Monetary Policy and Innovation

Yueran Ma
Chicago Booth & NBER

Kaspar Zimmermann
Frankfurt School

OeNB Annual Economic Conference 2025

Insights from a paper prepared for the 2023 Jackson Hole Economic Symposium

Overview

Traditional view: monetary policy has short-run effects; neutral in long run

Another view: $\underbrace{\text{monetary policy} \Rightarrow \text{innovation}}_{\text{via demand \& financial conditions}} \Rightarrow$ longer-term impact

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This paper: empirical analyses of how monetary policy affects innovation

- Little systematic evidence so far
- VC investment rose 20% annually 2012 to 2021; fell 30% annually since 2022

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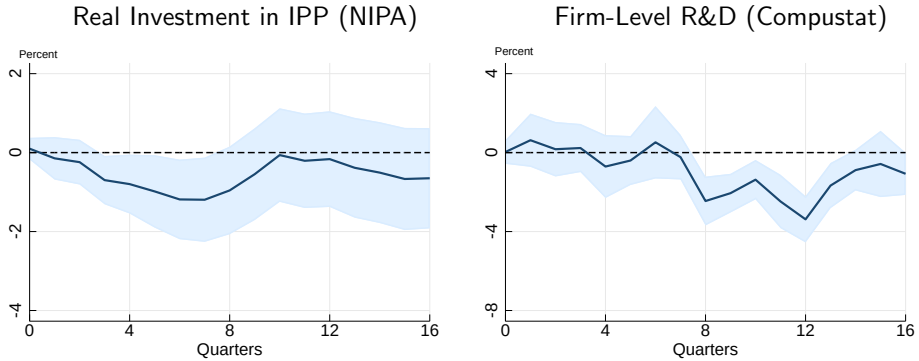
We find: after 100 bps tightening shock à la Romer and Romer (2004)

1. Both innovation spending and patenting in important technologies decrease
2. Aggregate innovation index declines by up to 9% in next 2 to 4 years
3. Implies lower output by 1% and TFP by 0.5% after another 5 years

Result 1: R&D spending changes by 1% to 3%

Response to 100 bps monetary policy shock

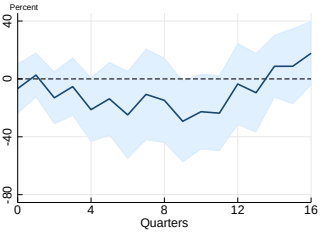


All impulse responses use local projections. Shaded areas are 90% confidence intervals.

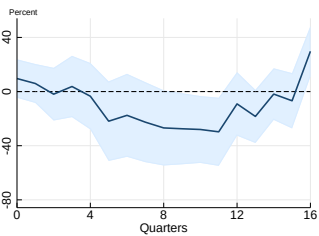
Result 2: VC investment changes by up to 25%

Response to 100 bps monetary policy shock

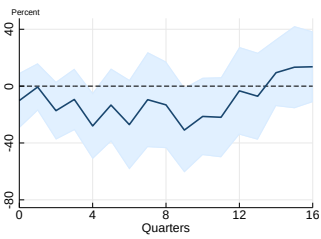
Real VC Investment



Early Stage VC

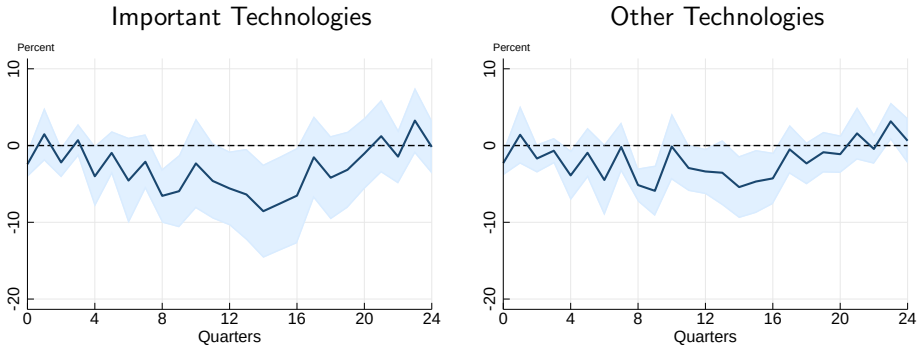


Late Stage VC



Result 3: Patenting in important tech changes by up to 9%

Response to 100 bps monetary policy shock



Bloom et al. (2023) classify 277 important technologies since 1976

- E.g., cloud computing, electric vehicles

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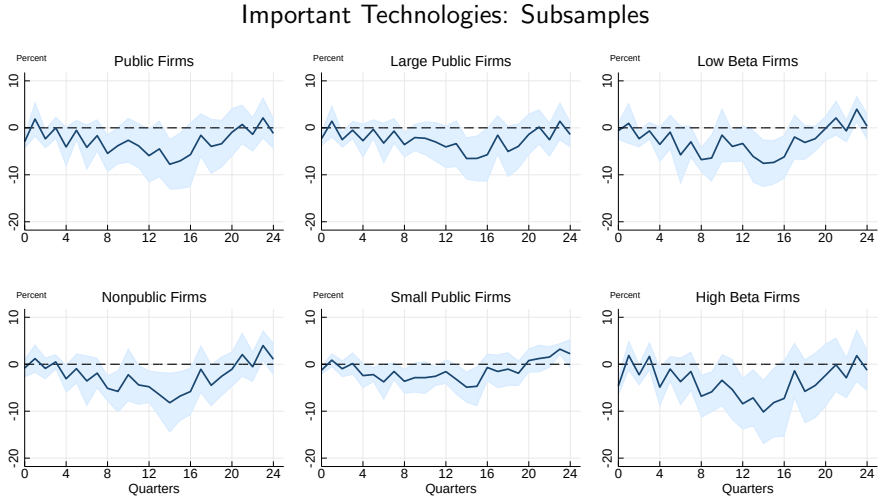
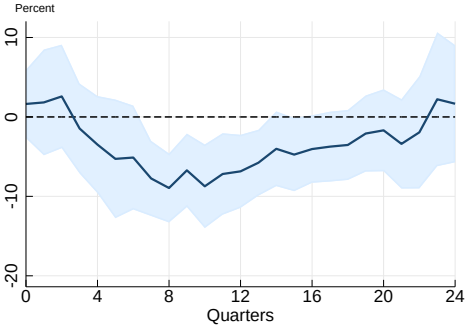
Response to 100 bps monetary policy shock



Result 4: Aggregate innovation index changes by up to 9%

Response to 100 bps monetary policy shock

- Kogan et al. (2017) constructed aggregate innovation index by estimating the economic value of patents (among public firms, normalized by total stock market capitalization)
- A 9% reduction in the innovation index $\Rightarrow$ 1% lower output and 0.5% lower TFP after another 5 years



Innovation channel: longer lasting effects than traditional investment channel

Mechanisms: Demand and financial conditions

For example, following monetary policy tightening:

1. **Lower demand ⇒ less profitable to innovate**
   - R&D and patenting decline more among high beta industries
   - R&D and patenting also decline among large public firms
2. **Tighter financial conditions ⇒ less funding and appetite for risk taking**
   - Early stage VC investment declines (immediate demand less relevant)
   - Innovation responds to financial conditions (e.g., excess bond premium)

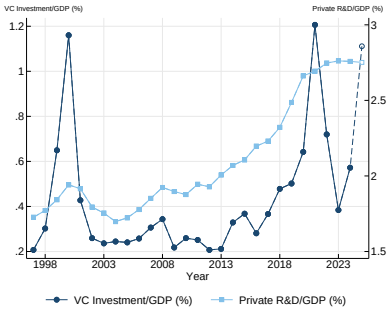
We focus on the effects of conventional monetary policy

- Impact of QE on innovation in Europe: Grimm, Laeven, and Popov (2022)
- Impact of ultra-low interest rates on productivity: Liu, Mian, and Sufi (2021)

Current conditions

VC investment grew ∼20% annually from 2012 to 2021; large decline since 2022

- All major sectors are affected
- Will see if recent decline is correction of overvaluation or persistent slump (rebound in 2025?)
- Data show monetary policy affects important technologies, not just bubbles

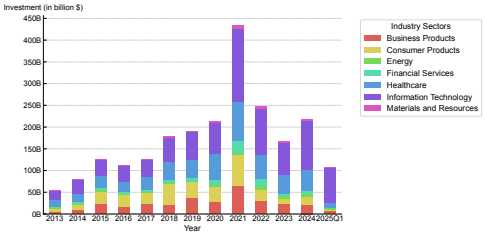


Historical perspective: technology revolutions survived adverse macro conditions

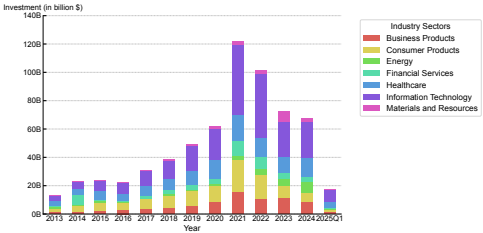
- Second industrial revolution hit by frequent panics and crises
- Third industrial revolution hit by oil shock, high inflation, high interest rate

Decomposition

- Venture capital has rebounded in Q1 of 2025, but remains highly concentrated in the U.S., the IT sector, and late-stage investments



(a) USA



(b) Europe

Policy implications

Questions for future work:

1. Should policy be more accommodative if innovation is undersupplied?
2. Should policy be more countercyclical to stabilize innovation?
3. Monetary policy has tightening and easing; do their effects cancel out?
4. Can other policies substitute for monetary policy?

Well known that constant monetary stimulus can be counterproductive

- Friedman (1968), Lucas (1976)

Policies that stabilize innovation could be helpful

- Barlevy (2004), Aghion, Farhi, and Kharroubi (2012), Ikeda and Kurozumi (2019)

Summary

Lack of prior research on how monetary policy affects innovation is surprising

1. Monetary policy affects demand and financial conditions
   - Christiano, Eichenbaum, and Evans (1999), Bernanke and Kuttner (2005)
2. Demand and financial conditions affect innovation
   - King and Levine (1993), Barlevy (2007), Ouyang (2011), Anzoategui et al. (2019)

- Should connect the dots
- A wealth of follow-up studies confirm the association in diverse settings

Open questions:

- Measurement of innovation
- U.S. monetary policy might also affect innovation in other countries
- Why VCs so sensitive to monetary policy?
- Cleansing effect of tight monetary policy among unproductive firms?