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## Monetary policy and corporate productivity in emerging markets

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# MONETARY POLICY AND CORPORATE PRODUCTIVITY IN EMERGING MARKETS

*Nuobu Renzhi and John Beirne*

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## **ABSTRACT**

This paper examines the impact of monetary policy shocks on firm-level productivity across 32 emerging market economies from 2000 to 2023, using panel local projections and a comprehensive firm-level dataset. We identify exogenous monetary policy shocks using a forward-looking Taylor rule and analyze their dynamic impact on total factor productivity. The results indicate a significant and persistent decline in productivity following a monetary-tightening shock. Crucially, financial frictions drive heterogeneous responses among firms: firms facing higher financial frictions experience more severe and prolonged productivity losses, whereas those with lower frictions recover more quickly. Additionally, firms characterized by low market power, younger age, or operation in financially vulnerable sectors, such as services, experience larger and longer-lasting productivity losses compared to their counterparts. Furthermore, we find asymmetric effects, whereby contractionary monetary shocks result in substantial productivity losses, while expansionary shocks fail to generate offsetting gains.

**Keywords:** productivity, monetary policy, emerging markets

**JEL codes:** D22, D24, E52

## I. INTRODUCTION

Productivity has long been a topic of interest as it matters greatly for economic growth and welfare. This importance is further enhanced by the significant fall in labor productivity growth over the past few decades (e.g., Goldin et al. 2024). Although emerging market economies (EMEs) have demonstrated stronger productivity growth compared to the global average, they have also experienced a pronounced slowdown in recent years (e.g., Adler et al. 2017). This trend has raised widespread concern and sparked debate on its underlying causes. Many scholars attribute the slowdown to factors such as reduced innovation and declining business dynamism (Fernald 2015; Cetto, Fernald, and Mojon 2016; Decker et al. 2016). However, an increasing body of literature argues that tighter financial conditions and weakened corporate balance sheets, particularly in the aftermath of the global financial crisis, play a significant role in explaining the productivity deceleration (e.g., Aghion et al. 2012; Duval, Hong, and Timmer 2020). For monetary policymakers, a key unresolved issue remains: to what extent can monetary policy influence productivity dynamics?

Despite its importance, empirical work on this topic is relatively scarce, notably in the case of EMEs. To address this gap in the literature, we employ panel local projections as in Jordà (2005) to estimate the impact of monetary policy on productivity. We use an extensive cross-economy firm-level dataset, across 32 EMEs over the period 2000 to 2023. Using firm-level data to explore the response of productivity to monetary policy entails several benefits. First, endogeneity concerns are alleviated with micro-level data, which could be more prevalent with aggregate-level regressions. This is because decisions on monetary policy not likely to be driven by individual firm-level activities. Second, firm-level data deepens the fixed effects across economy, firm, and time fixed effects. This enhances our monetary shock identification. Third, firm-level balance sheet information enables an examination of the specific channels from monetary policy to productivity. In this context, we estimate firm-level total factor productivity (TFP) as our measure of corporate productivity, following the methodology of Diez, Fan, and Villegas-Sanchez (2021).

We examine the dynamic causal effects of monetary policy on firms' productivity by estimating a series of panel local projections (Jordà 2005). To mitigate endogeneity concerns in respect of monetary policy transmission, we isolate variations in the interest rate from the central bank's systematic responses to lagged, contemporaneous, and expected future economic outcomes. Specifically, we identify the unanticipated and exogenous component of monetary policy shocks based on a forward-looking Taylor rule, following Romer and Romer (2004). The estimated residuals therefore can be regarded as exogenous monetary policy shocks and form the basis for the impulse response function analysis.

Our baseline results show that, following a 100 basis points monetary policy-tightening shock, firms' productivity declines significantly and persistently. The peak impact occurs immediately after the shock, with a decline of around 0.3%, and this negative effect remains significant for at least 4 years. This aligns with the findings of Manaresi and Pierri (2024) and Guérin (2023), demonstrating that temporary tightening of financial conditions caused by contractionary monetary policy can have lasting effects on corporate productivity. Moreover, the dampening of TFP growth suggests tighter monetary policy could have long-term effects on the broader economy's productive potential, consistent with Jordà, Singh, and Taylor (2020). These average responses also serve as a benchmark for analyzing heterogeneous effects across different groups of firms. Our baseline results are robust to a set of sensitivity checks, including using alternative measures of corporate productivity and monetary policy shocks, as well as alternative model specifications.

To explore the potential channels of monetary policy transmission, we employ a semiparametric approach following Cloyne et al. (2023), estimating the heterogeneous effects of monetary policy

on firm-level TFP based on various firm characteristics. Our estimates highlight the critical role of financial frictions in shaping these effects. Firms with high financial frictions experience a pronounced TFP decline, peaking at 0.44% and persisting over time. In contrast, firms with low financial frictions see a smaller, short-term decline of 0.25% at its peak, followed by a recovery within 3 years. These results suggest the aggregate impact of monetary policy on firms' TFP is largely driven by those with high financial frictions.

Extended analyses further examine the role of financial frictions in affecting the transmission of monetary policy shocks. By exploring heterogeneity across firm characteristics such as market power, sectoral classification, and age, we find consistent evidence that firms facing higher financial frictions experience more pronounced and persistent declines in productivity following monetary tightening. Specifically, low-markup firms, younger firms, and firms in the services sector, which are typically more financially constrained, display significantly larger and longer-lasting productivity losses compared to their counterparts. Additionally, we document asymmetric responses to monetary policy, where contractionary shocks have substantial negative effects on productivity, while expansionary shocks yield no comparable gains, underscoring the irreversibility of losses induced by tightening. Together, these findings emphasize the amplifying effect of financial frictions on monetary policy transmission, reinforcing their pivotal role in shaping productivity dynamics across diverse economic contexts.

This paper relates to two key strands of the literature. First, we contribute to the work carried out on the impacts of monetary policy and its transmission at the firm level. Liquidity constraints have been highlighted in earlier studies as important channels, particularly for smaller firms where there is greater responsiveness to monetary policy (e.g., Gertler and Gilchrist 1994; Kashyap, Lamont, and Stein 1994). More recent studies have explored various factors that affect financial frictions and how they affect the transmission of monetary policy, including firm age, liquidity, leverage, and default risk (e.g., Jeenas 2018, 2019; Anderson and Cesa-Bianchi 2020; Ottonello and Winberry 2020; Ippolito, Ozdagli, and Perez-Orive 2018; Cloyne et al. 2023). Other research has focused on changing market structures, with firms holding market power less likely to adjust output in response to monetary policy shocks, thereby weakening the policy's impact (Syverson 2018, Renzhi and Beirne 2023, Duval et al. 2024). This shift in market power may also influence the shape of the Phillips curve and create new inflationary pressures (Haldane et al. 2018, Konczal and Lusiani 2022). Our work is particularly close to Guérin (2023), who empirically investigates the effect of monetary policy on productivity, with a focus on advanced economies. This paper provides further insights on the nexus between firm-level productivity and monetary policy. Focusing on EMEs, with new empirical evidence, the paper highlights the heterogeneous and asymmetric effects of monetary policy on productivity at the level of the firm.

Second, we complement the literature on the impact of financial constraints on productivity. Much of this research focuses on the relationship between financial frictions and resource misallocation across firms, and its consequences for productivity growth (Hsieh and Klenow 2009). Some studies suggest constrained firms are less likely to receive optimal resource allocation, reducing productivity (Midrigan and Xu 2014). Other work highlights how credit booms, driven by large capital inflows and loose credit conditions, can be associated with productivity losses and misallocation (Benigno, Converse, and Fornaro 2015; Gopinath et al. 2017). A parallel strand of literature examines the effect of financial constraints on productivity growth within firms as opposed to misallocation across firms (Aghion et al. 2012; Aghion, Hemous, and Kharroubi 2014; Duval, Hong, and Timmer 2020; Manaresi and Pierri 2024). Distinct from these studies, our paper uses a rich firm-level dataset for EMEs to examine the impact of monetary policy shocks on productivity, further underscoring the link between financial frictions and productivity.

The remainder of this paper is structured as follows. Section II describes the data and outlines the empirical methodology. Section III presents the empirical results with robustness checks and extensions. Section IV concludes.

## II. DATA AND METHODOLOGY

In this section, we start by describing the data, the estimation of corporate productivity, and the monetary policy shocks. Next, we present the econometric framework used to produce the empirical results.

### A. Data

Firm-level data is obtained from the Orbis database, which is an annual global panel dataset with over 300 million firms, compiled by Bureau van Dijk. The availability of harmonized cross-economy financial information for both listed and non-listed firms across multiple periods is a key advantage of this dataset. This enables us to examine firms' responses to monetary policy in a consistent manner. Following the approach of Kalemli-Ozcan et al. (2024), we clean the Orbis dataset, including dealing with basic reporting errors and quality checks. In addition, we remove the agriculture, finance, and insurance industries as well as sectors with high government ownership (e.g., administration), following Cloyne et al. (2023) and Durante, Ferrando, and Vermeulen (2022). Finally, we restrict our sample to firms that report key information on firms' value added, costs of labor and capital, and costs of intermediate inputs, for at least 7 consecutive years. Following the data-cleaning exercise, we obtain an unbalanced panel with 42,096 distinct firms covering the period between 2000 and 2023 across 32 EMEs.<sup>1</sup>

The key variables for estimating the corporate productivity are the firm-level value added, costs of labor and intermediate inputs, and cost of capital inputs, obtained as the operating revenue, costs of goods sold, and tangible fixed assets, respectively.<sup>2</sup> Following the literature (e.g., Diez, Fan and Villegas-Sanchez 2021), we deflate the above variables by using gross domestic product (GDP) deflators. The advantage of adopting GDP deflators lies in their better coverage across economies and time, especially for the cross-economy feature of our firm-level data. The GDP deflator is obtained from the International Monetary Fund (IMF).

The firm-level factors that may influence firms' productivity, other than variables used in the productivity estimation, are based on the standard corporate finance literature. Specifically, we control for firm size (the logarithm of total assets), age of the firm, number of employees, and profitability (the return on equity). The table on the next page presents the summary statistics of the main firm-level variables used in the empirical analysis. We also control for several key economy-specific macroeconomic fundamentals, including real GDP growth, inflation, and official exchange rates, which are obtained from the IMF and national statistics.

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<sup>1</sup> The sample EMEs are Bangladesh; Bosnia and Herzegovina; Bulgaria; the People's Republic of China; Croatia; Czech Republic; Estonia; Greece; Hong Kong, China; Hungary; India; Indonesia; Iran; Israel; Jordan; the Republic of Korea; Latvia; Malaysia; Nigeria; North Macedonia; Pakistan; the Philippines; Poland; Romania; Russian Federation; Serbia; Singapore; South Africa; Sri Lanka; Taipei, China; Ukraine; and Viet Nam. The distribution of firms across the sample of EMEs is provided in the Appendix Table.

<sup>2</sup> Costs of goods sold is defined as the direct cost attributable to the production of the goods sold in a company, which includes the cost of the materials used in creating the good along with the direct labor costs used to produce the good.



### Summary Statistics of Main Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Total factor productivity	1.769	0.294	1.445	7.753
Cash ratio	0.097	0.126	0.000	0.993
Markup	1.324	0.456	0.155	4.999
Size	9.459	2.334	0.000	21.967
Age	3.177	0.442	1.946	5.617
Employment	4.506	1.919	0.693	13.705
Profitability	15.939	22.785	-2.376	60.375

Notes: The table shows summary statistics for the main firm-level variables used in the empirical analysis. “Total factor productivity” is the logarithm of firm-level total factor productivity. “Cash ratio” is the ratio of cash and cash equivalents to total assets. “Markup” is the estimated firm’s markup, defined as the ratio of price to marginal cost. “Size” is the logarithm of total assets deflated by the gross domestic product deflator. “Age” is the logarithm of firm age where firm age is calculated from the year of incorporation. “Employment” is the log of the number of employees. “Profitability” is measured by the return on equity.  
Source: Authors’ calculations.

### B. Corporate Productivity

We define corporate productivity as the firm-level TFP, which is a measure of the firm’s production effectiveness.<sup>3</sup> To obtain the firm-level TFP, following the standard literature, we estimate the following production function:

$$y_{i,t} = \beta_0 + \beta_k k_{i,t} + \beta_v v_{i,t} + TFP_{i,t} + \eta_{i,t} \quad (1)$$

where  $y_{i,t}$  refers to the log of real value added for firm  $i$  in period  $t$ ;  $k_{i,t}$  refers to the log values of the real capital stock;  $v_{i,t}$  is the log of any flexible input (in real terms), including labor and intermediate inputs of the firm;  $TFP_{i,t}$  refers to the log of firm-level TFP; and  $\eta_{i,t}$  refers to the error term. A key challenge in estimating the output elasticities of inputs is simultaneity bias, which arises from the potential correlation between unobserved productivity (known to the firm) and the firm’s input choices. To address this issue, we apply the methodology of Diez, Fan, and Villegas-Sanchez (2021), which builds on the control function approach pioneered by Olley and Pakes (1996), Akerberg, Caves, and Frazer (2015), and Levinsohn and Petrin (2003). This method offers several advantages over alternative methodologies like Ordinary Least Squares or the Olley–Pakes approach. First, it addresses endogeneity by better accounting for the simultaneity between input choices and unobserved productivity shocks. Second, it allows for more flexible handling of dynamic inputs, such as labor and capital, improving estimates in industries where both inputs adjust over time. Third, it is more robust to different functional form assumptions, making it applicable across a broader range of industries and production settings. Specifically, the approach assumes that firm-level productivity follows a first-order Markov process, where productivity is a function of capital and flexible inputs:

<sup>3</sup> TFP provides a better gauge of a firm’s overall efficiency, compared with other conventional measures, such as labor productivity (Imrohoroglu and Tüzel 2014). However, we adopt labor productivity as an alternative measure of corporate productivity, defined as real value added per employee, in the robustness checks.

$$TFP_{i,t} = m(k_{i,t}, v_{i,t}) \quad (2)$$

We then employ a two-stage method to estimate the firm-level TFP.<sup>4</sup> In the first stage, we estimate the expected output by using a second-order approximation, which removes measurement errors and unanticipated shocks. In the second stage, we rely on the law of motion for productivity and project current productivity on its lagged values, allowing us to obtain the estimated firm-level TFP in its logarithm.

### C. Monetary Policy Shocks

The aim of this paper is to examine how monetary policy affects corporate productivity. Therefore, we need to account for the identification concern regarding the causal effects of monetary policy. To isolate interest rate fluctuations from the central bank's systematic responses to lagged, contemporaneous, and expected future economic outcomes, we identify the unanticipated and exogenous part of monetary policy shocks based on a forward-looking Taylor rule, which follows the approach of Romer and Romer (2004). Specifically, we estimate annual monetary policy (interest rate) shocks for each of our sample EMEs as follows:

$$i_t = \alpha_0 + \alpha_1 i_{t-1} + \phi_1 E_t y_{t+1} + \phi_2 E_t \pi_{t+1} + \sum_{l=0}^1 \phi_3 y_{t-l} + \sum_{l=0}^1 \phi_4 \pi_{t-l} + \gamma ex_{t-1} + \varepsilon_t^{MP} \quad (3)$$

where the variable  $i_t$  refers to the short-term interest rate at time  $t$ . Following Romer and Romer (2004), we include the 1-year-ahead forecasts for real GDP growth  $y$  and inflation  $\pi$ , denoted as  $E_t y_{t+1}$  and  $E_t \pi_{t+1}$ . We use the forecasts in IMF World Economic Outlook publications to proxy for the forecasts of the central bank.<sup>5</sup> As the central banks in EMEs also target the exchange rate, we include the official exchange rate  $ex$  (in logs) as an additional explanatory variable. The estimated residual  $\varepsilon_t^{MP}$  serves as a measure of the monetary policy shock.

### D. Econometric Methodology

To examine the dynamic causal effects of monetary policy shocks on firms' productivity, we estimate a series of panel local projections, based on the derived monetary policy shock series together with the dataset described earlier. Following Jordà (2005), the basic local projection framework can be specified as follows:

$$TFP_{i,c,t+h} - TFP_{i,c,t-1} = \alpha_i^h + \lambda_c^h + \gamma_t^h + \sum_{l=0}^L \delta_l^h z_{i,c,t-l} + \beta^h \varepsilon_{c,t}^{MP} + u_{i,c,t+h} \quad (4)$$

where  $i$  and  $c$  denote the firm and economy, respectively;  $TFP$  is the logarithm of firm-level TFP;  $\varepsilon_t^{MP}$  refers to identified monetary policy shocks in year  $t$ ;  $\alpha_i$  denotes the firm fixed effects, controlling for the time-invariant characteristics of the firm; and  $z_{i,c,t-l}$  is a vector of control variables, including lags of the dependent variable and time-varying firm characteristics that could influence TFP (e.g., size, age, and profitability), as well as macroeconomic fundamentals reflecting domestic business cycles (e.g., real GDP growth, inflation, and exchange rates). The term  $\lambda_c^h$  accounts for economy-specific fixed effects, capturing heterogeneity in firm-level TFP responses to monetary policy shocks across economies; and  $\gamma_t^h$  controls for structural breaks caused by the global financial crisis and the coronavirus disease pandemic. The coefficient  $\beta^h$  represents the

<sup>4</sup> Details on estimating firm-level productivity can be found in Diez, Fan, and Villegas-Sanchez (2021).

<sup>5</sup> Ideally, we would use central bank forecasts as in Romer and Romer (2004), but these are generally not available for most EMEs.

percentage change in TFP in response to a 100 basis points (bps) monetary policy shock at each horizon  $h \in (0, 1, \dots, 4)$ .  $u_{i,c,t+h}$  denotes disturbances.

To explore the potential channels of monetary policy transmission, as captured by the heterogeneity in firm characteristics, we introduce a dummy variable,  $I_{i,t-1}^m$ , which identifies the group of firms of interest. Specifically, it takes the value of 1 if at time  $t-1$  the firm's characteristic falls within a particular level  $m \in M$  of the characteristic distribution, defining the firm's group. This semi-parametric approach allows us to estimate the heterogeneous effects of monetary policy on firm-level TFP based on different firm characteristics. Following Cloyne et al. (2023), we specify our extended model as:

$$\begin{aligned} TFP_{i,c,t+h} - TFP_{i,c,t-1} = & \alpha_t^h + \lambda_c^h + \gamma_t^h + \sum_{l=0}^L \delta_l^h z_{i,c,t-l} \\ & + \sum_{m=1}^M I_{i,t-1}^m \cdot \beta_m^h \epsilon_t^{MP} + \sum_{m=1}^M I_{i,t-1}^m \cdot \eta_m^h + u_{i,c,t+h} \end{aligned} \quad (5)$$

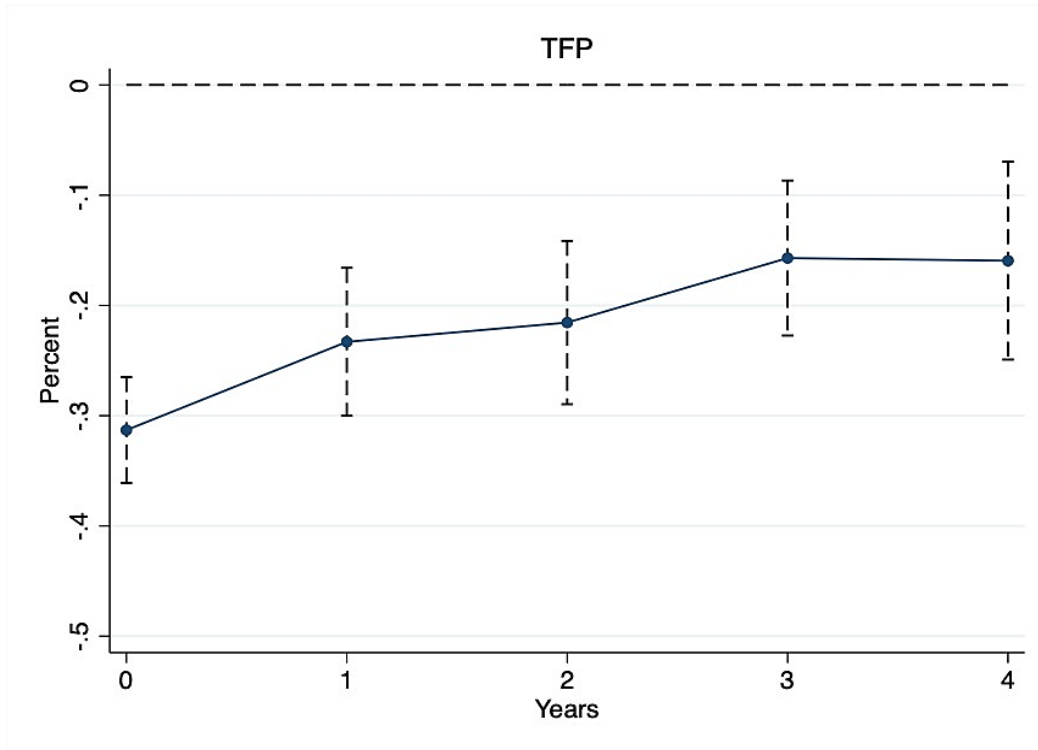
where the notation follows that of Eq. (4).

### III. EMPIRICAL RESULTS

#### A. Baseline

Figure 1 depicts the average responses of firm-level TFP to a 100-bps contractionary monetary policy shock, based on the baseline model of Eq. (4). The solid line in each graph represents the estimated  $\beta^h$  in percentage change for up to 4 years. The dashed bars represent 95% confidence bands. Following a monetary policy tightening, firms' productivity declines significantly and persistently. The peak impact is observed right after the shock at a value of around -0.3%, and the effect remains negative and significant for at least 4 years. This finding is in line with Guérin (2023) and Manaresi and Pierri (2024), underlining that a temporary tightening financial condition caused by contractionary monetary policy can have persistent effects on corporate productivity. Our results also indicate that tightening monetary policy, by dampening TFP growth and the economy's productive potential, could generate long-term effects on the aggregate economy (Jordà, Singh, and Taylor 2020). Moreover, these average responses constitute a baseline against which to assess the heterogeneous responses of firms' productivity across different groups.

**Figure 1: Impulse Responses to a Contractionary Monetary Policy Shock  
—Average Effects**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

## B. Conditioning on Financial Frictions

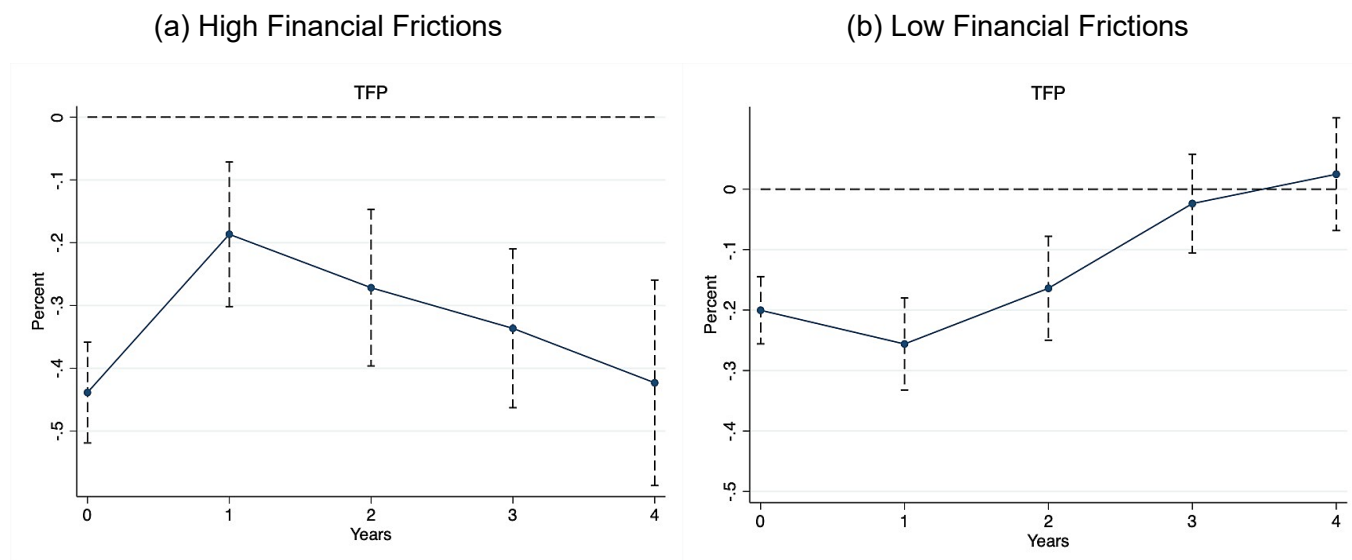
A large body of literature (e.g., Ottonello and Winberry 2020) suggests firms with tighter financial constraints are more responsive to monetary policy shocks. Therefore, if the effect of monetary policy on productivity is driven primarily by firms' financial frictions, we would expect to observe stronger responses to monetary policy shocks among firms with higher levels of financial frictions. To this end, in this part of the analysis, we allow the responses of firm-level TFP to monetary policy shocks to vary based on the level of financial friction across firms. Specifically, we divide the sample into two groups: firms with high financial frictions and those with low financial frictions. Since financial frictions cannot be directly measured, we use the ratio of cash and cash equivalents to total assets as our primary indicator. A lower ratio indicates higher liquidity risk, all else being equal. We use the median value of the sample as the threshold to classify firms into high and low financial friction groups.<sup>6</sup>

Figure 2 presents the impulse responses of firm-level TFP to contractionary monetary policy shocks for the two firm groups: those with high financial frictions (left panel) and those with low financial frictions (right panel). A comparison of these panels highlights the marginal role financial frictions play in the transmission of monetary policy, controlling for other relevant factors. The results demonstrate heterogeneous responses in productivity between the two groups. Firms with

<sup>6</sup> A threshold of 0.0478 is applied.

high financial frictions experience a significant decline in TFP, peaking at around 0.44%, with the effect persisting over time. In contrast, firms with low financial frictions exhibit only a short-term decline in TFP of 0.25% at its peak, followed by a recovery within 3 years of the shock. Furthermore, compared to the benchmark results in Figure 1, firms with high financial frictions have larger responses, suggesting the average impact on firms' TFP is driven primarily by this group.

**Figure 2: Productivity Responses to a Contractionary Monetary Policy Shock  
Conditioning on Financial Frictions**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

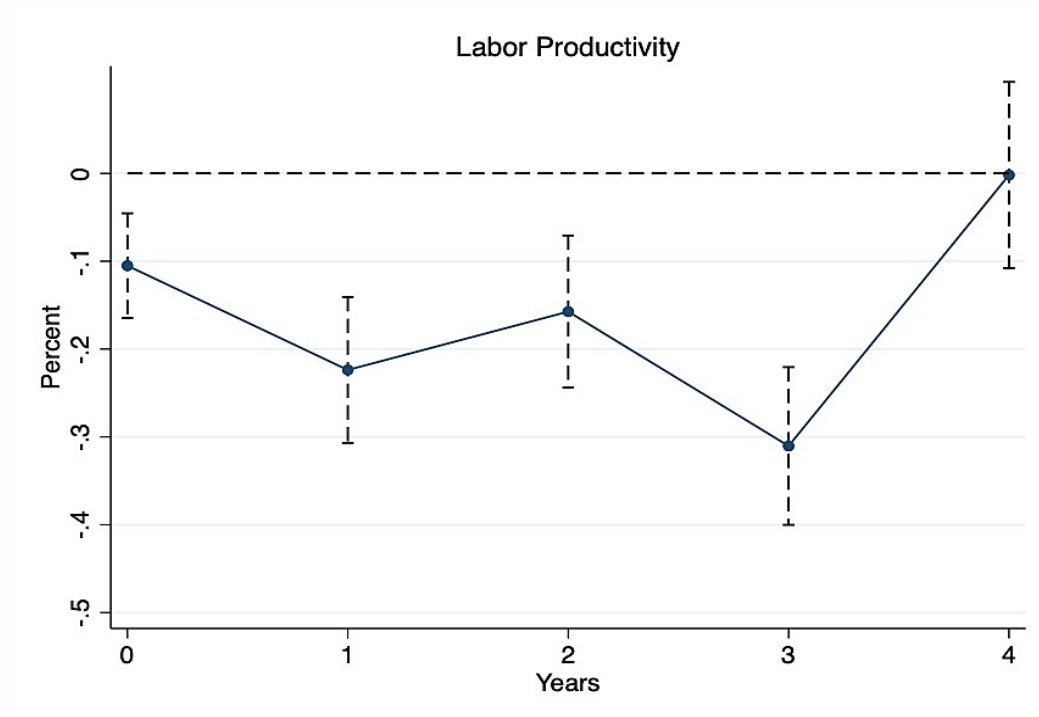
Source: Authors' calculations.

## C. Robustness Checks

### 1. Alternative Measure of Productivity

Our first robustness test assesses the baseline results by using labor productivity as an alternative measure of corporate productivity. Labor productivity is measured by dividing a firm's operating revenue by its number of employees each year, following the Organisation for Economic Co-operation and Development definition. Figure 3 plots the impulse responses of firms' labor productivity to a contractionary monetary policy shock. The results are qualitatively consistent with the baseline estimates, indicating that a tightening in monetary policy negatively impacts labor productivity.

**Figure 3: Impulse Responses to a Contractionary Monetary Policy Shock  
—Labor Productivity**



Notes: The figure plots the impulse responses of labor productivity to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

## 2. Alternative Measure of Monetary Policy Shocks

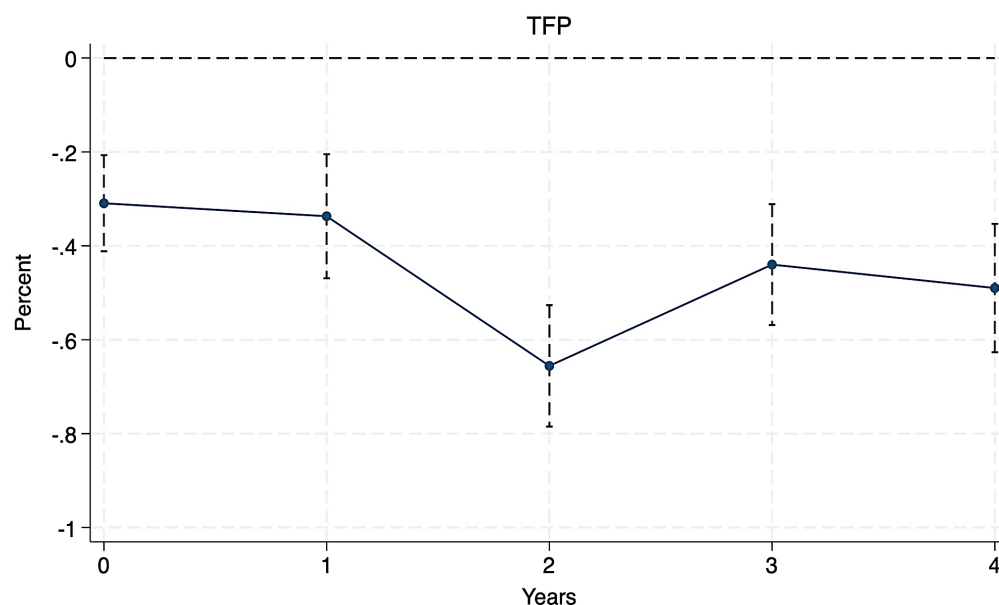
For our second robustness check, we employ the annual cross-economy monetary policy shock series constructed by Choi, Willems, and Yoo (2024), which implements a hierarchical identification strategy to address variations in data availability across economies. High-frequency studies are used to construct monetary policy shocks, based on existing work that focused on the euro area (e.g., Jarociński and Karadi 2000). When such shocks are unavailable, we use short-term interest rate changes (daily frequency) around monetary policy decision announcements as proxies. Where daily frequency is not available, we use expected interest rate changes, based on Bloomberg surveys. In cases where such expectations are not accessible, monetary policy shocks are calculated using residuals from a backward Taylor rule specification. In the case of economies with fixed exchange rates, we apply the monetary policy shock of the “anchor” economy, adjusted for the extent of capital account openness.<sup>7</sup> We normalize Choi, Willems, and Yoo (2024)’s monetary policy shock to have a one-to-one relationship with the short-term interest rate.

Figure 4 shows the estimated impulse responses to a contractionary monetary policy shock of 1 percentage point over a period of up to 4 years. Consistent with the benchmark result, firms’ TFP declines steadily following a monetary policy tightening, with a peak effect of approximately -0.65

<sup>7</sup> For further details on the construction and sources of the monetary policy shocks, see Choi, Willems, and Yoo (2024).

percentage points. Overall, these findings confirm the robustness of our results when using the alternative monetary policy shock measure.<sup>8</sup>

**Figure 4: Impulse Responses to a Contractionary Monetary Policy Shock**  
**—Choi, Willems, and Yoo (2024)’s Monetary Policy Shocks**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

### 3. Alternative Model Specifications

Our third robustness test evaluates whether the baseline results hold under alternative model specifications. To further address potential endogeneity concerns, we include lags of monetary policy shocks as additional controls, as shown in Figure 5 (left panel). The results indicate that productivity declines persistently and significantly following a contractionary monetary policy shock, in line with the baseline estimates. Up to this point, we have followed the standard approach in the literature, incorporating lags of the dependent variable as controls in local projections. However, concerns may arise over endogeneity if there is a correlation between the lags of the dependent variable and the excluded lags captured in the error term (e.g., Nickell bias). To further test the robustness of our baseline estimates, we now remove the lags of the dependent variable from the model. Figure 4 (right panel) presents the estimated impulse responses of productivity to a 100-bps positive public debt shock, without including the lags of the dependent variable. The results show that, while the response of productivity becomes more volatile, it still

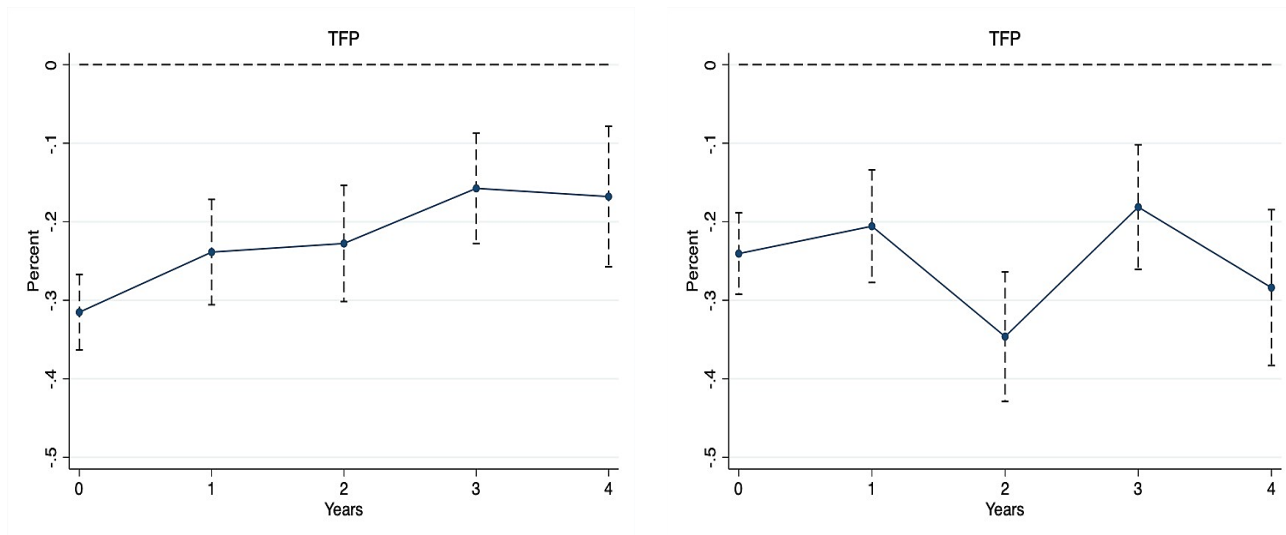
<sup>8</sup> As the monetary policy shock series by Choi, Willems, and Yoo (2024) extends only through 2019, this analysis also mitigates concerns that the baseline estimates are influenced by potential structural breaks caused by the coronavirus disease pandemic.

declines significantly after the shock, remaining broadly consistent with the baseline estimates, further confirming the robustness of our findings.

**Figure 5: Impulse Responses to a Contractionary Monetary Policy Shock  
—Alternative Model Specifications**

(a) Adding Lags of Monetary Policy Shocks

(b) Dropping Lags of Dependent Variable



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

#### 4. Alternative Proxy for Financial Frictions

One potential concern in using the ratio of cash and cash equivalents to total assets as a proxy for financial frictions is that such liquidity measures can endogenously respond to monetary policy shocks or fluctuate with the business cycle, potentially affecting the ranking of firms along the financial frictions distribution.<sup>9</sup> To address this issue, following Cloyne et al. (2023), we adopt firm age as an alternative proxy. Firm age offers a key advantage: rank invariance, as the incorporation date of a firm is predetermined and its age is less likely to be influenced by cyclical economic fluctuations. Specifically, we categorize firms into two groups: younger firms (less than 25 years since incorporation) and older firms (25 years or more). This effectively implies that each group represents around half of the observations, while the estimation results are not sensitive to the exact threshold.

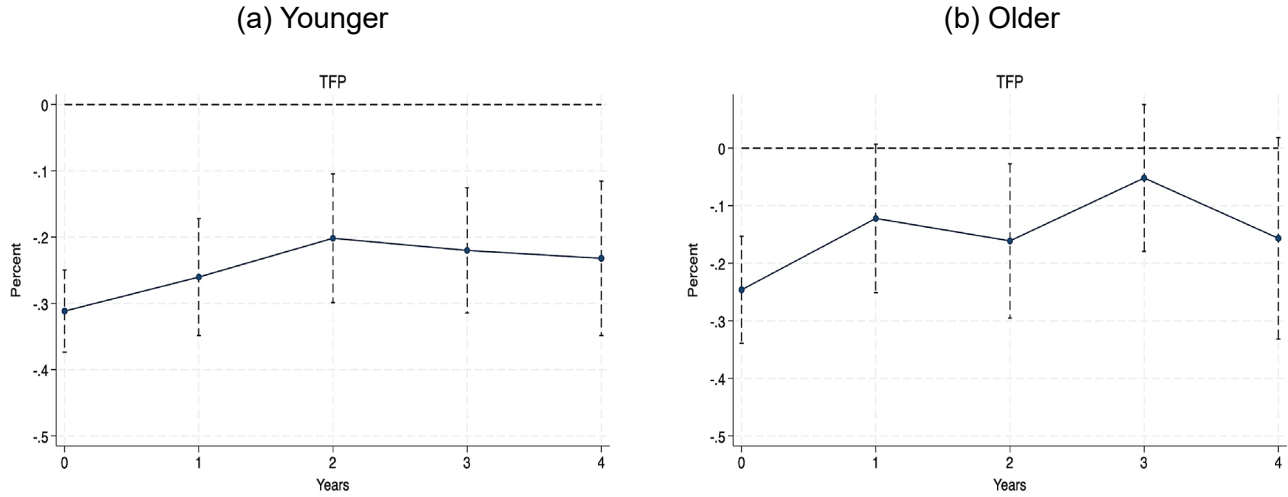
Figure 6 plots the heterogeneous impulse responses of productivity to contractionary monetary policy shocks for younger (left panel) and older (right panel) firms. A clear pattern emerges, underscoring the role of firm age in shaping the heterogeneity of financial frictions. Younger firms exhibit a larger and more persistent decline in TFP following monetary tightening, with a peak effect of approximately -3.1%—resembling the response pattern of firms with high financial frictions. In contrast, older firms experience only a smaller and short-term decline in TFP, akin to firms with low

<sup>9</sup> Similar concerns apply to using the firm size or leverage as proxies for financial frictions.



financial frictions. These heterogeneous responses highlight the amplifying role of financial frictions in monetary policy transmission, where financially constrained firms are more responsive to monetary tightening. This result aligns with our earlier findings in Section III.B. Furthermore, our results are consistent with the findings of Cloyne et al. (2023) and Durante, Ferrando, and Vermeulen (2022). These provide further evidence that the heterogeneity in the response to monetary policy shocks by firms is closely linked to financial frictions.

**Figure 6: Productivity Responses to a Contractionary Monetary Policy Shock Conditioning on Firm Age**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

## D. Extensions

### 1. Conditioning on Market Power

The evidence presented in the previous section reveals that facing a higher level of financial friction is a strong predictor of a larger response of firm-level TFP to monetary policy changes. In recent years, there has been growing concern that declining productivity may signal an increase in corporate market power, as reflected in rising firm markups (e.g., De Ridder 2024). Additionally, a growing body of literature indicates that markups could affect firms' responses to monetary policy (e.g., Syverson 2018, Renzhi and Beirne 2023, Duval et al. 2024). Hahn (2022) theoretically shows that rising market power makes aggregate productivity more procyclical and causes a rise in monetary non-neutrality. In this section, we extend the analysis by allowing the responses of firms' productivity to monetary policy shocks to vary across different levels of firms' markup distributions.

Following the literature, we define a firm's markup as the ratio of price to marginal cost. However, estimating markups is more challenging than this definition suggests, as most firm-level datasets (including Orbis) do not provide direct information on firm prices or marginal costs. To address this limitation, we adopt the methodology of De Loecker and Warzynski (2012), who derive the following expression for the markup ( $Markup_{i,t}$ ) from the firm's cost-minimization problem:

$$\text{Markup}_{i,t} = \frac{P_{i,t}}{MC_{i,t}} = \frac{\partial F_{i,t}(\cdot)}{\partial v_{i,t}} \frac{v_{i,t}}{F_{i,t}(\cdot)} / \frac{P_{i,t}^{v_{i,t}} v_{i,t}}{P_{i,t} Q_{i,t}} = \frac{\theta_{i,t}^v}{\alpha_{i,t}^v} \quad (6)$$

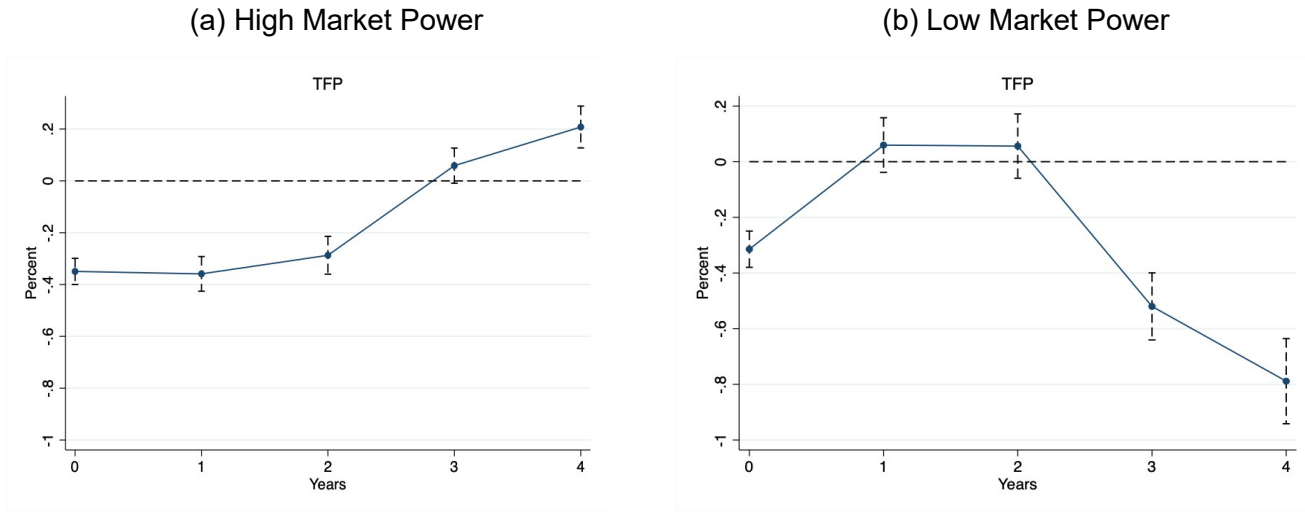
where  $P_{i,t}$  refers to the output price,  $MC_{i,t}$  represents marginal cost,  $F_{i,t}(\cdot)$  denotes the firm's production function, and  $v_{i,t}$  is the flexible input. The firm's markup is thus estimated as the ratio of the output elasticity of the variable input ( $\theta_{i,t}^v$ ) to the firm's expenditure share on that input ( $\alpha_{i,t}^v$ ). While the expenditure share can be calculated directly from the sales and input data in the Orbis dataset, output elasticity is unobserved and requires the estimation of a production function. For this, we estimate a Cobb-Douglas production function following Diez, Fan, and Villegas-Sanchez (2021).<sup>10</sup> Based on these estimates, we compute firm markups and classify firms into high and low market power groups using the sample's median value as the threshold.<sup>11</sup>

Figure 7 presents the heterogeneous impulse responses of productivity to contractionary monetary policy shocks across two groups of firms: low market power (left panel) and high market power (right panel). A comparison of these two panels reveals the marginal contribution of firms' markup, controlling for other factors that may affect monetary policy transmission. The results indicate that, while the initial impact of monetary policy on productivity is similar for both groups, firms with high market power experience only a short-term decline in TFP, followed by a recovery within 3 years, akin to the pattern observed for firms with low financial frictions. In contrast, firms with low market power exhibit larger and more persistent declines in productivity, with effects lasting over 4 years, resembling the response of firms with high financial frictions. These findings align with the literature, which shows that low-markup firms are generally more responsive to changes in monetary policy, as they tend to face greater credit constraints (Duval et al. 2023). Furthermore, in the presence of financial frictions, higher corporate profits associated with elevated markups can provide a buffer against shocks to external funding conditions, allowing firms to finance their working capital or non-pledgeable, innovation-enhancing investments (Aghion, Farhi, and Kharroubi 2019). This may help mitigate the output response of high-markup firms to monetary policy shocks. Overall, our results further emphasize the role of financial frictions in shaping the transmission of monetary policy to productivity.

<sup>10</sup> Details on estimating firm markups can be found in Diez, Fan, and Villegas-Sanchez (2021).

<sup>11</sup> The threshold applied is 1.0306.

**Figure 7: Productivity Responses to a Contractionary Monetary Policy Shock  
Conditioning on Firm's Market Power**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

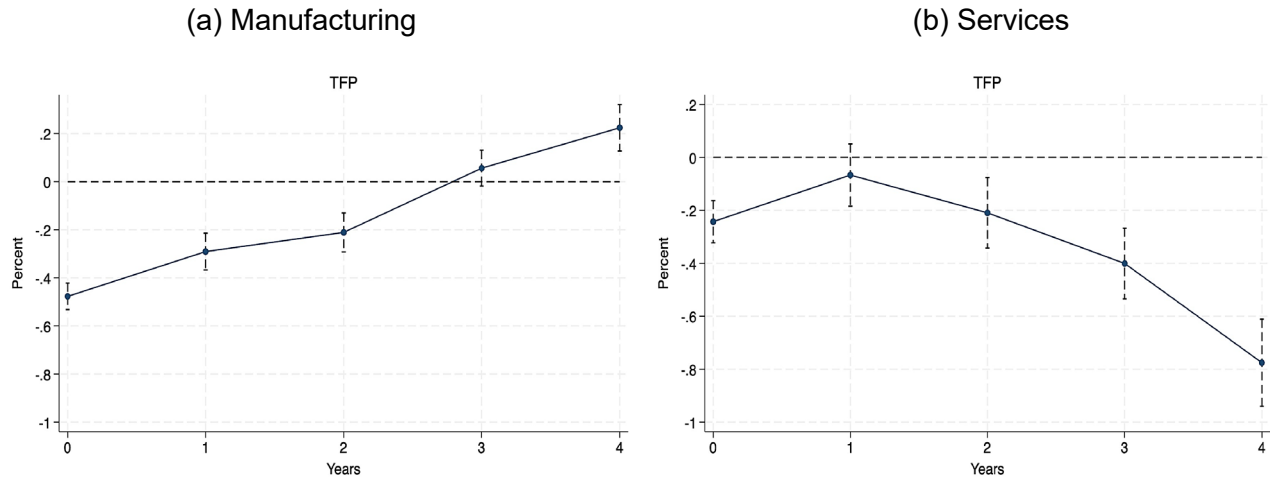
## 2. Sectoral Heterogeneity

Recent literature has emphasized the importance of examining the effects of monetary policy at the sectoral and industrial level (e.g., Kreamer 2022; Singh, Suda, and Zervou 2022). This pertains to enhancing our insights on which sectors are driving the aggregate effect, as well as capturing potential distributional effects of monetary policy on firms. As a result, we further extend our analysis by investigating whether different sectors and industries may affect the impacts of monetary policy shocks on corporate productivity. To do so, we consider two broad sectors: manufacturing and services, classified according to the NACE rev.2.<sup>12</sup>

Figure 8 depicts the impulse responses of productivity to contractionary monetary policy shocks for firms in manufacturing (left panel) and services (right panel). The results show there is a significant decline in productivity across both sectors following a monetary-tightening shock. However, the effects differ in both magnitude and persistence. Firms in the manufacturing sector experience a larger immediate drop in productivity while the impact is relatively short-lived. In contrast, firms in the services sector exhibit a smaller initial decline, but the negative effects are more persistent, lasting beyond 4 years. These findings are consistent with the financial accelerator theory (e.g., Bernanke, Gertler, and Gilchrist 1999), which posits that firms facing higher financial frictions are more susceptible to monetary conditions. Given the relatively higher financing constraints facing services sector firms, they exhibit a prolonged adverse response to monetary policy tightening. This finding highlights the critical role of financial frictions in shaping sectoral heterogeneity in productivity responses.

<sup>12</sup> Specifically, the manufacturing sector corresponds to NACE rev.2 section C, and the services sector is obtained by aggregating the following NACE rev.2 sections: wholesale and retail trade (G), transport and storage (H), accommodation and food activities (I), information and communication (J), real estate activities (L), and other business activities (M, N, P, Q, R, and S).

**Figure 8: Productivity Responses to a Contractionary Monetary Policy Shock  
Conditioning on Sectors**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

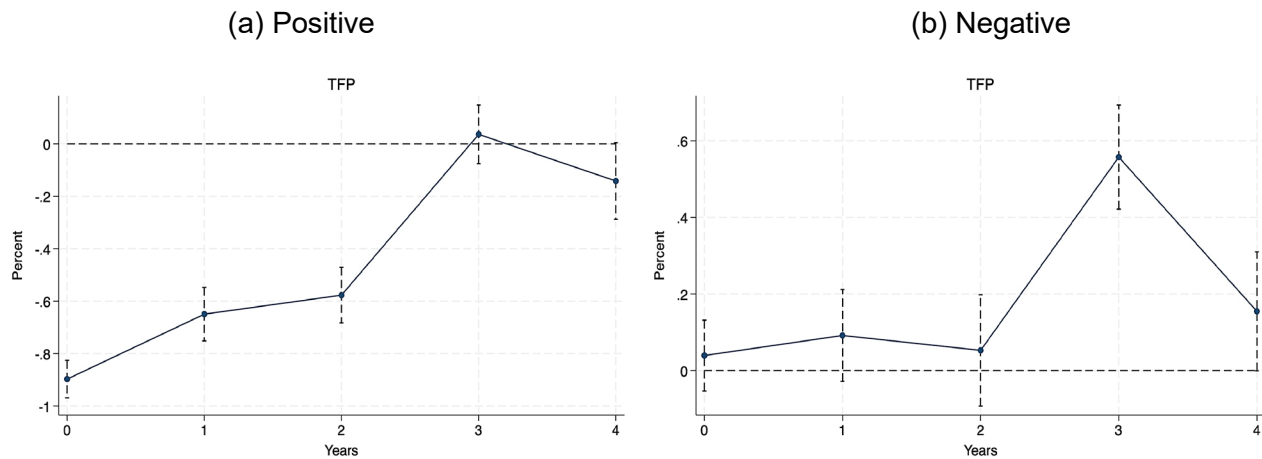
### 3. Asymmetric Effects of Monetary Policy Shocks

Our baseline specification assumes a symmetric impact of monetary policy shocks on corporate productivity. In this section, we relax this assumption and explore the potential asymmetry in productivity responses by distinguishing between positive (contractionary) and negative (expansionary) monetary policy shocks.

Figure 9 shows the impulse responses of productivity to positive and negative monetary policy shocks. The estimates reveal that shocks to monetary policy have pronounced asymmetric effects on corporate productivity. Positive (contractionary) monetary policy shocks have large negative impacts on firm-level TFP, whereas negative (expansionary) shocks have no statistically significant effects, at least during the initial 2 years. Consistently, the estimates of the impact of monetary tightening are much larger than the ones obtained by the baseline symmetric specification.

Overall, our results indicate that contractionary shocks to monetary policy impose substantial and lasting productivity losses, whereas expansionary shocks of the same magnitude fail to generate comparable gains. This asymmetry highlights the irreversibility of productivity declines induced by monetary tightening, suggesting that easing financial frictions cannot fully offset the damage caused by prior tightening shocks.

**Figure 9: Productivity Responses to Positive and Negative Monetary Policy Shocks**



TFP = total factor productivity.

Notes: The figure plots the impulse responses of TFP to a 100-bps contractionary monetary policy shock at an annual frequency. 95% confidence bars are reported.

Source: Authors' calculations.

## IV. CONCLUSION

This paper provides new empirical evidence on the effects of monetary policy on firm-level productivity in emerging market economies (EMEs), using a unique firm-level dataset covering 32 EMEs over the period from 2000 to 2023. By employing a panel local projections approach, we estimate the dynamic impact of monetary policy tightening on corporate productivity, with a particular focus on the role of financial frictions in amplifying these effects.

Our findings reveal that monetary policy shocks lead to significant and persistent declines in productivity. These effects are largely driven by firms with higher levels of financial friction, which experience more severe and prolonged productivity losses following monetary tightening. In contrast, firms with lower financial frictions are able to recover from the initial productivity decline more quickly. These results suggest the transmission of monetary policy to the real economy, particularly in terms of its effects on productivity, is heavily mediated by the degree of financial constraints firms face.

The extended analyses further reinforce the critical role of financial frictions, showing that firms with higher financial constraints—characterized by lower market power, younger age, or belonging to more financially vulnerable sectors, like services—experience significantly larger and more persistent productivity declines in response to monetary tightening. The asymmetry in responses further underscores the disproportionate harm contractionary shocks cause, as expansionary policies fail to generate offsetting productivity gains.

Our paper has implications for monetary policymakers and financial supervisors. First, we highlight the need for central banks to carefully consider the heterogeneous effects of monetary policy across firms with varying financial conditions. Tightening monetary policy in environments where firms face significant financial frictions can exacerbate productivity slowdowns, thereby dampening the broader economy's long-term growth potential. Second, we underscore the importance of policy measures that aim to alleviate financial frictions, such as improving access to credit for small and financially constrained firms, which could mitigate the adverse effects of monetary tightening on productivity, supporting more balanced and resilient economic outcomes.

**Appendix Table: Distribution of Firms Across Emerging Market Economies**

<b>Economy</b>	<b>Share (%)</b>	<b>Economy</b>	<b>Share (%)</b>
Bangladesh	0.13	Latvia	1.01
Bosnia and Herzegovina	0.03	North Macedonia	9.07
Bulgaria	0.04	Malaysia	0.06
People's Republic of China	7.95	Nigeria	0.09
Czech Republic	0.02	Pakistan	0.48
Estonia	0.03	Philippines	0.09
Greece	15.84	Poland	0.50
Hong Kong, China	0.19	Romania	0.19
Croatia	0.06	Russian Federation	38.82
Hungary	3.93	Singapore	0.03
Indonesia	0.65	Serbia	0.08
India	0.26	South Africa	0.14
Iran	0.05	Sri Lanka	0.11
Israel	0.25	Taipei, China	0.26
Jordan	0.03	Ukraine	2.77
Republic of Korea	16.01	Viet Nam	0.82

Notes: This table shows the distribution of firms across our sample EMEs. The total number of firms is 42,096.

Source: Authors' calculations.

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## Monetary Policy and Corporate Productivity in Emerging Markets

This paper examines how monetary policy shocks affect firm-level productivity in 32 emerging markets from 2000 to 2023, using panel local projections and firm-level data. Exogenous shocks are identified via a forward-looking Taylor rule. Results show that contractionary shocks significantly reduce productivity, especially for firms with high financial frictions, low market power, younger age, or those in vulnerable sectors like services. These firms face deeper, longer-lasting losses. Notably, expansionary shocks do not produce equivalent productivity gains, revealing asymmetric effects.

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