Business Cycles & Monetary Policy

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Introduction

- Business Cycle activity constitutes expansionary & contractionary phases
- These fluctuations are due to the optimal responses of agents to shocks
- Monetary policy shock seeks to promote economic stability
- Inflation targeting central bank focus on maintaining price stability
  - Large part of monetary economics considers the relationship between real (i.e. output) and nominal variables (i.e. interest rates)
- Significant overlap between monetary economics & study of business cycle

Foundations of monetary policy research

- To investigate some of the stylised features of the data early research considered the empirical evidence from existing *reduced-form* models
- These backward-looking models include linear regression & VAR specifications

$$x_t = \phi x_{t-1} + \varepsilon_t$$

- Focus on the relationship between money, inflation and output (the business cycle)
- Linear regression models for monetary policy include the Taylor (1993) rule

$$r_t = \phi r_{t-1} + (1 - \phi)(\alpha y_{t-1} + \gamma \pi_{t-1}) + \varepsilon_t$$

- Can be used to identify the effects of a monetary policy shock, ε_t

Foundations of monetary policy research

- Alternative specifications may be provided by VAR models
  - Sims (1972, 1980) specified models with contemporaneous variables and identification restrictions
- Variants of VAR models distinguish between LR & SR
- Models used over a long period and serve as a benchmark for more recent models
  - Some of these are considered in the Time Series Analysis course

Early empirical findings

- Friedman & Schwartz (1963) suggest that changes in monetary policy cause output fluctuations
  - This study constitutes an early econometric analysis
  - Largely based on correlation studies (with lags)
  - Extensive sample of nearly 100 years
  - $\uparrow i_t = \downarrow y_t$ and $\downarrow i_t = \uparrow y_t$
- Be cautious of causal inference from correlation studies
- Could the relationship work the other way?
  - Monetary supply is endogenous, economic expansion could result in $\uparrow$ credit $= \uparrow$ MS, which occurs during expansionary monetary policy
  - Tobin (1970) and Moore (1988, 1989)
- Friedman & Kuttner (1992) suggest that the relationship in Friedman & Schwartz (1963) breaks down over more recent periods
- Evidence over early periods is mixed - but what about the current evidence?

Dynamic Responses to Monetary Shock

- To quantify the dynamic response of variables to a monetary policy shock we may use IRFs

$$IRF_{i,j} = \frac{\partial r_{t+j}}{\partial \varepsilon_t}, \;\; IRF_{y,j} = \frac{\partial y_{t+j}}{\partial \varepsilon_t}, IRF_{\pi,j} = \frac{\partial \pi_{t+j}}{\partial \varepsilon_t}$$

- Surprising finding of most early research that use regression models is that an increase in interest rates results in an initial increase in inflation
- This phenomena is termed the *"price puzzle"* - however more recent research shows that this relationship does not exist

Review of VAR literature

- Christiano, et al. (1999) provides an extensive review of literature on these VAR based models
- Suggest that there is consensus regarding the transmission of monetary policy,

  "... after a contractionary monetary policy shock, short term interest rates rise, aggregate output, employment, profits and various measures of wages fall, the aggregate price level responds very slowly, and various measures of wages fall, albeit by very modest amounts."

Benchmark VAR model

- Christiano, et al. (1999) also include what is regarded as the benchmark VAR model
- While it has a more complex VAR structure, the essential policy rule takes the form,

$$r_t = \phi_r r_{t-1} + \phi_{y,1} y_t + \phi_{y,2} y_{t-1} + \phi_\pi \pi_t + \phi_p p_t + \phi_m m_{t-1} + \varepsilon_t$$

where r_t is the Federal Funds rate, y_t is GDP growth, π_t is the GDP deflator, p_t are commodity prices, m_t represents a vector of monetary aggregates, and ε_t is the monetary policy shock

Benchmark VAR model

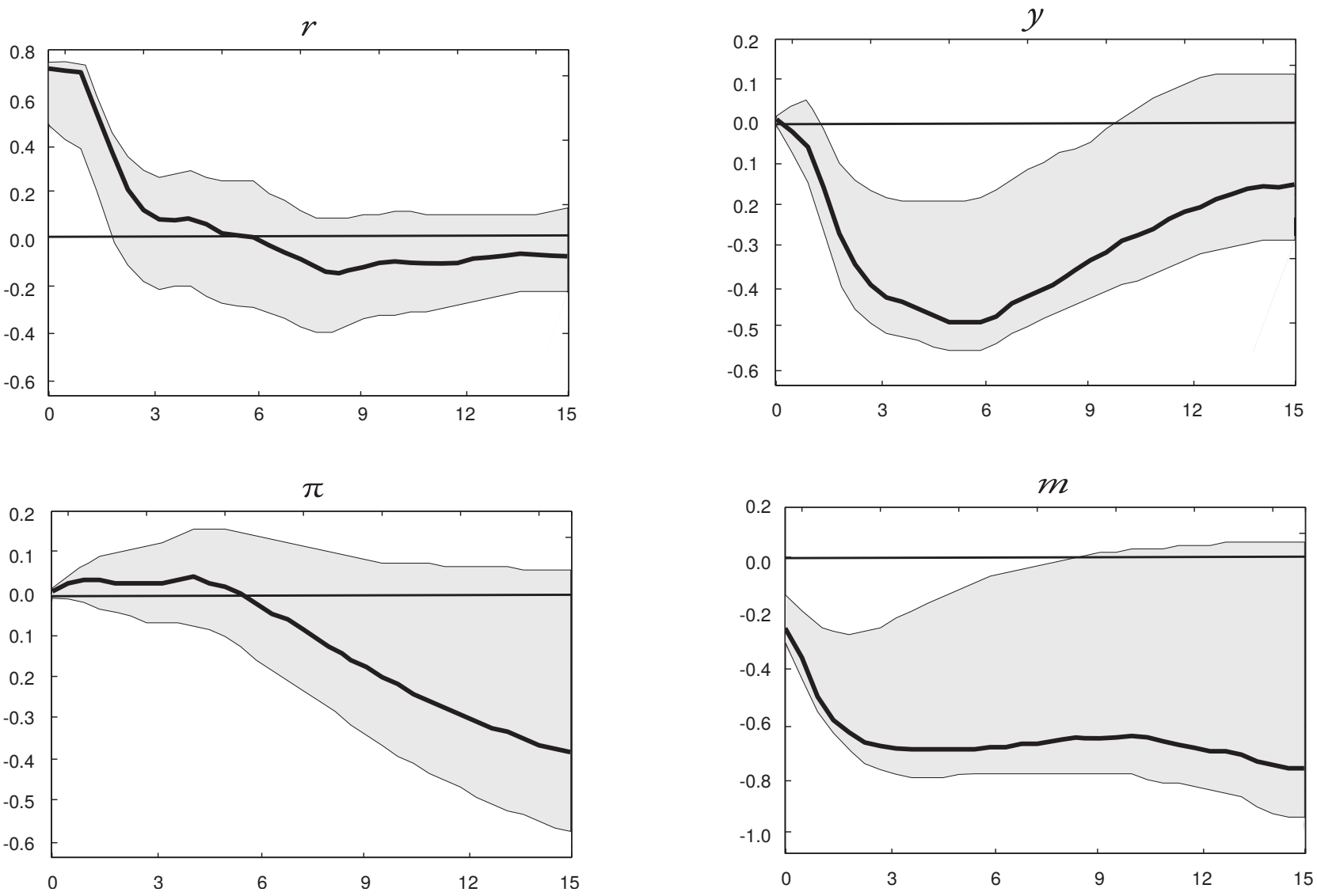

Figure: Impulse Response Functions

Results

- Federal funds initially $\uparrow$ 0.75% - takes 5 quarters to return
- Output $\downarrow$ 0.5% after 5 quarters to return
- Inflation initially flat, then decreases
  - Suggest that prices only reduce after persistent reduction in output
  - Could provide evidence for sticky prices (but note the width of the confidence intervals)
- Most agree about the direction of these variables
- Few agree about the exact quantum of movement and the fraction of variability explained by monetary shock
  - Uhlig (2005) and Altig, et al. (2011) suggest monetary policy accounts for 5-10% of output volatility
  - Christiano, et al. (2005) suggest that it accounts for 15-38%

Critique of VAR-based Evidence

- Reduced-form models do not allow for forward-looking variables
  - Calls into question the timing of these IRFs
- While including commodity prices minimises the effect of *price puzzle* it's still present
- Rudebusch (1998) notes that these shocks do not correspond with policy actions over time

Conclusion

- Using the evidence of reduced-form models:
- Monetary policy shock results in a temporary deviation of output from its steady state
  - Hence it is of importance when explaining the business cycle
  - Could be used for stabilisation policies
- Monetary policy also potentially affects prices:
  - With greater delay and with smaller impact