

Monetary Policy and Innovation

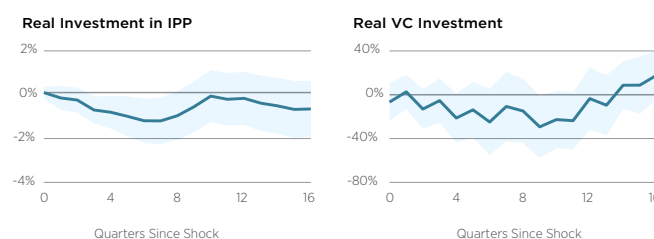
Based on BFI Working Paper No. 2023-125 "[Monetary Policy and Innovation](#)," by Yueran Ma, Chicago Booth; and Kaspar Zimmermann, Frankfurt School of Finance & Management

Monetary policy has a substantial impact on innovation activities. After a tightening shock of 1 percentage point, spending on research and development declines by about 1%-3%, venture capital investment declines by about 25%, and patenting in important technologies declines by 9%.

Milton Friedman's influential 1968 [address](#) to the American Economic Association concerning the significance of monetary policy for economic stability highlighted the idea that monetary policy can have real effects in the short run, but not in the long run. In this paper, prepared for the Federal Reserve Bank of Kansas City's Jackson Hole Economic Symposium, the authors consider one possibility of departing from the neutrality of monetary policy, at least in the medium term, through the effects of monetary policy on innovation. It's possible, for instance, that monetary policy contractions (such as interest rate hikes) could decrease funding for innovation, causing lasting effects on both innovation and growth. To date, research on monetary policy and innovation is largely theoretical, and empirical analyses on this issue are quite sparse. This paper aims to fill this gap.

To study this issue, the authors use several measures of innovation (e.g., R&D spending, patenting, innovation indices from previous research), as well as macroeconomic indicators such as GDP and unemployment, along with information on historical monetary policy

Figure 1 • Investment in Intellectual Property Products (IPP), Venture Capital (VC) Investment



Note: These graphs show the impact of a 100-basis-point (or 1 percentage point) monetary policy shock on both real investment in intellectual property products and real venture capital investment. The horizontal axis tracks the quarters since the monetary policy shock, and the shaded area shows the 90% confidence interval.

changes. (The authors focus on the effects of conventional monetary policy, or adjusting interest rates, rather than unconventional monetary policy, such as quantitative easing.) They use these data to estimate the effects of monetary policy shocks on innovation activities. The authors observe the following changes in innovation activities in the years following monetary policy shocks, which they normalize so

that each change corresponds to the impact of monetary tightening of 1 percentage point:

- Investment in intellectual property products in the national accounts, which includes aggregate spending on research and development and software, declines by about 1%. Venture capital investment also declines by as much as 25% 1-3 years after a monetary policy shock.
- Patenting in “important technologies,” defined as innovations that became major topics in earnings discussions, declines by up to 9% 2-4 years after a shock. Interestingly, patenting in other technologies declines by less.
- The overall economic value of patents, which is based on aggregating stock market reactions to the approval of individual patents, also declines by up to 9% in the years following a monetary policy shock. This drop can contribute to declines of 1% in real output and 0.5% in total factor productivity after five years.

What explains these results? The authors draw on their data to offer the following two explanations for how monetary policy shocks impact innovation:

- Monetary policy can influence innovation by changing aggregate demand and correspondingly the profitability of innovation. Industries where demand is more closely tied to economic conditions are more responsive to monetary policy shocks. Their spending on research and development also changes by more in response to a shock. In

addition, the change in innovation activities occurs among both public and private firms, and among both large public and small public firms. To the extent that large public firms are less affected by financial conditions, the change in technological development among these companies is likely driven by demand, not just financial market conditions.

- Monetary policy can also influence innovation by changing financial market conditions. Early-stage venture capital investment declines after monetary policy tightening. To the extent that early-stage startups are still in the product development phase and may not have products coming to the market immediately, the reduction of funding could reflect less appetite among investors for risky undertaking, not just reduced demand.

These findings suggest that monetary policy may affect the productive capacity of the economy in the longer term, in addition to the well-recognized near-term effects on economic outcomes. Developments in the past several years highlight the relevance of these issues. Rising interest rates since 2022 have been accompanied by a substantial decline in venture capital investment. Meanwhile, recent breakthroughs in artificial intelligence raise the hope that another technological revolution could be on the horizon. While the authors’ focus is to present empirical facts and optimal policy analysis is beyond the scope of this paper, they encourage further research on this dimension of monetary policy.

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