A Fiscal Decomposition of Unexpected Inflation: Cross-Country Estimates and Theory

Livio C. Maya

November 2022

Introduction: The Fiscal Sources of Unexpected Inflation

- Micro-founded macro models: **Real Market Value of Debt = Discounted Surpluses**

$$\left(\frac{B_{t-1}}{P_{t-1}} \cdot \frac{Q_t}{\Pi_t} =\right) \frac{Q_t \cdot B_{t-1}}{P_t} = \sum_{k=0}^{\infty} E_t \left[\frac{s_{t+k}}{R_{t+k}}\right]$$

- Therefore, unexpected movements in the inflation rate Π_t must correspond to news about:
  - Bond prices Q_t
  - Real surpluses $\{s_{t+k}\}$
  - Real discounting $\{R_{t+k}\}$

$$\Delta E_t \Pi_t = \ a \ \Delta E_t Q_t - \ b \ \Delta E_t \{s_{t+k}\} + \ c \ \Delta E_t \{R_{t+k}\}$$

- Central question

What does unexpected inflation forecast?

Introduction: Exercises, Motivation, Results

- This paper
  1. Estimate a Bayesian-VAR to measure the terms of the decomposition given different reduced-form shocks
     - 25 countries (developed and developing)
     - Variance decomposition and a Recession Scenario
  2. Estimate a New-Keynesian, Fiscal Theory of the Price Level model to reproduces B-VAR decompositions
- Motivation depends on how to read Debt/Price = Discounted Surpluses
  - Active monetary: *"How should fiscal policy adjust to unexpected inflation?"*
  - Active fiscal: *"How does inflation react to changes in fiscal policy?"*

  Estimates can also discipline model building
- Main results
  - Real discounting quantitatively as important as surpluses
  - Contribution of surpluses often stem from GDP growth, not surplus-to-GDP ratios
  - In simple NK models, productivity shocks alone can rationalize these patterns
  - Differences in policy rules alone go a long way in explaining different decompositions

Introduction: Related Literature

- **Fiscal Theory of the Price Level.** Cochrane (2022a) and Cochrane (2022b).
  - Analysis of multiple countries + more general debt instruments
  - NK model estimated to reproduce decompositions

  Leeper (1991), Sims (1994), Cochrane (1998), Cochrane (2005), Leeper and Leith (2016), Bassetto and Cui (2018), Cochrane (2022c), Brunnermeier et al. (2022).

- **Monetary-Fiscal Interaction.**
  Cagan (1956), Sargent and Wallace (1981), Hall and Sargent (1997), Hall and Sargent (2011), Jiang et al. (2019), Corsetti et al. (2019), Sunder-Plassmann (2020), Du et al. (2020), Akhmadieva (2022)

- **Empirical Finance** (Decomposition of Returns)
  Campbell and Shiller (1988), Cochrane (1992), Campbell and Ammer (1993), Chen and Zhao (2009).

Introduction: A Map of the Road

1. **Concepts.** Derive a linearized decomposition from the valuation equation
   - In a simplified environment
   - In a general environment (bonds with multiple maturities and currency denominations)
2. **Bayesian-VAR.** Methodolgy and Results
   - Dealing with poor data + ensuring decomposition
   - Bayesian estimation + Prior distribution
   - Variance + Recession decompositions
3. **Theory.** Two-country NK model: an open and a ”closed” economy
   - Linearized equations
   - Estimation *via* method of moments

Frame title

References

Akhmadieva, V. (2022). Fiscal adjustment in a panel of countries 1870–2016. *Journal of Comparative Economics*, 50(2):555–568.

Bassetto, M. and Cui, W. (2018). The fiscal theory of the price level in a world of low interest rates. *Journal of Economic Dynamics and Control*, 89:5–22.

Brunnermeier, M. K., Merkel, S., and Sannikov, Y. (2022). The Fiscal Theory of the Price Level With a Bubble.

Cagan, P. (1956). The Monetary Dynamics of Hyperinflation. In *Studies in the Quantity Theory of Money*, pages 25–117. University of Chicago Press, milton friedman edition.

Campbell, J. Y. and Ammer, J. (1993). What Moves the Stock and Bond Markets? A Variance Decomposition for Long-Term Asset Returns. *The Journal of Finance*, 48(1):3–37.

Campbell, J. Y. and Shiller, R. J. (1988). The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors. *The Review of Financial Studies*, 1(3):195–228.

Chen, L. and Zhao, X. (2009). Return Decomposition. *Review of Financial Studies*, 22(12):5213–5249.

Cochrane, J. H. (1992). Explaining the Variance of Price–Dividend Ratios. *The Review of Financial Studies*, 5(2):243–280.

Cochrane, J. H. (1998). A Frictionless View of U.S. Inflation. *NBER Macroeconomics Annual*, 13:323–384.

Cochrane, J. H. (2005). Money as stock. *Journal of Monetary Economics*, 52(3):501–528.

Cochrane, J. H. (2022a). The fiscal roots of inflation. *Review of Economic Dynamics*, 45:22–40.

Cochrane, J. H. (2022b). A fiscal theory of monetary policy with partially-repaid long-term debt. *Review of Economic Dynamics*, 45:1–21.

Cochrane, J. H. (2022c). The Fiscal Theory of the Price Level.