RESERVE BANK OF AUSTRALIA

AMSI Optimise
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Uncertainty and Monetary Policy in Good and Bad Times

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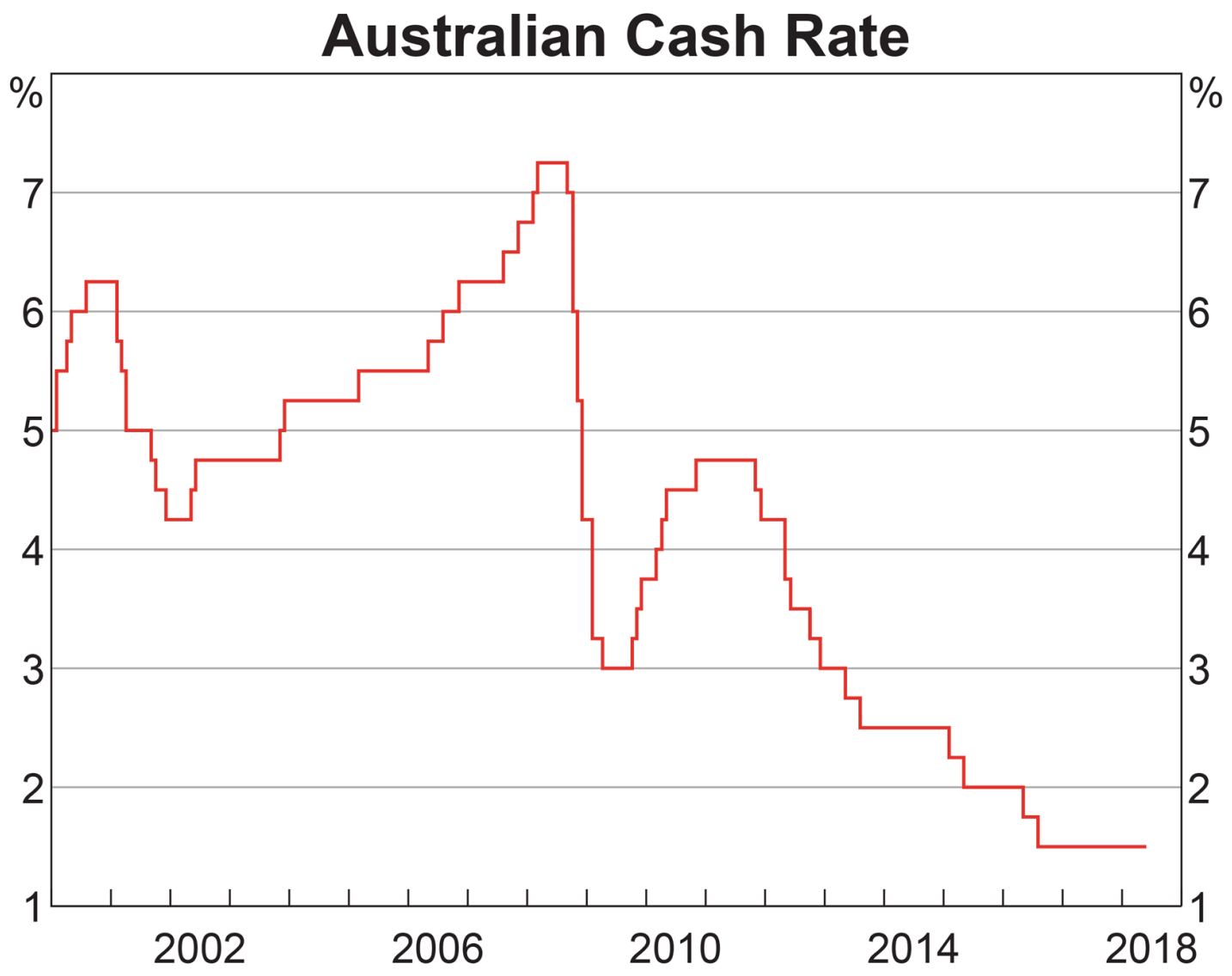
Reserve Bank of Australia

*Views in this presentation are my own, and do not necessarily reflect the views of the Reserve Bank of Australia


Australian Cash Rate
%
%
7
6
5
4
3
2
1
2002
2006
2010
2014
2018
Source: RBA

Monetary Policy

- Price stability
- Full employment
- Economic prosperity and welfare

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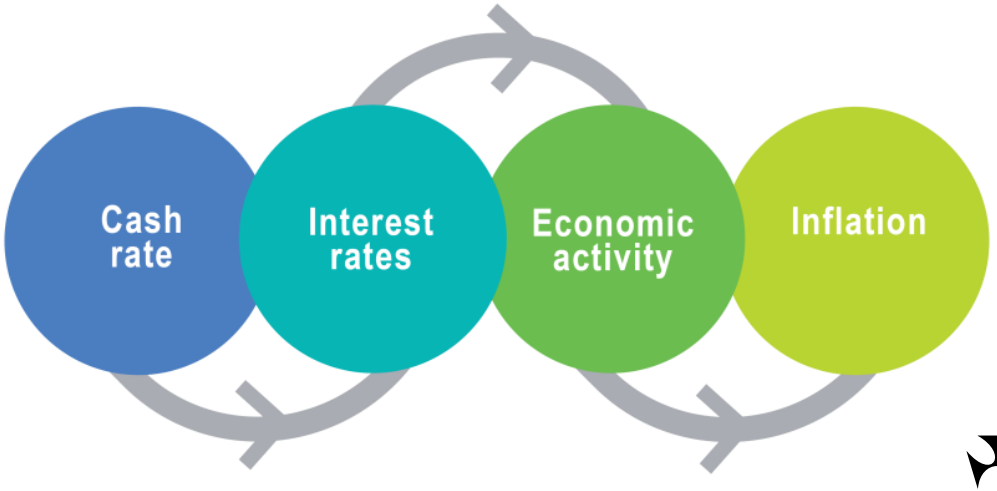
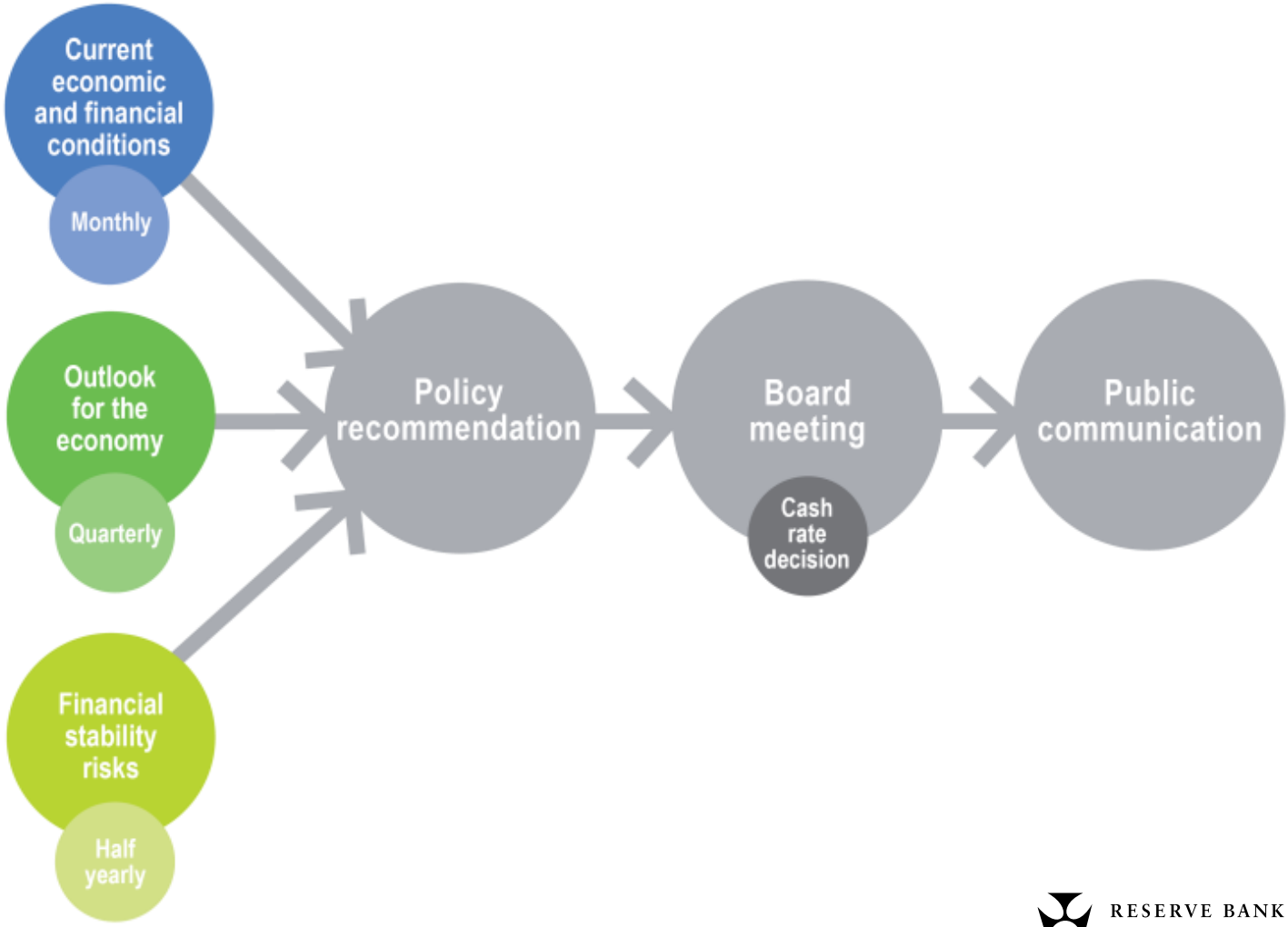


The Decision Process



Outline

1. Sources of uncertainty
2. How it affects the economy
3. Uncertainty and monetary policy
4. Concluding remarks

Sources of Economic Uncertainty

- **Data uncertainty**: current state of the economy
- **Model uncertainty**: structure of the economy
- **Macroeconomic uncertainty**: economic outlook

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Knightian Uncertainty

- **Risk** can be quantified by a **known probability distribution** over a set of events
- **"Knightian" Uncertainty** refers to people's **inability to forecast the likelihood** of events happening

Knightian Uncertainty

The argument I have been seeking to make today is that the mis-assessment of risk has been a key element of the financial crisis. One of the contributing factors to this mis-assessment was an over-reliance on a model-based approach to risk management, which focussed too much on measurable risk without taking full enough account of unmeasurable uncertainty.

Speech

On Risk and Uncertainty

Guy Debelle
Assistant Governor (Financial Markets)

Address to Risk Australia Conference
Sydney – 31 August 2010

Webcast Audio

How does uncertainty affect the economy?

- Precautionary savings
- “Wait-and-see” effect, productive capacity
- Labour market distortions
- Financial channel

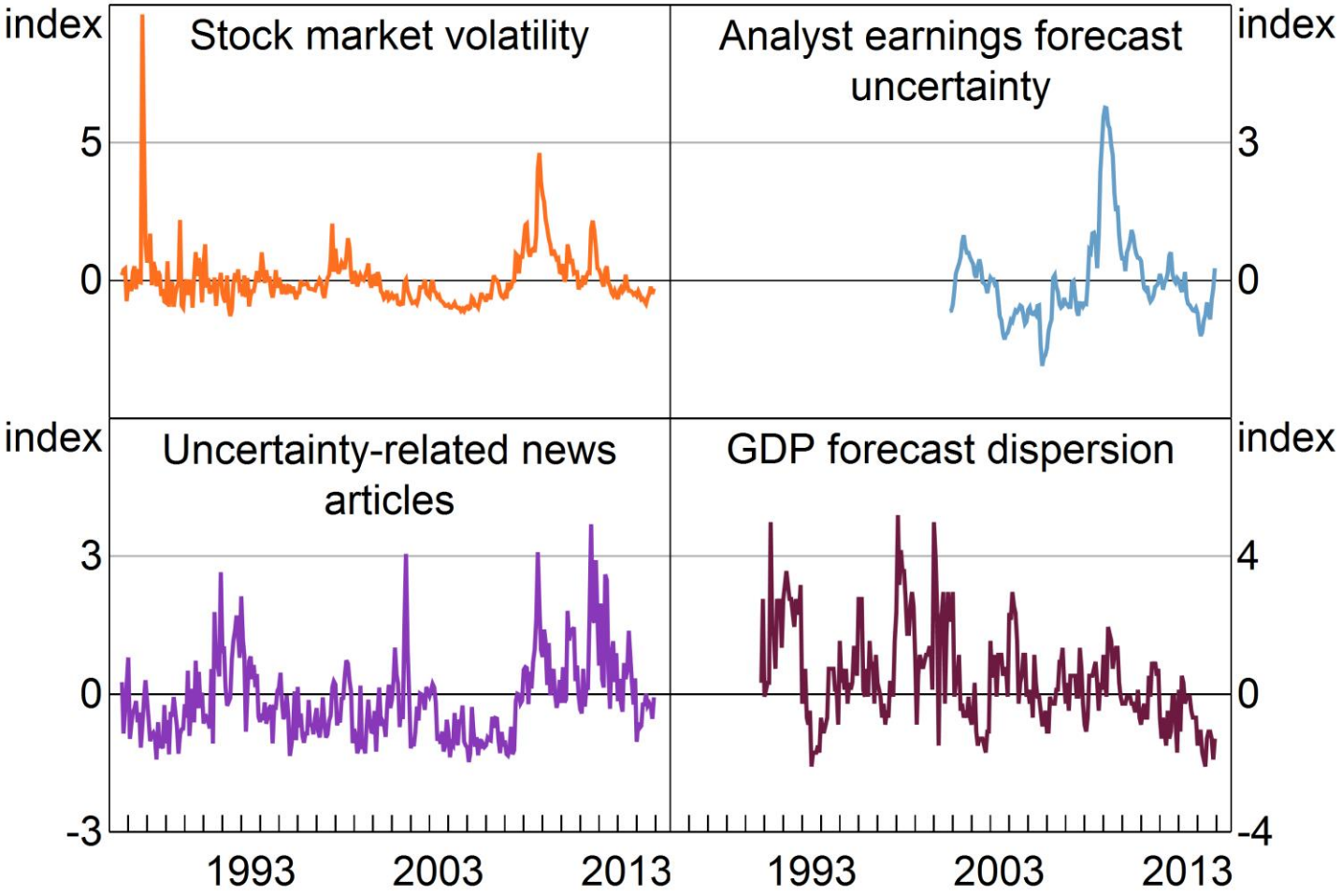
Measuring Macroeconomic Uncertainty

- Volatility (implied or realized) of stock returns (e.g. VIX)
- Survey-based dispersion measures (e.g. SPF forecasts)
- Cross-sectional dispersion of firm profits, productivity
- Newspaper-based measures (e.g. EPU by Baker et al. 2016)

The Australian Uncertainty Index

by Moore (2016)

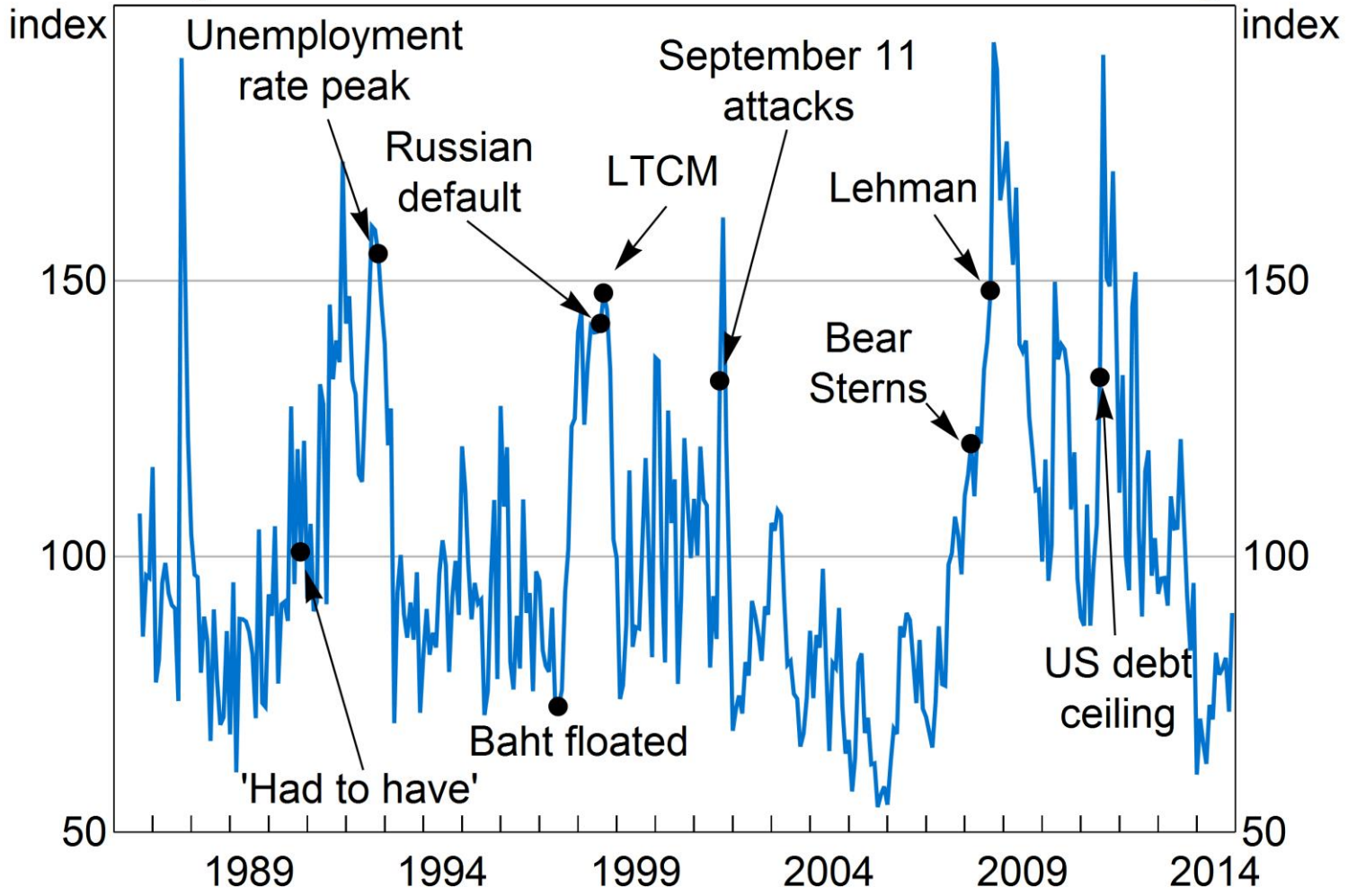
Components of the Economic Uncertainty Index



* All components are standardised to have mean 0 and standard deviation 1 for the period November 2000 to December 2014

Sources: Author's calculations; Consensus Economics; Factiva; MSCI; Thomson Reuters

Major Events and Economic Uncertainty



Sources: Author's calculations; Consensus Economics; Factiva; MSCI; Thomson Reuters

Uncertainty and Monetary Policy in Good and Bad Times

by Caggiano, Castelnuovo and Nodari (2017)

What is this paper about?

1. Are the effects of **macroeconomic uncertainty** shocks different in **good** and **bad** times?

2. What is the role played by **monetary policy** when the economy is hit by an uncertainty shock?

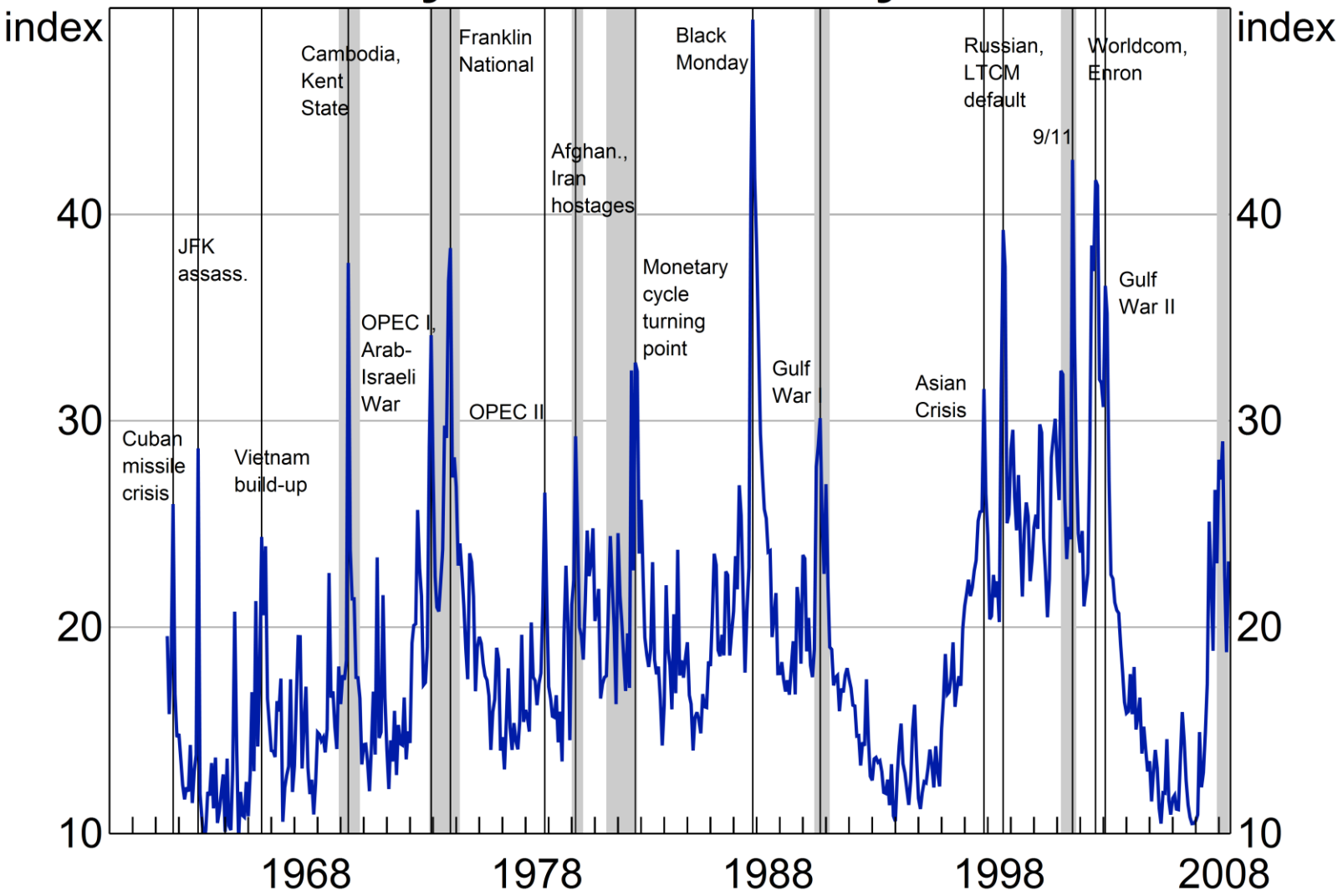
What do we do?

- Uncertainty shocks (**in the US**) based on historical events associated with jumps in financial volatility
- **Nonlinear** effects of uncertainty shocks:
  - Smooth-Transition VAR model (STVAR), GIRFs
- **Effectiveness** of monetary policy:
  - Counterfactual simulations and *narrative evidence*

What do we find?

- Uncertainty shocks have asymmetric negative effects:
  - larger fall in economic activity in bad times
  - slower recovery in good times
  - they have deflationary effects
- Monetary policy response more effective in booms
- *Risk-management* essential in setting policy

U.S. Stock Market
Volatility and Uncertainty Shocks



Smooth Transition VAR model

$$X_t = F(z_{t-1})\,\Pi_R\,X_{t-p} + \left(1 - F(z_{t-1})\right)\Pi_E\,X_{t-p} + \varepsilon_t$$

$$F(z_t) = \frac{exp(-\gamma z_t)}{1 + exp(-\gamma z_t)}$$

- STVAR: combination of two linear VARs, variables depend on their past values
- X_t = [S&P500, uncertainty, ffr, wages, cpi, hours, employment, output]
- $F(z_t)$ interpreted as probability of being in a recession
- z_t is a transition indicator and γ the smoothness parameter
- estimation via Maximum Likelihood using MCMC (Chernozhukov and Hong 2003)

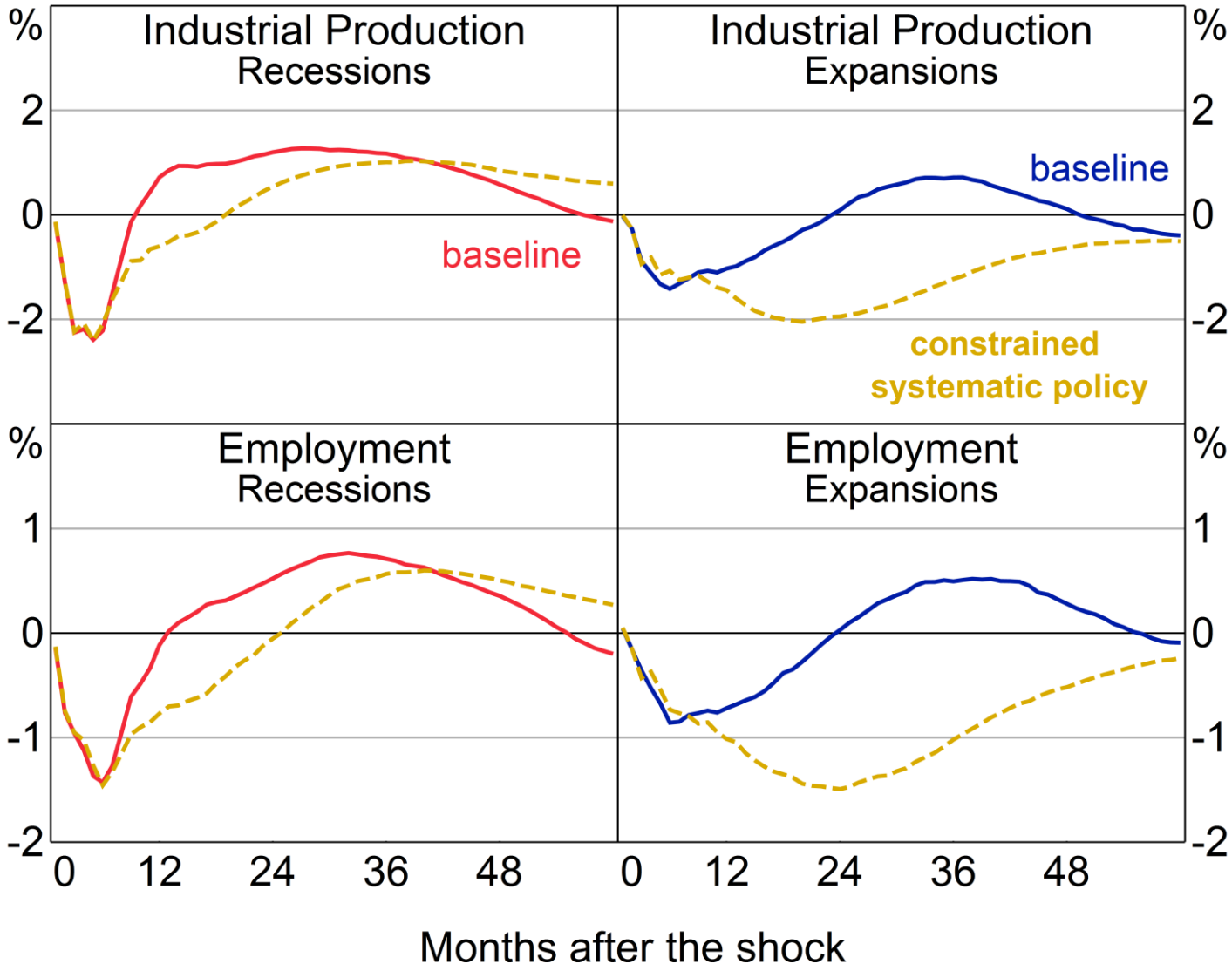
Effectiveness of monetary policy

What would have happened if the Federal Reserve had not reacted to the macroeconomic fluctuations induced by uncertainty shocks?

- We shut down the systematic response of the federal funds rate to movements in the economic system triggered by uncertainty shocks

The Role of Systematic Monetary Policy

Baseline vs. Counterfactual responses



Interpreting policy (in)effectiveness

In recessions it may be that…

- Lower sensitivity to interest rates (Mumtaz and Surico 2015)
- Higher price flexibility (Vavra 2014)
- Greater financial frictions (Caldara et al 2016)

Narrative evidence

FOMC Minutes – 23 October 1962

[...] With regard to policy, Mr. Swan [President of the San Francisco Fed] expressed the view that the ***uncertainties presented by the international situation****, and in particular the* ***Cuban crisis****, ruled out doing anything at the moment except to maintain as even a keel as possible.*

DJIA ▲ 17576.79 0.24% S&P 500 ▲ 2044.39 0.36% Nasdaq ▲ 4813.48 0.98% U.S. 10 Yr ▲ 16/32 Yield 1.830% Crude Oil ▼ 38.14 -3.17% Euro ▲ 1.1276 0.71%

THE WALL STREET JOURNAL.

ECONOMY | CENTRAL BANKS

Yellen Says Global Uncertainty Justifies Slower Path of Rate Increases

Fed chief says monetary policy will respond to economy's twists and turns

March 29, 2016

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Summary of our findings

- Heightened macroeconomic uncertainty slows the economy
- Negative economic impact is stronger in bad times

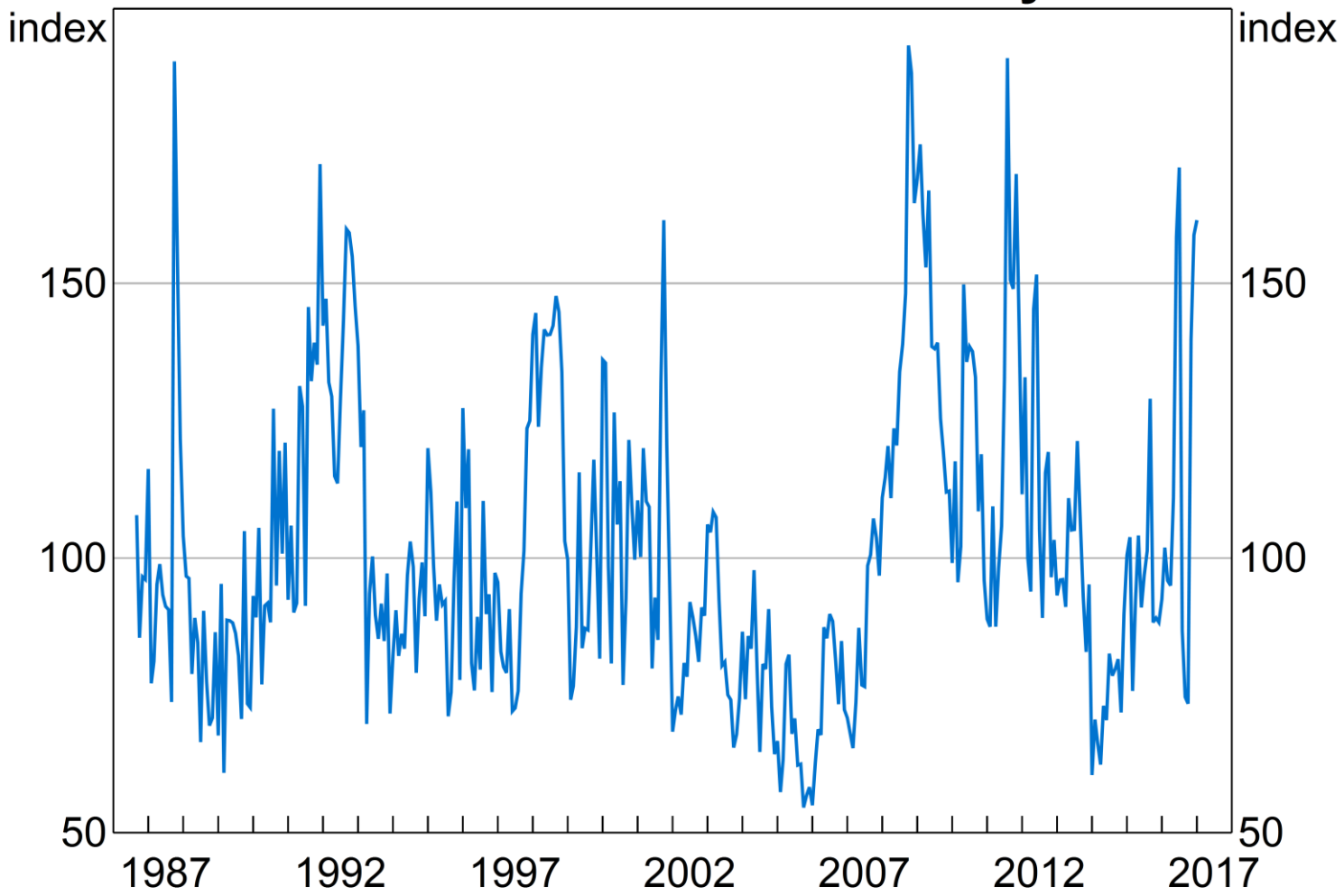
  … but more persistent in good times
- Monetary policy helps offsetting economic slowdown following increases in uncertainty

How do we deal with uncertainty?

- Wide range of data, *big data*
- Wide range of forecasting models
- Scenario analysis
- Risk management
  - Brainard's gradualism in good times
  - Decisive policy responses in bad times
- Communication

SPARES

Australia – Economic Uncertainty Index



* For the period November 2000 to December 2014: mean = 100, standard deviation = 30 points

Source: Moore (2017)

Figure 13: Responses to an Uncertainty Shock

Impulse responses from quarterly VAR

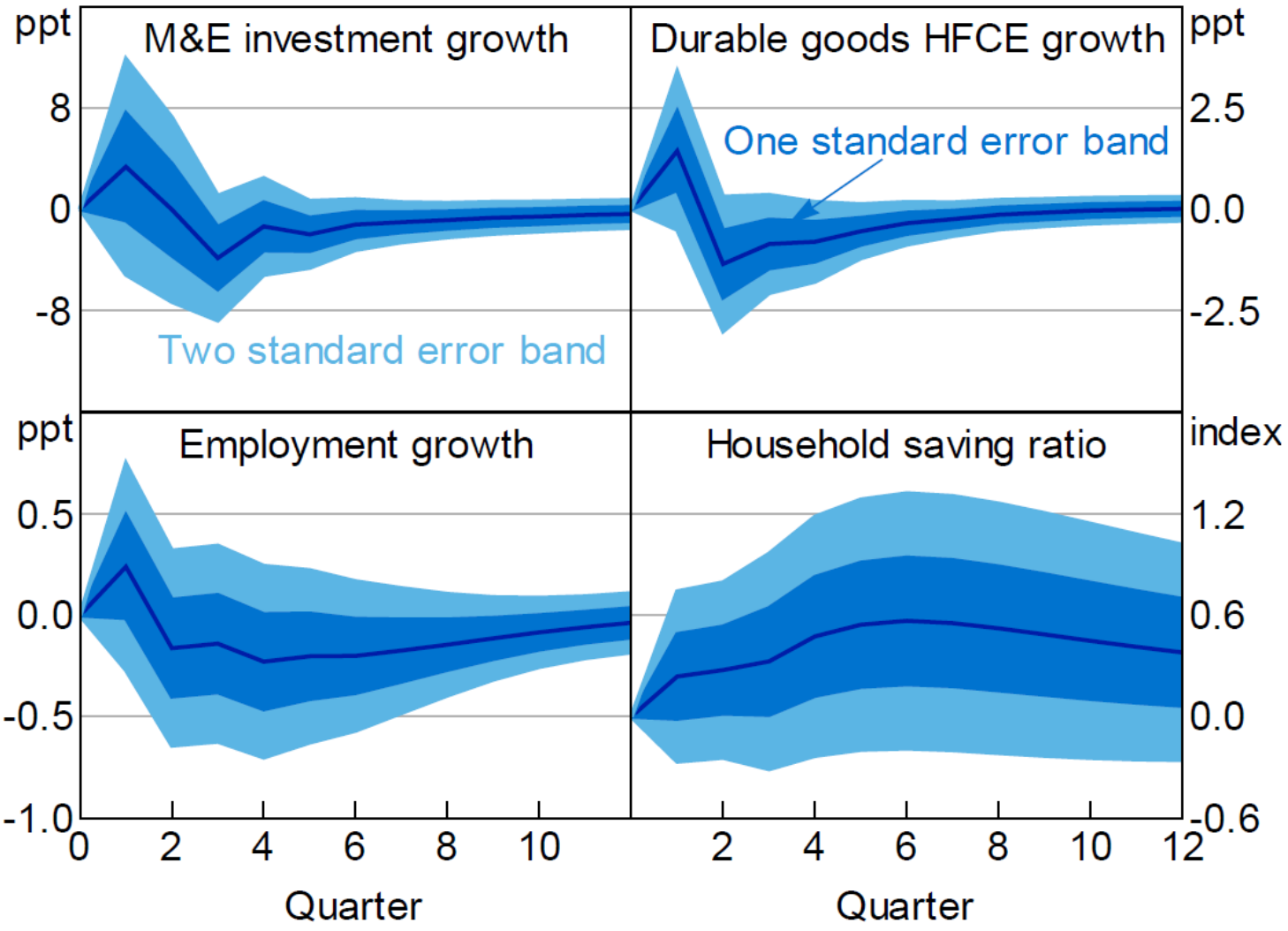
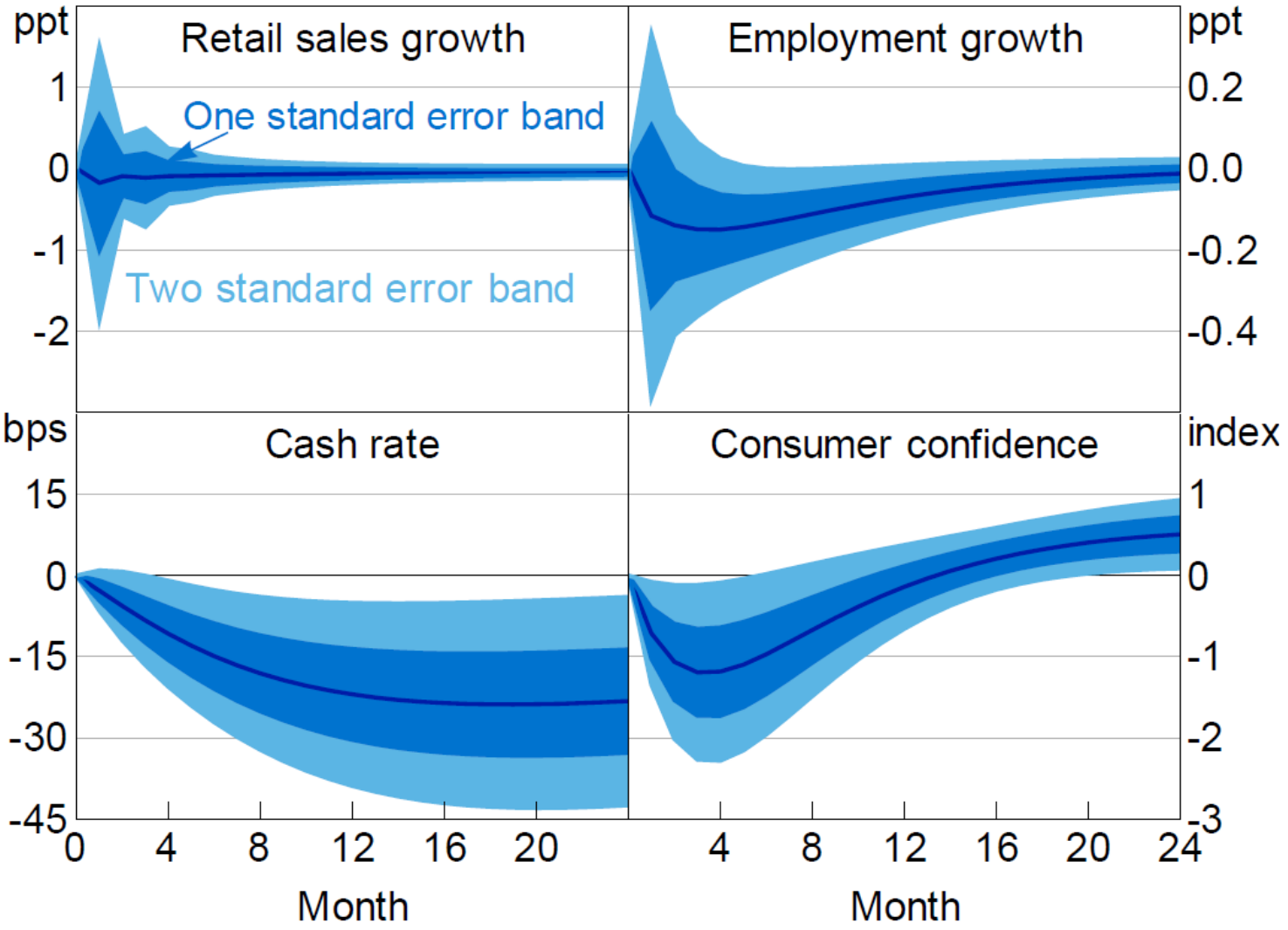


Figure 11: Responses to an Uncertainty Shock

Impulse responses from monthly VAR



Model specification and estimation

Our STVAR largely follows the VAR in Bloom (2009)

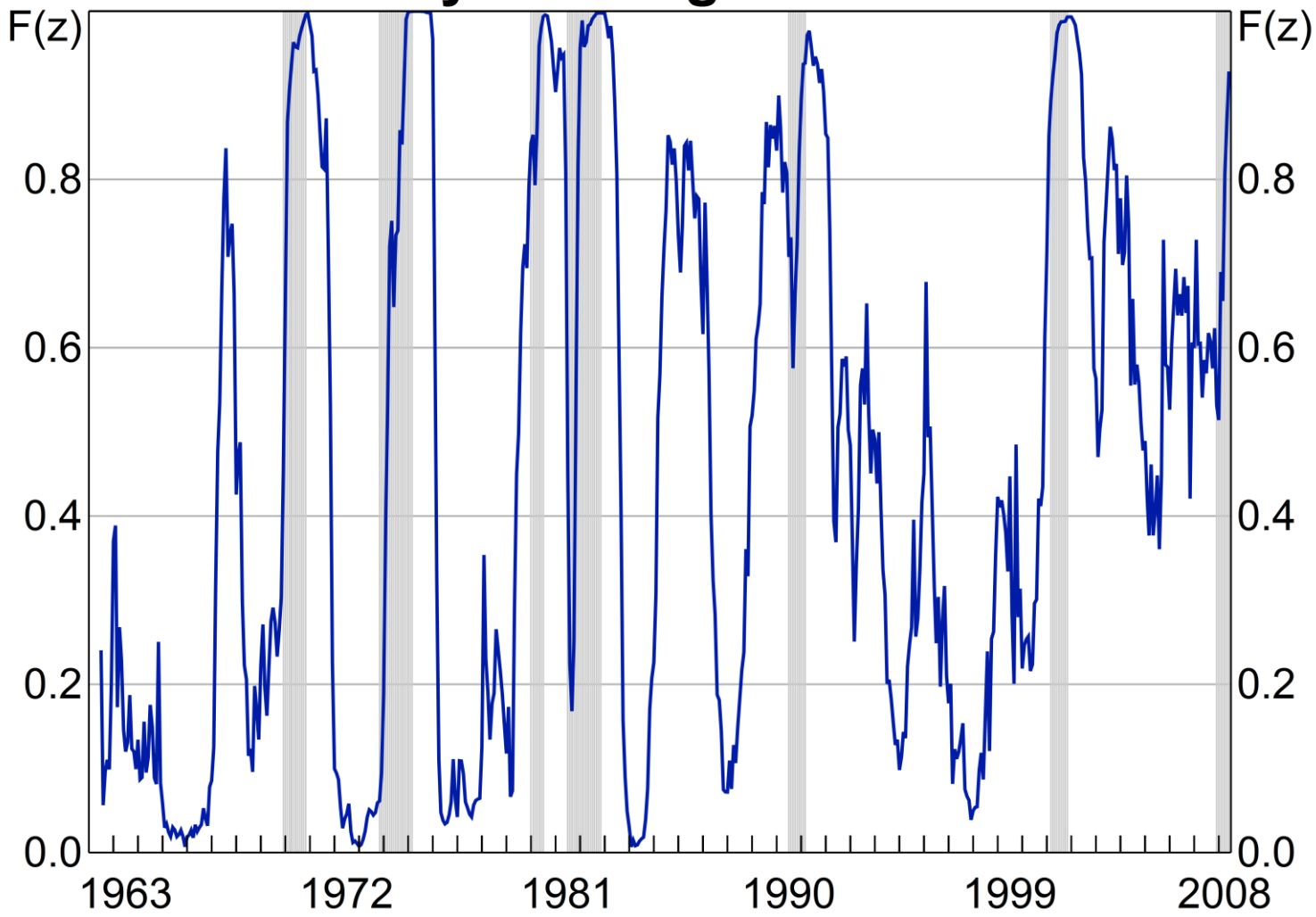
- X_t = [sp500, unc, ffr, wages, cpi, hours, emp, indpro]
- sample 1962M7 – 2008M6, 6 lags
- recursive ordering approach (Cholesky)
- estimation via ML-MCMC (Chernozhukov and Hong 2003)

Transition function and indicator

$$F(z_t) = \frac{exp(-\gamma z_t)}{1 + exp(-\gamma z_t)}$$

- z_t industrial production growth, backward-looking MA 12
- γ calibrated to get 14 per cent NBER recessions
- Recessions: negative growth over past 12 months

Probability of being in a Recession



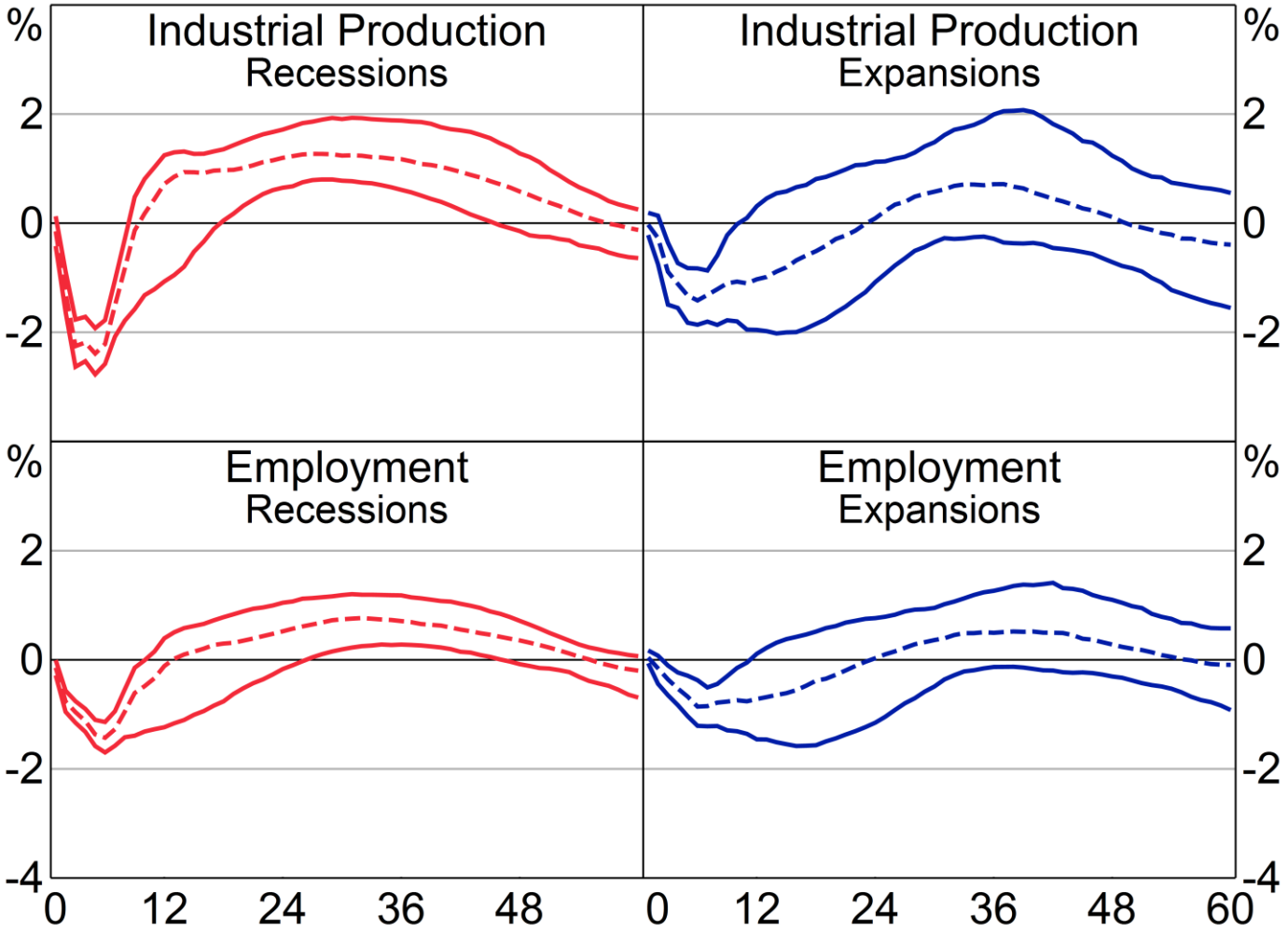
Generalised IRFs

Intuition

- Split sample into recessions and expansions
- Randomly draw initial conditions from a given regime
- Set the shock $\varepsilon_t = u_t + \delta$
- Simulate the model and compute 2 alternative paths
  - one under no shock
  - one conditional on the shock δ
- GIRF is the difference between the paths $X_{t+h}^{(\delta)} - X_{t+h}$

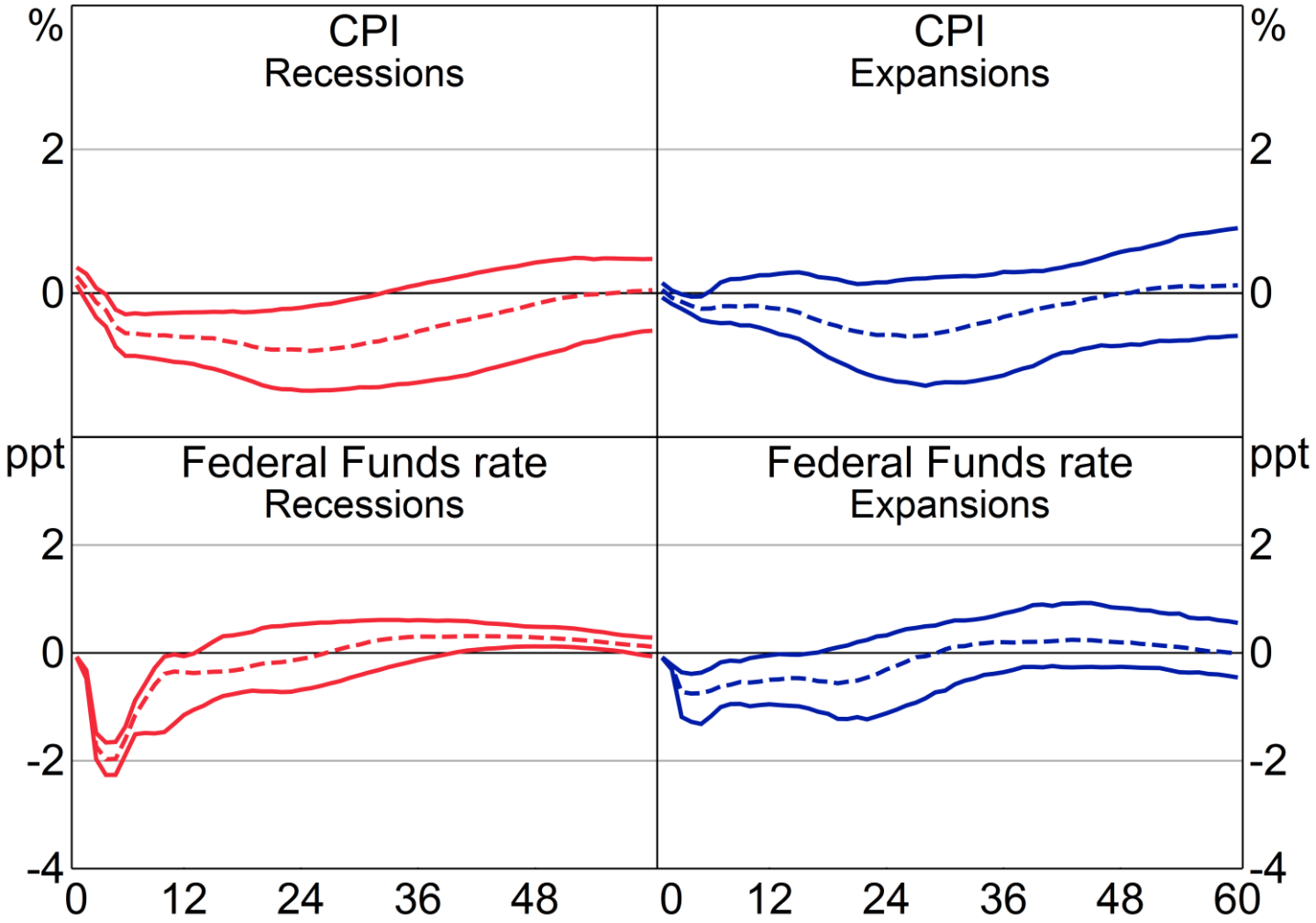
Responses to an Uncertainty Shock

Real variables, deviation from baseline



Responses to an Uncertainty Shock

Nominal variables, deviation from baseline



Risk Management-driven Policy Rate Gap