Firm Market Power Channel of Monetary Policy Transmission

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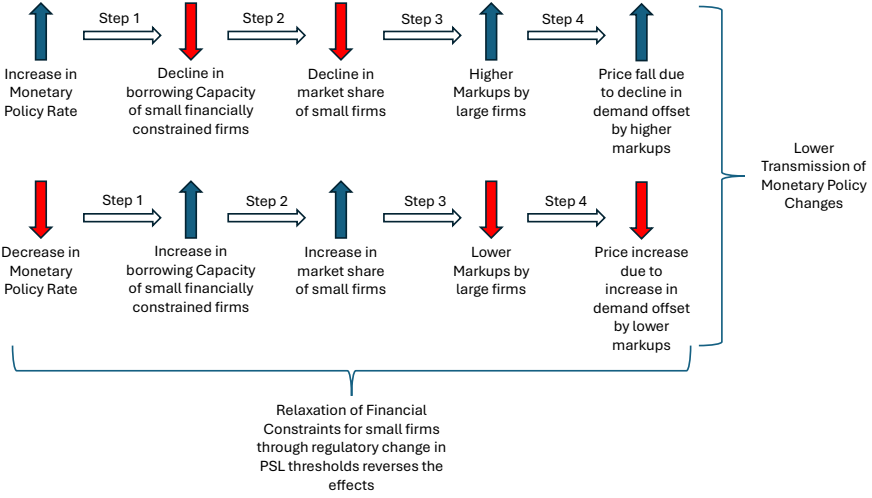
Motivation and Question

- Market concentration has been increasing across countries (Gutierrez and Philippon (2017), De Loecker et al. (2020), Autor et al. (2020))
  - How does market concentration affect cost pass-throughs and transmission of monetary policy? (Acharya et al. (2023), Brauning et al. (2023), Wang and Werning (2022), Baqaee et al. (2024))
- Literature on financial acceleration (Kiyotaki and Moore (1997), Bernanke et al. (1999))
  - Monetary policy shocks have a higher impact on financially constrained firms
- Questions:
  - How does a monetary policy shock affect industry concentration?
  - How does the endogenous change in competition affect the transmission of monetary policy to prices?

Hypothesis


Increase in Monetary Policy Rate
Step 1
Decline in borrowing Capacity of small financially constrained firms
Step 2
Decline in market share of small firms
Step 3
Higher Markups by large firms
Step 4
Price fall due to decline in demand offset by higher markups
Decrease in Monetary Policy Rate
Step 1
Increase in borrowing Capacity of small financially constrained firms
Step 2
Increase in market share of small firms
Step 3
Lower Markups by large firms
Step 4
Price increase due to increase in demand offset by lower markups
Lower Transmission of Monetary Policy Changes
Relaxation of Financial Constraints for small firms through regulatory change in PSL thresholds reverses the effects

Literature

- Relationship between industry concentration and monetary policy pass-throughs
  - High industry concentration associated with lower pass-throughs (Wang and Werning (2022), Baqaee et al. (2024), Afrouzi (2024), Meier and Reinelt (2024))
  - High industry concentration associated with higher pass-throughs (Brauning et al. (2023), Acharya et al. (2023), Duval et al. (2024))
  - We show that monetary policy shocks could impact industry concentration itself in an environment involving financial frictions
- Literature on financial acceleration (Kiyotaki and Moore (1997), Bernanke et al. (1994), Bernanke (1999), Ottonello and Winberry (2020))
  - We study the impact of financial accelerators on industry concentration and the price responsiveness to monetary policy shocks of unconstrained firms
- Literature that studies the impact of financial frictions on inflation. (Acharya et al. (2024), Gilchritst et al. (2017, Meinen and Soares (2022))
  - We show that the presence of financially constrained firms slows down the transmission of demand shocks to prices by altering industry concentration

Priority Sector Lending (PSL): Change in Eligibility

- Central Bank mandates SCBs in India to extend 40% of net credit to priority sectors
  - Agricultural Units, Small Enterprises, Others: Education, Housing, Social Infra, etc.
  - Non-compliance results in penalties: redirect such funds to low-interest paying funds such as RIDF
- 2006 change: PSL was expanded from firms with Gross Plant and Machinery (GPM) up to 10 million to Gross Plant and Machinery up to 50 million
  - Manufacturing firms with 10 to 50 million came under the purview: Potentially relaxing the financial constraint

Data and Sample

- Firm-level financial information and related party transaction data from the prowess database
- Product-level sales and quantities from the prowess database
- Firm-level data on investments in GPM from the Annual Survey of Industries - Higher coverage of smaller firms
- Bank-firm level loan data from Ministry of Corporate Affairs (MCA)
  - Borrower identity, Lender identity, Date of issue of the loan, Date of loan repayment, Date of modification, if any
- Macroeconomic data, MIBOR, and dates of announcement of monetary policy from the website of the RBI

Sample Period: 2001 to 2011

- Number of unique manufacturing firms - 16,495
- Number of unique banks - 50

Industry Exposure

$$PSL\_exp_k = \frac{\sum_{i=1}^{i=n_k} GPM_{i,k,2005} * 1_{(GPM>=10million \& GPM<=50million)}}{\sum_{i=1}^{i=n_k} GPM_{i,k,2005}} \quad (1)$$

- *GPM* - Gross Plant and Machinery
- *k* - NIC 4-digit level

Measure of monetary policy shock

Endogeneity and reverse causality concerns with central bank rates as the measure (Romer and Romer (2004), Nakamura and Steinsson (2018))

- Change in Mumbai Inter-Bank Overnight Rate (MIBOR) around the monetary policy announcement date

$$MP\_shock_d = r_{MIBOR,d} \tag{2}$$

Where MP_shock is the monetary policy shock, d is the corresponding monetary policy announcement date

- We further aggregate the above measure to year level.

$$MP\_shock_t = \sum MP\_shock_d \tag{3}$$

Identification

$$
\begin{aligned}
Y_{i,t} = & \alpha + \beta_1 PSL\_exp_k \times post_t \times MP\_shock_t + \beta_2 PSL\_exp_k \times MP\_shock_t \\
& + \beta_3 post_t + \beta_4 PSL\_exp_k + \beta_5 MP\_shock_t + \beta_6 post_t \times MP\_shock_t \\
& + \beta_7 PSL\_exp_k \times post_t + \beta_8 X_{i,t} + \delta_i + \gamma_t + \epsilon_{i,t}
\end{aligned} \tag{4}
$$

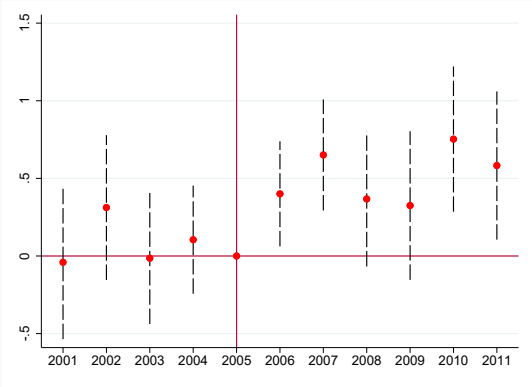
- $Y_{i,t}$ - Year-on-year average change in prices
- *Post* - $1_{year>=2006}$
- *MP_shock* - Measure of monetary policy shock
- *PSL_exp* - Fraction of GPM belonging to firms with GPM between INR 10 to 50 million
- Firm and Year Fixed effects

First Stage: Expansion of Borrowing to Financially Constrained Firms

	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

- Treat - Firms with $GPM >= INR\ 10\ million\ \&\ GPM <= INR\ 50\ million$
- Treated firms experience a 55% differential increase in borrowing
- No significant change for Firms with $GPM < INR\ 10\ million$

Pretrend: Expansion of Borrowing to Financially Constrained Firm



Transmission of Monetary Policy Shock to Lending

	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

- A 25 bps increase in the exogenous component of monetary policy rates is associated with a 32% lower reduction in lending and vice versa

Endogenous Change in Market Concentration

	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

- A 25 bps increase in the exogenous component of monetary policy rates is associated with a 55bps lower increase in HHI for every standard deviation increase in PSL exposure

Endogenous Change in Market Power

	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

- We estimate firm-level markups using the methodology described in DeLoecker et.al. (2020)
- The response of markups also reduces significantly in the post period as PSL exposure increases

Transmission of Monetary Policy Shock to Prices

	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

- 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

Heterogeneity Tests: Firms' Access to Internal Capital Markets

	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

- Results are stronger for unconstrained firms

Heterogeneity Tests: Banks' Exposure to PSL Lending

	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

- Results are stronger for firms with high exposure to constrained banks

Robustness tests

- Concern: The increase in lending to newly PSL-eligible firms comes at the cost of old PSL-eligible firms.
  - We do not find a decline in credit to firms with GPM<INR 10 million.
  - We control for industry exposure to GPM<10 million and find similar results.
- Concern: Change in the transmission of monetary policy is due to forbearance policy allowing zombie firms to stay afloat (Acharya et al. (2024)).
  - We control for industry exposure to insolvent firms.
  - Results hold in a sample restricted till 2008.
- Results are robust to using an alternative definition of monetary policy shock.
- Results are robust to external validation using state-level inflation instead of firm-level price change.

Conclusion

- We highlight a novel channel of transmission of monetary policy changes to prices
  - The monetary policy shock changes the market power of unconstrained firms
  - The industry concentration increases (declines) in response to monetary policy contraction (expansion)
  - The response of price to monetary policy shocks is lower in presence of above endogenous effect