Advanced Monetary Economics

Lecture 13

Malte Rieth
Martin-Luther-Universität Halle-Wittenberg

What we have learned so far

- strong evidence in micro data for price stickiness
- New Keynesian model takes this into account
- provides a model for the interest rate channel
- changes in nominal interest rate affect output and inflation
- a contractionary monetary policy shock lowers output and inflation

Outlook

- What are monetary policy shocks?
- How to measure such shocks?
- How to determine the effects of monetary policy shocks?
- How do they compare to the effects of the theoretical predictions from the New Keynesian model?

1 Monetary policy and the economy

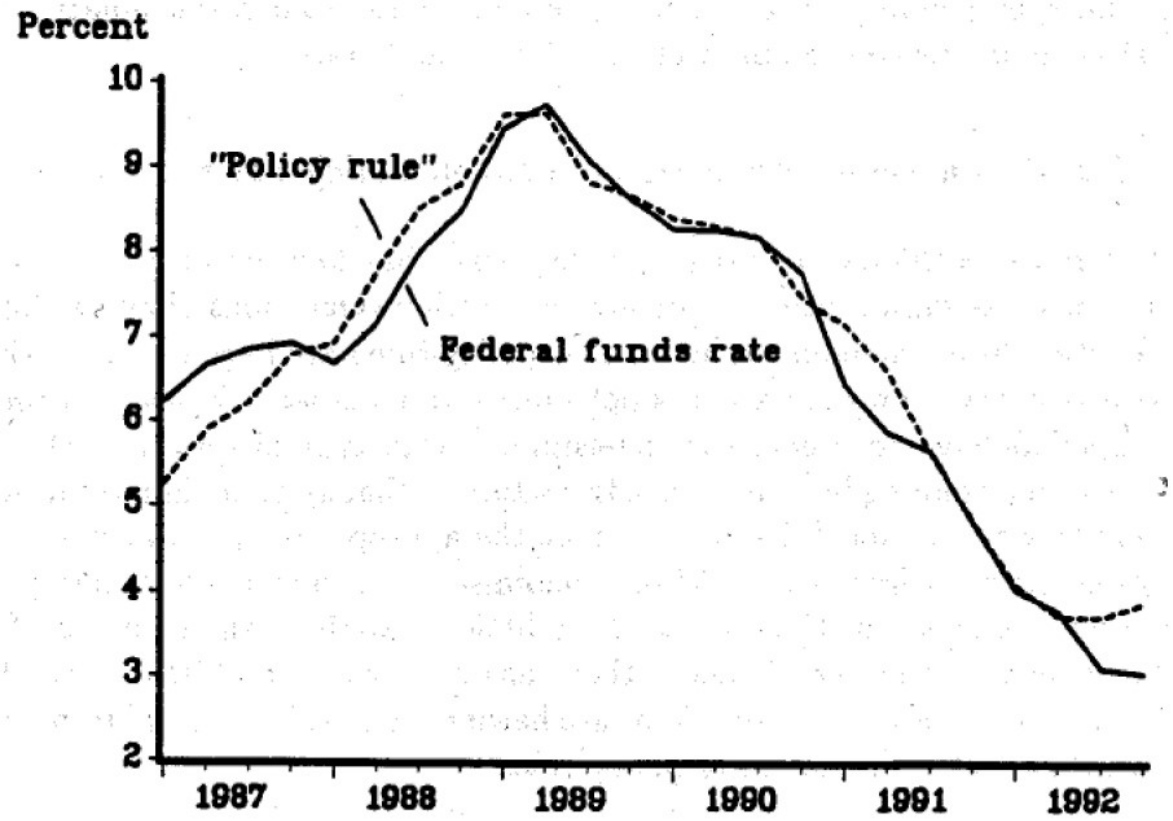
- Why not simply look at interest rate changes and then infer the effects on the economy?

- Monetary policy responds to changes in the economy $\longrightarrow$ Monetary policy is endogenous

- central bank responses the Covid-19 pandemic
  - drop in the Federal funds rate by 1.5% in March
  - ECB launched PEPP and re-engaged in forward guidance

- to determine causality we need exogenous variation in monetary policy

- Reminder: the Taylor rule



- Behavior of Federal funds rate (i_t) described well by a simple rule, which prescribes

adjustment in response to inflation (π_t) and the output gap ($\hat{y}_t$)

$$i_t = 0.04 + 1.5\,(\pi_t - 0.02) + 0.5\hat{y}_t$$

- values for the annual frequency ($\neq$ to DSGE model, which was calibrated to quarterly frequency)

- in the New Keyensian model, we had

$$\hat{\imath}_t = \phi\hat{\pi}_t + \hat{v}_t$$

- let us generalize this and include output to be more consistent with actual central bank behavior

$$\hat{\imath}_t = \phi_\pi\hat{\pi}_t + \phi_y\hat{y}_t + \hat{v}_t$$

- the systematic component of monetary policy is $\phi_\pi\hat{\pi}_t + \phi_y\hat{y}_t$

- the term $\hat{v}_t$ is a monetary policy shock $\longrightarrow$ a deviation from a rule!

- interpretation: a deviation from the monetary policy rule can reflect:
  - exogenous shocks to preferences of policymakers
  - strategic considerations of the monetary authority due to public expectations
  - measurement error in preliminary available data

- A monetary policy shock is a deviation from a monetary policy rule $\longrightarrow$ simple concept and straightforward to implement empirically:
  1. estimate the Taylor-rule
  2. determine the deviations from the rule
  3. determine the effects on the economy

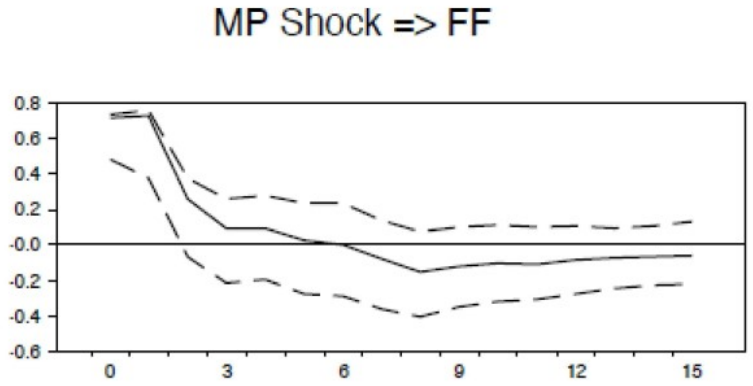
2 Estimation of monetary policy effects

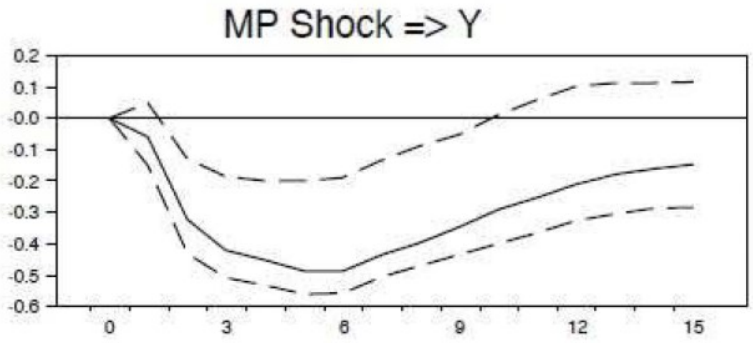
- Famous Handbook chapter: Christiano, Eichenbaum, Evans (1999), Monetary policy shocks: What have we learned and to what end?

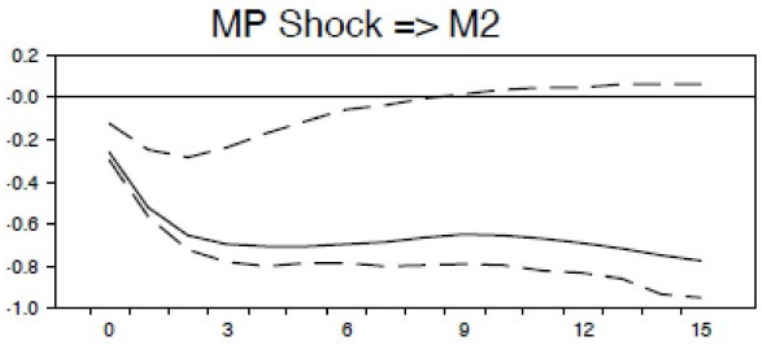
- Authors use structural vector autoregression (SVAR) to estimate the dynamic impact of monetary policy shocks

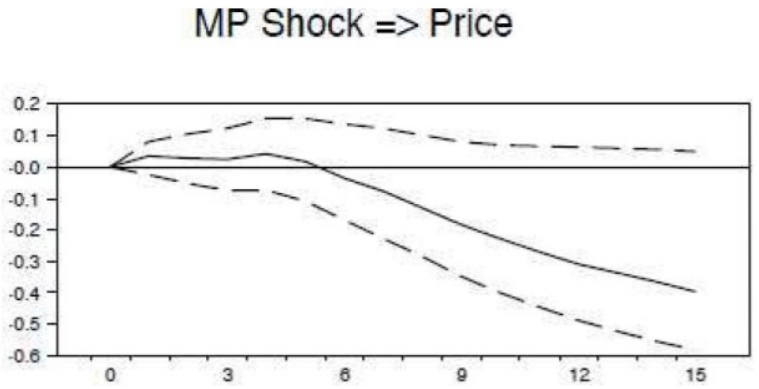
- The effects are shown by estimated impulse response functions.

- effects on Federal funds rate, broad money, ouput, and prices:









- Another famous study: Romer and Romer (2004, A new measure of monetary shocks: Derivation and implications, American Economic Review) criticize Taylor rule residuals as measure of monetary policy shocks:

  1. the shocks may contain changes in monetary policy not intended by the central bank, for example, because the federal funds rate is noisy and changes in response to conditions in the interbank market (unrelated to monetary policy)

  2. the shocks may actually reflect some endogenous component of monetary policy to the extent that the inflation and output measures do not fully capture the systematic component of monetary policy

- one needs to study monetary policy more detailed to identify monetary policy shocks $\longrightarrow$ construct policy shocks from archives

- To determine the "Intended Federal Funds Rate" focus on regular meetings only, read "Record of Policy Actions of the FOMC", "Minutes of the FOMC", and "Monetary Policy Alternatives"

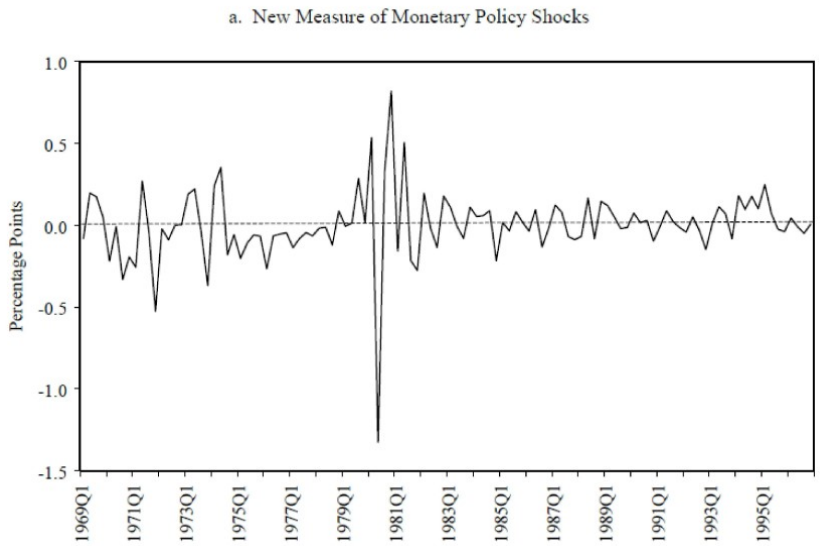
- To determine the information set of the federal funds rate $\longrightarrow$ use forecasts contained in report on "Current Economic and Financial Conditions"

- set up and estimate the monetary policy rule

$$\begin{aligned}\Delta\tilde{i}_t &= \beta_0 + \beta_1\tilde{i}_t + \sum_{h=-1}^{2}\beta_{2,h}\Delta y^f_{t,h} + \sum_{h=-1}^{2}\beta_{3,h}\left(\Delta y^f_{t,h} - \Delta y^f_{t-1,h}\right) \\ &\quad + \sum_{h=-1}^{2}\beta_{4,h}\Delta\pi^f_{t,h} + \sum_{h=-1}^{2}\beta_{5,h}\left(\Delta\pi^f_{t,h} - \Delta\pi^f_{t-1,h}\right) + \beta_6 u^f_t + \varepsilon^{RR}_t,\end{aligned}$$

where $\tilde{i}_t$ is the intended federal funds rate, Δy_t output growth, π_t inflation, u_t the unemployment rate, f denotes forecasts of that variable by the Federal Reserve in meeting t for horizon h

- ε_t^{RR} is the "new measure of monetary policy shocks":



- it captures changes in the intended federal funds rate
  - not reflecting current economic developments
  - free of anticipatory actions

- Interpretation of these shocks:
  - erratic beliefs of policymaker about the economy
  - changes in tastes and goals of policymaker
  - changes in operational procedures

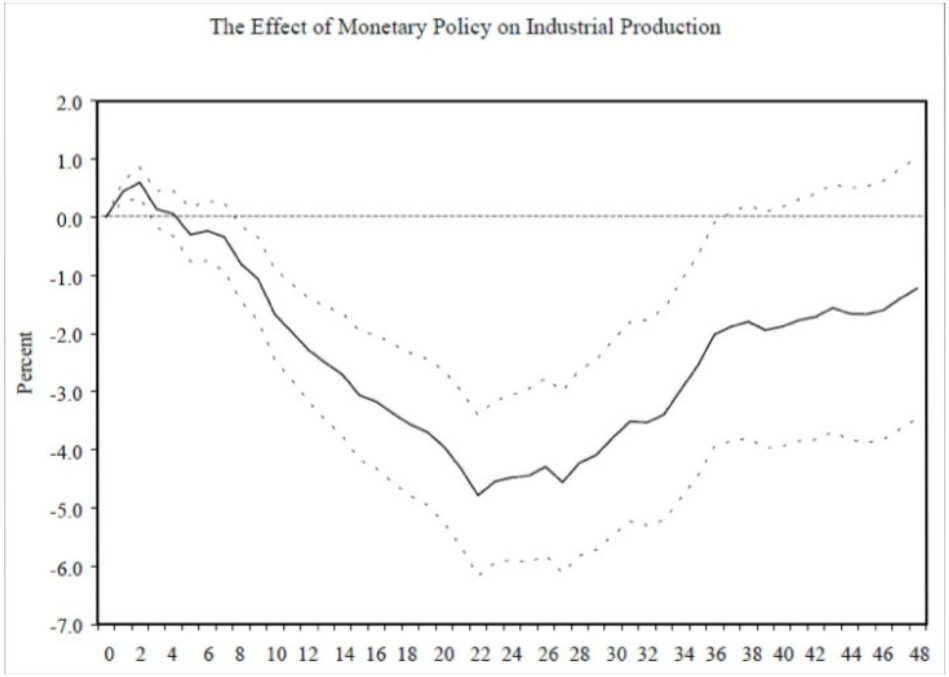
- to determine how output and prices behave in the wake of monetary shocks, run the following regression

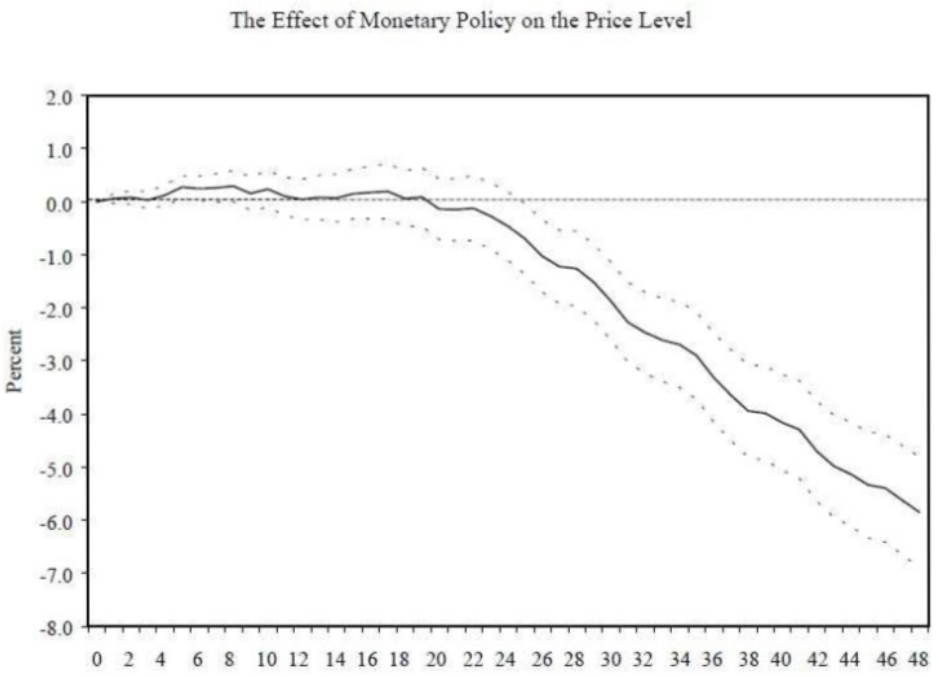
$$\Delta x_t = \beta_0 + \sum_{p=1}^{L} \beta_p \Delta x_{t-p} + \sum_{q=0}^{J} \gamma_q S_{t-q} + e_t,$$

  where x_t is either output (industrial production) or prices, S_{t-q} is the new shock measure and e_t just an error term wihtout further meaning

- The coefficients of interest are the γ_qs. They measure the contemporaneous ($q = 0$) and lagged ($q > 0$) impact of the monetary shocks on output or prices.

- the effect of the narrative shocks on output and prices:





- Questions we want to answer

  1. What is a monetary policy shock? $\longrightarrow$ deviation from a monetary policy rule accounting for central banks intentions and information set

2. How to measure a monetary policy shock? $\longrightarrow$ study central bank archives very carefully and run a simple regression afterwards

3. How to determine the effects of a monetary policy shock? $\longrightarrow$ include the narrative shocks in a regression

3 Monetary policy and financial markets

- High-frequency (minute or daily) interest-rate futures measure the expected Federal Funds rate

- Monetary policy shocks are changes in interest-rate futures around the FOMC policy announcement

- Interest-rate futures and policy announcements: change in expected Federal Funds rate ($E_d i_{m+h}$) on day d of month m:

$$\Delta E_d i_{m+h} = f_d^{m+h} - f_{d-1}^{m+h},$$

  where f_d^{m+h} is the futures for Federal Funds rate with h month maturity

- Gertler and Karadi (2015) define the monetary policy shock as the change in three-month interest-rate futures in a 30-minute window around the policy announcement:

$$s_t = \Delta E_{30\,\text{min}} i_{m+3}$$

- Is an increase in s_t bad news?

- Assume information frictions (central banks have superior knowledge)

- An increase in interest rates to cool down the economy could imply it is going really great.

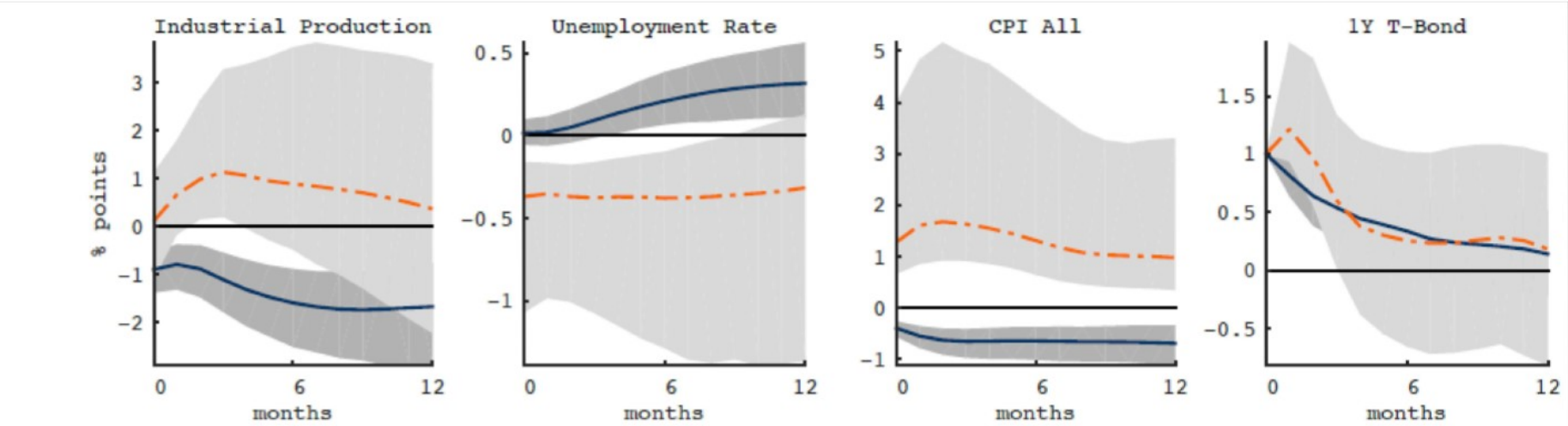
- Monetary policy shocks have an information component – signaling channel of monetary policy (Melosi (2017))

- Miranda-Agrippino and Ricco (2020) start with high-frequency market-based monetary policy shock and regress it on the forecasts of the FOMC (as in Romer and Romer)

- New monetary policy measure is the error term of this regression after corrected for potential autocorrelation

- Information (signaling) component of monetary policy: fitted value of the regression

- The signaling channel of monetary policy:



Impulse responses to the information component (red) and the monetary policy shock component (blue)

What we have learned

- A monetary policy shock is
  - a deviation from a policy rule
  - a surprise to financial market participants
- How to measure a monetary policy shock?
  - Financial market surprises around a policy announcement
  - Control for information component of the monetary policy surprise using the information set of the central bank