Firm Market Power Channel of Monetary Policy Transmission*

Nishant Kashyap Prasanna Tantri

January 29, 2025

Abstract

We ask whether monetary policy shocks can influence market concentration levels in industries due to their disproportionate impact on the borrowing capacity of financially constrained firms. Using a natural experiment in India that made firms having investments in plant and machinery above a threshold limit eligible for a directed lending program, we show that the presence of financially constrained firms influences the responsiveness of market concentration levels to monetary policy shocks. A rate hike (cut) disproportionately impacts financially constrained firms and leads to an increase (decrease) in the power of unconstrained firms in the industry. Thus, a rate hike (cut) is associated with an increase (decrease) in markups, leading to a slowdown in the transmission of monetary policy shocks to prices. Thus, we highlight a hitherto unexplored channel—the market concentration channel—of transmission of monetary policy shocks into prices.

Keywords: Monetary Policy Transmission, Financial Constraint, Market Power, Financial Acceleration

JEL Codes: E50, E51, E58, G21

*Nishant Kashyap (Corresponding author), nishant_kashyap@isb.edu and Prasanna Tantri, prasanna_tantri@isb.edu are from Indian School of Business, Gachibowli, Hyderabad, India. We thank the Center for Analytical Finance, Indian School of Business for providing the data and the necessary financial assistance for this project. The usual disclaimer applies.

1 Introduction

In the backdrop of recent literature highlighting an increase in market concentration levels,[1] researchers have started examining the impact of market concentration on cost pass-throughs and the transmission of monetary policy actions (Acharya et al. (2023); Bräuning et al. (2023); Wang and Werning (2022); Baqaee et al. (2024)).[2] In parallel, the literature on financial acceleration has established that monetary policy shocks have a higher impact on financially constrained firms due to changes in those firms' net worth (Kiyotaki and Moore (1997); Bernanke (1999); Holmstrom and Tirole (1997); Gertler and Gilchrist (1994); Bernanke et al. (1994)). Combining the insights from the above two strands of literature, we examine the impact of monetary policy shocks on industry concentration through the financial acceleration channel. We also study the consequent impact of the responsiveness of prices to monetary policy shocks amidst changes in industry concentration due to changes in financial constraints faced by small firms.

The following thought experiment summarizes our findings. A monetary policy shock disproportionately impacts firms whose maximum borrowing capacity is linked to their net worth ("constrained firms") (Kiyotaki and Moore (1997)). Consequently, the presence of constrained firms alters the market power of unconstrained firms following a monetary policy shock. A change in power of the unconstrained firms impacts their markups and sensitivity of their prices to monetary policy shocks (Wang and Werning (2022); Baqaee et al. (2024)). Thus, our key insight is that the sensitivity of prices to monetary policy shocks depends on the presence of constrained firms that are impacted by the financial accelerator, and the channel is a change in industry concentration. For instance, consider a negative (positive) demand shock arising from a rate hike (cut). Our point is that due to the financial accelerator effect, the borrowing capacity of the constrained firms is likely to be negatively

[1] Gutiérrez and Philippon (2017); De Loecker et al. (2020); Autor et al. (2020); Barkai (2020); Grullon et al. (2019)

[2] In fact, the Federal Reserve Bank of Kansas City sponsored a symposium titled "Changing Market Structures and Implications for Monetary Policy," Aug. 23-25, 2018, in Jackson Hole (Willis (2018))

(positively) impacted. Consequently, the market power of unconstrained firms is likely to increase (decrease), leading to an increase (decrease) in markups. This moderates the decline (increase) in prices in response to a negative (positive) demand shock induced by a rate hike (cut) (Baqaee et al. (2024)).

A major identification concern for our study is that market concentration itself could cause financial constraints for some firms. Further, market concentration and financial constraints could be influenced by factors that have an impact on the transmission of monetary policy changes. To overcome the above challenges, we use an exogenous change to India's priority sector lending program (PSL). Under the program, banks in India are mandated to allocate at least 40% of the total credit to "priority sectors" (Bhue et al. (2016)). Apart from agriculture, affordable housing, and lending to weaker sections of society, lending to small and medium firms (SMEs) also qualifies under the definition of priority sector. Banks face significant penalties for not fulfilling the PSL mandate.

For the purpose of this program, small firms are identified based on their investment in plant and machinery. In September 2006, the Government of India altered the SME definition by increasing the investment threshold from Indian Rupee (INR) 10 million in plant and machinery to INR 50 million. Consequently, firms with an investment between INR 10 and 50 million became eligible for priority sector lending. Banerjee and Duflo (2014) show that firms that get included in the priority sector experience a significant reduction in financial constraints and increase their revenue in general. We find similar results: banks increase the supply of credit to the treated firms after the redefinition.

As explained in the thought experiment above, our first hypothesis is that the release of financial constraints slows down the working of the financial accelerator channel as banks become more willing to lend to priority sector borrowers. Banks' willingness may manifest in the form of relaxing loan-to-value or other constraints. Extending the above thesis to the event we study, we expect the release of financial constraints to make borrowings of erstwhile constrained firms less dependent on the value of their net worth. Therefore, their borrowings

become relatively less sensitive to monetary policy shocks.

To identify the effect, we compare the newly eligible firms with investments in plant and machinery between INR 10 and 50 million before the event ("the treated group") and similar firms with investments in plant and machinery between 50 million and 100 million before the event ("the control group") using a differences-in-differences framework. We identify monetary policy shocks using the unexpected reaction of the Mumbai Inter-Bank Overnight Rate (MIBOR) to monetary policy changes (Bujunoori et al. (2024)). For the purpose of the above tests, we obtain loan-level data from the Ministry of Corporate Affairs (MCA), the government of India. We obtain data on the financial variables of firms from the Prowess database maintained by the Center for Monitoring Indian Economy (CMIE). Finally, we obtain data on MIBOR and monetary policy changes from the Reserve Bank of India (RBI), the Indian Central Bank.

In our first stage test, we find that the sensitivity of total borrowings of treated firms to a 25 basis points monetary policy shock reduces differentially by 32%. Given that the treated and control firms are similar, our results cannot be explained by the demand channel. This is likely due to the differential working of the financial accelerator channel after a change in financial constraints.

We next examine whether the release of financial constraints changes the responsiveness of industry concentration to monetary policy shocks. The idea here is that because the previously financially constrained firms are now less affected by monetary policy shocks, the market power of the unconstrained firms in their industry should also become less sensitive to monetary policy shocks. To identify the above effect, we first calculate the exposure of each industry to treated firms just before the event. The exposure is measured as the proportion of total assets of an industry belonging to the treated firms. We obtain the required data from the annual survey of industries (ASI) conducted by the National Sample Survey Office (NSSO), which falls under the Ministry of Statistics and Programme Implementation

(MOSPI). We use the Herfindahl Index (HHI) to measure industry concentration.[3]

We find that a one standard deviation increase in the exposure to treated firms reduces the sensitivity of industry concentration to a 25 basis points monetary policy shock by 55 basis points after the event when compared to before. The change represents an economically meaningful 3% of the median industry concentration before the event. Thus, a rate increase (decrease) in the post-event period, when firms are less constrained than before, leads to a lower increase (decrease) in industry concentration.

Our final hypothesis is that the change in sensitivity of industry concentration caused by changes to financial constraints impacts the sensitivity of prices to monetary policy shocks. We use the fact that Indian accounting standards mandated firms to disclose product-level gross revenues to calculate prices at the product level (Khandelwal (2010), De Loecker et al. (2016), Bau and Matray (2023)). The revenue so disclosed is before any trade or other discounts and, therefore, is not impacted by trade terms such as quantity, trade credit, etc. Using the above data, we examine the impact on markups. We calculate markups following the method suggested by De Loecker et al. (2020). However, the disclosure stopped in 2011 due to India aligning its accounting standards with US GAAP and IFRS. Hence, our sample period ends in 2011.

An increase in industry concentration could reduce the sensitivity of prices to changes in demand (Baqaee et al. (2024)). In other words, a decline in prices in response to rate increases is lower in industries having financially constrained firms as the power of unconstrained firms increases with the rate hikes. Higher power leads to higher markups. The result is symmetric with rate cuts. There are two forces at work here. The first force comes from demand, and the second one is from markup changes. Our thesis is that as industry concentration changes, the change in markups partly offsets the change in price that would have been caused by demand alone.

In line with the above thesis, we find that after the release of financial constraints due to

[3]We define industries at 4-digit National Industrial Classification (NIC) code because the unmasked identifier of industries is available in the ASI data at that level.

the relaxation of the PSL definition, there is (i) a decrease in the sensitivity of markups and (ii) an increase in the sensitivity of prices to monetary policy shocks in industries having a higher level of presence of treated firms. Specifically, one standard deviation higher presence of treated firms increases the price sensitivity to a monetary policy shock of 25 basis points by 15%. Thus, in line with our thesis, changes in financial constraints impact the responsiveness of prices to monetary policy shocks by affecting industry concentration.

In the second part of the paper, we look at the heterogeneity in impact. In the first set of tests, we examine firms with access to internal capital markets. Given that these firms are likely to be relatively less financially constrained (Almeida and Wolfenzon (2006); Buchuk et al. (2014); Almeida et al. (2015)), we hypothesize that their market power should be more sensitive to monetary shocks in industries with higher presence of financially constrained firms. Accordingly, we find that our results are stronger for firms with access to internal capital markets operating within industries that are more exposed to the treated firms. Second, we examine heterogeneity from the banks' side. We expect our results to be stronger when the bank involved regularly struggles to meet the PSL targets. Such a bank is likely to relax credit more for treated firms than a bank that is already meeting the PSL targets comfortably (Bhue et al. (2016)). Our results are in line.

We then address concerns regarding our interpretation of the results. First, a reader may worry that the PSL redefinition merely reallocates credit from firms with INR 0-10 million in plant and machinery to firms with INR 10-50 million investments. As stated above, PSL involves lending to several categories of borrowers and not just to small firms. Thus, additional credit to the treated firms need not come from a reduction in credit to other small firms. In fact, we do not find a significant decline in the flow of credit to firms with investment in plant and machinery between INR 0-10 million, after the event. Also, to address any residual concerns, we control for the proportion of firms having investment in plant and machinery between INR 0-10 million at an industry level. Our results go through.

Further, we rule out the possibility that our results are due to the zombification of the

economy induced by forbearance and zombie firms using subsidies to keep prices low (Acharya et al. (2024); Caballero et al. (2008)). Our results are driven by healthy firms not changing their prices. In fact, we exploit the cross-sectional variation in the presence of zombie firms in industries and find that their presence does not impact our results. We also use alternative definitions of industry concentration based on the proportion of sales contributed by the top 3 and top 5 industries (Gutiérrez and Philippon (2017)). Our results go through. Moreover, we conduct an external validation test using a subsequent increase in PSL threshold due to the redefinition of small enterprises eligible for PSL. Our findings remain qualitatively similar. Finally, we show the robustness of our results using an alternative definition of monetary policy change.

In sum, we find that the presence of the financial accelerator effect can slow down the transmission of monetary policy to prices by changing the level of industry concentration. Our results can explain the incomplete pass-through of monetary policy changes to prices, especially when financial constraints are likely higher.

We contribute to the recent literature that examines the relationship between industry concentration and monetary policy pass-throughs. For instance, Wang and Werning (2022) argue that increased market concentration leads to higher price stickiness and flattens the Philips curve. Similarly, in Baqaee et al. (2024), prices of relatively more efficient firms that charge high-mark-ups are less sensitive to demand shocks than those of less efficient firms that charge low-mark-ups. Thus, concentration improves resource allocation and productivity and reduces inflation in response to a positive demand shock induced by a rate cut. In Afrouzi (2024), rational inattention to competitors' prices of firms operating in less competitive industries increases price stickiness and non-neutrality with concentration. In Meier and Reinelt (2024), higher markups are associated with higher price stickiness, but the causality flows from price stickiness to markups: firms with price stickiness have higher markups for precautionary reasons. Therefore, a monetary policy shock increases the markup dispersion and reduces the efficiency of resource allocation.

In contrast, some studies find that higher concentration is associated with higher pass-through of costs to prices. For instance, in Bräuning et al. (2023), industry leaders try to maintain their margins when costs go up. Therefore, an increase in industry concentration leads to a higher pass-through of costs. Acharya et al. (2023) also find similar results. In their framework, a cost shock first leads to higher inflation expectations that stick even after the original shock disappears. Next, search frictions increase with an increase in inflation expectations, leading to lower elasticity of demand. Consequently, firms with pricing power increase markups. Thus, the pass-through of cost shocks increases with increased concentration. Duval et al. (2024), find that firms' market power dampens the response of their output to monetary shocks. However, they also find the relative price responsiveness of high and low-markup firms to a demand shock is not very different.

In contrast to the above studies that take industry concentration as exogenous, we show that monetary policy shocks could impact industry concentration itself in an environment involving financial frictions. The amplification of the impact of monetary policy shocks on constrained firms by the financial accelerator channel is the mechanism. Accordingly, we find an increase (decrease) in industry concentration in response to a contractionary (expansionary) monetary policy. Finally, we find that a reduction (increase) in industry concentration is associated with higher (lower) responsiveness of prices to monetary policy shocks in the presence of financial constraints.

We also contribute to the literature on financial acceleration. In Kiyotaki and Moore (1997), due to credit market frictions, the borrowing capacity of constrained firms depends on their net worth. A demand shock, including a monetary shock, impacts firms' borrowing capacity by influencing their net worth. This can have a spiraling effect as the current borrowing capacity influences future net worth, which influences future borrowing capacity. Holmstrom and Tirole (1997) document that entrepreneurs choosing private benefits over maximizing the value of the project is the friction that links net worth to lending. A bank can relax these constraints by monitoring. However, a bank needs to have its own capital to be

a credible monitor. Thus, the financial accelerator effects depend on both firm and bank net worth. Several other studies have robustly established the financial accelerator phenomenon both theoretically and empirically (Bernanke and Gertler (1995); Bernanke (1999); Bernanke et al. (1994); Gertler et al. (2007); Gertler and Gilchrist (1994)). In contrast to the financial accelerator logic described above, Ottonello and Winberry (2020) show that firms facing lower (higher) default risk are more likely to show a higher responsiveness of investments to monetary policy shocks. The results are driven by relatively flatter (upward-sloping) marginal cost curves faced by firms with low (high) default risk.

While most of the extant studies on financial accelerators focus on the impact on constrained firms, we study the impact of financial accelerators on industry concentration and the price responsiveness to monetary policy shocks of unconstrained firms. As noted above, we show that financial accelerators can influence the price sensitivity of unconstrained firms by altering industry concentration.

Finally, we contribute to the broader literature that studies the impact of financial frictions on inflation. Acharya et al. (2024) show that undercapitalized banks providing subsidized credit created a disinflationary impact in the Euro area during the Global Financial Crisis. Subsidized credit creates excess supply and dampens prices. Gilchrist et al. (2017) and Meinen and Soares (2022) show that liquidity-constrained firms in the US increased prices in 2008, while their unconstrained counterparts cut prices. The results are due to liquidity-constrained firms prioritizing the preservation of internal liquidity over growth in customer markets. De Almeida (2015) finds similar results for the Euro area. In contrast, Kim (2021) shows that firms facing a credit crunch reduce prices to decrease their inventory holding and generate additional cash flow from product markets. Abbate et al. (2023) show that contractionary financial shocks can temporarily increase inflation by acting as supply shocks. Their result is in line with the "cost channel" in Barth et al. (2001). D'Acunto et al. (2018) document that price-sticky firms are financially constrained and have lower leverage. They further show that the relaxation of financial constraints is associated with an increase

in the financial leverage of price-sticky firms.

We contribute to this literature by showing that the presence of financially constrained firms slows down the transmission of demand shocks to prices by altering industry concentration. Further, almost all extant studies on financial frictions examine crisis periods. We add to this literature by showing that financial frictions can have an impact on monetary policy transmission into prices even during normal times.

2 Institutional Details

2.1 Priority Sector Lending

The Reserve Bank of India (RBI) mandates the scheduled commercial banks in India to extend 40% of their net credit to sectors considered as priority sectors. The major categories of credit that come under the purview of priority sector lending (PSL) are credit extended to agricultural units, small enterprises, and other purposes such as education, housing, and social infrastructure projects. While some priority sectors, such as agriculture, have their individual targets (18% of net credit), others, such as credit for purposes of small enterprises, education, and social infrastructure, are fungible. Hence, the banks have some level of autonomy in the distribution of credit between different categories of priority sectors.

The RBI monitors the banks' compliance with the priority sector guidelines on a quarterly basis to ensure a continuous flow of credit to the priority sectors. In the event of non-compliance, the banks must deposit the shortfall in the Rural Infrastructure Development Fund (RIDF) or other funds as directed by the RBI. The interest rate paid on such funds is decided by the RBI and is typically 200 to 500 basis points lower than the market interest rate.[4] Moreover, the non-compliance is taken into account by the RBI while granting regulatory clearances/approvals for various purposes.[5]

[4]See: `https://www.nabard.org/ftrcontent.aspx?id=539`

[5]For instance, banks need the RBI's approval for basic activities such as opening a branch, extending management's tenure, etc. PSL non-compliance can be held against the bank while granting these approvals.

The PSL program defines small enterprises separately for manufacturing and services firms. For manufacturing firms, the definition is based on gross plant and machinery, while for services firms, the definition is based on investments in equipment.[6] The data related to gross plant and machinery are available from firms' annual reports, which allows us to identify small enterprises under the purview of PSL from among the manufacturing firms. However, the data on investments in equipment are not available for most firms. Therefore, we focus our analysis on the manufacturing firms.

Our identification strategy relies on a regulatory change related to the ceiling on the size of small enterprises under the priority sector lending regulation. Before 2006, credit extended to manufacturing firms with gross plant and machinery up to Indian Rupee (INR) 10 million came under the purview of PSL. In June 2006, the federal Ministry of Micro, Small, and Medium Enterprises defined manufacturing firms with gross plant and machinery up to INR 50 million as Micro and Small enterprises through the MSME Act (2006). Subsequently, in September 2006, the coverage of PSL was expanded to cover all Micro and Small enterprises, that is, firms with gross plant and machinery up to INR 50 million. The regulation potentially increased the credit access to firms with gross plant and machinery between INR 10 million to 50 million.[7]

The 2006 regulatory change in the threshold on gross plant and machinery for enterprises eligible under PSL was not the first such change. There have been such changes before 2006. For instance, the PSL threshold for manufacturing enterprises was revised from INR 6.5 million to INR 30 million in 1998 (Banerjee and Duflo (2014)). However, the threshold was subsequently revised downwards to INR 10 million within 2 years in 2000. In contrast, the 2006 regulatory change in threshold lasted until 2015. Hence, the 2006 change provides us with sufficient time after the event to study its effects. Moreover, as we subsequently elaborate in the next section, we rely on the disclosure of product quantity data for estimating

See: https://www.rbi.org.in/scripts/BS_ViewMasDirections.aspx?id=11959#Others

[6]See: https://samadhaan.msme.gov.in/WriteReadData/DocumentFile/MSMED2006act.pdf

[7]We subsequently show in section 4.1 that the change in regulation indeed resulted in significantly higher credit flow to aforementioned firms.

inflation in prices at the firm level, which is crucial to test our hypotheses. The mandatory disclosure of product quantities and prices lasted until 2011. Therefore, we can not use regulatory changes in definitions after 2011 for our analysis.

2.2 Product-level Disclosure

As alluded to in the Introduction, a central hypothesis of our paper is related to the firm-level inflation in prices. To determine price inflation at the firm level, we require product-level prices for the firms. We could obtain the above data in India as Indian GAAP mandated the firms to disclose the requisite data. Specifically, before 2011, Schedule VI of The Companies Act 1956 required that manufacturing firms in India disclose product-level information on sales quantity and sales value in INR in their annual report.[8] The reported sales value is before any trade discount. Hence, the sales values are unaffected by any trade discounts.

The above mandate on manufacturing firms was a unique feature of the Indian accounting standards. The US GAAP and the IFRS, which are the most widely used accounting standard in the US, UK, and Europe, do not require firms to disclose product-level information in annual reports. However, to make the Indian accounting standards consistent with International standards, the Ministry of Corporate Affairs revised the standards through the Companies Act, 2011. The new accounting standard, which closely follows IFRS, discontinued the mandatory disclosure of product-level data. It just mandates the firm to disclose operating revenues under the classification of revenue from products, revenue from services, and revenue from other operating income. Therefore, our sample period for the main tests stop in the year 2011. We leverage the above product-level data on sales quantity and sales value until 2011 to estimate the firm-level inflation, as elaborated subsequently in section 3.

[8]This dataset has been used by several studies in the literature and is representative of the organized manufacturing sector operating in India (Goldberg et al. (2010a), Goldberg et al. (2010b)).

3 Data

3.1 Data Sources and Variables

Our data come from the following different sources: 1) the Prowess database maintained by the Center for Monitoring Indian Economy (CMIE), 2) the Annual Survey of Industries (ASI) conducted by the National Sample Survey Office (NSSO), 3) the Registry of charges from the Ministry of Corporate Affairs (MCA), and 4) website of the RBI. Below we elaborate on the process followed in obtaining the data from each of the above databases.

First, we obtain the firm-level financial information, bank-level financial information, and product-level sales and quantity data from the Prowess database maintained by the Center for Monitoring Indian Economy (CMIE). The specific firm-level data that we obtain from prowess are: the gross plant and machinery, firms' borrowings, total assets, total capital, total sales, raw material expenses, packaging expenses, measures of firms' profits, interest expense, gross property, plant, and equipment, current assets, current liabilities, and cash balance from the "Standalone Annual Financial Statements" section of the database. The bank-level financial data are: total assets, total loans and advances, and total PSL advances.

In addition, we obtain the product-level data on sales quantity and sales value in INR from the prowess database.[9] We divide the sales value with sales quantity to obtain the product-level prices (Khandelwal (2010), De Loecker et al. (2016), Bau and Matray (2023)). To estimate the firm-level price inflation, first, we calculate the year-on-year percentage change in prices for each product. Then, we estimate the weighted average of the year-on-year change in price across all the products within a firm, weighing the change in price of each product with the sales value in INR of that respective product. The above estimate is the firm-level price inflation that we use in our further analysis. Finally, we also obtain the Related Party Transactions (RPT) disclosed by the firms in their annual reports from the prowess database.

[9]INR stands for Indian Rupee.

Second, to define the industry exposure to firms that became newly eligible for PSL in 2006, we obtain firm-level data on investments in gross plant and machinery from the Annual Survey of Industries (ASI) conducted by the National Sample Survey Office (NSSO). The NSSO conducts the survey annually at the respective firms' facilities. The questionnaire in the survey covers various financial aspects of the firm's facilities, such as gross plant and machinery, sales of various products, employment statistics, gross value added by the facility, etc. The questionnaires are categorized into 10 blocks: A to J, where each block covers a different aspect of firms' financial information. The data also contains the unique ID of the facility and the 4-digit NIC code of the respective firm. We obtain the data on gross plant and machinery from block C of the survey.

We use the ASI data to assess industry exposure and the Prowess database for tests involving financial variables because of the nature of the two databases. The ASI conducts a census of establishments and, therefore, provides a better picture of the extent of small firms in an industry. The Prowess database compiles data based on financial statements reported by firms to the Ministry of Corporate Affairs. Therefore, its coverage of firms on the extensive margin is limited. However, since the data obtained from Prowess is audited, the database is better suited for tests involving financial variables as these numbers are consistently reported over time.

To define the ex-ante exposure of industries to the 2006 regulatory change, we first identify the firms in the ASI database with gross plant and machinery between INR 10 million and 50 million in 2005. We then add up the gross plant and machinery of firms with gross plant and machinery between INR 10 million to 50 million within each NIC 4-digit. Next, we add up the gross plant and machinery of all firms within each NIC 4-digit. We then take the ratio between the total gross plant and machinery of the firms with gross plant and machinery investments between INR 10 million and 50 million and the total gross plant and machinery within the industry in 2005. The above ratio is the exposure of the respective industries to the firms that became newly eligible for PSL after 2006.

Third, we obtain the loan-level data at the bank-firm level from the Ministry of Corporate Affairs (MCA). All scheduled commercial banks in India have to register the charges related to secured loans with MCA, failing which they lose some of the benefits of the security against their loans (Chopra et al. (2021)). Therefore, it is reasonable to expect that almost all of the secured loans are registered with MCA. The database provides the identities of lenders and borrowers, loan amount, the date on which the loan was extended, the date on which the loan was repaid, and the date of modification in the loan contract, if any.

Finally, we obtain the data related to Mumbai Inter-Bank Overnight rates (MIBOR), the dates of monetary policy announcements, the GDP growth rate, and the CPI inflation from the website of the RBI. The MIBOR data and the dates of monetary policy announcements are used to arrive at the measure of monetary policy shock, as elaborated below.

3.2 Measure of Monetary Policy Shock

The monetary policy of the central bank is influenced by the current and expected macroeconomic variables. Hence, such variables may be endogenous to the policy rates (Nakamura and Steinsson (2018), Romer and Romer (2004)). The above endogeneity may lead to bias in estimating the transmission of policy rates to firm-level outcomes. Nakamura and Steinsson (2018) succinctly lay out the identification threat due to reverse causality in such settings - "Output and interest rates are jointly determined. An assumption must be made about whether the contemporaneous correlation between these variables is taken to reflect a causal influence of one on the other or the reverse."

A potential solution to the endogeneity issue is to use the unexpected component of the monetary policy change. The literature uses the movement in interest rate futures around monetary policy announcements to capture the unexpected component of monetary policy (Gorodnichenko and Weber (2016), Hanson and Stein (2015)). However, such an interest rate futures market was non-existent in India during the sample period. Therefore, any price discovery is expected to occur in the spot markets. We rely on the daily MIBOR

data to estimate the monetary policy shock.[10] MIBOR is estimated by polling a representative panel of 30 banks and primary dealers. Note that, the MIBOR is market-driven with no direct intervention by the central bank. Therefore, it is reasonable to expect that the present macroeconomic environment and future expectations about macroeconomic trajectory are ex-ante priced in MIBOR. Any change in MIBOR on the day of the monetary policy announcement is plausibly the exogenous component of monetary policy change.

We first estimate the change in overnight MIBOR on the day of the monetary policy announcement. Finally, we cumulate the changes corresponding to each monetary policy announcement within the year to arrive at a yearly measure of monetary policy shock - MP_shock. The average MP_shock during the sample period is 15 basis points.

3.3 Sample Construction and Summary Statistics

The institutional features discussed above determine the choice of our sample period, which spans from 2001 to 2011. As discussed in Section 2.1, there was a downward revision of the PSL limit in 2000. To avoid confounding effects from this change, we start our sample period in 2001. Moreover, we previously elaborated that mandatory reporting of product-level data ceased in 2011. Therefore, we end our sample in 2011.

We estimate our regression models using data at three levels in our analysis: firm-year, firm-bank-year, and industry-year levels. Overall, there are 37,081 unique firms in the sample obtained from the Prowess database for our sample period. From these, we limit our analysis to 16,495 manufacturing firms, of which we are able to estimate firm-level price inflation for 9,756 unique firms. These firms result in 54,795 firm-year observations in our panel. Of these, 5,075 unique firms and 14,523 firm-years have gross plant and machinery between INR 10 million and INR 100 million. In the subsequent tests in section 4, where treatment is defined at the firm level, we limit the sample to firms with gross plant and machinery between INR 10 million and INR 100 million.

[10] We do not have access to the MIBOR data at minute-by-minute frequency. Therefore, we use the daily MIBOR data to create the measure of monetary policy shock.

Of the 16,495 manufacturing firms, 8,950 have outstanding secured loans from 50 scheduled commercial banks. These firm-bank pairs result in 143,360 observations in the firm-bank-year panel. Of these, 4,391 unique firms and 30,017 firm-bank-years have gross plant and machinery between INR 10 million and INR 100 million. Finally, the firms in the sample belong to 114 unique industries defined at the NIC four-digit level. These 114 industries result in 1,241 observations in the industry-year panel. We present the sample construction in Table 1.

The average gross plant and machinery in the Prowess sample is INR 1268 million. The average exposure of industries to PSL-eligible firms increased from 17% of total plant and machinery to 29% of total plant and machinery after the 2006 regulatory change. On average, about 10% of the assets in these industries belong to firms that became newly eligible for PSL after the regulatory change. The average aggregate borrowing at the firm level in our sample is INR 336 million. At the loan level, the average new secured borrowing by firms is INR 68 million. The average (median) price inflation of firms in our sample is 8.33% (4.38%). Finally, with respect to banks, the average loan book is about INR 372 billion, of which about INR 116 billion is extended to PSL on average. We present the summary statistics in Table 2 and define the variables in Table A1 of the online appendix.

4 Main Results

4.1 First Stage: Firms' Borrowing

As elaborated in section 1, our thesis related to the change in the transmission of monetary policy after the 2006 regulatory change in the PSL cap is based on the premise that it relaxed credit constraints for firms with gross plant and machinery between INR 10 million and INR 50 million. Therefore, we conduct a first-stage test to examine whether such firms are indeed able to borrow significantly more than other similar firms. Banerjee et al. (2014) demonstrate this effect using the 1998 change in PSL limits. Since we use a different event, we

conduct a test in the spirit of Banerjee and Duflo (2014) to evaluate whether the regulatory change leads to an increase in borrowing. We use firms' borrowing data from the Prowess database to estimate the following specification for the test. We estimate the model using the firm-year level panel.

$$Y_{i,t} = \alpha + \beta_1 \times Post_t \times Treat_{i,t} + \beta_2 \times Post_t + \beta_3 \times Treat_{i,t} + \beta_4 \times X_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t} \quad (1)$$

Where $Y_{i,t}$ represents the natural logarithm of new borrowing by firm i in year t. New borrowing is estimated as the difference between the firm's outstanding loan in the current year and the previous year. The variable *post* takes a value of one after 2006 and zero otherwise. The variable *treat* takes a value of one for firms with gross plant and machinery between INR 10 million and INR 50 million in the previous year and zero otherwise. The variable $X_{i,t}$ represents the firm-year level vector of control variables. Following Meier and Reinelt (2024); we include the following control variables: total assets, leverage ratio (total borrowing to total assets ratio), current ratio, and profit margin of the firm (profit before interest and taxes to sales ratio).[11] The variables δ_i and γ_t represent firm and year fixed effects, respectively. The fixed effects control for any time-invariant firm-level shocks and time-varying shocks affecting all firms.

To further control for the endogenous effects of firm characteristics, we restrict the data to firms of comparable sizes. We limit the sample to firms with gross plant and machinery ranging from INR 10 million to INR 100 million. The above sample restriction ensures that the treated and control firms face similar financial constraint. The coefficient of interest is β_2, which represents the differential borrowing by the treated firms compared to control firms after the regulatory change.

We present the results in columns 1 and 2 of Table 3. The dependent variable is the

[11] Meier and Reinelt (2024) study the relationship between firms' markup dispersion and monetary policy using firm-year level data similar to our setting.

natural logarithm of new borrowing. The main explanatory variable is an interaction term $post \times treat$. We include the control variables listed above in column 2. We also include firm and year fixed effects in all columns. We find that the coefficient on the interaction term is positive and statistically significant across both specifications. In the full-fledged specification, treated firms experience a 55% differential increase in borrowing compared to control firms after the regulatory change. Thus, the affected firms indeed receive higher credit after the increase in the PSL limit in 2006.

Pre-Trend: The underlying identification assumption of the above inference is that the borrowings of treated and control firms would have followed similar trajectories in the absence of the regulatory change. To test the above parallel trend assumption, we estimate the following event study specification to identify and rule out any pre-existing trends.

$$\begin{aligned} Y_{i,t} =& \alpha + \sum_{y=2001, y\neq 2005}^{i=2011} \beta_{1y} \times Year_y \times Treat_{i,y} + \beta_2 \times \sum_{y=2001, y\neq 2005}^{i=2011} \beta_{2y} \times Year_y \\ &+ \sum_{y=2001, y\neq 2005}^{i=2011} \beta_{3y} \times Treat_{i,y} + \beta_4 \times X_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t} \end{aligned} \tag{2}$$

Where the variable $Year_y$ takes a value of one in year y and zero otherwise. The variable $treat_{i,y}$ takes a value of one for firms with gross plant and machinery between INR 10 million and INR 50 million in year $y-1$ and zero otherwise. The rest of the variables are the same as in equation 1.

We plot the coefficients β_{1y} in panel A of Figure 1. We find that the differential increase in borrowing by treated firms starts only in 2006. We do not observe any differential change in borrowing by treated firms prior to the expansion of PSL limits for small enterprises. Overall, the results demonstrate a differential increase in borrowings among firms newly eligible for PSL following the regulatory change.

4.2 Monetary Policy Transmission to Lending

Figure 2 outlines the thought experiment behind our central question of how market power mediates the transmission of monetary policy shocks to prices. Step 1 in the figure illustrates that monetary policy rate changes disproportionately affect financially constrained firms due to financial acceleration effects (Kiyotaki and Moore (1997), Bernanke (1999)). To illustrate, consider a scenario where monetary policy tightens. A tightening of monetary policy triggers a negative demand shock, reducing firms' net worth. This decrease in net worth reduces the borrowing capacity of financially constrained firms, leading to lower investments. The decline in investments results in lower demand for assets by financially constrained firms. For the markets of the assets to clear, the user cost of the assets has to be reduced. Hence, the market price of the constrained firms' assets falls, further reducing their net worth and kicking off the second round acceleration of the initial demand shock. This spiraling effect amplifies the effect of monetary policy (Kiyotaki and Moore (1997)). The above dynamic operates in reverse when policy rates are loosened.

Our identification strategy examines the impact of changes in PSL thresholds on the financial acceleration channel described above. As documented in section 4.1, newly eligible firms borrowed more after the PSL threshold change, likely relaxing their financial constraints (Kiyotaki and Moore (1997), Bernanke (1999), Kashyap (2024)). Our hypothesis is that the relaxation of financial constraints results in lower sensitivity of lending to monetary policy shocks.

To test the above thesis, we create a bank-firm-year level panel of outstanding loans using the loan-level data from MCA. To construct this panel, we begin with all firm-bank pairs with outstanding loans in 2001. We then add a new firm-bank pair whenever a lending relationship begins and remove pairs when the borrower fully repays the outstanding loan. This process continues until 2011, resulting in a firm-bank-year sample of outstanding loans from 2001 to 2011. For each firm-bank-year observation in the panel, we also include the loan amount borrowed by the firm from the lender in that year. We estimate the following

specification using this firm-bank-year level panel to test the thesis.

$$
\begin{aligned}
Y_{i,j,t} =& \alpha + \beta_1 \times treat_{i,t} \times post_t \times MP_shock_t + \beta_2 \times treat_{i,t} \times MP_shock_t + \beta_3 \times post_t \\
&+ \beta_4 \times treat_{i,t} + \beta_5 \times MP_shock_t + \beta_6 \times post_t \times MP_shock_t + \beta_7 \times treat_{i,t} \\
&\times post_t + \beta_8 \times X_{i,t} + \delta_i + \gamma_{j,t} + \epsilon_{i,j,t}
\end{aligned} \tag{3}
$$

Where $Y_{i,j,t}$ represents lending by bank j to firm i in year t. The variable MP_shock represents the aggregated monetary policy shock for the year, as estimated in section 3.2. The variables δ_i and $\gamma_{j,t}$ represent firm fixed effects and bank $\times$ year fixed effects, respectively. These fixed effects account for any time-invariant shocks affecting firms and both time-varying and time-invariant shocks affecting banks. Since our treatment is at the firm-year level, we cannot include firm $\times$ year fixed effects. Therefore we account for firm-level time-varying shocks by including firm-year level control variables listed in section 4.1 and their interactions with MP_shock. These control variables capture any cross-sectional variation in the endogenous effect of monetary policy shocks linked to observable firm characteristics. The remaining variables are defined in section 4.1. We limit the sample to firms with gross plant and machinery ranging from INR 10 million to INR 100 million. The coefficient of interest, β_1, captures the differential change in lending response to monetary policy shocks for treated firms during the post-PSL threshold expansion period.

We present the results in Table 4. In columns 1 and 2, we present results from the Poisson regression. There are a substantial number of instances in our firm-bank-year panel where the loan amount is zero. As Chen and Roth (2024) argue, applying a log transformation in such cases can potentially introduce bias in the economic interpretation of the coefficients. Thus, we use Poisson regression as the main specification. We complement this with OLS regressions in the last four columns. In columns 3 and 4, the dependent variable is the natural logarithm of the loan amount, while in columns 5 and 6, it is an indicator variable that equals one if there is non-negative borrowing by the firm from the bank in that year

and zero otherwise. We include the firm-year level control variables in the even-numbered columns. We also include firm and bank × year fixed effects in all columns.

Across specifications, the coefficient on the interaction term $post \times treat \times MP_shock$ is positive and statistically significant. This result shows that the transmission of monetary policy shocks to lending decreases significantly after the relaxation of smaller firms' financial constraints following the PSL threshold expansion. For illustration, consider column 2. In response to a 25 bps increase in the exogenous component of monetary policy rates, the reduction in lending is lower by 32% for treated firms after the PSL threshold expansion, and vice versa. This finding highlights an economically significant decline in the transmission of monetary policy shocks to these firms.

4.3 Change in Market Power

4.3.1 Response of Market Concentration to Monetary Policy Shock

Step 2 in Figure 2 highlights how market concentration responds to monetary policy changes. As noted in section 4.2, financially constrained firms are more vulnerable to monetary policy shocks due to financial acceleration effects (Kiyotaki and Moore (1997), Bernanke (1999)). When monetary policy tightens, financially constrained firms contract more than financially unconstrained firms; conversely, when it loosens, constrained firms expand relatively more. As a result, the market share and the power of financially unconstrained firms are likely to increase during monetary tightening and decrease during loosening.

From the above argument, it follows that a regulatory change in the PSL threshold, which relaxes financial constraints for newly eligible small firms, would likely reduce the sensitivity of market concentration to monetary policy shocks. After the regulatory change, the newly PSL-eligible smaller firms are likely to contract less during monetary tightening and expand less during loosening than financially unconstrained firms. The hypothesis that follows is that the relative increase or decrease in the market share of larger firms during monetary policy tightening or loosening is likely to reduce after the regulatory change. We examine

the thesis using the following specification. The data used for estimation are organized at industry-year level.

$$\begin{aligned} Y_{k,t} =& \alpha + \beta_1 \times PSL_exp_k \times post_t \times MP_shock_t + \beta_2 \times PSL_exp_k \times MP_shock_t + \\ & \beta_3 \times post_t + \beta_4 \times PSL_exp_k + \beta_5 \times MP_shock_t + \beta_6 \times post_t \times MP_shock_t \\ & + \beta_7 \times PSL_exp_k \times post_t + \beta_8 \times X_{k,t} + \delta_k + \gamma_t + \epsilon_{k,t} \end{aligned} \tag{4}$$

Where $Y_{k,t}$ denotes the measure of market concentration within an industry k during the year t. We use three measures of market concentration within an industry: the Herfindahl–Hirschman Index (HHI) of the industry, the share of sales by the top 3 firms by sales in the industry, and the share of sales by the top 5 firms by sales in the industry (Gutiérrez and Philippon (2017)). HHI is calculated as the sum of the squares of the market shares of all firms in an industry. As described in section 3, we define an industry at the NIC 4-digit level. The variable PSL_exp represents the industry's exposure to firms with gross plant and machinery between INR 10 million and INR 50 million prior to the regulatory change, as defined in section 3. The variable $X_{k,t}$ represents the same set of control variables as in equation 1 averaged at the industry-year level. The variables δ_k and γ_t represent industry fixed effects and year fixed effects, respectively. All other variables are defined as in equation 3. The coefficient of interest, β_1, captures the differential change in the response of HHI to monetary policy shocks in industries more exposed to treated firms following the increase in the PSL threshold.

We present the results in Table 5. The dependent variable is HHI in column 1, the share of sales by the top 3 firms by sales in column 2, and the share of sales by the top 5 firms by sales in column 3. The primary explanatory variable is the interaction term $PSL_exp \times post \times MP_shock$. The coefficient on the interaction term $PSL_exp \times MP_shock$ is positive and statistically significant. This result indicates that market concentration increases (declines) in response to monetary policy tightening (loosening), as expected. Notably, the coefficient

on $PSL_exp \times post \times MP_shock$ is negative and statistically significant. For a 25 bps increase in the exogenous component of monetary policy rates, the rise in market concentration in response to an increase in PSL exposure by one standard deviation is lower by 55 basis points after the PSL threshold expansion, and vice versa. The coefficient represents an economically significant 3% of the median HHI. This result implies that the responsiveness of market concentration to monetary policy declines in industries more exposed to PSL firms after the regulatory change.

4.3.2 Firm Markups and Monetary Policy Shock

In step 3 of Figure 2, we hypothesize that a change in market concentration should eventually impact markups (Syverson (2019)). Thus, we expect monetary policy tightening (loosening) to result in higher (lower) markups for firms that gain (lose) market share due to the financial acceleration effect. A relaxation of financial constraints for smaller firms could potentially reverse this effect. In particular, the positive relationship between markups and monetary policy changes is likely to weaken following an increase in the PSL threshold. We investigate whether this association diminishes in industries with greater exposure to firms newly eligible for PSL after the regulatory change.

We estimate firm-level markups using the methodology described in De Loecker et al. (2020). To derive the expression for markup, De Loecker et al. (2020) solve the cost-minimization problem of a monopolist firm. Under a competitive benchmark, firms choose to produce until the marginal cost of input is equal to the marginal revenue, which translates to the output elasticity of the input being equal to the revenue share of the input. The deviation from the competitive benchmark drives a wedge between the output elasticity of the input and the revenue share of the input, and the markups charged by a monopolist equals the ratio between the two. The expression is given below.

$$\mu_{i,t} = \theta^{v}_{k,t} \frac{P_{i,t} Q_{i,t}}{P^{V}_{i,t} V_{i,t}}$$

Where $\mu_{i,t}$ is the markup of firm i in year t. $\theta^v_{k,t}$ is the output elasticity of the input v in industry k to which firm i belongs. $P_{i,t}Q_{i,t}$ is the total revenue of the firm and $P^V_{i,t}V_{i,t}$ is the total expense on input v. Following De Loecker et al. (2020), we estimate $\theta^v_{k,t}$ for industry k in year t by regressing the natural logarithm of sales on the natural logarithm of raw material expense and the natural logarithm of property, plant, and equipment within each industry k and year t. The above variables are scaled using the GDP deflator before taking the log transformation. The coefficient on the natural logarithm of raw material expense is the $\theta^v_{k,t}$ for raw material input. The revenue and the raw material expenses for each firm are known. We then use the above formula to calculate markup at the firm-year level.

Having estimated the markup, we test the above thesis by estimating the following specification using data at firm-year level.

$$\begin{aligned} Y_{i,t} =& \alpha + \beta_1 \times PSL_exp_k \times post_t \times MP_shock_t + \beta_2 \times PSL_exp_k \times MP_shock_t \\ &+ \beta_3 \times post_t + \beta_4 \times PSL_exp_k + \beta_5 \times MP_shock_t + \beta_6 \times post_t \times MP_shock_t \\ &+ \beta_7 \times PSL_exp_k \times post_t + \beta_8 \times X_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t} \end{aligned} \tag{5}$$

Where $Y_{i,t}$ is the markup at the firm-year level. The variables δ_i and γ_t are firm and year level fixed effects, respectively. The rest of the variables are as defined in equation 3. The coefficient of interest, β_1, captures the differential change in the response of markup to monetary policy shocks in industries more exposed to treated firms following the increase in the PSL threshold.

We present the estimates in Table 6. The dependent variable is markup estimated above at the firm-year level. The main explanatory variable is the interaction term $post \times PSL_exp \times MP_shock$. We include firm-year level control variables listed in section 4.1 in the even-numbered columns. We leave out the firms with plant and machinery between INR 10 million to INR 50 million (treated firms) to avoid any biases due to the treatment effect on such firms. In columns 3 and 4, we further leave out all the firms that are eligible for

PSL, that is, firms with plant and machinery up to INR 50 million to show that the effect is driven by the larger firms.[12]

We find that the coefficient on the interaction term, $post \times PSL_exp \times MP_shock$, is negative and statistically significant across specifications. The coefficient in column 4 implies that - for a 25 bps increase in the exogenous component of monetary policy rates, the rise in markups in response to an increase in PSL exposure by one standard deviation is higher by about 26% of the median markup after the PSL threshold expansion, and vice versa. Overall, the increase (decline) in markups in response to monetary policy tightening (loosening) dampens significantly after the financial constraints are relaxed due to the increase in the PSL threshold. The result is consistent with a dampened response of market concentration to monetary policy shocks after the regulatory change.

4.4 Response of Price Inflation to Monetary Policy Shock

Step 4 of Figure 2 suggests that monetary policy shocks eventually influence firms' price responsiveness to monetary policy shocks. This arises from two opposing forces. First, the demand-side effect of monetary policy moves prices in the opposite direction of the policy change. Second, changes in markups by unconstrained firms—an increase during tightening and a decrease during loosening — exert pressure on prices in the same direction as monetary policy change. As a result, endogenous changes in markups may dampen the transmission of monetary policy to price inflation.

To test the thesis, we estimate the following specification using a firm-year level panel.

[12]Note that, in the earlier firm-year and firm-bank-year level tests the treatment is defined at firm level. We essentially compare newly eligible PSL firms with other firms. Therefore, we can not leave out the PSL firms in those tests. However, in the test related to markups, and subsequently prices in section 4.4, the treatment is defined at the industry level. Hence, we are able to leave out the PSL firms and see the impact on larger firms present in those industries.

$$
\begin{aligned}
Y_{i,t} =& \alpha + \beta_1 \times PSL_exp_k \times post_t \times MP_shock_t + \beta_2 \times PSL_exp_k \times MP_shock_t \\
&+ \beta_3 \times post_t + \beta_4 \times PSL_exp_k + \beta_5 \times MP_shock_t + \beta_6 \times post_t \times MP_shock_t \\
&+ \beta_7 \times PSL_exp_k \times post_t + \beta_8 \times X_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t}
\end{aligned} \tag{6}
$$

Where $Y_{i,t}$ is the average year-on-year change in price (price inflation) at the firm-year level. The estimation of the above variable using product-level data on sales quantities and values is discussed in section 3. The variables δ_i and γ_t are firm and year level fixed effects, respectively. The rest of the variables are as defined in equation 3. The coefficient of interest is β_1, which captures the differential change in the response of firm-level price inflation to monetary policy shocks in industries more exposed to treated firms following the increase in the PSL threshold.

We present the results in Table 7. The dependent variable is price inflation at the firm-year level. The explanatory variable of interest is the interaction term - $post \times PSL_exp \times MP_shock$. We include firm-year level control variables listed in section 4.1 in the even-numbered columns. We leave out the firms with plant and machinery between INR 10 million to INR 50 million (treated firms) as in section 4.3.2 above. Similar to section 4.3.2, we further leave out all the firms that are eligible for PSL in the last two columns.

As expected, the coefficient on the interaction term, $post \times PSL_exp \times MP_shock$, is negative and statistically significant across specifications. Let us consider full-fledged specification in column 4. We find that for a 25 bps increase in the exogenous component of monetary policy rates, the decline in price inflation in response to an increase in PSL exposure by one standard deviation is higher by about 15% of the median price inflation following the PSL threshold expansion, and vice versa. Overall, the expected negative association between inflation and monetary policy shocks increases significantly after the financial constraints are relaxed due to the increase in the PSL threshold.

5 Heterogeneity Tests

5.1 Firm Heterogeneity by Financial Constraints

As explained through figure 2, our results are likely to be stronger in financially unconstrained firms. We already show in the section 4.4 that our results are driven by relatively larger firms - which are less likely to be financially constrained. In a recent paper, Gürkaynak et al. (2022) document that financial frictions are present in even the larger S&P 500 firms in the US. Therefore, we also consider an alternative definition of financial constraints based on firms' access to internal capital markets.

Extant literature has documented that firms with access to internal capital markets are relatively less financially constrained (Almeida and Wolfenzon (2006); Buchuk et al. (2014); Almeida et al. (2015)). Such firms can obtain internal financing in lieu of external sources of finance. In India, such transactions within internal capital markets are reported by the firms as Related Party Transactions (RPT). The major types of RPTs are listed in Table A2 of the online appendix. We obtain the data on RPT from the Prowess database. We categorize firms that were involved in any RPT transactions during the three years before the 2006 regulatory change in PSL threshold as firms with access to internal capital markets. We then estimate equation 8 separately for firms with access to internal capital markets (unconstrained firms) and firms with no access to internal capital markets (constrained firms).

We present the estimates in Table 8. We present the estimates for the sample of unconstrained firms in panel A and for the sample of constrained firms in panel B. We include firm-year level control variables in the even-numbered columns. We find that the coefficient on the interaction term $post \times PSL_exp \times MP_shock$ is negative and statistically significant in panel A but statistically insignificant in panel B. A t-test for difference in coefficients shows that the coefficients in panel A are significantly larger in magnitude than the corresponding coefficients in panel B. Hence, the results are indeed more pronounced in relatively less constrained firms.

5.2 Bank-Level Heterogeneity

Next, we exploit the heterogeneity across banks in their propensity to expand priority sector lending after the increase in the PSL threshold in 2006. The banks that had very low exposure to PSL before the regulatory expansion in PSL threshold plausibly found it difficult to lend to PSL-eligible borrowers. The reasons for the difficulty in lending to such borrowers could range from the fact that such lenders do not specialize in PSL-eligible borrowers to the limited geographic presence of such lenders. Therefore, when the PSL threshold was expanded in 2006, it would have potentially expanded the opportunity set of PSL-eligible lending relatively more for such constrained lenders. Moreover, such lenders also did not need to substitute away from the PSL-eligible firms from the older regime to lend to newly PSL-eligible firms. Hence, we expect that banks with lower exposure to PSL loans in the pre-regulatory change period would have a higher propensity to expand lending to newly PSL-eligible firms. Hence, the firms that have high exposure to such banks are likely to show a higher change in response of market power to monetary policy shocks and, in turn, a higher change in response of prices to monetary policy shocks.

To test the above thesis, we define firms' exposure to banks with ex-ante small portfolios of PSL loans. We do it in two steps. In the first step, we estimate the average ratio between the bank's PSL lending and total lending in the three years before the increase in the PSL threshold. We categorize the banks in the bottom quartile based on the average ratio as the banks with small portfolios of PSL loans (constrained banks). In the second step, we estimate the ratio between the firms' outstanding loans to banks with small portfolios of PSL loans and the total firms' outstanding loans. The above estimate is the exposure of firms to banks with ex-ante small portfolios of PSL loans.

We then estimate equation 8 separately for firms with non-zero exposure to constrained banks and firms with zero exposure to constrained banks. We present the estimates in Table 9. We present the estimates for the sample of firms with non-zero exposure to constrained banks in panel A and for the sample of firms with zero access to constrained banks in panel B.

We include firm-year level control variables in the even-numbered columns. We find that the coefficient on the interaction term $post \times PSL_exp \times MP_shock$ is negative and statistically significant in panel A but statistically insignificant in panel B. A t-test for difference in coefficients shows that the coefficients in panel A are significantly larger in magnitude than the corresponding coefficients in panel B. Hence, the results are indeed more pronounced in firms exposed to constrained banks.

6 Robustness and Alternative Explanations

6.1 Reallocation of Credit from Pre-Regulation Eligible Firms

A reader may be concerned that the increase in lending to the newly PSL-eligible firms could potentially come at the cost of reduced lending to other smaller firms that were already eligible for PSL - the firms with plant and machinery between INR 0 to 10 million. This concern may be a potential threat to our identification because our identification is based on the premise that the expansion of PSL limits relaxed constraints for relatively smaller firms. In sum, our identification assumes that the PSL expansion does not result in a differential decline in credit to firms with gross plant and machinery below INR 10 million.

We provide two arguments to support this assumption. First, as discussed in Section 2, it is not obvious that the lending to newly eligible borrowers with plant and machinery between INR 10 to 50 million has to come at the expense of borrowers with plant and machinery between INR 0 to 10 million. The banks have significant flexibility in reallocating PSL across different sectors, such as allocating more PSL to the newly eligible firms while reducing PSL in education or social infrastructure. Second, we explicitly test whether firms with gross plant and machinery below INR 10 million experience a differential reduction in credit after the regulatory change. To test this thesis, we estimate the following specification similar to equation 1.

$$
\begin{aligned}
Y_{i,t} =& \alpha + \beta_1 \times Post_t \times Non_treat_PSL_{i,t} + \beta_2 \times Post_t + \beta_3 \times Non_treat_PSL_{i,t} \\
&+ \beta_4 \times X_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t}
\end{aligned} \tag{7}
$$

The variable non_treat_PSL takes a value of one for firms with gross plant and machinery below INR 10 million and zero otherwise. The data is limited to firms with gross plant and machinery up to INR 100 million, excluding those between INR 10 million and INR 50 million (treated firms). In essence, we compare the borrowings of firms with gross plant and machinery below INR 10 million to those with gross plant and machinery between INR 50 million and INR 100 million. The rest of the variables are the same as in equation 1. We present the results in columns 3 and 4 of Table 3, which have a similar structure as columns 1 and 2. The coefficient on the interaction term is positive but statistically insignificant in both columns. We find no differential decline in the borrowings of firms with gross plant and machinery below INR 10 million.

Nevertheless, we also control for the industry exposure to firms with gross plant and machinery between INR 0 and 10 million and its interaction with MP_shock in equation 8. We present the results in Table A3 of the online appendix. We find that the coefficient on the term $post \times MP_shock \times PSL_exp$ continues to be negative and statistically significant. The above result further allays the concern that results are affected by redistribution from the PSL eligible firms from the earlier regime.

6.2 Placebo Test

To further establish that the effect that we observe is precisely due to the regulatory change in PSL threshold and not merely by chance, we conduct false year placebo tests. We restrict the data to the sample period before 2006 and define false years for regulatory change. We also estimate the exposure of industries to the new PSL-eligible firms before the corresponding false regulation years. We then estimate equation 8 using the above definitions of post.

We present the results in Table A4 of the online appendix. In columns 1, 2, 3, and 4, we define *post* as one after years 2002, 2003, 2004, and 2005, respectively, and zero otherwise. We restrict the sample period to the years 1999 to 2006. We do not find a negative and statistically significant coefficient on $post \times PSL_exp \times MP_shock$ in any of the specifications. Hence, the results appear to be statistically and economically meaningful only after the regulatory change.

6.3 Credit to Insolvent Firms as an Alternative Explanation

A potential alternative explanation for the change in transmission of monetary policy to prices is the increase in credit to insolvent firms driven by the forbearance introduced by the RBI in 2008 after the Global Financial Crisis (Chari et al. (2021)). The expansion in credit due to the forbearance regime allows such insolvent firms to stay afloat, creating an excess supply and causing deflationary conditions (Acharya et al. (2024)). The above effect could potentially coincide with declining policy rates after the change in the PSL threshold, resulting in a spurious correlation between the two.

However, our paper shows that the increase in transmission of monetary policy to prices is, in fact, driven by the larger and financially unconstrained firms, as shown in sections 4.4 and 5.1, which are unlikely to be insolvent. Nevertheless, to allay the above concern further we conduct two empirical tests. In the first test, we control for the exposure of industries to insolvent firms. Our measure of industries' exposure to insolvent firms is the ratio between the sales by firms with an interest coverage ratio below one and total sales by all the firms in the industry.[13] We control for the interaction between post, MP_shock , and exposure of industries to insolvent firms in equation 8. We present the results in columns 1 and 2 of Table A5 of the online appendix. We find that the coefficient on $post \times PSL_exp \times MP_shock$ is qualitatively and quantitatively unchanged. Hence, the results are orthogonal to any change

[13]The interest coverage ratio is the ratio between profit before interest and tax and interest expense of the firms. An interest coverage ratio below one implies that the firms' profits are not enough to cover their interest liabilities.

in transmission due to a concurrent increase in zombie credit during the forbearance period.

In our second test, we limit the sample to the period before 2008 (when the forbearance regime started) and present our estimates in columns 3 and 4 of Table A5 of the online appendix. We find that the coefficient on $post \times PSL_exp \times MP_shock$ continues to be negative and statistically significant.

6.4 External Validation

To further establish that the results that we observe are indeed driven by the relaxation of financial constraints due to the expansion of the PSL threshold, we conduct an external validation using a subsequent regulatory change. The firms with gross plant and machinery up to INR 100 million were categorized as Micro, Small, and Medium Enterprises (MSME) before 2020.[14,15] Loans to such firms were eligible for PSL. In June 2020, the Ministry of Micro, Small, and Medium Enterprises revised the limit on gross plant and machinery for MSMEs to INR 500 million and also added another criterion that the turnover of the firm should be less than INR 2500 million. Hence, the firms with gross plant and machinery between 100 million to 500 million and sales less than INR 2500 million became newly eligible for PSL. We expect the financial constraints on such firms to decline after 2020, which should lead to a dampening of the financial acceleration channel and, resultantly, an increase in the transmission of monetary policy shocks to prices. Therefore, we ask whether the response of inflation to monetary policy improves in markets that are more exposed to such firms.

We would like to re-emphasize here that the mandatory disclosure of firm-level prices stopped in 2011. In lieu of firm-level data, we use state-level Consumer Price Index (CPI) inflation data from the Ministry of Statistics and Program Implementation to implement the

[14]See: `https://msme.gov.in/faqs/q1-what-definition-msme`

[15]The 2020 change in PSL eligibility was similar to the 2006 change in the sense that threshold for the categorization of MSME was expanded from INR 100 million to INR 500 million of gross plant and machinery. There was another regulatory change in PSL eligibility in 2015, which brought the medium-sized firms under the purview of PSL. There was no expansion in the MSME threshold. It is likely that such a change was already anticipated by the banks. Therefore, we use the 2020 change for external validation.

external validity. We ask whether the states that are more exposed to newly PSL-eligible firms show a differentially higher response of CPI inflation to monetary policy shock. To define the exposure of the state to newly PSL-eligible firms, we divide the total assets of firms with plant and machinery between INR 100 million and INR 500 million and sales less than INR 2500 million and the total assets of all the firms in the respective state in the year 2020. We then estimate the following specification using state-year level data for a sample spanning from 2018 to 2023.

$$\begin{aligned} Y_{s,t} =& \alpha + \beta_1 \times State_exp_s \times post_t \times MP_shock_t + \beta_2 \times State_exp_s \times MP_shock_t \\ &+ \beta_3 \times post_t + \beta_4 \times State_exp_s + \beta_5 \times MP_shock_t + \beta_6 \times post_t \times MP_shock_t \\ &+ \beta_7 \times State_exp_s \times post_t + \beta_8 \times X_{s,t} + \delta_s + \gamma_t + \epsilon_{s,t} \end{aligned} \tag{8}$$

Where $Y_{s,t}$ is the year-on-year CPI inflation in state s in year t. The variable $State_exp$ is the state's exposure to newly PSL-eligible firms as defined above. The variables δ_s and γ_t are state and year fixed effects, respectively. The variable *post* takes a value of one after 2020 and zero otherwise. The variable $X_{s,t}$ represents a state-year level vector of control variables and their respective interactions with MP_shock. We include the following control variables - state-level GDP growth, state-level investments, and state-level annual rainfall - which are expected to influence CPI inflation and the distribution of MSMEs across states. The rest of the variables are as defined in equation 4. We present the results in Table A6 of the online appendix. Across specifications, we find that the coefficient on the interaction term $state_exp \times post \times MP_shock$ in negative and statistically significant. Hence, consistent with our main identification, the response of prices to monetary policy shocks indeed improves significantly after the expansion of the PSL threshold in 2020.

6.5 Alternative Measure of Monetary Policy

Finally, we show the robustness of our findings using an alternative measure of monetary policy shock - cumulative change in the Indian central bank's target interest rate (repo rate) during the year. We estimate equation 8 with the above measure and present the results in Table A7 of the online appendix. Our findings remain qualitatively unchanged.

7 Conclusion

In this study, we highlight a novel channel through which the transmission of monetary policy shocks to prices is impacted. We show that in industries with a substantial presence of financially constrained firms, the market power of the unconstrained firms changes with monetary policy changes. For instance, a rate hike significantly limits the borrowing ability of constrained firms, increasing the market power of unconstrained firms. The consequent increase in markups by unconstrained firms slows down the decline in prices in response to the demand shock caused by the rate hike. The effect is symmetric for rate cuts.

We use a natural experiment provided by a change in the definition of small firms that are eligible for a directed lending program. The newly eligible firms experienced a significant decline in financial constraints. Using the presence of newly eligible firms within industries, we find that the sensitivity of market concentration and markups to monetary policy shocks reduces after the relaxation of financial constraints. Crucially, we also find that the sensitivity of prices to monetary policy shocks improves after the relaxation of financial constraints.

We recognize that there could be concerns about the generalizability of a finding from an emerging market setting. However, the increase in market concentration and the presence of financial frictions are phenomena that are present in most economies, including developed economies. Therefore, our results are likely to be directionally valid for other settings.

References

Abbate, A., S. Eickmeier, and E. Prieto (2023): "Financial shocks and inflation dynamics," *Macroeconomic Dynamics*, 27, 350–378.

Acharya, V. V., M. Crosignani, T. Eisert, and C. Eufinger (2023): "How do supply shocks to inflation generalize? Evidence from the pandemic era in Europe," Tech. rep., National Bureau of Economic Research.

——— (2024): "Zombie Credit and (Dis-) Inflation: Evidence from Europe," *The Journal of Finance*, 79, 1883–1929.

Afrouzi, H. (2024): "Strategic inattention, inflation dynamics, and the nonneutrality of money," *Journal of Political Economy*, 132, 3378–3420.

Almeida, H., C.-S. Kim, and H. B. Kim (2015): "Internal capital markets in business groups: Evidence from the Asian financial crisis," *The Journal of Finance*, 70, 2539–2586.

Almeida, H. and D. Wolfenzon (2006): "Should business groups be dismantled? The equilibrium costs of efficient internal capital markets," *Journal of Financial Economics*, 79, 99–144.

Autor, D., D. Dorn, L. F. Katz, C. Patterson, and J. Van Reenen (2020): "The fall of the labor share and the rise of superstar firms," *The Quarterly Journal of Economics*, 135, 645–709.

Banerjee, A. V. and E. Duflo (2014): "Do firms want to borrow more? Testing credit constraints using a directed lending program," *Review of Economic Studies*, 81, 572–607.

Baqaee, D. R., E. Farhi, and K. Sangani (2024): "The supply-side effects of monetary policy," *Journal of Political Economy*, 132, 1065–1112.

Barkai, S. (2020): "Declining labor and capital shares," *The Journal of Finance*, 75, 2421–2463.

Barth, I., M. J, and V. A. Ramey (2001): "The cost channel of monetary transmission," *NBER macroeconomics annual*, 16, 199–240.

Bau, N. and A. Matray (2023): "Misallocation and capital market integration: Evidence from India," *Econometrica*, 91, 67–106.

Bernanke, B. (1999): "The Financial Accelerator in a Quantitative Business Cycle Framework," *Handbook of Macroeconomics/Elsevier*.

Bernanke, B. S. and M. Gertler (1995): "Inside the black box: the credit channel of monetary policy transmission," *Journal of Economic perspectives*, 9, 27–48.

Bernanke, B. S., M. Gertler, and S. Gilchrist (1994): "The financial accelerator and the flight to quality," .

Bhue, G., N. R. Prabhala, and P. Tantri (2016): *Do Programs Mandating Small Business Lending Disincentivize Growth?: Evidence from a Policy Experiment*, National Stock Exchange of India Limited.

Bräuning, F., J. L. Fillat Comenge, and G. Joaquim (2023): "Cost-price relationships in a concentrated economy," Tech. rep., Working Papers.

Buchuk, D., B. Larrain, F. Muñoz, and F. Urzúa (2014): "The internal capital markets of business groups: Evidence from intra-group loans," *Journal of Financial Economics*, 112, 190–212.

Bujunoori, R. R., N. Mannil, and P. Tantri (2024): "Does labor composition impact the transmission of monetary policy to output?" *Journal of Development Economics*, 167, 103241.

Caballero, R. J., T. Hoshi, and A. K. Kashyap (2008): "Zombie lending and depressed restructuring in Japan," *American economic review*, 98, 1943–1977.

Chari, A., L. Jain, and N. Kulkarni (2021): "The unholy trinity: Regulatory forbearance, stressed banks and zombie firms," Tech. rep., National Bureau of Economic Research.

Chen, J. and J. Roth (2024): "Logs with zeros? Some problems and solutions," *The Quarterly Journal of Economics*, 139, 891–936.

Chopra, Y., K. Subramanian, and P. L. Tantri (2021): "Bank cleanups, capitalization, and lending: Evidence from india," *The Review of Financial Studies*, 34, 4132–4176.

De Almeida, L. A. (2015): "Firms' balance sheets and sectoral inflation in the euro area during the financial crisis," *Economics Letters*, 135, 31–33.

De Loecker, J., J. Eeckhout, and G. Unger (2020): "The rise of market power and the macroeconomic implications," *The Quarterly Journal of Economics*, 135, 561–644.

De Loecker, J., P. K. Goldberg, A. K. Khandelwal, and N. Pavcnik (2016): "Prices, markups, and trade reform," *Econometrica*, 84, 445–510.

Duval, R., D. Furceri, R. Lee, and M. M. Tavares (2024): "Market power and monetary policy transmission," *Economica*, 91, 669–700.

D'Acunto, F., R. Liu, C. Pflueger, and M. Weber (2018): "Flexible prices and leverage," *Journal of Financial Economics*, 129, 46–68.

Gertler, M. and S. Gilchrist (1994): "Monetary policy, business cycles, and the behavior of small manufacturing firms," *The Quarterly Journal of Economics*, 109, 309–340.

Gertler, M., S. Gilchrist, and F. M. Natalucci (2007): "External constraints on monetary policy and the financial accelerator," *Journal of Money, credit and Banking*, 39, 295–330.

Gilchrist, S., R. Schoenle, J. Sim, and E. Zakrajšek (2017): "Inflation dynamics during the financial crisis," *American Economic Review*, 107, 785–823.

Goldberg, P. K., A. K. Khandelwal, N. Pavcnik, and P. Topalova (2010a): "Imported intermediate inputs and domestic product growth: Evidence from India," *The Quarterly journal of economics*, 125, 1727–1767.

——— (2010b): "Multiproduct firms and product turnover in the developing world: Evidence from India," *The Review of Economics and Statistics*, 92, 1042–1049.

Gorodnichenko, Y. and M. Weber (2016): "Are sticky prices costly? Evidence from the stock market," *American Economic Review*, 106, 165–199.

Grullon, G., Y. Larkin, and R. Michaely (2019): "Are US industries becoming more concentrated?" *Review of Finance*, 23, 697–743.

Gürkaynak, R., H. G. Karasoy-Can, and S. S. Lee (2022): "Stock market's assessment of monetary policy transmission: The cash flow effect," *The Journal of Finance*, 77, 2375–2421.

Gutiérrez, G. and T. Philippon (2017): "Declining Competition and Investment in the US," Tech. rep., National Bureau of Economic Research.

Hanson, S. G. and J. C. Stein (2015): "Monetary policy and long-term real rates," *Journal of Financial Economics*, 115, 429–448.

Holmstrom, B. and J. Tirole (1997): "Financial intermediation, loanable funds, and the real sector," *the Quarterly Journal of economics*, 112, 663–691.

Kashyap, N. (2024): "Do improvements in creditor rights dampen the financial acceleration of monetary policy shocks?" *Working Paper*.

Khandelwal, A. (2010): "The long and short (of) quality ladders," *The Review of Economic Studies*, 77, 1450–1476.

Kim, R. (2021): "The effect of the credit crunch on output price dynamics: The corporate inventory and liquidity management channel," *The Quarterly Journal of Economics*, 136, 563–619.

Kiyotaki, N. and J. Moore (1997): "Credit cycles," *Journal of political economy*, 105, 211–248.

Meier, M. and T. Reinelt (2024): "Monetary policy, markup dispersion, and aggregate tfp," *Review of Economics and Statistics*, 106, 1012–1027.

Meinen, P. and A. C. Soares (2022): "Markups and financial shocks," *The Economic Journal*, 132, 2471–2499.

Nakamura, E. and J. Steinsson (2018): "Identification in macroeconomics," *Journal of Economic Perspectives*, 32, 59–86.

Ottonello, P. and T. Winberry (2020): "Financial heterogeneity and the investment channel of monetary policy," *Econometrica*, 88, 2473–2502.

Romer, C. D. and D. H. Romer (2004): "A new measure of monetary shocks: Derivation and implications," *American Economic Review*, 94, 1055–1084.

Syverson, C. (2019): "Macroeconomics and market power: Context, implications, and open questions," *Journal of Economic Perspectives*, 33, 23–43.

Wang, O. and I. Werning (2022): "Dynamic oligopoly and price stickiness," *American Economic Review*, 112, 2815–2849.

Willis, J. L. (2018): "Changing Market Structures and Implications for Monetary Policy: An Introduction to the 2018 Economic Policy Symposium," .

Figure 1: Event Study for Borrowing

In this figure, we plot the coefficients corresponding to the event study related to the change in borrowing in response to an increase in PSL threshold. The dependent variable is the natural logarithm of borrowing by the corresponding firm. The explanatory variables are the interactions between an indicator variable that identifies treated firms and the corresponding year indicators. The treated firms are defined as the firms with gross plant and machinery between INR 10 million and INR 50 million. We include firm and year fixed effects. We also include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm. The red dots represent the point estimate of the coefficients and the dashed-lines represent the corresponding 95% confidence intervals.

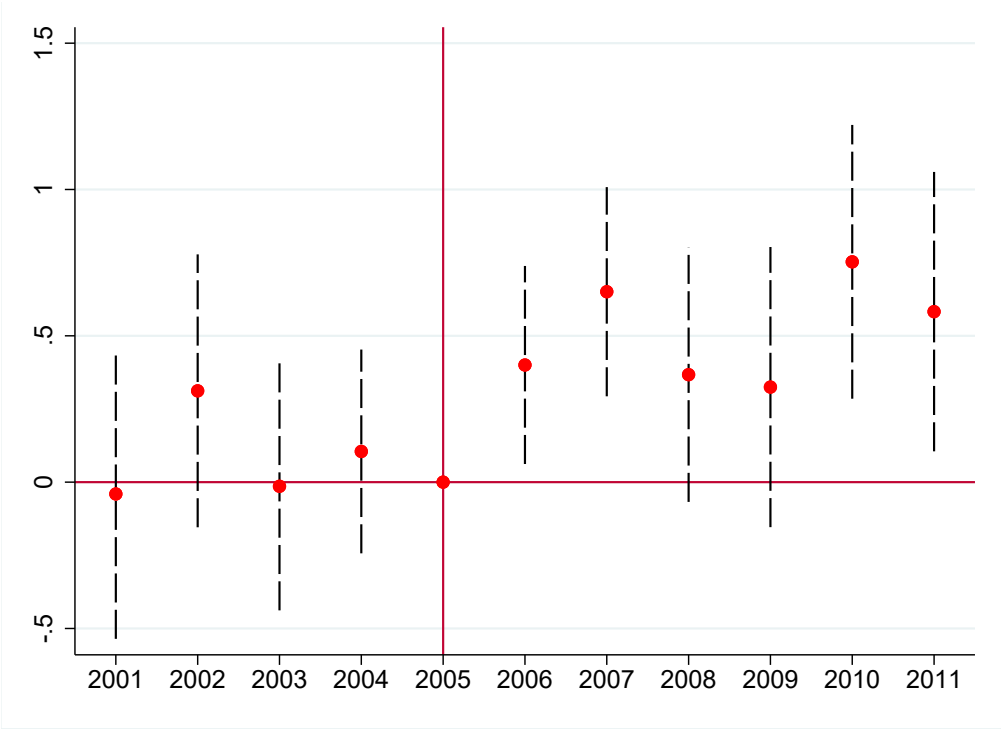


Figure 2: Flow Chart of the Thesis

In this figure, we present the flowchart of our hypothesis to guide our empirical tests.

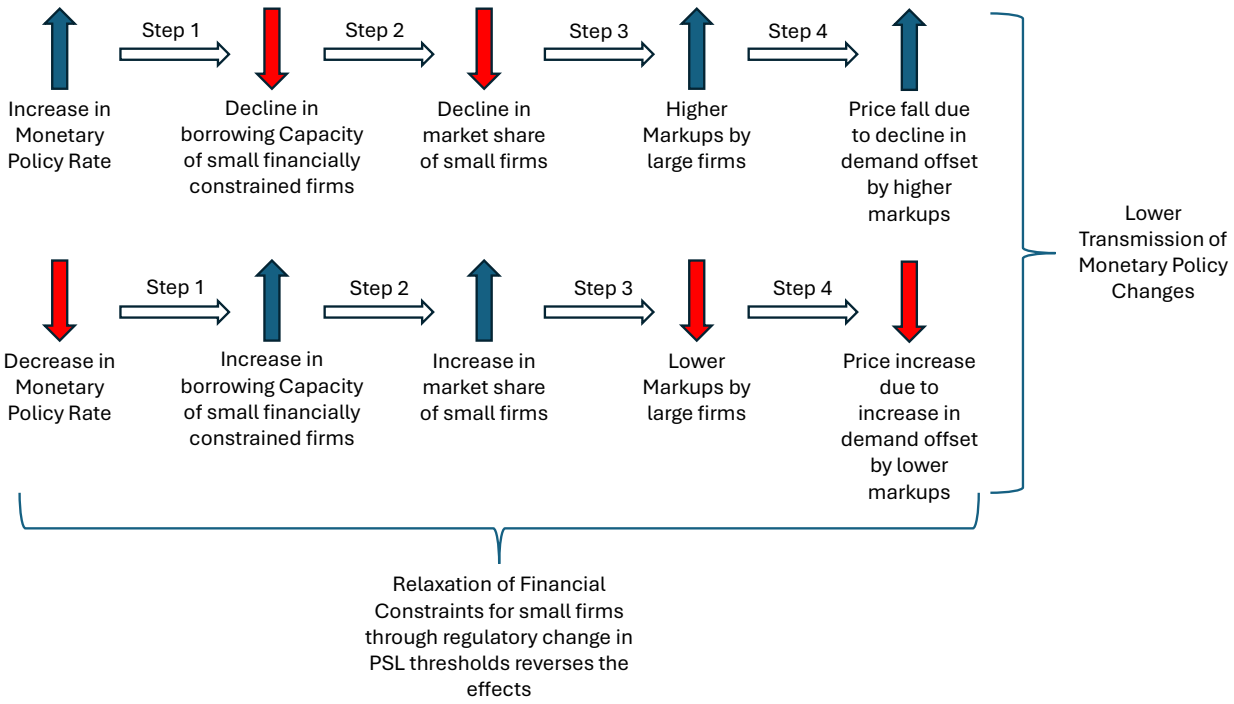


Table 1: Sample Construction

In this Table, we present the sample construction. In Panel A, we present the sample at the firm-year level. In Panel B, we present the sample at the firm-bank-year level. In Panel C, we present the sample at industry-year level. The sample period spans from year 2001 to 2011.

Panel A: Firm-Year level	
Number of unique firms	37,081
Number of manufacturing firms	16,495
Number of manufacturing firms with inflation data	9,756
Number of firm-year level observations corresponding to above firms	54,795
Number of manufacturing firms with Gross Plant and Machinery between INR 10 million to 100 million	5,075
Number of firm-year level observations corresponding to above firms	14,523
Panel B: Firm-Bank-Year level	
Number of unique Manufacturing firms	8,950
Number of Scheduled Commercial Banks	50
Number of firm-bank-year level observations	143,360
Number of manufacturing firms with Gross Plant and Machinery between INR 10 million to 100 million	4,391
Number of firm-bank-year level observations	30,017
Panel C: Industry-Year level	
Number of unique industries	114
Number of industry-year level observations	1,241

Table 2: Summary Statistics

In this Table, we present the summary statistics. In Panel A, we present the summary for firm-year level variables. In Panel B, we present the summary for firm-bank-year level variables. In Panel C, we present the summary for bank-year level variables. In panel D, we present the summary for bank-year level variables. The sample period spans from the year 2001 to 2011 in the above panels. In Panel E, we present the summary for state-year level variables and the sample in Panel E spans the years 2018 to 2023.

Variables	N	Mean	Median	SD	1st %ile	99th %tile
Sample period - 2001-2011						
Panel A: Firm-Year level						
Borrowing in INR millions	39,656	336	25	3,110	0	4,837
Price Inflation %	35,522	8.332	4.38	27.001	-70.897	86.917
Treat	39,656	0.24	0	0.43	0	1
Non-treat PSL	39,656	0.128	0	0.334	0	1
Markup	37,338	2.249	1.339	3.627	0.518	29.165
Total Assets	39,654	3,426	364	33,112	5	45,818
Leverage ratio	39,649	0.868	0.43	4.171	0.009	8.163
Current ratio	39,175	3.886	2.01	16.655	0.041	33
Profit Margin	36,651	-2.655	0.014	76.157	-25.75	0.41
Panel B: Firm-bank-year level						
Borrowing in INR millions	26,269	68	0	3,120	0	1000
Oustanding loans in millions	26,269	479	68	8,910	0.4	4000
Panel C: Bank-year level						
Total Assets in million	548	668,168	315,347	1,135,654	6,091	4,941,606
Lending in millions	547	372,103	159,112	668,648	2,438	2,621,536
Lending to PSL in millions	537	115,879	55,520	194,435	667	800,182
Panel D: Industry-year level						
PSL exposure %	1,241	10.112	6.160	12.515	0.000	65.331
HHI	1,214	0.300	0.188	0.276	0.019	1
Top 3	1,214	0.65	0.65	0.255	0.146	1
Top 5	1,214	0.753	0.801	0.227	0.215	1
Panel E: State-year level (2018 to 2023)						
State exposure %	204	11.814	7.722	16.457	0.000	70.432
CPI Inflation %	208	5.145	5.16	2.023	0	8.943
State Investment in INR million	210	155167	13145	404536	0	2108370
State GDP Growth	198	4.914	5.896	5.513	-9.472	16.415
State Rainfall in MM	175	1567	1326	924	403	4491

Table 3: First Stage: Lending

In this table, we present the estimates for the specification that tests the differential effect of regulatory change in PSL limit on affected firms' borrowings. The data are organized at the firm-year level. The sample is restricted to firms with gross plant and machinery between INR 10 million and INR 100 million in columns 1 and 2. The sample is restricted to firms with gross plant and machinery between INR 0 million and INR 100 million except the treated firms in columns 3 and 4. The dependent variable $log(borrowing)$ is the natural logarithm of new borrowing by the respective firm in the respective year. The variable *post* takes a value of one after 2006 and zero otherwise. The variable *treat* takes a value of one for firms with gross plant and machinery between INR 10 million and INR 50 million and zero for other firms. The variable *non_treat_psl* takes a value of one for firms with gross plant and machinery below INR 10 million and zero for other firms. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm in the even-numbered columns. We also include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Log(Borrowing)			
	(1)	(2)	(3)	(4)
Post × Treat	0.503**	0.437**		
	(0.191)	(0.173)		
Treat	-0.587***	-0.434**		
	(0.176)	(0.167)		
Post × Non_treat_PSL			0.213	0.300
			(0.310)	(0.296)
Non_treat_PSL			-0.962**	-0.865**
			(0.327)	(0.341)
Observations	12,704	11,295	8,032	6,829
R-squared	0.701	0.625	0.753	0.701
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Table 4: Response of Lending to Monetary Policy Shock

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to lending. The data are organized at the firm-bank-year level. The sample is restricted to firms with gross plant and machinery between INR 10 million and INR 100 million. We present the estimates from a Poisson regression in columns 1 and 2 and the estimates using OLS in the last four columns. The dependent variable is the loan amount in columns 1 and 2, the natural logarithm of the loan amount in columns 3 and 4, and a dependent variable identifying non-zero loans in columns 5 and 6. The variable *post* takes a value of one after 2006 and zero otherwise. The variable *treat* takes a value of one for firms with gross plant and machinery between INR 10 million and INR 50 million and zero for other firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in the even-numbered columns. We also include firm and bank × year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Poisson		OLS			
	Borrowing		Log Borrowing		New Loan	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat × MP shock	1.053**	1.107**	0.680**	0.840**	0.033*	0.042**
	(0.540)	(0.463)	(0.302)	(0.302)	(0.016)	(0.016)
Treat × MP shock	-0.393*	-0.346	-0.260*	-0.321**	-0.013*	-0.017**
	(0.225)	(0.220)	(0.120)	(0.121)	(0.007)	(0.007)
Treat	-0.113	-0.162	0.281	0.411*	0.018	0.026*
	(0.204)	(0.188)	(0.210)	(0.225)	(0.011)	(0.012)
Post × Treat	0.402	0.419*	-0.170	-0.279	-0.013	-0.020
	(0.251)	(0.214)	(0.201)	(0.207)	(0.011)	(0.011)
Observations	15,757	14,852	25,541	22,939	25,541	22,939
R-squared			0.290	0.286	0.290	0.286
Control variables	No	Yes	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank × Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Response of Market Concentration to Monetary Policy Shock

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to industry concentration. The data are organized at the industry-year level. We define the industry at NIC 4-digit level. The dependent variable is the Herfhindahl Index of the industry in column 1, the ratio between sales of top 3 firms by sales and total sales in the industry in column 2, and the ratio between sales of top 5 firms by sales and total sales in the industry in column 3. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include industry-year level control variables - average total assets of the firms in the industry, average leverage ratio of the firms in the industry, average current ratio of the firms in the industry, and the average profit margin of the firms in the industry and their respective interactions with MP_shock in the even-numbered columns. We also include industry and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at industry and year levels and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	HHI		Top 3		Top 5	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × PSL Exp × MP shock	-0.182*	-0.196*	-0.095**	-0.112**	-0.037***	-0.048**
	(0.093)	(0.104)	(0.041)	(0.046)	(0.007)	(0.017)
PSL Exp × MP shock	0.069**	0.063**	0.036***	0.049**	0.021***	0.027**
	(0.022)	(0.027)	(0.005)	(0.016)	(0.003)	(0.010)
Post × PSL Exp	-0.136*	-0.136*	-0.098	-0.101	-0.061	-0.063
	(0.068)	(0.067)	(0.059)	(0.061)	(0.045)	(0.047)
Observations	1,206	1,202	1,206	1,202	1,206	1,202
R-squared	0.915	0.915	0.941	0.943	0.954	0.955
Control variables	No	Yes	No	Yes	No	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Response of Markup to Monetary Policy Shock

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' markups. The data are organized at the firm-year level. In columns 1 and 2, we leave out the firms with gross plant and machinery between 10 million and 50 million. In columns 3 and 4, we leave out the firms with gross plant and machinery between 0 million and 50 million. The dependent variable is the firms' markup estimated using the methodology followed in De Loecker et al. (2020), as elaborated in section 4.3.2. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in the even-numbered columns. We also include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Markup			
	(1)	(2)	(3)	(4)
Post × PSL Exp × MP shock	-1.125**	-1.477**	-1.162*	-1.151*
	(0.446)	(0.512)	(0.545)	(0.597)
PSL Exp × MP shock	0.764***	0.847***	0.889***	1.013***
	(0.098)	(0.140)	(0.137)	(0.144)
Post × PSL Exp	-0.736	-0.667	-1.145*	-1.219**
	(0.564)	(0.515)	(0.519)	(0.532)
Observations	35,891	33,391	31,569	29,665
R-squared	0.688	0.683	0.659	0.651
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Table 7: Response of Price to Monetary Policy Shock

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices. The data are organized at the firm-year level. In columns 1 and 2, we leave out the firms with gross plant and machinery between 10 million and 50 million. In columns 3 and 4, we leave out the firms with gross plant and machinery between 0 million and 50 million. The dependent variable is the average year-on-year changes in firms' prices. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in the even-numbered columns. We also include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Price Change			
	(1)	(2)	(3)	(4)
Post × PSL Exp × MP shock	-0.208**	-0.209**	-0.220**	-0.212**
	(0.084)	(0.080)	(0.074)	(0.077)
PSL Exp × MP shock	0.028	0.033	0.054*	0.057**
	(0.024)	(0.024)	(0.026)	(0.023)
Post × PSL Exp	-0.005	-0.013	0.012	0.009
	(0.031)	(0.037)	(0.028)	(0.029)
Observations	27,585	26,078	25,167	24,018
R-squared	0.180	0.184	0.182	0.185
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Table 8: Response of Price: Unconstrained versus Constrained firms

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices. The data are organized at the firm-year level. In panel A, we restrict the sample to firms that were involved in at least one RPT transaction three years before the 2006 regulatory change. In panel B, we restrict the sample to firms that were involved in no RPT transaction three years before the 2006 regulatory change. The dependent variable is the average year-on-year changes in firms' prices. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in the even-numbered columns. We also include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Panel A: Unconstrained		Panel B: Constrained	
	Price Change			
	(1)	(2)	(3)	(4)
Post × PSL Exp × MP shock	-0.267***	-0.257**	-0.059	-0.078
	(0.079)	(0.083)	(0.192)	(0.182)
PSL Exp × MP shock	0.047*	0.052**	-0.056	-0.058
	(0.022)	(0.022)	(0.055)	(0.064)
Post × PSL Exp	-0.010	-0.008	0.022	-0.023
	(0.025)	(0.027)	(0.101)	(0.113)
Observations	18,409	17,512	9,176	8,566
R-squared	0.152	0.157	0.220	0.223
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Table 9: Response of Price: Unconstrained versus Constrained firms

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices. The data are organized at the firm-year level. In panel A, we restrict the sample to firms with non-zero exposure to banks with low PSL ratio in 2005. In panel A, we restrict the sample to firms with zero exposure to banks with low PSL ratios in 2005. We define low PSL ratio banks as the ones in the bottom quartile based on the average ratio between PSL loans and total loans between 2003 and 2005. The dependent variable is the average year-on-year changes in firms' prices. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in the even-numbered columns. We also include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Panel A: Exposed to Constrained Banks		Panel B: Not exposed to Constrained Banks	
	Price Change			
	(1)	(2)	(3)	(4)
Post × PSL Exp × MP shock	-0.653**	-0.639**	-0.197*	-0.191
	(0.229)	(0.248)	(0.101)	(0.113)
PSL Exp × MP shock	0.161***	0.139***	0.041	0.047
	(0.028)	(0.037)	(0.030)	(0.028)
Post × PSL Exp	0.112	0.121	-0.059**	-0.053**
	(0.073)	(0.080)	(0.019)	(0.023)
Observations	2,666	2,507	17,809	17,194
R-squared	0.168	0.171	0.169	0.171
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Internet Appendix

Table A1: Variable Definition

The table defines all the main variables used in the analyses.

Variable	Definition
Borrowing (Firm-Year level)	Outstanding loan in current year minus the outstanding loan in the previous year.
Price Inflation	Weighted average of the year-on-year change in the price of firms' products, weighted by the sales value of the respective products.
Treat	The variable takes a value of one for firms with gross plant and machinery between INR 10 million and INR 50 million and zero otherwise.
Non-treat PSL	The variable takes a value of one for firms with gross plant and machinery below INR 10 million and zero otherwise.
Markup	Ratio between the output elasticity of the input and the revenue share of the respective input. We estimate it using the raw material input and follow the methodology of De Loecker et al. (2020).
Leverage ratio	The ratio between the total borrowings and total assets.
Current ratio	The ratio between the current assets and current liabilities.
Profit Margin	The ratio between the profits before interest and tax and total sales of the firm.
Borrowing (Firm-Bank-Year level)	Total Loan extended by the bank to the respective firm in the year.
Oustanding loans	Total outstanding loans between the respective firm-bank pair as on the respective year.
PSL exposure	The total assets of the firm with gross plant and machinery between INR 10 million and INR 50 million and the total asset of all firms in the industry.
HHI	The sum of the square of market share of all firms within the respective industry.
Top 3	The sum of sales of the top 3 firms by sales within the industry divided by the total sales within the industry
Top 5	The sum of sales of the top 5 firms by sales within the industry divided by the total sales within the industry

Table A2: RPT types

The table provides the list of major RPT types reported by the firms.

RPT type
RPT Income
RPT expenses
RPT Share Cpital
RPT share application
RPT Sales
RPT purchases
RPT Fixed Assets
RPT Investments
RPT deposits
RPT Finance
RPT Loans
RPT Unclassified

Table A3: Controlling for PSL-eligible Firms from Older Regime

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices. The data are organized at the firm-year level. In column 1, we leave out the firms with gross plant and machinery between 10 million and 50 million. In column 2, we leave out the firms with gross plant and machinery between 0 million and 50 million. The dependent variable is the average year-on-year changes in firms' prices. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in all columns. We also include firm and year fixed effects in all columns. We also include an additional control variable - the interaction between the industry's exposure to firms with gross plant and machinery investments between INR 0 to 10 million and MP_shock. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Price Change	
	(1)	(2)
Post × PSL Exp × MP shock	-0.212**	-0.214**
	(0.081)	(0.078)
PSL Exp × MP shock	0.007	0.029
	(0.036)	(0.037)
Post × PSL Exp	-0.013	0.009
	(0.037)	(0.029)
Observations	26,078	24,018
R-squared	0.184	0.185
Control variables	Yes	Yes
Firm F.E.	Yes	Yes
Year F.E.	Yes	Yes

Table A4: False Year Placebo

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices using false treatment years. The data are organized at the firm-year level and the sample spans the years 1999 to 2006. The dependent variable is the average year-on-year changes in firms' prices. In column 1, 2, 3, and 4 *post* takes a value of one after years 2002, 2003, 2004, and 2005, respectively and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in all columns. We include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	2002	2003	2004	2005
	Price Change			
	(1)	(2)	(3)	(4)
Post × PSL Exp × MP shock	0.194	0.031	0.373*	0.250
	(0.329)	(0.119)	(0.187)	(0.152)
PSL Exp × MP shock	-0.236	-0.097***	-0.112***	-0.060*
	(0.300)	(0.024)	(0.031)	(0.030)
Post × PSL Exp	-0.061	-0.124**	-0.202***	-0.096
	(0.077)	(0.047)	(0.054)	(0.055)
Observations	18,257	18,250	18,257	18,257
R-squared	0.627	0.628	0.627	0.627
Control variables	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Table A5: Factoring in Forbearance

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices. The data are organized at the firm-year level. In column 1, we leave out the firms with gross plant and machinery between 10 million and 50 million. In column 2, we leave out the firms with gross plant and machinery between 0 million and 50 million. The dependent variable is the average year-on-year changes in firms' prices. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include a triple interaction term - $post \times MP_shock \times insolventexp$. Here, $insolventexp$ is the total sales by firms with an interest coverage ratio of less than one and the total sales by all firms in the industry. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with MP_shock in the even-numbered columns. We include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Price Change			
	(1)	(2)	(3)	(4)
Post × PSL Exp × MP shock	-0.208**	-0.211**	-0.414*	-0.512**
	(0.084)	(0.080)	(0.205)	(0.208)
PSL Exp × MP shock	0.044	0.065**	0.035	0.056*
	(0.025)	(0.024)	(0.026)	(0.025)
Post × PSL Exp	-0.010	0.013	0.066	0.116*
	(0.039)	(0.030)	(0.057)	(0.051)
Observations	26,072	24,013	14,766	13,513
R-squared	0.185	0.185	0.229	0.229
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes

Table A6: External Validation

In this table, we present the external validation using the subsequent redefinition of small enterprises. The data are organized at the state-year level and the sample spans years 2018 to 2023. The dependent variable is the year-on-year inflation of CPI at the state level. The variable *post* takes a value of one after 2006 and zero otherwise. The variable *Stateexp* is the total assets of firms with plant and machinery between INR 100 million and INR 500 million and sales greater than INR 2500 million and the total assets of all the firms in the respective state. The variable MP_shock is the measure of monetary policy shock as defined in section 3.2. We include state-year level control variables - investments, GDP growth, and rainfall and their respective interactions with MP_shock in the even-numbered columns. We include state and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at state and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Inflation	
	(1)	(2)
Post × State Exp × MP shock	-0.188**	-0.133***
	(0.050)	(0.009)
State Exp × MP shock	0.203***	0.147***
	(0.045)	(0.006)
Post × State Exp	-0.046	-0.043
	(0.023)	(0.029)
Observations	202	163
R-squared	0.470	0.498
Control variables	No	Yes
State F.E.	Yes	Yes
Year F.E.	Yes	Yes

Table A7: Alternative Measure of Monetary Policy Shock

In this table, we present the estimates for the specification that tests the effect of regulatory change in PSL limit on transmission of monetary policy to firms' prices. The data are organized at the firm-year level. In columns 1 and 2, we leave out the firms with gross plant and machinery between 10 million and 50 million. In columns 3 and 4, we leave out the firms with gross plant and machinery between 0 million and 50 million. The dependent variable is the average year-on-year changes in firms' prices. The variable *post* takes a value of one after 2006 and zero otherwise. The variable $PSLexp$ is the ratio between the total assets of firms with plant and machinery between INR 10 million and INR 50 million and the total assets of all the firms in the industry of the respective firms. The variable $Delta_repo$ is the cumulative change in repo rate during the respective year. We include firm-year level control variables - total assets of the firm, leverage ratio of the firm, current ratio of the firm, and the profit margin of the firm and their respective interactions with $Delta_repo$ in the even-numbered columns. We also include firm and year fixed effects in all columns. The standard errors reported in the parentheses are two-way clustered at firm and year levels, and adjusted for heteroskedasticity. ***, **, * represent statistical significance at 1%, 5%, and 10%, respectively.

	Price Change			
	(1)	(2)	(3)	(4)
Post × PSL Exp × Delta Repo	-0.144**	-0.169**	-0.145**	-0.130**
	(0.059)	(0.065)	(0.059)	(0.056)
PSL Exp × Delta Repo	0.120**	0.146**	0.133**	0.119**
	(0.048)	(0.054)	(0.047)	(0.042)
Post × PSL Exp	-0.082*	-0.107**	-0.072	-0.070
	(0.038)	(0.044)	(0.045)	(0.048)
Observations	25,558	24,097	23,302	22,186
R-squared	0.186	0.189	0.187	0.190
Control variables	No	Yes	No	Yes
Firm F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes