

The New Keynesian Model: Computational and Econometric Tools, and Financial Market Extensions

Lawrence Christiano

Outline

- Why models?
 - *Dynamic, Stochastic, General Equilibrium (DSGE)* models
- Why did New Keynesian DSGE models become so popular in past decade?
- DSGE models after 2008.

Why Models?

- Policy questions:
 - What kind of monetary policy will stabilize inflation?
 - Should monetary policy respond to credit growth or stock prices and, if so, by how much?
 - Should government spending and tax policy be used to stabilize the business cycle? If yes, how?
 - How should monetary policy respond to changes in interest rate spreads?
 - Should the government ever purchase privately-issued assets or make loans or equity injections to banks? If yes, when and how much?
 - What should capital requirements be and how (if at all) should they vary over the business cycle?
- All these questions:
 - have a quantitative answer.
 - require contemplating the interaction of financial, labor, goods, currency markets, etc.
 - difficult to juggle all these things in your head.

Why Models?

- Models can be used to compute the quantitative answers that are required.
- They can ensure that the rationale for whatever decision is taken in the end is coherent.
- They are a discipline device: if the answer they give contradicts your intuition, you can fight it out with the model.
 - Either you discover your intuition was wrong.
 - Or, you realize you are right and that the model fails to properly capture some feature of reality.
 - In this case, you've gained a deeper understanding of your own initial intuition.
 - Either way, there is a deeper foundation for the policy action taken.

Why did New Keynesian (NK) DSGE models become so popular in the past decade?

- Two key findings before 2008:
 - They resolved an age-old puzzle.
 - They are useful for forecasting.
- They have been useful in placing structure on discussions about policy.

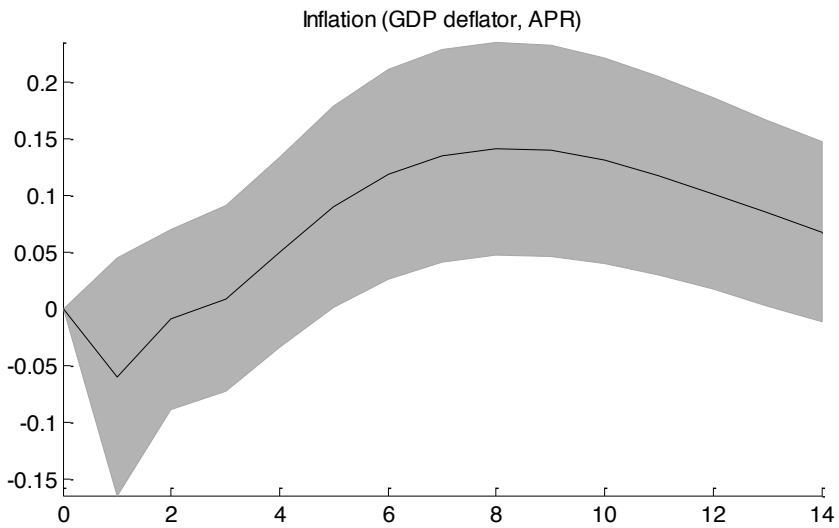
Hume essay, *Of Money* (1752)

- ...money... must first quicken the diligence of every individual, before it encrease the price of labour.
- The farmer and gardener, finding that all their commodities are taken off, apply themselves with alacrity to the raising more...

Early Monetary DSGE Models

- Generally inconsistent with Hume observation (also, Friedman's AEA Presidential address).
- In those models, monetary expansion produced an immediate rise in P and little rise in output.
 - Not surprisingly, early academic models little use to practical people.
- Can use VARs to quantify Hume observations...

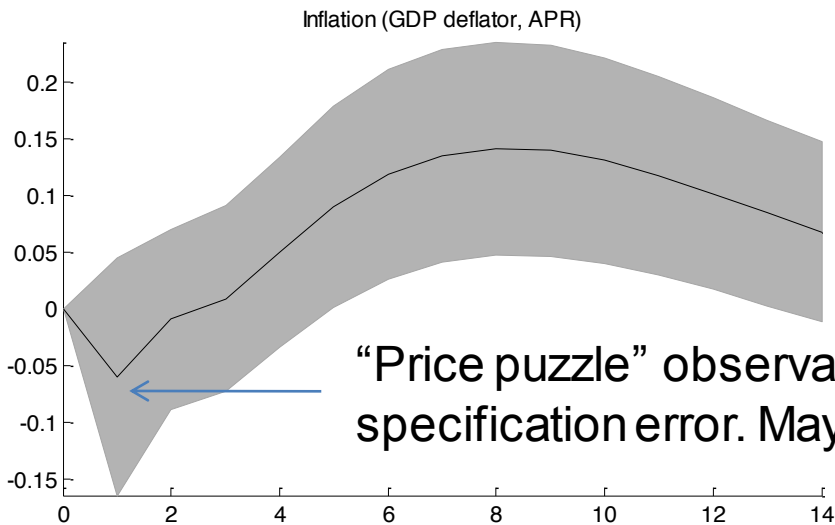
The Hume Problem



Responses to a one-standard deviation shock to monetary policy

source: Christiano, Traband and Walentin, 2010, DSGE Models for Monetary Policy Analysis, in Friedman and Woodford, editors, Handbook of Monetary Economics

The Hume Problem

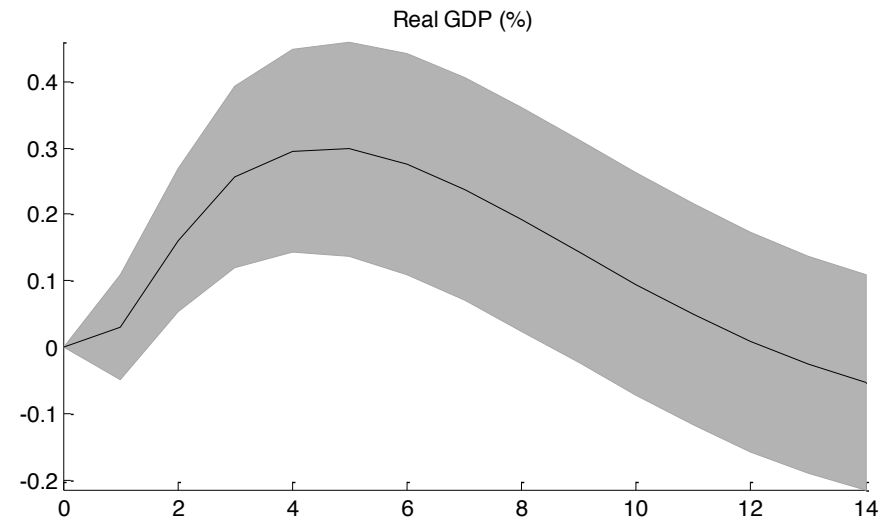
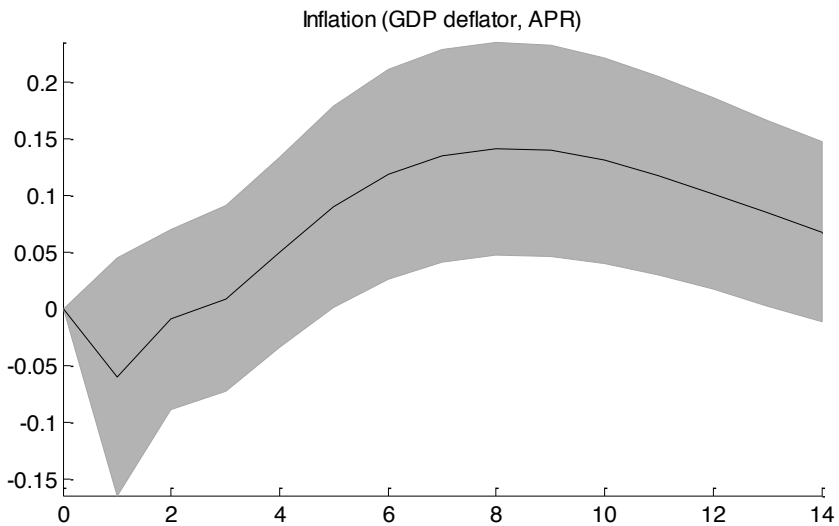


“Price puzzle” observation: initially thought to reflect econometric specification error. May actually reflect a real feature of the data.

Responses to a one-standard deviation shock to monetary policy

source: Christiano, Traband and Walentin, 2010, DSGE Models for Monetary Policy Analysis, in Friedman and Woodford, editors, Handbook of Monetary Economics

The Hume Problem



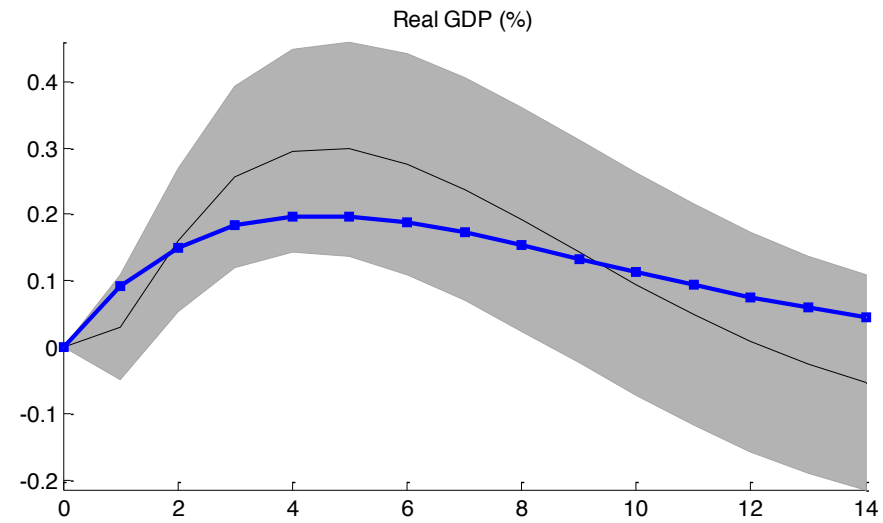
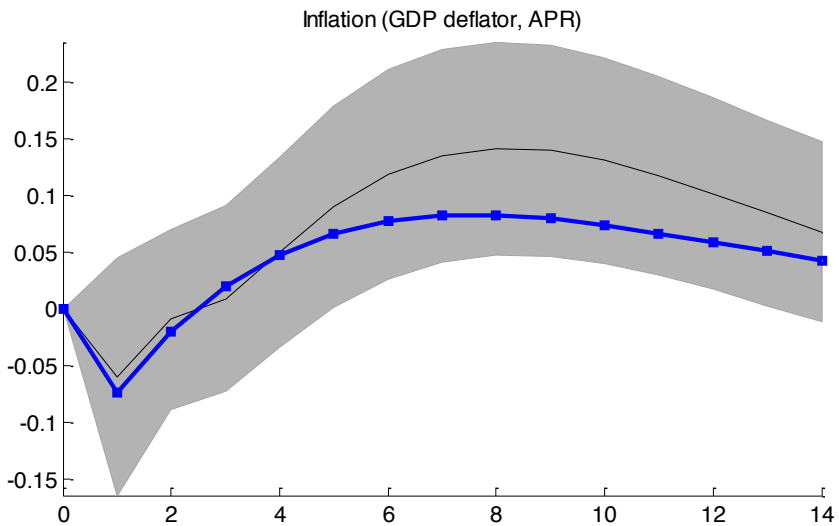
Responses to a one-standard deviation shock to monetary policy

source: Christiano, Traband and Walentin, 2010, DSGE Models for Monetary Policy Analysis, in Friedman and Woodford, editors, Handbook of Monetary Economics

Position in late 1990s

- Mankiw (Economic Journal, 2001) argued that no plausibly parameterized model would soon come to terms with the Hume observation.
 - A quantitative account would require assuming prices stuck for two years...inconsistent with micro evidence.
- The discovery was then made that New Keynesian models give a plausible account for the Hume observation.
- New Keynesian DSGE models elevated from 'toy model' status.

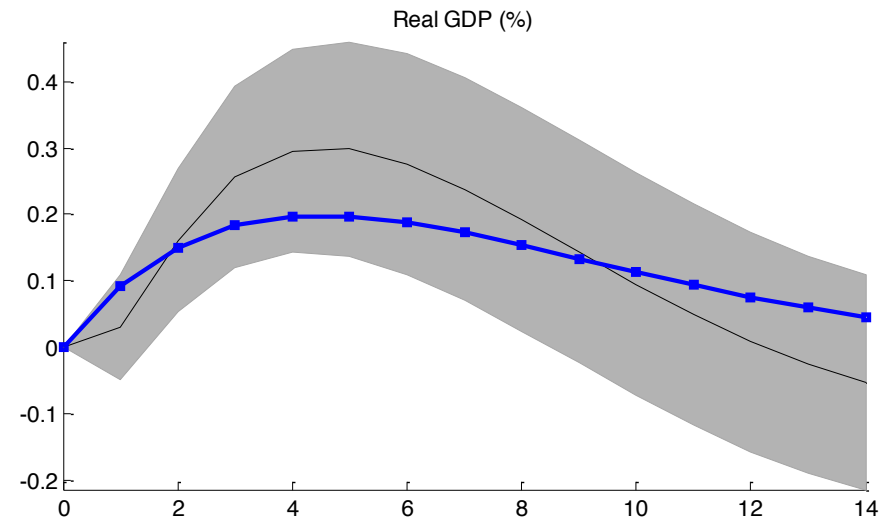
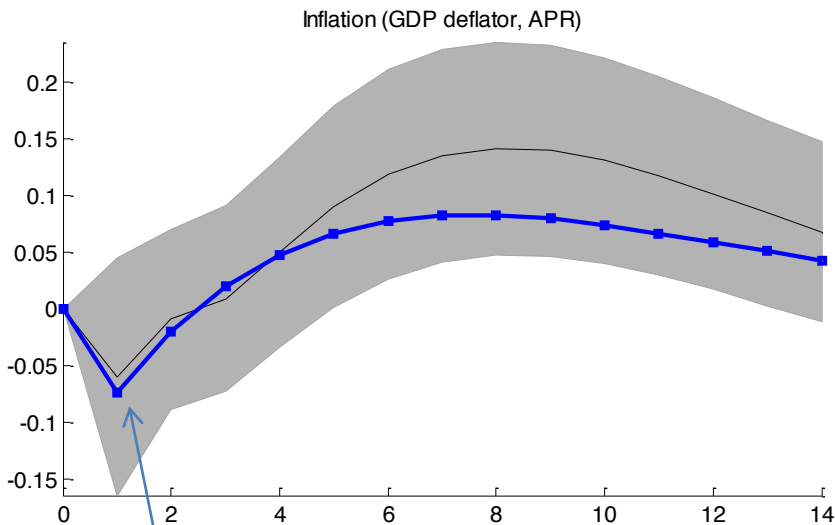
The Hume Problem and DSGE Models



Responses to a one-standard deviation shock to monetary policy

source: Christiano, Traband and Walentin, 2010, DSGE Models for Monetary Policy Analysis, in Friedman and Woodford, editors, Handbook of Monetary Economics

The Hume Problem and DSGE Models



Responses to a one-standard deviation shock to monetary policy

source: Christiano, Traband and Walentin, 2010, DSGE Models for Monetary Policy Analysis, in Friedman and Woodford, editors, Handbook of Monetary Economics

Assumption that firms must borrow to finance variable inputs (the “working capital channel”) implies that an expansionary monetary policy shock (which drives down the interest rate) reduces inflation for a while.

Significance of Preceding Observation

- Earlier models, which were not compatible with Hume observation seemed to miss key aspects of the monetary transmission mechanism.
 - Lacked the credibility needed to be useful in the analysis of monetary policy.

Another Key Finding

- Smets and Wouters' demonstration that New Keynesian DSGE models forecast about as well as sophisticated atheoretical models.
- This also helped to elevate DSGE models from status of 'toys' to serious tools.

Contribution of New Keynesian DSGE Models to Analysis of Policy

- Much discussion of inflation targeting and the Taylor Principle:
 - If inflation rises 1%, raise nominal interest rate by more than 1%.
- DSGE models helped quantify the wisdom in the Taylor Principle.
- As we shall see, they also articulate some possible pitfalls.
 - If working capital channel is strong enough, Taylor Principle may destabilize.
 - Taylor Principle may inadvertently trigger a ‘rational asset price bubble’.
- Contributed to discussions about how to use fiscal/tax policy to stabilize business cycles.
- It is possible to integrate rich financial structures into NK DSGE models, to address questions that involve finance:
 - Implications of central bank purchases of assets.
 - How to respond to interest rate spreads, credit growth, stock market?
- NK framework can be adapted to capture labor market analysis.

Recent Years Have Witnessed an Increase in Popularity of NK Models

- NK model used to make sense of the events of recent years, and to formulate a policy response:
 - zero lower bound interacting with weak aggregate demand due to various factors, including collapse in housing prices.
 - ‘forward guidance’, ‘fear of deflation’ comes straight from NK model.
 - alternative hypotheses (skills mismatch, uncertainty) have lost their appeal over time.
- Model correctly predicted that inflation would be weak, despite massive increase in money supply.
- Model rationalizes apparent evidence that fiscal austerity reduces economic activity.

Objective of Course

- Introduction to the basic New Keynesian model.
 - Foundations and concepts.
- Policy implications of the New Keynesian model
 - Case for and against ‘inflation targeting’.
 - Risks to the economy if the interest rate is at its zero lower bound.
 - Monetary policy and asset market fluctuations.
 - Other issues.
- Financial frictions.
- Computational methods for solving the models, Bayesian econometric methods for estimating them.
- Computer exercises in Dynare.