.00053***	0.00048**	-0.0023	0.0007***	0.0007***	0.0001
	[0.48]	[1.77]	[0.93]	[3.12]	[2.61]	[-1.58]	[3.87]	[4.44]	[0.16]
Post * D(IR) * Z	0.00000	-0.00003	-0.00000	-0.00029**	-0.00022**	0.0037*	-0.0012**	-0.0069**	0.0008**
	[0.27]	[-1.45]	[-0.01]	[-2.01]	[-2.06]	[1.95]	[-2.39]	[-2.19]	[2.20]
Observations	10087	8938	5913	10128	10128	9390	9382	8065	10128
Panel B: Behavior analysis									
D(IR)	0.000172***	-0.000307*	-0.000069	-0.000072***	-0.000082**	0.000094	-0.000132***	-0.000098**	-0.000007
	[2.75]	[-1.71]	[-0.43]	(-3.32]	[-2.42]	[1.12]	[-3.59]	[-2.13]	[-0.23]
D(IR) * Z	-0.000006***	-0.000003	0.000006	0.000021***	0.000003*	-0.000320**	0.000165***	0.000142	-0.000156***
	[-4.26]	[1.16]	[0.27]	[2.79]	[1.80]	[-2.34]	[2.86]	[0.61]	[-3.23]
Observations	30,067	34,058	20,338	36,067	36,067	33,890	33,283	32,252	36,067

The dependent variable is the perception of access to finance as an obstacle by the manager in Panel A and a dummy equal to one if a firm applied for a loan in the year previous the survey in Panel B. The table reports the coefficients ζ_1 and ζ_3 of Eq. 3 in Panel A and coefficients γ_1 and γ_2 of Eq. 4 in Panel B. Each column considers a specific firm-level moderator and we indicate also the type of the variable (continuous or binary). All estimates are based on OLS regressions technique and include other control variables, fixed effects (event in Panel A and country in Panel B) and additional interactions described in Eq. 3 in Panel A. Robust t-value in parentheses are clustered at the event/country level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Online Appendix

"Do firms react to monetary policy in developing countries?"

Appendix A: Construction and validation of the event database

A1. Construction of the database

To build the event database, we do the following step.

1. We identified all waves of the WBES in low- and middle-income countries. For each wave, we identified the start and end dates of the surveys from the information provided on the day of the survey for each firm (question a14).

2. For each country, we collected central bank documents that reported information on monetary policy decisions.

3. For each wave of the survey, we determined whether there was at least one event during the interview period, as well as one year before and one year after.

4. For all events that occurred during the windows (from 1 year before the first interview to 1 year after the last interview), we collected the following information on the event

    - Exact day
    - New value of the federal funds rate (in basis points)

5. For each event identified, we traced the previous change to extract the same information as before (date and rate)

Comparing the current event with the previous event is crucial to measure the amplitude of the change (in basis points). The following table shows the list of 130 events included in the study. Note that some events are excluded from the analysis (for example, because we have a sufficient number of companies in the country).

Table A1: List of events

Country	Event date	IR	$\Delta(IR)$
Armenia	12/03/08	7.25	-50
Armenia	01/14/09	7	-25
Armenia	02/11/09	6.75	-25
Armenia	03/18/20	5.25	-25
Armenia	06/17/20	4.5	-50
Azerbaijan	10/13/08	15	100
Azerbaijan	10/30/08	12	-300
Azerbaijan	11/30/08	10	-200
Azerbaijan	12/13/19	7.5	-25
Chile	06/16/10	1	50
Chile	07/19/10	1.5	50
Chile	08/13/10	2	50
Chile	09/21/10	2.5	50
Chile	10/15/10	2.75	25
Chile	11/17/10	3	25
Chile	12/17/10	3.25	25
Colombia	07/04/17	5.75	-50
Colombia	07/28/17	5.5	-25
Colombia	09/01/17	5.25	-25
Colombia	10/30/17	5	-25
Colombia	11/27/17	4.75	-25
Colombia	01/30/18	4.5	-25
Colombia	04/30/18	4.25	-25
Costa Rica	08/30/10	7.5	-150
Costa Rica	10/21/10	6.5	-100
Dominican Rep.	03/29/11	6.25	25
Dominican Rep.	11/01/16	5.5	50
Egypt	03/17/20	9.75	-300
Georgia	02/14/13	4.75	-50
Georgia	03/28/13	4.5	-25

Table A1 (Continued)

Georgia	09/26/19	7.5	50
Ghana	05/22/13	16	100
Ghana	02/06/14	18	200
Guatemala	11/29/17	2.75	-25
Hungary	03/27/13	5	-25
Hungary	05/29/13	4.5	-25
India	07/15/13	10.25	200
India	09/20/13	9.5	-75
India	10/07/13	9	-50
India	10/29/13	8.75	-25
India	01/28/14	9	25
Indonesia	07/03/09	6.75	-25
Indonesia	08/05/09	6.5	-25
Jordan	09/18/19	4.25	-25
Kazakstan	01/01/09	10	-50
Kazakstan	04/16/19	9	-25
Kazakstan	09/10/19	9.25	25
Kenya	07/30/18	9	-50
Lituania	11/12/08	3.25	-50
Lituania	01/21/09	2	-125
Malaysia	01/22/20	2.75	-25
Malaysia	03/03/20	2.5	-25
Malaysia	07/07/20	1.75	-25
Moldova	09/30/08	17	-150
Moldova	12/02/08	15.5	-150
Moldova	12/23/08	14	-150
Moldova	01/20/09	12.5	-150
Moldova	06/19/19	7	50
Moldova	07/31/19	7.5	50
Mongolia	11/19/08	9.75	-50
Mongolia	01/25/13	12.5	-75
Mongolia	04/05/13	11.5	-100

Table A1 (Continued)

Namibia	08/20/14	6	25
Namibia	02/18/15	6.25	25
Nigeria	11/25/14	13	100
North Macedonia	01/09/13	3.99	-24
North Macedonia	02/13/13	3.98	-1
North Macedonia	03/13/13	3.92	-6
North Macedonia	03/13/19	2.75	-25
Pakistan	06/24/13	9	-50
Pakistan	09/16/13	9.5	50
Pakistan	11/18/13	10	50
Pakistan	03/24/15	8	-50
Peru	06/11/10	1.75	25
Peru	07/09/10	2	25
Peru	08/06/10	2.5	50
Peru	09/10/10	3	50
Peru	05/12/17	4	-25
Peru	07/14/17	3.75	-25
Peru	09/14/17	3.5	-25
Peru	11/10/17	3.25	-25
Peru	01/12/18	3	-25
Peru	03/09/18	2.75	-25
Philippines	05/27/09	4.25	-25
Romania	07/02/13	5	-25
Romania	08/06/13	4.5	-50
Romania	10/01/13	4.25	-25
Russia	11/12/08	12	100
Russia	12/01/08	13	100
Serbia	11/03/08	17.75	200
Serbia	02/05/13	11.75	25
Serbia	05/14/13	11.25	-50
Serbia	06/06/13	11	-25
South Africa	07/24/20	3.5	-25

Table A1 (Continued)

Tajikistan	07/08/13	6.1	-40
Tajikistan	10/07/13	5.5	-60
Tajikistan	02/01/19	14.75	75
Tajikistan	06/03/19	13.25	-150
Tanzania	02/01/13	3.57	-147.89
Tanzania	03/01/13	3.59	1.55
Tanzania	04/01/13	3.50	-8.65
Tanzania	05/01/13	3.54	4.13
Tanzania	07/01/13	2.76	-105.14
Tanzania	08/01/13	2.58	-18.16
Tanzania	09/01/13	2.24	-34.55
Tanzania	10/01/13	2.64	40.39
Tanzania	11/01/13	4.03	138.61
Tanzania	08/01/14	4.27	-16.23
Tunisia	12/25/13	4.5	50
Tunisia	06/25/14	4.75	25
Tunisia	03/17/20	6.75	-100
Turkey	05/16/08	19.75	50
Turkey	06/17/08	20.25	50
Turkey	10/23/08	19.75	-50
Turkey	11/20/08	18.75	-100
Turkey	12/19/08	17.5	-125
Turkey	05/17/13	4.5	-50
Turkey	01/29/14	10	550
Turkey	05/23/14	9.5	-50
Uganda	06/01/13	11	-100
Ukraine	06/10/13	7	-50
Ukraine	04/26/19	17.5	-50
Ukraine	07/19/19	17	-50
Ukraine	09/06/19	16.5	-50
Ukraine	10/25/19	15.5	-100
Ukraine	12/13/19	13.5	-200

Table A1 (Continued)

Uruguay	09/24/10	6.5	25
Vietnam	12/01/09	8	100
Zambia	07/05/13	9.75	25
Zambia	11/22/19	11.5	125

A2. Validation of the database

This sub-section describes the procedures and differences identified between our database on monetary policy events and monthly statistics provided in the IMF's International Financial Statistics (IFS).

A) Procedure

From the events we identified, we cross-checked whether the key policy rate was similar before and after the event. For example, suppose a country A that experienced a change in its key policy rate from 4.5 to 5 on July 15, 2019, we identify in the IFS the key policy rate provided for this country A at the end of June (before) and at the end of July (after). There is no difference, if data in the IFS provided a rate of 4.5 in June and 5 in July. If not, we consider that our database does not match with IFS monthly statistics. We limit the analysis to the 130 events considered in the 12-day window.

B) Result of the comparison

Out of 130 events considered in our database, we found similar data in IFS for 94 events (72%) and differences for 36 events (28%). The reasons for the divergence between our database and the IFS monthly statistics are discussed in detail below.

Reason 1: Absence of data in the IFS (11 events)

The first reason is the lack of data in the IFS, which covers 11 events representing 2 countries. The following countries are added to our database but are missing from the IFS (number of events in brackets): Tunisia (3) and Ukraine (5).

Reason 2: Difference in rates considered (23 events)

The main reason is the difference in the rate considered between our database and the IFS monthly statistics. These differences are detailed below.

- Jordan (1 event): The main rate of the Central Bank of Jordan (CBJ) was changed on 18/09/2019. It passed from 4.5 to 4.25. The CBJ considers the latter rate as its main policy rate. The 3.5 rate available in IFS is the overnight deposit window rate.
- Tanzania (10 events): We use the repo rate instead of the discount rate (the only rate available in the IFS dataset).
- Turkey (8 events): We use the one-week repo rate as the policy rate of the Central Bank of the Republic of Turkey. This rate is the policy rate according to the central bank.
- Uganda (1 events): The policy rate of the Bank of Uganda is the Central Bank Rate (CBR) and we used this rate instead of the discount rate available in IFS.
- Vietnam (1 event): The discount rate of the State Bank of Vietnam changed from 7.5 to 5 on 10/04/2009. This rate is not available in IFS.
- Zambia (2 events): We have used the monetary policy rate of the Bank of Zambia. The data available in IFS are the discount rates (average)

Reason 3: Delay in reporting in the IFS (1 events)

For one event in North Macedonia) there is a delay in the reporting of IFS data. The National Bank of North Macedonia provides historical changes of its policy instruments. The key rate (overnight lending rate) changed on 09/01/2013 (4.23 to 3.99) and on 13/03/2019 (3 to 2.75). These changes were not reported in the IFS.

Reason 4: more than on events within a month (1 event)

The policy rate in Georgia changed twice in August 2019 (on July 5 and July 26). Unlike our database, the IFS data do not distinguish between the two changes.

Appendix B: Perception analysis - sample selection

The aim of the first section is to identify the impact of monetary policy changes on firms' perceptions of credit constraints. The analysis consists of comparing firms surveyed just before a change with firms surveyed just after the change. The intuition is that both groups of firms face similar macroeconomic conditions and that differences are mainly due to the monetary policy decision.

We took five steps to construct the sample.

First, we identified all survey waves in the WBES for all low- and middle-income countries (according to the World Bank classification at the date of the survey).

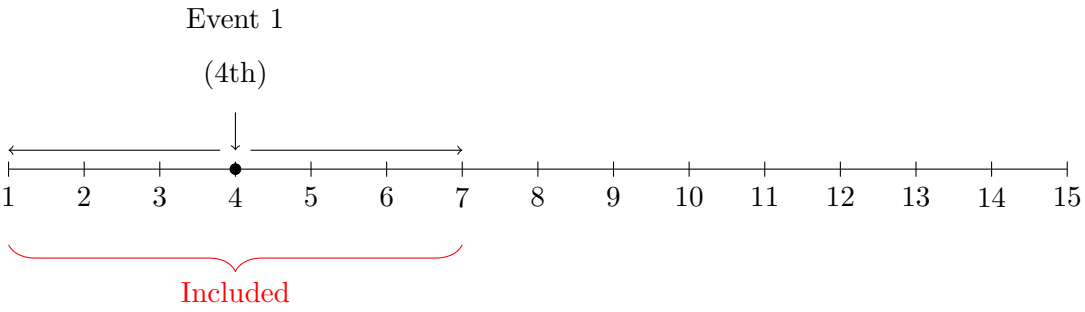
Second, we checked whether there was a monetary policy intervention (rate change) within the survey wave. We only kept waves with at least one event during the survey period. Let's consider a survey that takes place on January 15, 2019 and April 26, 2019. We retained this survey in our sample if there is one monetary policy (or more) between these two dates. If not, we dropped the survey from our sample.

Third, we restricted the sample to firms interviewed within a specific window around the event (respectively, 3, 6, 9, and 12 days). The rationale is to ensure that we were comparing firms that faced a similar environment. We therefore dropped firms surveyed more than the given number of day before or after an event.

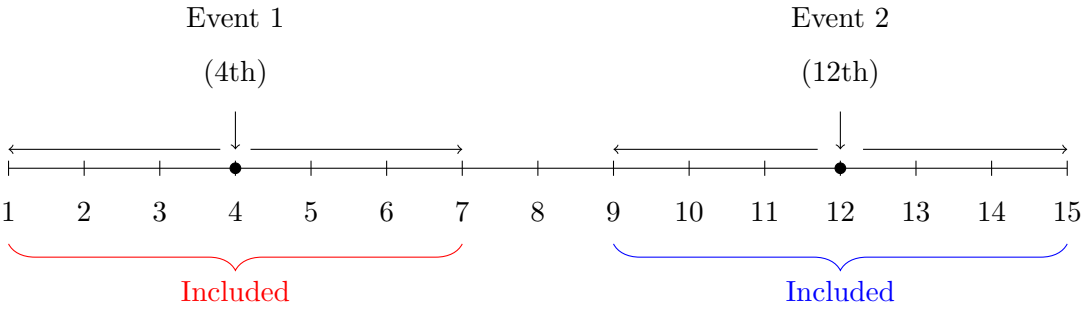
Fourth, we dropped firms where there was an overlap between two monetary policy changes. For instance, a firm can be interviewed 6 days after a first event and 5 days before a second intervention. As a result, the status of this firm is unclear as it is both observed before an event (control) and after another event (treated). By excluding these firms we are able to identify only one event for each firm in the final sample. We detail this procedure in the figure below.

Finally, we exclude events with less than 25 firms in order to have a sufficient number of observations per event (as we exploit variation within an event) and firms if dependent variable or control variables are not available.

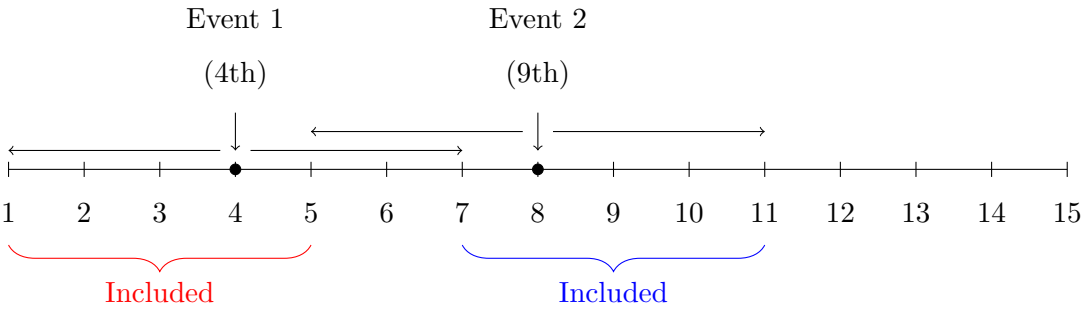
Panel A: One event



Panel B: Two (non-overlapping) events



Panel C: Two overlapping events



Consider a country where firms are interviewed in the first part of a given month. We consider three possibilities according to the date of events (monetary policy changes) with a 3-day window.

In **Panel A**, there is only one monetary policy change on 4th of the month. The sample includes only firms surveyed between 1st day of the month (3 days before the event, right-to-left arrow) and 7th day of the month (3 days after the event, left-to-right arrow), as indicated by the red brace. Other firms surveyed before (in the previous month) or after the 7th of the month are excluded from the analysis.

In **Panel B** we consider two events separated by more than 6 days. The first event occurred on 4th day of the month and the second on the 12th. As before, the analysis includes firms surveyed from 1st to 7th (first event, red brackets). We also include firms associated with the second event that were surveyed from 9th to 15th (blue brackets). Other firms surveyed in the month before, after 12th of the month, and between 7th and 9th are excluded from the analysis.

In **Panel C**, we consider two events that occur within a window of less than 6 days. The first event occurs on 4th and the second event occurs on 8th. As before, the hypothetical sample of firms retained for analysis are those surveyed from 1st and 7th for the first event. For the second event, the eligible firms are those surveyed from 5th to 11th. As we can see, firms interviewed from 5th and 7th are included in both samples. There is an overlap for these firms. We can no longer link them to a single event. Therefore, we exclude these firms. The final sample of firms includes firms interviewed from 1st to 5th for the first event (red brackets) and from 7th to 11th for the second event (blue brackets).

Based on the previous procedures, we identify the following sample according to the windows considered.

- 3-day: 1,264 firms from 13 countries and 26 events
- 9-day: 4,156 firms from 32 countries and 81 events
- 3-day: 7,794 firms from 38 countries and 116 events
- 3-day: 10,128 firms from 39 countries and 130 events

The Table C2 displays the number of firms and events by country according to the window considered.

Appendix C. Perception analysis - Supplementary materials

Table C1: Description of variables

Variable	Definition	Source
	Panel A: Dependent variable	
Perception	Variable measuring the degree of perception of credit access as an obstacle to firm growth, ranging from 0 (no obstacle) to 4 (very severe obstacle)	WBES[a]
	Panel B: Interest variables	
$\Delta(IR)$	Monetary policy key rate change	MP[b]
Post	Dummy equal to one if the firm is surveyed after the event; zero otherwise	WBES & MP
Hike	Dummy equal to one if the event is an increase of policy rate; zero otherwise	MP
	Panel C: Control variables	
Age	The number of employees in the firm in logarithm	WBES
Size	Age of the firm in logarithm	WBES
Female	Dummy equal to one if the firm is owned by a woman	WBES
Experience	Logarithm of experience of the manager	WBES
Foreign	Dummy equal to one if the firm is foreign-owned	WBES
State	Dummy equal to one if the firm is State-owned	WBES
Listed	Dummy equal to one if the firm is Listed	WBES
Partnership	Dummy equal to one if legal status is a partnership	WBES
Sole Prop.	Dummy equal to one if legal status is a sole proprietorship	WBES
Subsidiary	Dummy equal to one if a firm is a subsidiary of a larger firm	WBES
Export	Dummy equal to one if a firm exports directly or indirectly	WBES
Manufacture	Dummy equal to one if firm operates in manufacture	WBES
Mean other	Mean of other obstacles	WBES

Sources: [a]: World Bank Enterprise Surveys; [b] Database on monetary policy events; [c] Global Financial Development Database; [d]: World Development Indicators.

Table C2: Sample

Window →	3-day		6-day		9-day		12-day	
↓ Country	Firm	Event	Firm	Event	Firm	Event	Firm	Event
ARM	55	2	114	3	245	5	283	5
AZE			113	3	213	4	204	4
CHL	65	2	274	6	486	7	604	7
COL			258	6	397	6	533	7
CRI					55	2	66	2
DOM	28	1	43	1	111	2	141	2
EGY	89	1	130	1	205	1	285	1
GEO	40	1	98	2	178	3	214	3
GHA							58	2
GTM					34	1	40	1
HUN					100	2	109	2
IDN	343	4	780	5	1,246	5	1,537	5
IND	218	2	383	2	578	2	709	2
JOR					23	1	35	1
KAZ	68	2	106	2	198	2	271	3
KEN			34	1	56	1	77	1
LTU					60	2	66	2
MDA	30	1	159	5	254	5	301	6
MKD			26	1	149	4	177	4
MNG			70	2	147	3	204	3
MYS			30	1	108	3	129	3
NAM			33	1	46	1	84	2
NGA			29	1	33	1	35	1
PAK			71	2	139	3	224	4
PER	57	2	270	6	527	10	727	10
PHL			38	1	76	1	81	1
ROU			61	2	103	2	134	3
RUS	56	2	97	2	144	2	165	2
SRB			71	2	191	4	249	4
TJK			85	2	125	2	206	4
TUN					85	3	106	3
TUR	200	5	361	6	690	7	896	8
TZA	15	1	120	5	241	7	375	10
UGA			34	1	45	1	72	1
UKR			141	5	273	6	411	6
URY			35	1	44	1	61	1
VNM			29	1	59	1	77	1
ZAF			35	1	45	1	75	1
ZMB			28	1	85	2	107	2
Total	**1,264**	**26**	**4,156**	**81**	**7,794**	**116**	**10,128**	**130**

Table C3: Descriptive statistics on events

	Descriptive statistics			Distribution (absolute in points)			
D(IR)	Aver.	Median	Obs.	< 50	[50;100[	[100;150[	>= 150
TOTAL	-15.2	-25	130	59	39	18	14
Hike	71.9	50	45	17	16	8	4
Cut	-61.3	-50	85	42	23	10	10

The table presents descriptive statistics at the event level.

Table C4: Baseline model with control variables

Window →	3	6	9	12
Post	-0.00627	0.03312	0.02247	0.02457
	[-0.08]	[0.72]	[0.62]	[0.77]
Post × $\Delta(IR)$	0.00051**	0.00058**	0.00063**	0.00042*
	[2.15]	[2.10]	[2.48]	[1.73]
Size	-0.03919*	-0.05304***	-0.07313***	-0.07238***
	[-1.78]	[-2.97]	[-5.73]	[-5.92]
Age	-0.00527	-0.03137	-0.03064	-0.03492
	[-0.08]	[-0.82]	[-1.14]	[-1.51]
Female	-0.04060	0.02632	0.01337	0.00109
	[-0.41]	[0.48]	[0.36]	[0.03]
Manag exp	0.02428	0.02832	-0.00017	-0.00571
	[0.40]	[0.99]	[-0.01]	[-0.32]
Foreign	-0.07873	-0.13284*	-0.11653*	-0.10121*
	[-0.54]	[-1.75]	[-1.95]	[-1.90]
State	-0.20222	-0.24125*	-0.05287	0.03775
	[-0.85]	[-1.69]	[-0.47]	[0.34]
Listed	-0.04690	0.13648	0.01305	0.00869
	[-0.29]	[1.50]	[0.18]	[0.12]
Partnership	-0.04076	0.07984	0.04428	0.04248
	[-0.36]	[1.37]	[0.96]	[1.08]
Sole Prop.	0.15000	0.09451	0.08234	0.07199
	[1.25]	[1.27]	[1.56]	[1.56]
Multiplant	-0.20208*	-0.17556***	-0.16434***	-0.13465***
	[-1.75]	[-3.11]	[-4.20]	[-3.28]
Export	0.00596	-0.03140	0.00568	0.00398
	[0.08]	[-0.65]	[0.16]	[0.11]
Manufacturing	0.09636	0.14057**	0.17047***	0.15266***
	[0.94]	[2.60]	[4.26]	[3.55]
Other Const	0.72074***	0.69877***	0.71573***	0.70717***
	[11.48]	[20.85]	[27.57]	[26.34]
Observations	1264	4156	7794	10128
# events	26	81	116	130
Adjusted R^2	0.26	0.27	0.27	0.28

The table reports the estimates of our baseline model (Eq. 1). The dependent variable is the perception of access to finance as an obstacle by the manager. *Post* is a dummy equal to one if the firm was surveyed after the event and $\Delta(IR)$ is the change of key policy rate in basis points. In Panel B, we replace $\Delta(IR)$ by a dummy equal to one if $\Delta(IR) > 0$ (Hike). Other variables are described in Table **??**. All estimates are based on OLS regressions technique and include event fixed effects (defined as a monetary policy change). Robust t-value in parentheses are clustered at the event level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table C5: Non linearity : marginal effects

$\Delta(IR) \rightarrow$	0	50	100	150	200
Window: 3 days					
Easing	-0.074	-0.067	-0.061	-0.054	-0.048
Tightening	0.151	0.158	0.165	0.174	0.181
Window: 6 days					
Easing	-0.063	-0.045	-0.047	-0.050	-0.052
Tightening	0.136	0.160	0.183*	0.206*	0.229*
Window: 9 days					
Easing	-0.067	-0.077	-0.086	-0.096	-0.106
Tightening	0.151*	0.187**	0.224**	0.260**	0.297**
Window: 12 days					
Easing	-0.047	-0.063	-0.078	-0.094	-0.11
Tightening	0.104	0.143*	0.183*	0.222**	0.261**

The table reports the marginal effect of different variation of $\Delta(IR)$ for both monetary easing and tightening using results from Panel C of Table 2. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table C6: Duration since the last event

Duration (days) →	60	90	120	150	180	210	240
Panel A: 3 days							
Post	-0.12420	-0.09028	-0.07744	-0.08297	-0.08297	-0.08437	-0.08437
	[-0.91]	[-0.79]	[-0.70]	[-0.89]	[-0.89]	[-0.92]	[-0.92]
Post * Duration	0.11812	0.02925	-0.04130	-0.06811	-0.06811	0.18770	0.18770
	[0.76]	[0.20]	[-0.27]	[-0.51]	[-0.51]	[1.42]	[1.42]
Post * Hike	0.15524	0.12130	0.21798	0.16563	0.16563	0.16706	0.16706
	[0.70]	[0.58]	[1.28]	[1.03]	[1.03]	[1.05]	[1.05]
Post * Hike * Duration	0.02111	0.10938	-0.09547	0.25579	0.25579		
	[0.08]	[0.43]	[-0.35]	[1.33]	[1.33]		
# event above	9	8	6	2	2	1	1
Panel B: 6 days							
Post	-0.06748	-0.06056	-0.06393	-0.04665	-0.04685	-0.04322	-0.04322
	[-1.37]	[-1.41]	[-1.54]	[-1.17]	[-1.19]	[-1.12]	[-1.12]
Post * Duration	0.08160	0.10301	0.13823	0.07516	0.09130	0.06333	0.06333
	[0.90]	[0.83]	[0.99]	[0.31]	[0.32]	[0.16]	[0.16]
Post * Hike	0.09122	0.11242	0.22304**	0.17987*	0.18532**	0.21534**	0.21534**
	[1.03]	[1.38]	[2.42]	[1.96]	[2.10]	[2.57]	[2.57]
Post * Hike * Duration	0.09668	0.04093	-0.26405	-0.11294	-0.16567	-0.40732	-0.40732
	[0.64]	[0.23]	[-1.16]	[-0.35]	[-0.45]	[-0.88]	[-0.88]
# event above	35	25	21	16	14	10	10
Panel C: 9 days							
Post	-0.08463*	-0.05986	-0.05552	-0.04235	-0.04345	-0.04803	-0.05097
	[-1.95]	[-1.50]	[-1.41]	[-1.10]	[-1.15]	[-1.29]	[-1.37]
Post * Duration	0.07886	0.02512	0.00724	-0.09443	-0.09352	-0.07305	-0.03945
	[1.05]	[0.26]	[0.07]	[-0.69]	[-0.63]	[-0.41]	[-0.21]
Post * Hike	0.09991	0.08082	0.16619**	0.13978*	0.15037**	0.18254**	0.18547**
	[1.26]	[1.11]	[2.06]	[1.78]	[1.99]	[2.55]	[2.60]
Post * Hike * Duration	0.11271	0.17842	0.04006	0.21532	0.18180	-0.00135	-0.03494
	[0.96]	[1.38]	[0.24]	[1.12]	[0.87]	[-0.01]	[-0.14]
# event above	55	38	33	28	26	20	18
Panel D: 12 days							
Post	-0.06855	-0.02966	-0.03322	-0.02144	-0.02188	-0.01822	-0.02269
	[-1.41]	[-0.65]	[-0.76]	[-0.52]	[-0.54]	[-0.45]	[-0.56]
Post * Duration	0.10143	0.01262	0.03087	-0.03668	-0.03709	-0.09470	-0.04548
	[1.36]	[0.14]	[0.32]	[-0.27]	[-0.25]	[-0.59]	[-0.27]
Post * Hike	0.11191	0.05430	0.11768*	0.09747	0.1044	0.11730*	0.12176*
	[1.44]	[0.74]	[1.69]	[1.46]	[1.63]	[1.90]	[1.97]
Post * Hike * Duration	-0.01604	0.12091	-0.00416	0.10845	0.08596	0.04305	-0.00615
	[-0.15]	[1.04]	[-0.03]	[0.62]	[0.45]	[0.20]	[-0.03]
Nb event above	65	47	39	32	30	22	20

The table reports the triple interaction model considering duration since the last event as a measure of amplitude.

Table C7: Robustness checks

	Baseline (0)	Alt Y (1)	Rel. D(IR) (2)	MPS (3)	Probit (4)	Overlap (5)	Excl. Crisis (6)
Panel A: 3-day window							
Post	-0.00627	-0.0104	-0.0192	-0.185	-0.00286	-0.00627	-0.00261
	[-0.08]	[-0.13]	[-0.24]	[-1.64]	[-0.03]	[-0.08]	[-0.03]
Post *D(IR)	0.00051**	0.000580**	0.00197*	-2.333	0.000706**	0.00051**	0.00050**
	[2.15]	[2.29]	[1.68]	[-1.61]	[2.42]	[2.15]	[2.12]
Obs.	1264	1,264	1,264	271	1,264	1264	1239
Panel B: 6-day window							
Post	0.03312	0.0311	0.0268	-0.00407	0.0337	0.01668	0.03067
	[0.72]	[0.74]	[0.57]	[-0.04]	[0.69]	[0.36]	[0.65]
Post *D(IR)	0.00058**	0.000662**	0.000202	1.465	0.000749***	0.00060**	0.00058**
	[2.10]	[2.59]	[0.10]	[0.61]	[2.65]	[2.09]	[2.09]
Obs.	4156	4156	4156	1016	4156	4248	4061
Panel C: 9-day window							
Post	0.02247	0.0226	0.0124	0.0310	0.0209	0.01267	0.02993
	[0.62]	[0.70]	[0.33]	[0.40]	[0.56]	[0.35]	[0.71]
Post *D(IR)	0.00063**	0.000702***	0.00142	0.793	0.000766***	0.00069**	0.00055**
	[2.48]	[3.41]	[0.95]	[0.47]	[2.75]	[2.59]	[2.19]
Obs	7794	7794	7794	1972	7794	7972	5136
Panel D: 12-day window							
Post	0.02457	0.0212	0.0175	0.0344	0.0206	0.0216	0.02072
	[0.77]	[0.74]	[0.53]	[0.56]	[0.62]	[0.68]	[0.63]
Post *D(IR)	0.00042*	0.000457**	0.00112	0.725	0.000525*	0.00047**	0.00043*
	[1.73]	[2.35]	[0.78]	[0.57]	[1.88]	[1.99]	[1.75]
Obs.	10128	10128	10128	2510	10128	10610	9739

The table reports the following robustness checks. Column (0) displays the baseline result for sake of comparison. Column (1) run the baseline model by replacing the dependent variable by a relative measure of perception *à la* Cazals and Léon [2023]. Columns (2) and (3) change the measure of the amplitude of the monetary policy by using the relative variation of interest rate and monetary policy surprise index for anchored countries computed by Choi et al. [2024], respectively. Column (4) considers the baseline model using an ordered probit instead of a linear model. Columns (5) and (6) run the baseline model but one a sample of overlapping firms and excluding crisis periods (defined as year where growth is below 2-standard deviation of its long trend), respectively. All models includes control variables and event fixed-effects. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

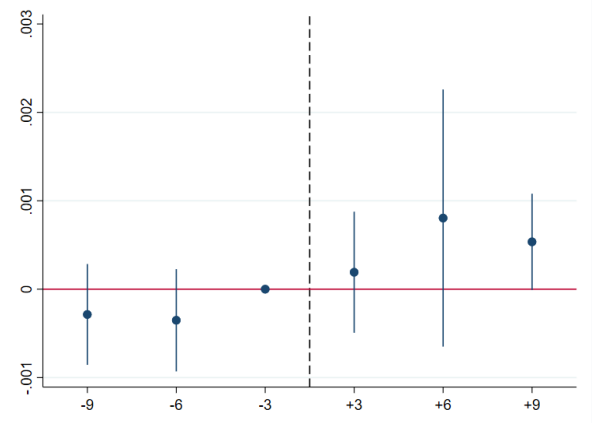
Table C8: Falsification test

	3 days		6 days		9 days		12 days	
	Coef	Std. Err.	Coef	Std. Err.	Coef	Std. Err.	Coef	Std. Err.
Credit	**0.00052****	**-0.00024**	**0.00058****	**-0.0003**	**0.00063****	**-0.00025**	**0.00041***	**-0.00024**
Mean	-0.00023	-0.00019	-0.00028	-0.00025	-0.00024	-0.00028	-0.00013	-0.0003
Electricity	-0.00064**	-0.00017	-0.00061**	-0.00029	-0.00029	-0.00037	-0.00021	-0.00032
Telecom	0.00008	-0.00022	0.00025	-0.00024	0.00012	-0.0002	0.0003	-0.00032
Transport	-0.00003	-0.00062	-0.00026	-0.00042	-0.00022	-0.00037	-0.00019	-0.00036
Customs	0.00002	-0.00027	-0.00044	-0.00059	-0.00049	-0.0005	-0.00039	-0.0005
Inf. Comp.	0.00025	-0.00042	0.00077*	-0.00044	0.00069	-0.00052	0.00037	-0.00064
Land	-0.00044	-0.00028	-0.00024	-0.00034	0.00018	-0.00039	0.00006	-0.00039
Courts	-0.00021	-0.00021	-0.00026	-0.00025	-0.00023	-0.00022	-0.00008	-0.00022
Crime	-0.00022	-0.00039	-0.00045	-0.00046	-0.00019	-0.00038	-0.00002	-0.00035
Tax rates	-0.0003	-0.00023	-0.00023	-0.00038	-0.0004	-0.00052	-0.00022	-0.00053
Tax Adm.	0.00021	-0.00029	0.00027	-0.00028	-0.00003	-0.00036	-0.00039	-0.00037
Bus License	0.00001	-0.00039	-0.00008	-0.00038	-0.00004	-0.00034	0.00003	-0.00029
Pol Inst.	-0.00087***	-0.00029	-0.00071*	-0.00036	-0.00074	-0.00046	-0.00041	-0.0004
Corruption	-0.00073	-0.00061	-0.00069**	-0.00032	-0.00070***	-0.00025	-0.00038	-0.00033
Labor Reg.	0.00033	-0.0003	0.00017	-0.00033	0.00025	-0.00027	0.00027	-0.00025
Workforce	-0.00029	-0.00039	-0.00039	-0.00033	-0.00024	-0.00024	-0.0001	-0.00027

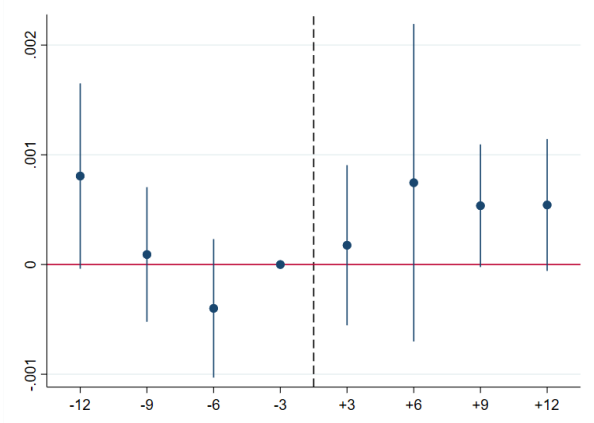
The table reports the coefficient associated with the interaction between $\Delta(IR)$ and *Post* dummy in a model incorporating control variables and event fixed-effects. Each row considers an alternative measure of perception (the first row is the mean of other constraints). We report results for the four windows in each column. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Figure C1: Effect of monetary policy change by 3-day period

Panel (a): 9-day window



Panel (b): 12-day window



The figures displays the coefficients associated with the interaction between 3-day periods and key policy rate change $\Delta(IR_e)$. Models also include event fixed effects, *Post* dummy and firm-level control variables (Size, Age, Experience, Female, Foreign, State, Manufacturing, Multi-plant, Export, Listed, Partnership, Sole Proprietorship, Mean_Constraints). Standard errors are clustered at the event level.

Appendix D: Behavior analysis - Supplementary materials

Table D1: Description of variables

Variable	Definition	Source
	Panel A: Dependent variable	
Application	Dummy equal to one if a firm with a need for credit applied for a loan in the previous year	WBES[a]
	Panel B: Interest variables	
$\Delta(IR)$	Monetary policy key rate change from the end of the previous year (Dec, 31, t-1) and the end of the considered year (Dec, 31, t)	IFS[b]
Hike	Dummy equal to one if there is an increase of policy rate during the year; zero otherwise	IFS
Cut	Dummy equal to one if there is a decrease of policy rate during the year; zero otherwise	MP
	Panel C: Control variables	
Firm-level control variables		
Age	The number of employees in the firm in logarithm	WBES
Size	Age of the firm in logarithm	WBES
Female	Dummy equal to one if the firm is owned by a woman	WBES
Experience	Logarithm of experience of the manager	WBES
Foreign	Dummy equal to one if the firm is foreign-owned	WBES
State	Dummy equal to one if the firm is State-owned	WBES
Listed	Dummy equal to one if the firm is Listed	WBES
Partnership	Dummy equal to one if legal status is a partnership	WBES
Sole Prop.	Dummy equal to one if legal status is a sole proprietorship	WBES
Subsidiary	Dummy equal to one if a firm is a subsidiary of a larger firm	WBES
Export	Dummy equal to one if a firm exports directly or indirectly	WBES
Manufacture	Dummy equal to one if firm operates in manufacture	WBES
Country-level control variables		
GROWTH	Annual GDP growth	WDI[c]
INFLATION	Consumer Price Index (annual variation)	WDI
GDP PC	GDP PER CAPITA (Constant USD)	WDI
FINDEV	Private credit to GDP	GFDD[d]

Sources: [a]: World Bank Enterprise Surveys; [b] International Financial Statistics; [c]: World Development Indicators; [d] Global Financial Development Database.

Table D2: Sample

Country	Obs.	Country	Obs.	Country	Obs.
ALB	171	GTM	262	NER	70
ARM	775	GUY	28	NGA	935
AZE	416	HND	246	NPL	340
BDI	116	IDN	1379	PAK	376
BEN	90	IND	4761	PER	828
BGD	827	IRQ	459	PHL	447
BGR	567	JAM	88	PNG	30
BLR	458	JOR	355	PRY	180
BLZ	61	KAZ	1069	RUS	3369
BOL	246	KEN	834	RWA	371
CAF	86	KGZ	398	SEN	316
CIV	195	LAO	134	SRB	638
CMR	166	LBN	264	SUR	55
COD	16	LCA	47	SWZ	76
COL	847	LKA	372	TCD	61
CRI	109	LSO	115	TGO	97
DMA	57	MAR	513	THA	403
DOM	153	MDA	553	TJK	129
ECU	254	MEX	287	TUR	1888
EGY	1756	MKD	237	TZA	409
FJI	12	MLI	101	UGA	328
GAB	19	MMR	458	UZB	533
GEO	370	MNG	533	VNM	644
GHA	516	MRT	92	VUT	12
GMB	113	MYS	829	ZMB	697
GRD	25				

Table D3: Descriptive statistics on events

	Descriptive statistics			Distribution (absolute in points)			
$\Delta(IR)$	Aver.	Median	Obs.	50	[50;100[	[100;150[	=150
TOTAL	-38.0	0	203	44	28	15	60
Hike	261.1	125	56	16	10	7	23
Cut	-245.7	-100	91	28	18	8	37

The table presents descriptive statistics at the country-year level.

Table D4: Baseline model with control variables

Variable	Coef	Std. Err.	Sign.
$\Delta(IR)$	-0.00008	0.00003	**
Size	0.00004	0.00002	**
Age	0.00100	0.00025	***
Female	0.02145	0.00696	***
Manag Exp	0.00160	0.00039	***
Foreign	0.00302	0.01235	
State	-0.01297	0.03423	
Listed	0.02516	0.01445	*
Partnership	-0.07255	0.01549	***
Sole Prop.	-0.09674	0.01281	***
Multiplant	0.05021	0.01403	***
Export	0.09431	0.01170	***
Manufacturing	-0.01806	0.00705	**
GROWTH	0.00263	0.00402	
INFLATION	-0.00358	0.00256	
FINDEV	0.00087	0.00132	
GDP PC	0.52744	0.29388	*

The table reports the estimates of our baseline model (Eq. 2). The dependent variable is a dummy equal to one if a firm applied for a loan, and 0 otherwise. $\Delta(IR)$ is the change of key policy rate in basis points from the end of the previous year and the end of year considered. Other variables are described in Table D1 Estimation is based on an OLS regression technique and include country fixed effects. Robust standard errors in parentheses are clustered at the country-year level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table D5: Robustness checks

	Baseline	Robustness checks				Falsification			
		Fixed assets	Rel. D(IR)	Sample (3days)	Sample (crisis)	Electricity	Water	Phone	Security
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta(IR)$	-0.00008**	-0.00004*	-0.00092***	-0.00012**	-0.00008**	-0.00001	-0.00007	0.00003	-0.00001
	[-2.52]	[-1.77]	(-2.65]	[-2.29]	[-2.54]	[-1.13]	[-1.25]	[0.75]	[-0.24]
Obs.	36,067	35,893	35,776	26,008	36,012	36,000	35,871	6,032	25,658
Country-year	203	203	200	111	201	203	203	55	200

The table reports the following robustness checks. Column (0) displays the baseline result for sake of comparison. Column (1) run the baseline model by replacing the dependent variable by a dummy equal to one if the firm purchased a fixed asset (without using exclusively its own funds). Column (2) changes the measure of the amplitude of the monetary policy by using the relative variation of interest rate. Columns (3) and (4) run the baseline model but one a sample of countries considered for the perception analysis (3-day window) and excluding crisis periods (defined as year where growth is below 2-standard deviation of its long trend), respectively. In columns (5) to (8), we run falsification by changing the dependent variables as follows: application for an electricity connection (column 5), application for a water connection (6), application for a telephone connection (7) and the fact to pay for security services (8). All models includes control variables and event fixed-effects. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Appendix E: Heterogeneity analysis - Supplementary materials

Table E1: Description of moderators

Variable	Definition	Source
Fin Dev	Private credit to GDP	GFDD[a]
Comp.	Share of assets held by the five largest banks	GFDD
Foreign	Share of assets held by foreign-owned banks	GFDD
Money (M3)	Cyclical component of the ratio of liquid liabilities to GDP obtained by using Hodrick-Prescott filter	GFDD
Remit.	Percentage of remittances inflows to GDP	WDI[b]
CBIE	De-jure central bank index provided by Romelli	Romelli [2022]
TOR	Average number of turnovers per year before the event	Dreher et al. [2010]
Irr. Turn.	Dummy equal to one if governor was replaced before the end of the mandate	Dreher et al. [2010]
IT	Dummy equal to one if the country is an inflation targeter	Rose and Rose [2024]

Sources: [a] Global Financial Development Database; [b]: World Development Indicators.

Table E2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev	Min	Max
Panel A: Perception (12-day window)					
Fin Dev	20,161	38.35	28.05	0.010	304.6
Comp	12,980	69.50	17.86	25.09	100
Foreign	9,534	43.57	24.82	0	100
Money (M3)	22,914	-0.142	3.931	-207.8	108.3
Remit.	18,100	4.435	8.437	0	235.9
CBIE	19,186	0.637	0.157	0.099	0.929
TOR	27,263	0.212	0.245	0	1
Irr. Turn.	19,028	0.102	0.302	0	1
IT	18,823	0.338	0.473	0	1
Panel B: Behavior					
Fin Dev	36,067	40.16	23.83	2.180	134.1
Comp	34,058	62.74	17.80	29.94	100
Foreign	20,338	32.75	24.14	0	94
Money (M3)	36,067	-0.255	3.565	-70.21	13.08
Remit.	36,067	5.051	6.294	0	43.77
CBIE	33,890	0.635	0.133	0.302	0.861
TOR	33,283	0.233	0.423	0	1
Irr. Turn.	32,252	0.101	0.302	0	1
IT	36,067	0.290	0.454	0	1

The table reports summary statistics of country-level moderators. See Table E1 for the definitions and sources of each variable.

Table E3: Perception analysis - Heterogeneity analysis, firm level

Moderator (Z) →	Size	Age	Foreign	Multi-plant	Female	Audited	Has a loan
Var. type →	Cont.	Cont.	Dummy	Dummy	Dummy	Dummy	Dummy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: 3 days window							
Post × $\Delta(IR)$	0.000717**	0.000739	0.000600**	0.000521	0.000456	0.001515	0.000416
	[2.61]	[1.59]	[2.51]	[1.70]	[1.41]	[1.67]	[1.36]
Post × $\Delta(IR)$ × Z	-0.000002*	-0.000012	-0.001855	-0.000212	0.000216	-0.001353	0.000308
	[-2.05]	[-0.45]	[-0.21]	[-0.41]	[0.21]	[-1.26]	[0.66]
Observations	1264	1264	1264	1264	1264	1255	1246
Panel B: 6 days window							
Post × $\Delta(IR)$	0.000505*	0.000255	0.000579**	0.000595*	0.000816**	0.000887*	0.000552
	[1.72]	[0.56]	[2.13]	[1.80]	[2.17]	[1.91]	[1.19]
Post × $\Delta(IR)$ × Z	0.000001	0.000018	0.000331	-0.000121	-0.000918	-0.000476	-0.000081
	[0.60]	[0.77]	[0.22]	[-0.17]	[-1.53]	[-0.83]	[-0.11]
Observations	4156	4156	4156	4156	4156	4069	4080
Panel C: 9 days window							
Post × $\Delta(IR)$	0.000680**	0.000344	0.000645**	0.000592*	0.000779**	0.000595*	0.000756**
	[2.47]	[0.83]	[2.45]	[1.91]	[2.23]	[1.98]	[1.99]
Post × $\Delta(IR)$ × Z	-0.000001	0.000016	0.000034	0.000290	-0.000578	0.000036	-0.000432
	[-0.51]	[1.08]	[0.04]	[0.57]	[-0.99]	[0.08]	[-0.81]
Observations	7794	7794	7794	7794	7794	7592	7649
Panel D: 12 days window							
Post × $\Delta(IR)$	0.000473*	0.000308	0.000434*	0.000346	0.000554*	0.000399	0.000533*
	[1.72]	[0.73]	[1.79]	[1.19]	[1.69]	[1.41]	[1.72]
Post × $\Delta(IR)$ × Z	-0.000001	0.000006	-0.000221	0.000544	-0.000560	0.000009	-0.000426
	[-0.60]	[0.42]	[-0.21]	[0.91]	[-1.25]	[0.02]	[-0.88]
Obs.	10128	10128	10128	10128	10128	9877	9956

The table reports the estimates of triple-difference model (Eq.2) with firm characteristics. Only coefficients associated with $Post \times \Delta(IR)$ and $Post \times \Delta(IR) \times Z$ are displayed. Z represents moderators, including two continuous variables (age, size) and five dummy variables (foreign ownership, multi-plant, women-owned, audited firms, and an indicator for firms having a loan). All models are estimated using firm-level control variables, event-fixed effects and $Post$ and $\Delta(IR) \times Z$ variables. Standard errors are clustered at the event level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table E4: Robustness checks

Moderator (Z) →	Size	Multi-plant	Age	Foreign	Female	Audited	Has a loan
Var. type →	Cont.	Dummy	Cont.	Dummy	Dummy	Dummy	Dummy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Perception analysis							
$Post \times \Delta(IR)$ (if $Z = 0$)	0.00050*	0.00035	0.00030	0.00044*	0.00056*	0.00042	0.00053*
$Post \times \Delta(IR)$ (if $Z = 1$)	0.00048*	0.00089**	0.00040	0.00029	0.00000	0.00041	0.00013
Panel B: Perception analysis							
$\Delta(IR)$ (if $Z = 0$)	-0.000067**	-0.000078***	-0.000078**	-0.000079***	-0.000086****	-0.000078***	-0.000110**
$\Delta(IR)$ (if $Z = 0$)	-0.000069**	-0.000070*	-0.000077**	-0.000046	-0.000059*	-0.000059**	-0.000005

The table reports the marginal effect of monetary policy change if the moderator equal 0 or 1. For continuous variable, $Z = 1$ signals that the moderator value is equal to the median. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

Table E5: Perception analysis - Heterogeneity analysis, country level

	Financial system					Institution and credibility			
Moderator (Z) →	Priv credit	CR5	Foreign	Money (M3)	Rem.	CBIE	TOR	Irr. Turn.	IT
Var. type →	Cont.	Cont.	Cont.	Cont.	Cont.	Cont.	Cont.	Dummy	Dummy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: 3 days window									
Post × $\Delta(IR)$	0.00128	-0.00186	-0.00471***	0.00060**	0.00097***	-0.0038	0.0009***	0.0007**	0.0001
	[0.88]	[-0.60]	[-2.88]	[2.20]	[3.72]	[-1.27]	[3.38]	[2.36]	[0.13]
Post × $\Delta(IR)$ × Z	-0.00001	0.00004	0.00016**	0.00009	-0.00002	0.0059	-0.0002	-0.0095	0.0008
	[-0.52]	[0.75]	[2.41]	[0.23]	[-0.15]	[1.47]	[-0.32]	[-1.27]	[1.13]
Obs.	1264	1199	866	1264	1264	1209	1166	1077	1264
Panel B: 6 days window									
Post × $\Delta(IR)$	0.00141	0.00338*	0.00156*	0.00075***	0.00082***	0.0007	0.0010***	0.0008***	0.0007
	[1.44]	[1.69]	[1.98]	[2.94]	[2.68]	[0.30]	[2.96]	[2.69]	[1.17]
Post × $\Delta(IR)$ × Z	-0.00002	-0.00004	-0.00002	-0.00019	-0.00015	-0.0000	-0.0008	0.0004	0.0001
	[-1.05]	[-1.40]	[-0.95]	[-1.02]	[-0.88]	[-0.02]	[-1.03]	[0.12]	[0.18]
Obs.	4156	3686	2496	4156	4156	3886	3713	3296	4156
Panel C: 9 days window									
Post × $\Delta(IR)$	0.00082	0.00310*	0.00103	0.00074***	0.00071***	-0.0012	0.0009***	0.0009***	0.0004
	[0.98]	[1.78]	[1.37]	[3.85]	[2.92]	[-0.64]	[4.05]	[4.46]	[0.83]
Post × $\Delta(IR)$ × Z	-0.00000	-0.00004	-0.00001	-0.00026*	-0.00014	0.0024	-0.0013*	-0.0065***	0.0006
	[-0.19]	[-1.38]	[-0.31]	[-1.71]	[-0.93]	[1.06]	[-1.82]	[-9.05]	[1.22]
Obs.	7758	6918	4681	7794	7794	7233	7041	6165	7794
Panel D: 12 days window									
Post × $\Delta(IR)$	0.00032	0.00250*	0.00059	0.00053***	0.00048**	-0.0023	0.0007***	0.0007***	0.0001
	[0.48]	[1.77]	[0.93]	[3.12]	[2.61]	[-1.58]	[3.87]	[4.44]	[0.16]
Post × $\Delta(IR)$ × Z	0.00000	-0.00003	-0.00000	-0.00029**	-0.00022**	0.0037*	-0.0012**	-0.0069**	0.0008**
	[0.27]	[-1.45]	[-0.01]	[-2.01]	[-2.06]	[1.95]	[-2.39]	[-2.19]	[2.20]
Obs.	10087	8938	5913	10128	10128	9390	9382	8065	10128

The table reports the estimates of triple-difference model (Eq.2) with the following moderators: private credit to GDP (column 1), assets of the five largest banks (2), foreign banks among total banks (3), cyclical component of broad money M3 to GDP (4), remittance inflows to GDP (5), central bank independence index (CBIE) from Romelli [2022] (6), turnover rate of central bank governors (TOR) (7), irregular turnover dummy (Irr. Turn.) from Dreher et al., 2010 (8), and inflation targeting dummy (9). Only coefficients associated with $Post \times \Delta(IR)$, $Post \times Z$ and $Post \times \Delta(IR) \times Z$ are displayed. All models are estimated using control variables and event-fixed effects. Standard errors are clustered at the event level. *, ** and *** refer to statistical significance at 10%, 5% and 1% respectively.

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