

The impact of interest: Firms' investment sensitivity to interest rates

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The issue

Monetary policy transmission operates through both *direct* and *indirect* channels

- HANK: shift towards indirect interest rate channels to consumption (Kaplan et al., 2018)
- Important direct transmission of interest rate through firms' investment (Auclert et al., 2020)

Empirical evidence on the *interest sensitivity of investment* is mixed

→ general problem is a lack of exogenous variation in interest rates that firms face

- Time-series evidence based on identified monetary policy shocks points towards significant and persistent effects on aggregate investment (Christiano et al., 2005)
- Recent qualitative survey evidence suggests a small direct interest rate sensitivity of firms' investment Sharpe and Suarez (2021), Graham (2022)

New evidence from hypothetical vignettes

Elicit firms' investment adjustments to various changes in interest rates on loans

- isolate direct impact of external financing costs on investment
- open-ended text questions to develop narrative of non-adjustment

Semi-elasticity: 1 p.p. \downarrow in lending rate \Rightarrow 6–7 % \uparrow in investment over following two years

- substantial share of non-adjusters + significant intensive margin conditional on adjust.
- part. strong effects for financially constrained firms and larger firms w/ labor shortages
- narratives of non-adjust. consistent with pecking order and with not being at margin

Local projection: firms' production response to monetary policy shock (1999-2021)

- interacted with interest sensitivity of investment from our vignette
- stronger production response of interest-sensitive firms

Roadmap

Survey Experiment

The Interest Rate Sensitivity of Investment

Macroeconomic Relevance

Experimental setup

Hypothetical scenarios to elicit firm's investment response to changes in the loan rate

- Scenarios should clearly identify the *partial equilibrium effect*
- Scenarios should be realistic for managers

Question was added to the December 2023 wave of the ifo Business Survey

- Large-scale survey among a representative sample of German firms
- Sophisticated respondents at the management level
- **3,295 firms** answering to our questions

Prior to the vignette, the firm's investment plans for the next two years are elicited

Hypothetical scenario

For the following questions, please imagine that the **financing conditions improve** for you and your competitors. For the next 2 years, **loan interest rates** for all maturities are **[0.5/1/3/4] percentage points lower** than currently expected. Assume that nothing else changes in terms of credit conditions, firm-specific or macroeconomic conditions.

If investments were planned in 2024/2025:

To what extent would you adjust the amount of the planned total investments for 2024 and 2025 as a result (in %)? (A rough estimate is sufficient) 2024:___ / 2025:___

If investments were not planned:

In this case, would you plan investments for [2024/2025]? Yes / No / I don't know

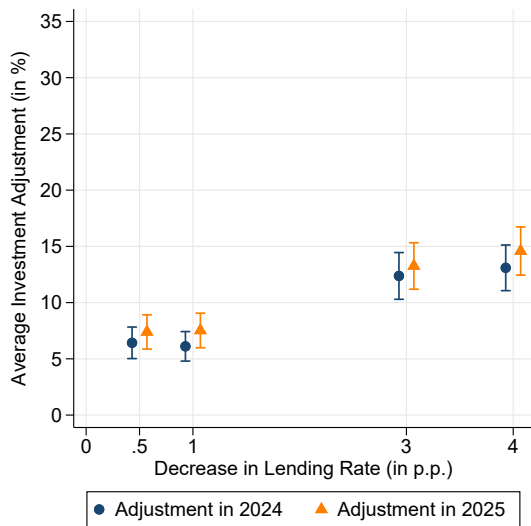
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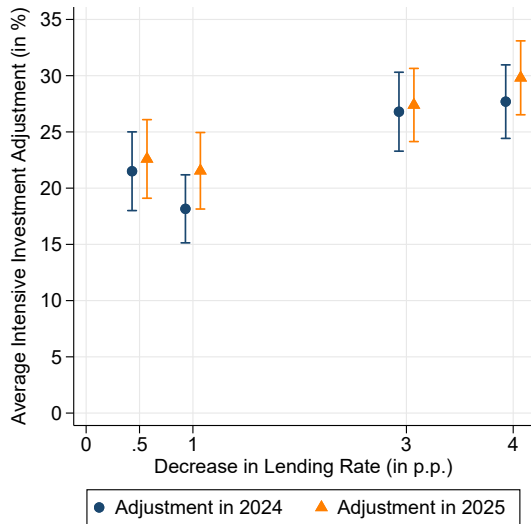
Macroeconomic Relevance

6-7% investment adjustment in response to a 1 p.p. rate change



- Average interest rate semi-elasticity of investment = 6-7%
 - 1/3 of GE investment response to monetary policy (Ottonello et al., 2020)
 - Comparable to short-run user cost elasticity estimates (Curtis et al., 2021)
- Non-linear: Lower response to larger interest rate cuts
- Constant effect over 1-2 years

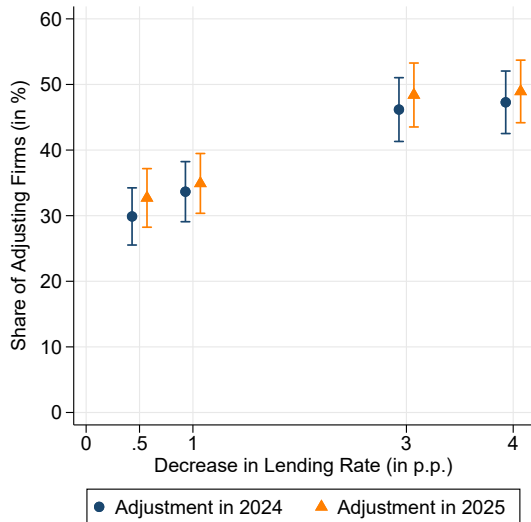
Intensive margin adjustment considerably larger



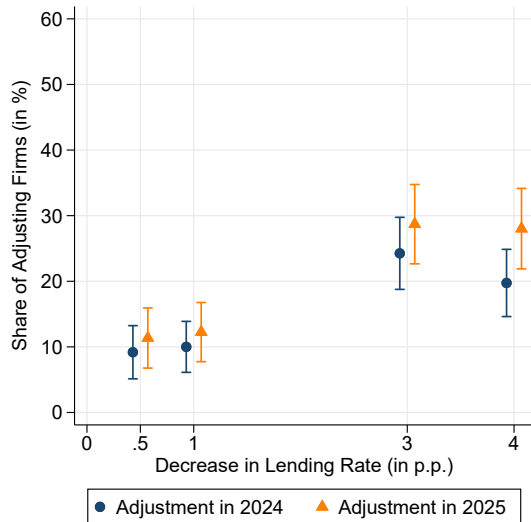
- Consider only firms that adjust investment plans
- Investment adjustment amounts to
 - 18–23% for small rate cuts
 - 27–30% for larger ones
- Large difference from overall effect size
→ significant share of non-adjusters

Extensive margin: evidence for fixed capital adjustment costs

Firms that planned to invest



Firms that did not plan to invest



What are the reasons behind non-adjustment?

In a frictionless world, the *non-adjustment of existing investment plans* after changes in interest rates is hard to rationalize.

- However, median firm in the survey does not adjust plans at all
- Non-adjustment cannot be explained by fixed capital adjustment costs alone

Ask open-text question to understand interest rate insensitivity:

Why would you not adjust the amount of the planned total investments despite lower interest rates?

- 77% of non-adjusters provide a (high-quality) explanation
- Hand-code answers into 6 broader areas encompassing 10 categories

Three main narratives of non-adjustment

1. Sufficient internal funds (37%)

- e.g.: “We have sufficient funds to finance investments from liquidity”
- High cash and equity holdings

2. Low return to capital – At optimal capital stock (20%)

- e.g.: “[...] higher investments than planned would probably not result in significantly higher returns despite the more favorable interest rate”
- Focus on replacement investments, low R&D activity

3. High return to capital – Interest rate not decisive (18%)

- e.g.: “Interest costs do not play a role in our investment decisions, as the returns are sufficiently high”
- Positive business expectations, high capacity utilization

Financial conditions particularly relevant for interest sensitivity

	(1)	(2)	(3)	(4)	(5)
<i>Extensive Margin Adjustment (0/100)</i>					
Loan negotiations past 3 months		14.892*** (3.711)	12.743*** (4.366)		
Loan negotiations past 3 months × Bank acted restrictive			10.775 (7.702)		
Financing conditions relevant for investment 2024				18.892** (7.474)	
Financially constrained					19.945*** (6.650)
Share of externally financed investment 2024 (in %)	0.208*** (0.041)	0.135*** (0.046)	0.136*** (0.047)	0.170*** (0.054)	0.179*** (0.042)
Log employees	-2.729*** (0.896)	-2.303** (0.922)	-2.220** (0.940)	-2.225** (0.986)	-1.961** (0.906)

Small, financially constrained & externally financed firms more likely to adjust

- Shifting the loan rate decreases the external finance premium
- Firms that face a larger external finance premium ex ante are more likely to react

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It is not just hypothetical!

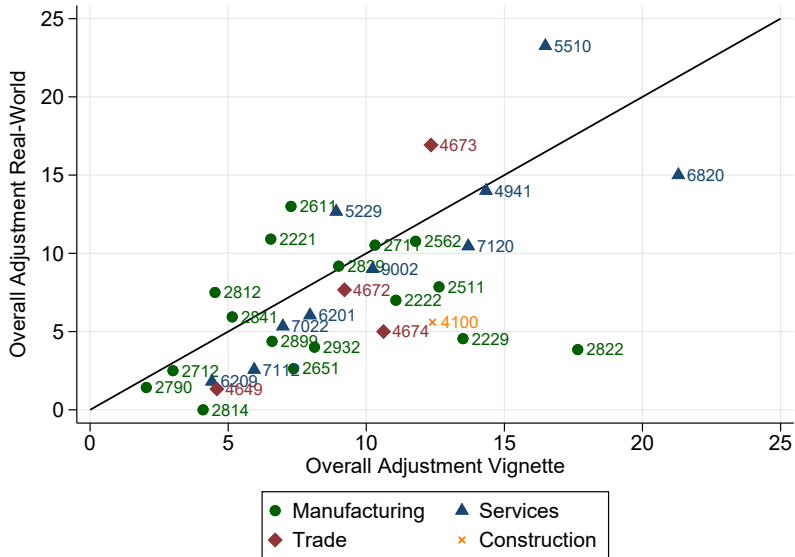
ECB key interest rate increased by 4.5 p.p. between 06/2022 – 09/2023

→ We asked firms for their investment adjustment in response to the hiking cycle

- Firms have reduced their investment by 8.6% in response to the interest rate hikes.
- Extensive margin: 20.3%; intensive margin: 41.5%
- Response highly correlated to firms' hypothetical investment adjustment in vignettes

	<i>Real World Response</i>		
	Overall adjustment	Extensive margin	Intensive margin
<hr/> <i>Hypothetical Response</i>			
Overall adjustment	0.362*** (0.038)		
Extensive margin		0.247*** (0.020)	
Intensive margin			0.494*** (0.055)

Partial-equilibrium effect via external finance premium dominates



Production response to monetary policy by interest rate sensitivity

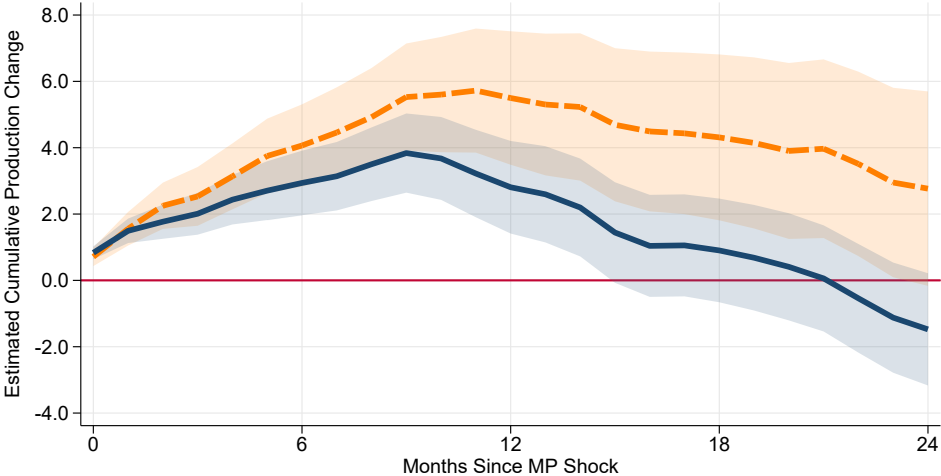
Estimate firms' production response to monetary policy shocks 1999 – 2021

1. **Outcome:** Add up monthly qualitative production changes
 - Each month, firms are asked whether, in the previous month, they: increased (1)/ kept unchanged (0)/ decreased (-1) their production
2. **Shock:** High-frequency identified monetary policy shocks (Jarociński & Karadi, 2020)
3. **Method:** Estimate impulse response functions of cumulative changes in production using local projections (Jordà, 2005)

Estimate distinct effects for firms that:

1. adjust investment in our vignette (interest rate sensitive)
2. do not adjust investment in our vignette (interest rate insensitive)

Stronger output response of interest rate sensitive firms



Adjusting in Vignette Not Adjusting in Vignette

Conclusion

- How large is firms' investment sensitivity to interest rates?
 - novel survey approach with hypothetical vignettes
 - causally identify firms' investment adjustments to lending rate changes
- 1 p.p. reduction in lending rate: upward adjustment in investment of 6–7 %
- Average response driven by
 - substantial fraction of non-adjusters
 - mainly due to high cash buffers and lack of investment opportunities
 - significant intensive margin conditional on adjusting
- Particularly strong effects for
 - financially constrained firms
 - firms facing labor shortages
- Interest rate sensitivity of first-order importance for firms' reaction to monetary policy