

Transmission of monetary policy and bank credit supply shocks to firm investment behavior: Tangibles vs Intangibles

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Introduction

- Background -*
- The significance of technological progress and investment in corporate intangible assets has increased in recent years, particularly in services sector-driven economies.
 - This technological transition is associated with changes in corporate financing and investment patterns.
 - The literature documents that firms with relatively more intangible assets use less debt and invest mostly from internal funds (Peters and Taylor, 2017; Falato et al., 2022; Crouzet and Eberly, 2023).
 - These corporate financing and investment patterns raise the question of how corporate intangible capital affects monetary policy transmission.
 - Our study explores how monetary policy and bank credit supply actions affect firm investment behavior.
 - More specifically, we focus on the differential effects of tangible and intangible investments in response to monetary policy and bank credit supply changes and their channels of transmission.

Objectives of the study

- We analyze the transmission of monetary policy and bank credit supply shocks on publicly-listed Indian firms' tangible and intangible investments.
- We assess the heterogeneity of firms' tangible and intangible investments responses to monetary and credit supply shocks based on their sectors and industries.
- We also explore the role of financial constraints in driving the responses of firm investment to these shocks, testing various channels of transmission.

Motivation of the study

- One of the oldest and most intensively investigated topics in macroeconomics – Yet a black box (Bernanke and Gertler (1995)).
- The assessment of Monetary Policy Transmission (MPT) at micro level.
- India is transitioning towards a knowledge-based, service-oriented economy, focusing on the adoption of digital technologies, human capital accumulation, and innovation activities.
- This has created the need to link the rise in intangible capital and monetary policy transmission with empirical evidence.
- In India, changes in bank credit availability have frequently occurred independent of monetary policy changes.

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Data

Firm-level Data

- We obtain firm-level panel data from the Prowess database, which is compiled and monitored by the Centre for Monitoring Indian Economy (CMIE).
- Sample size : 7000+ firms over the period 2002-2023 (Annual frequency).
- The key dependent variables of the study are the tangible and intangible investments of a firm.
 - Tangible investments – A firm's capital expenditure (CapEx) on tangible assets (changes in the firm's net PPE + the amount of respective depreciation cost reported for the current period)
 - Intangible investments - A firm's capital expenditure on intangible assets (changes in the firm's intangible assets + the amount of respective depreciation cost reported for the current period)

Estimation of Monetary and Credit Supply Shocks

- We employ a SVAR model using short-run restrictions (recursive identification approach as imposed by Musso et al. (2011), Coibion (2012), and Alpanda and Zubairy (2019)).
- The primary assumption is that the monetary authorities have access to the current GDP and consumer price index (CPI) in their information set.
- We calculate an analogous SVAR model:

$$B_0 y_t = A + B(L)y_{t-1} + \varepsilon_t$$

Where y is a vector of endogenous variables, including the log of real GDP, the log of CPI, the weighted average call money rate, and the log of real bank credit to the corporate sector. A is a set of exogenous variables containing a constant and a dummy variable for crisis periods. $B(L)$ is a matrix polynomial in the lag operator L and ε is a vector of structural shocks. (Source of data on economic variables – RBI)

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Empirical Model

Fixed-effects analysis :

We frame the following baseline model:

$$Ln(INV_{i,t}) = \alpha + \beta_1 shock_t + \gamma Z_{i,t} + \varphi_i + \delta_t + \varepsilon_{i,t}$$

Where the dependent variable, $ln(INV_{i,t})$ is the logarithm of firm i 's tangible/ intangible investment at quarter t for alternate specifications. $shock_t$ is the estimated contractionary monetary policy shock / positive credit supply shock. $Z_{i,t}$ is the set of firm-specific controls {firm age, firm size, leverage, liquidity, sales growth, net equity issuances, non-debt tax shield, taxes, profit margin, and earnings volatility}.

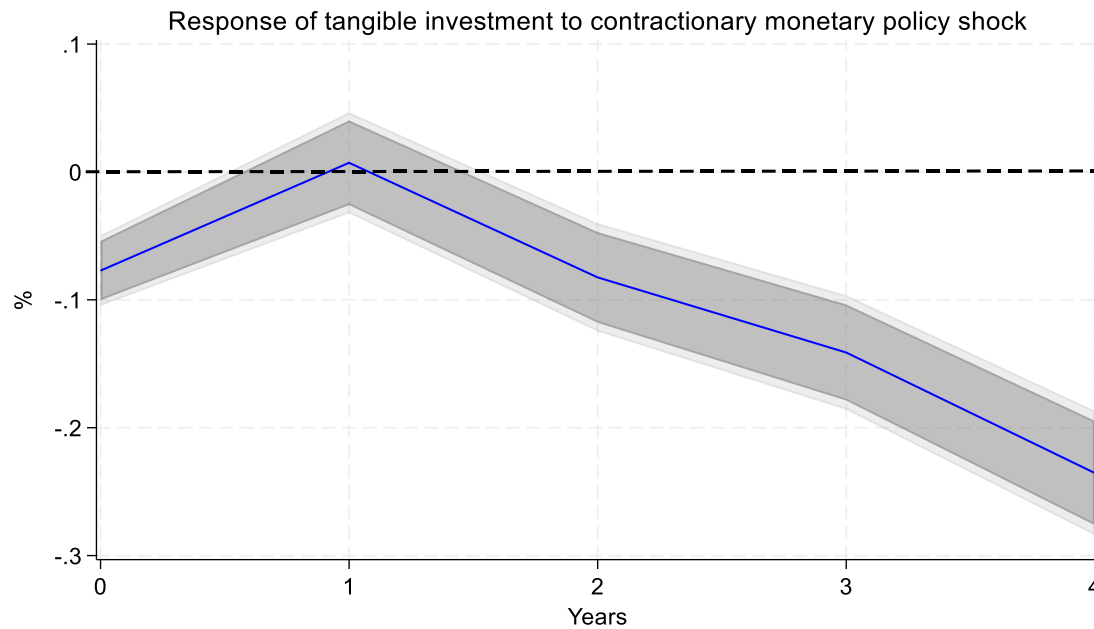
Local projection analysis :

To study firms' dynamic responses, we employ the local projection technique to compute the impulse response functions (IRF) of firms' tangible and intangible investments in response to these shocks for h periods ahead :

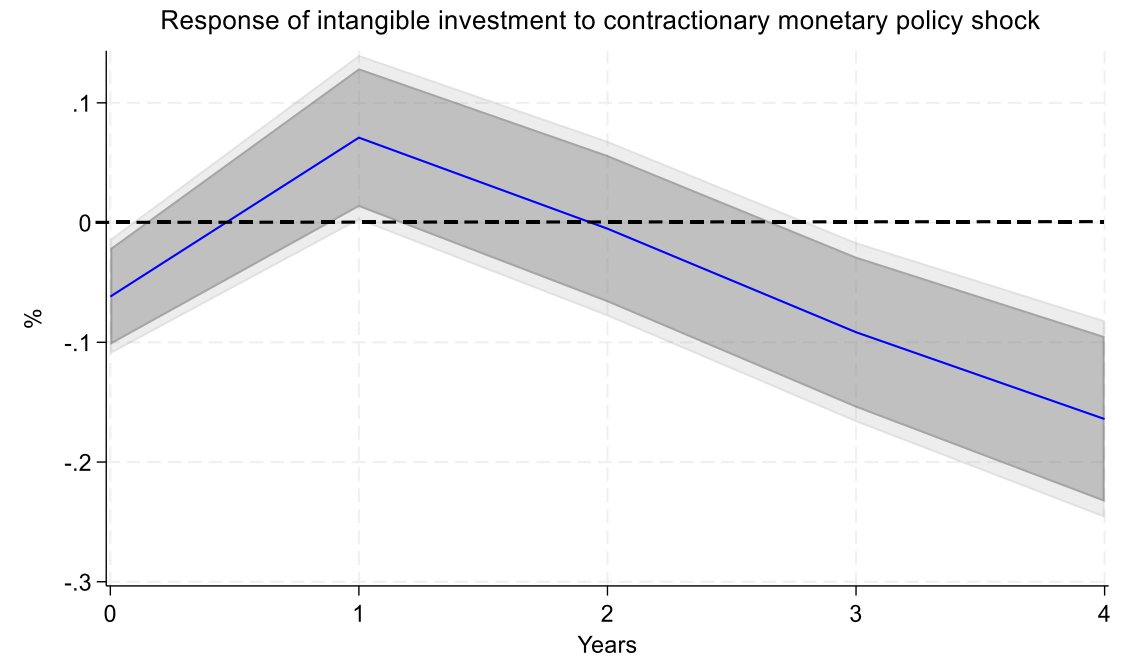
$$ln(INV_{i,t+h}) - ln(INV_{i,t-1}) = \beta_h shock_{t+h} + \gamma_h Z_{i,t} + \varphi_i + \varepsilon_{i,t+h}$$

Empirical Results

Local projection impulse responses of firms' tangible and intangible investments to contractionary monetary shocks–



1(a)

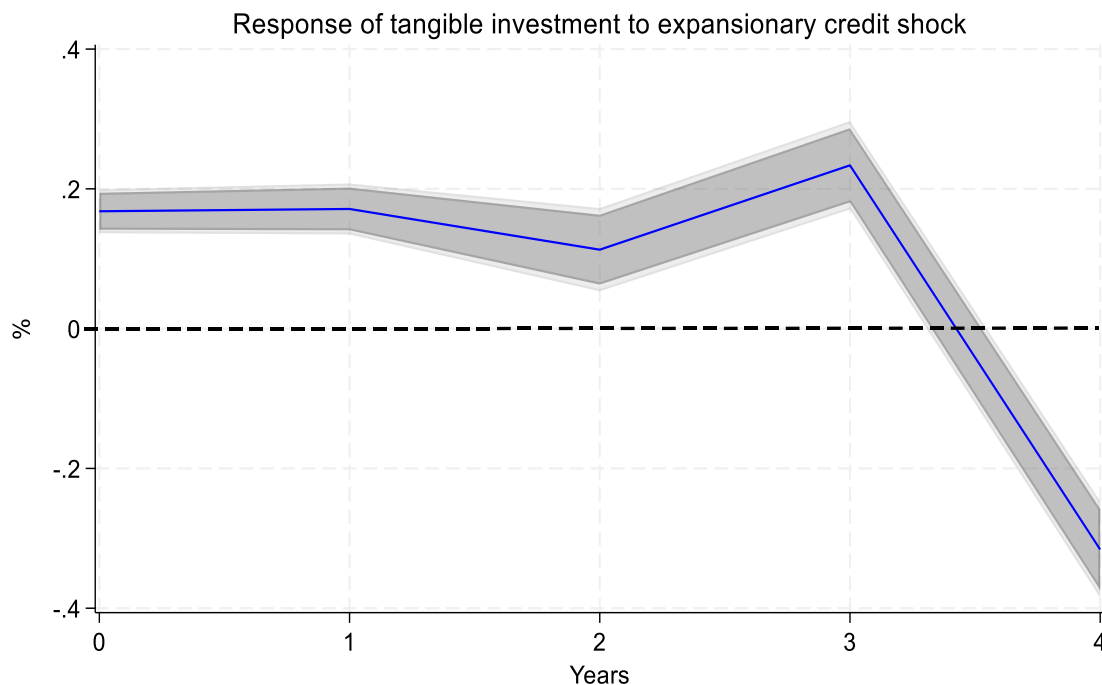


1(b)

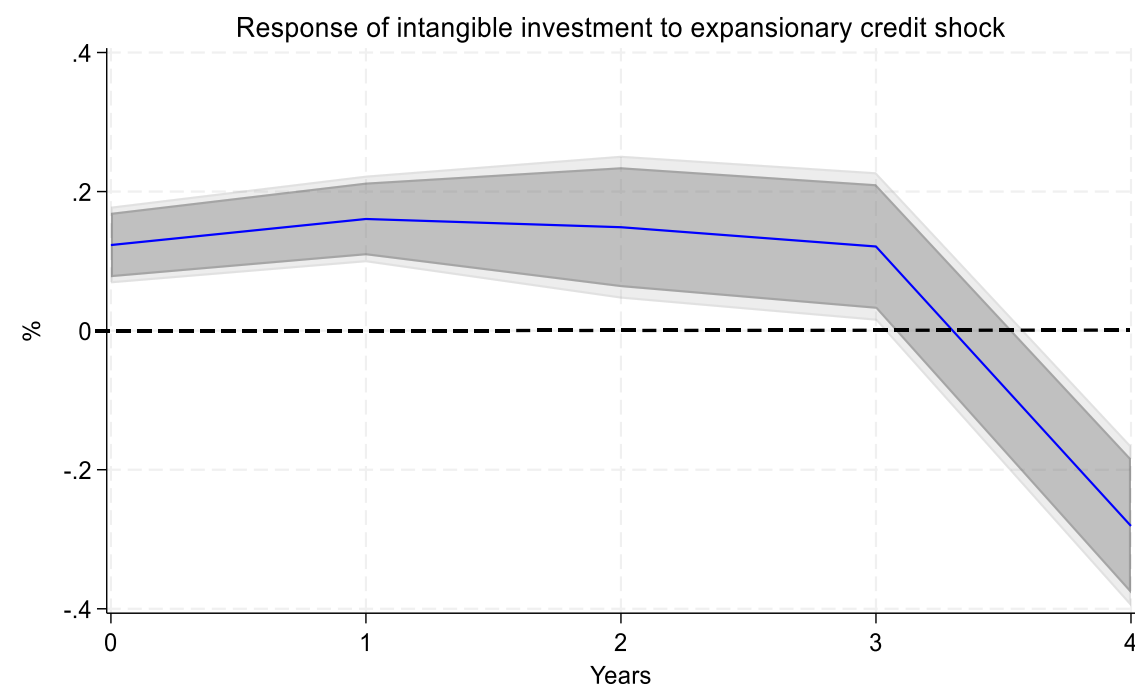
Figs. 1(a) and 1(b) present the impulse response of firms' tangible and intangible investment (in percentage points) to 100 bps contractionary monetary policy shock respectively, keeping other firm-specific factors as the control variables. The horizontal axis is in years. The dark and light grey shaded areas indicate 90% and 95% confidence intervals, respectively. The black dotted line indicates the lines of the x-axis ($x=0$).

Empirical Results

Local projection impulse responses of firms' tangible and intangible investments to positive bank credit supply shocks–



1(c)

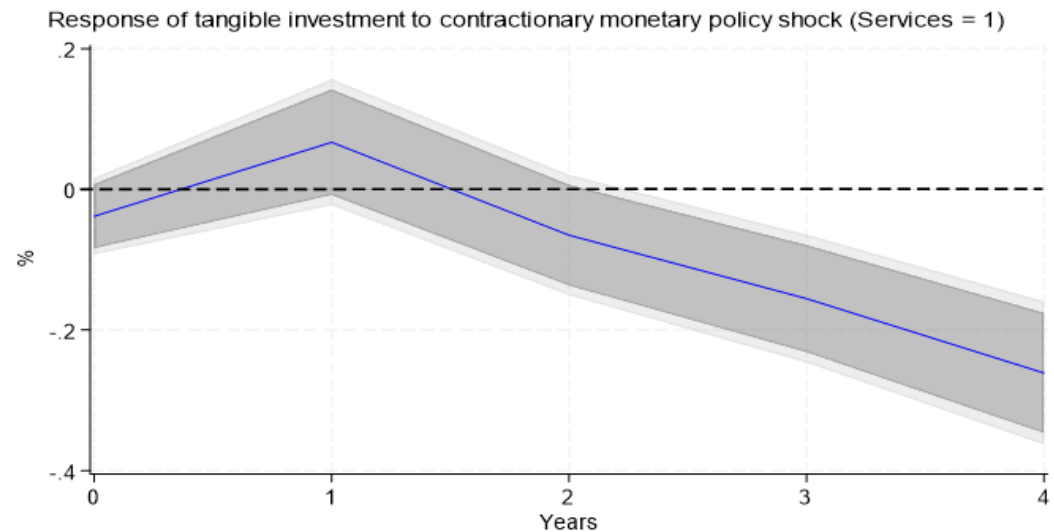
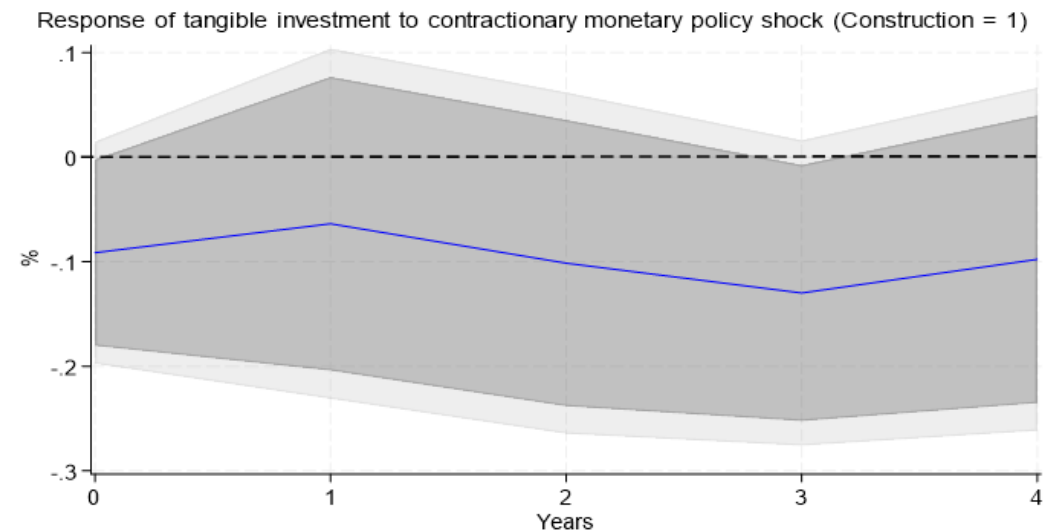
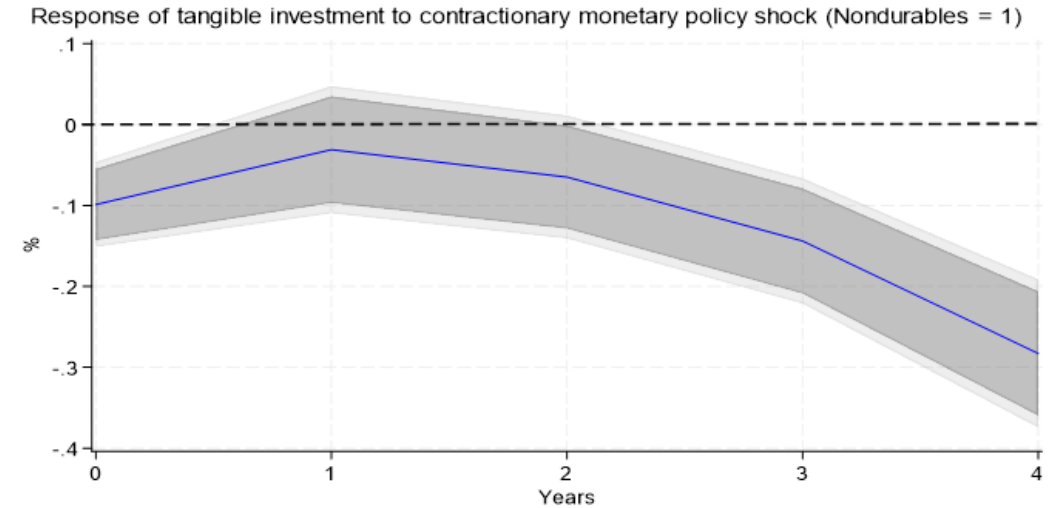
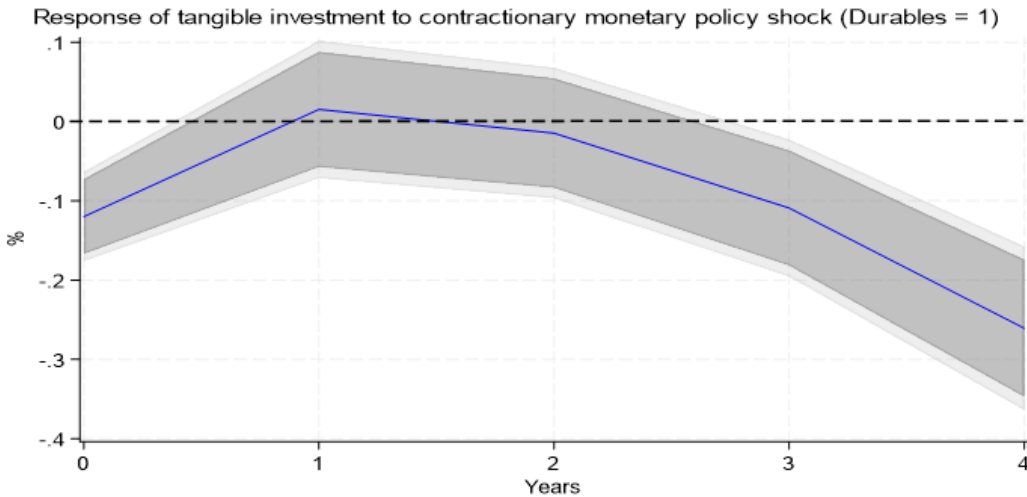


1(d)

Figs. 1(c) and 1(d) present the impulse response of firms' tangible and intangible investment (in percentage points) to 100 bps positive credit supply shock respectively, keeping other firm-specific factors as the control variables. The horizontal axis is in years. The dark and light grey shaded areas indicate 90% and 95% confidence intervals, respectively. The black dotted line indicates the lines of the x-axis ($x=0$).

Empirical Results

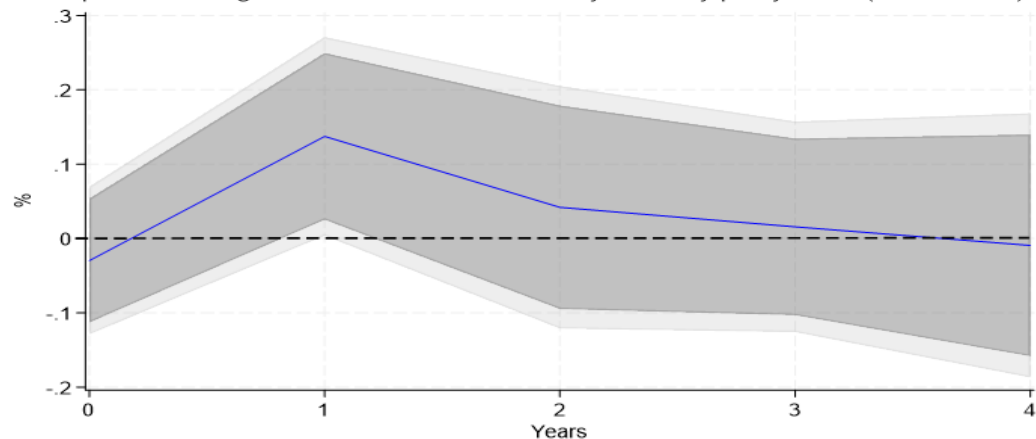
Local projection impulse responses of firms' tangible investments to monetary shocks: Industry-wide heterogeneity



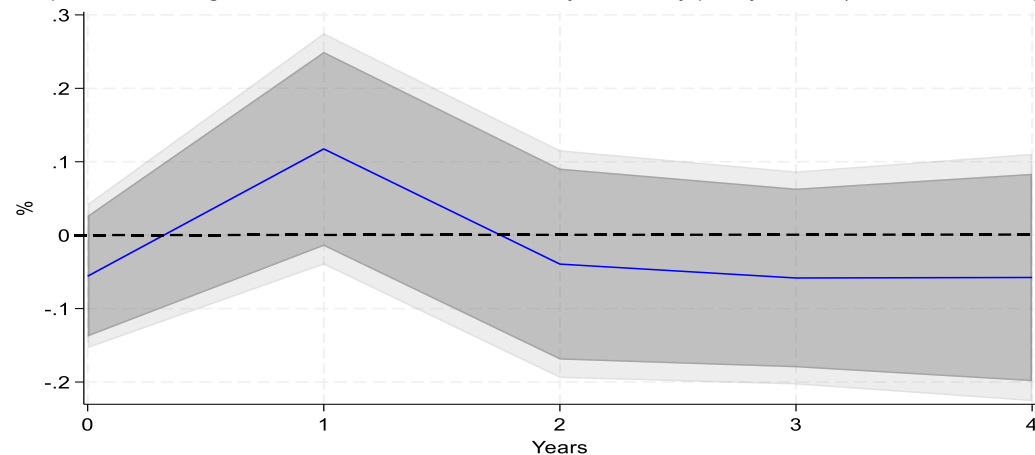
Empirical Results

Local projection impulse responses of firms' intangible investments to monetary shocks: Industry-wide heterogeneity

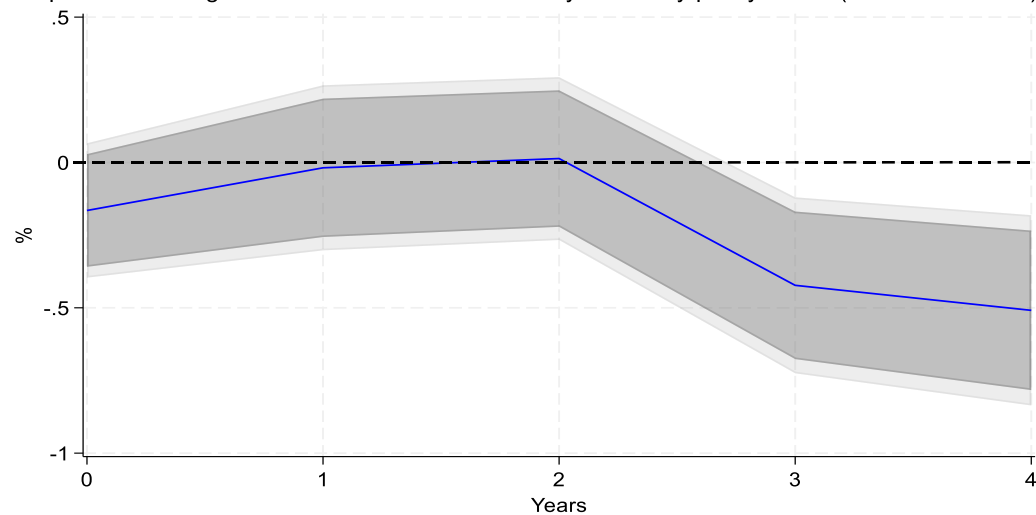
Response of intangible investment to contractionary monetary policy shock (Durables = 1)



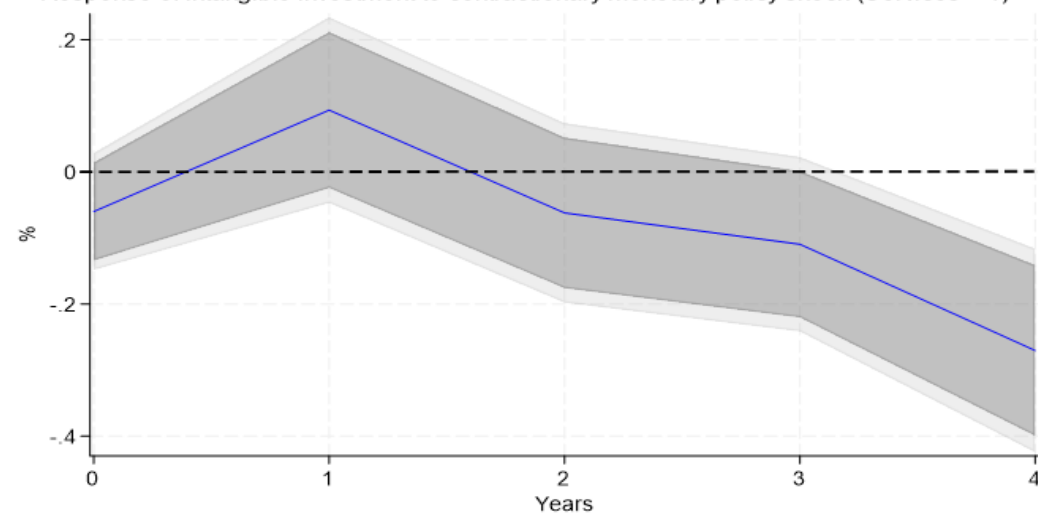
Response of intangible investment to contractionary monetary policy shock (Nondurables = 1)



Response of intangible investment to contractionary monetary policy shock (Construction = 1)

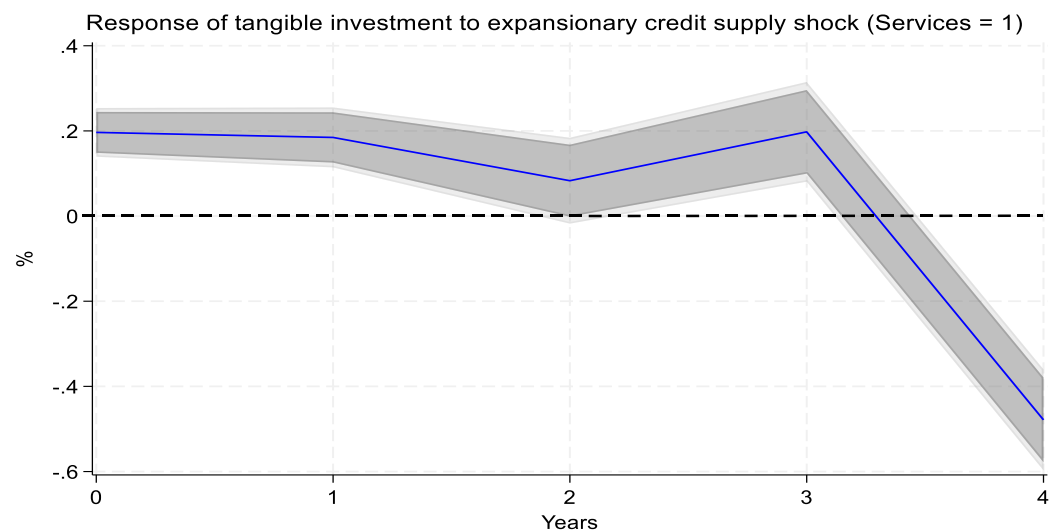
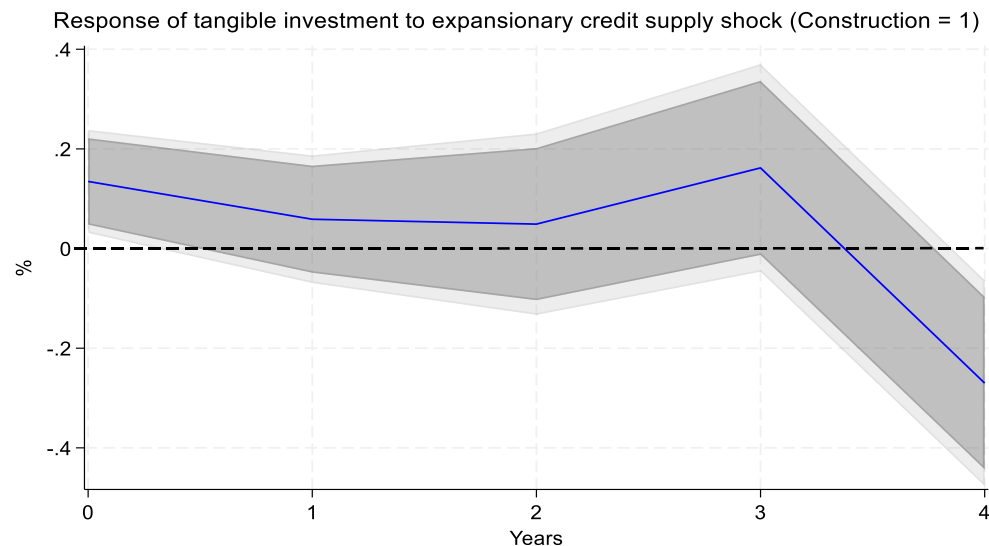
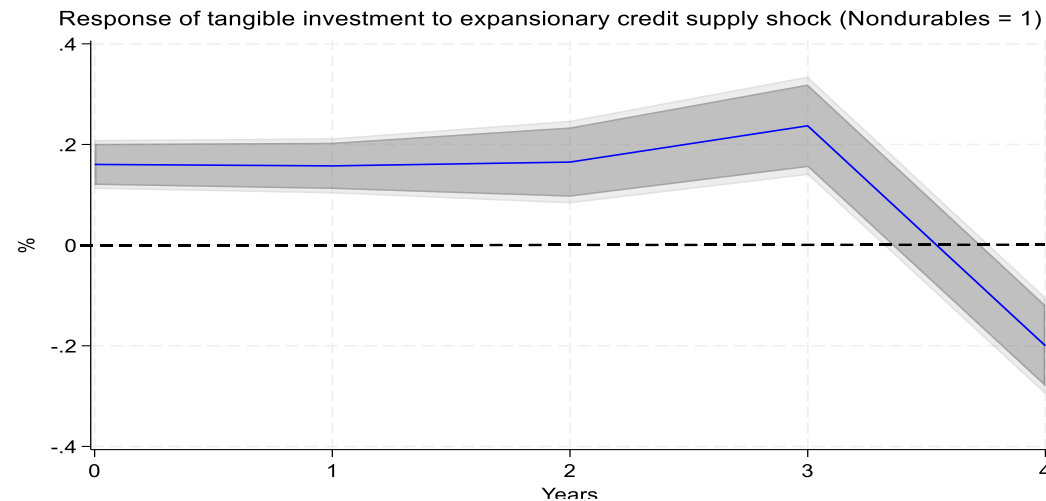


Response of intangible investment to contractionary monetary policy shock (Services = 1)



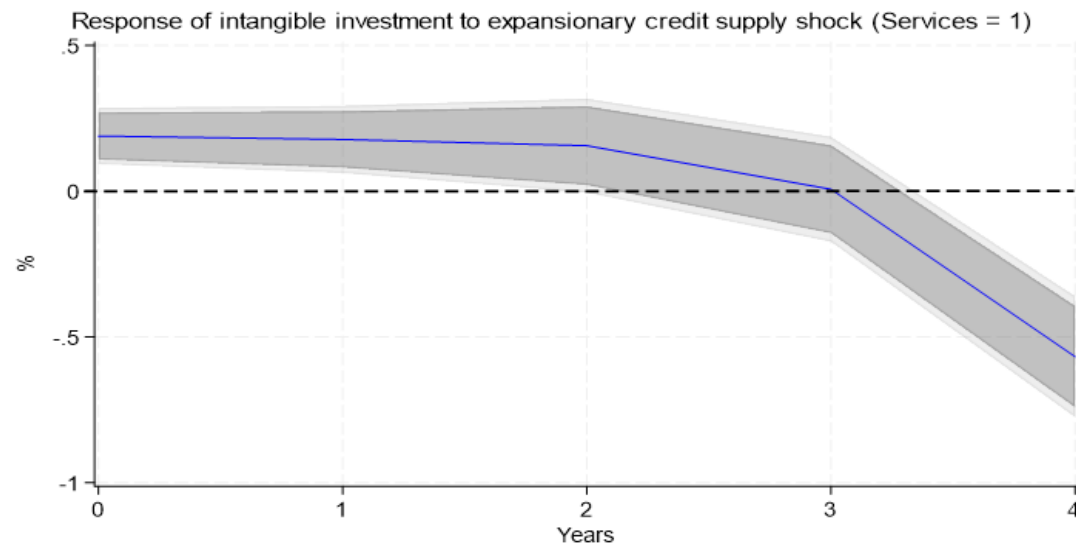
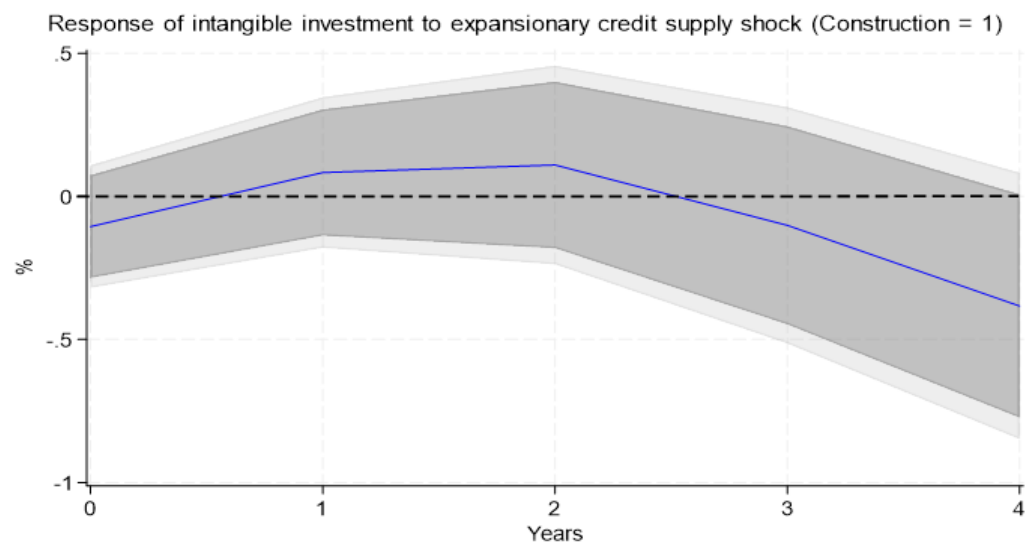
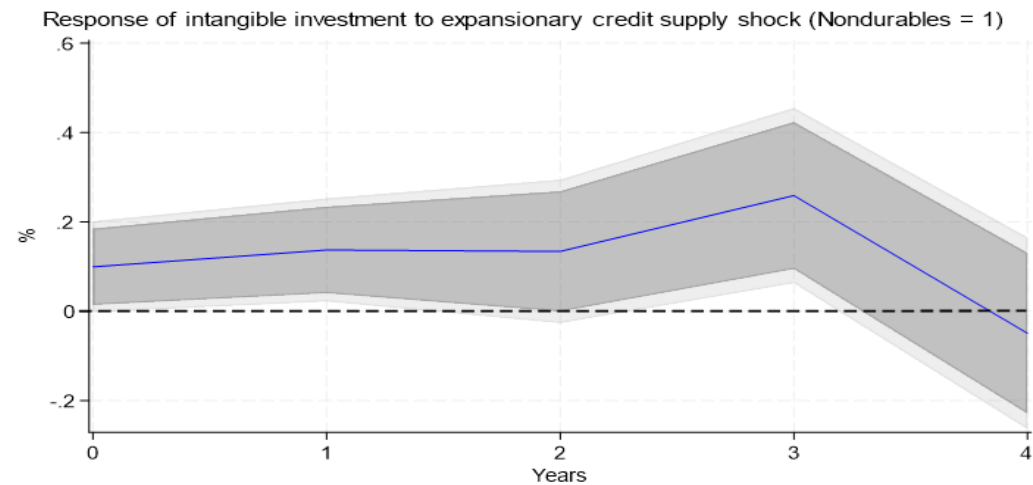
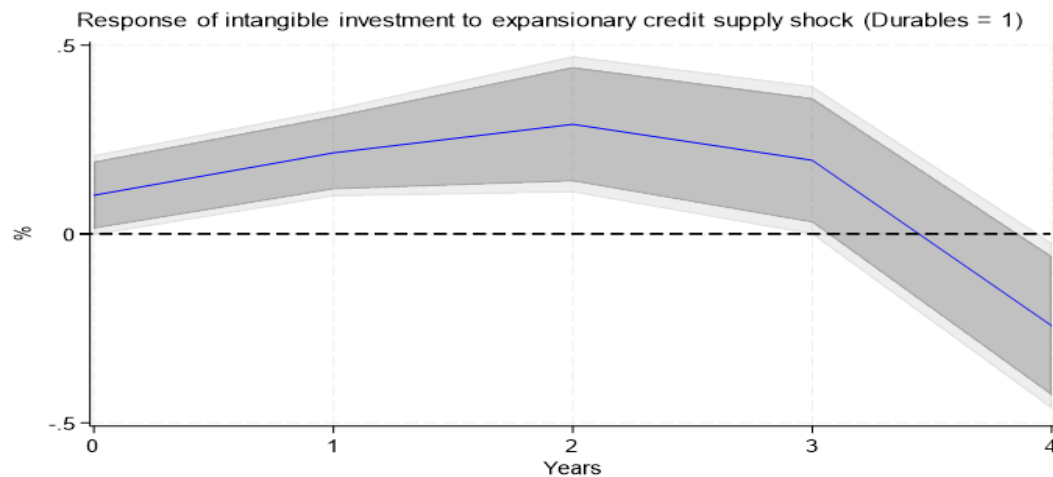
Empirical Results

Local projection impulse responses of firms' tangible investments to bank credit shocks: Industry-wide heterogeneity



Empirical Results

Local projection impulse responses of firms' intangible investments to bank credit shocks: Industry-wide heterogeneity



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Empirical Results

Examining channels of transmission – the role of financial frictions

- The level of investment is independent of the share of intangible assets held by the firm, given the firm is financially unconstrained.
- The investment of a financially constrained firm is conditional not only on the cost of borrowing and the collateral value of firm assets, but also on the share of intangible assets. ([Döttling and Ratnovski, 2023](#))

We test this proposed economic channel empirically, using various proxies of financial constraints:

- On the basis of interest coverage ratio ([Top and bottom quartile](#))
- On the basis of short-term debt holdings ([Top and bottom quartile](#))
- On the basis of working capital requirements ([Top and bottom quartile](#))
- On the basis of age ([Older, Middle-aged, and Younger firms](#))

Our findings are consistent with – firms' intangible investment is less sensitive to monetary and credit supply shocks than tangible investment, driven by the degree of financial constraints faced by the firms.

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Conclusion

Key takeaways :

- Intangible investments show a reduced sensitivity to monetary policy shocks and bank credit supply shocks compared to tangible investments for Indian firms.
- These findings persists, irrespective of the firm's industry and sector classification.
- Financially constrained firms are more responsive to both monetary policy shocks and bank credits supply shocks than unconstrained firms.
- They also play a crucial role in weakening the responses of intangible investments to these shocks, vis-à-vis tangible investments.

Policy implications:

- Weaker investment channel of monetary policy in service-driven economy like India – Shifting from traditional to unconventional monetary policies and other structural reforms.
- Need to develop credit risk assessment techniques that accurately reflect the value of intangible assets.

Thank You!

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