Discussion of Hasenzagl, Pellegrino, Reichlin & Ricco
A Model of the Fed's View on Inflation

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Federal Reserve Board

ABFER
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The views herein are my own and do not necessarily reflect those of the Federal Reserve Board.

Motivation

[The FOMC discussed] two key channels by which monetary policy affects inflation—the response of inflation to changes in resource utilization and the role of inflation expectations, or trend inflation, in the price setting process.

– Minutes of January 2018 FOMC meeting

My comments

- Key components of the model
- Three major comments
  1. Multiple cycles
  2. Inflation trends
  3. Identification
- Minor comments (time allowing)

The model

- The model decomposes output, unemployment, realized inflation, inflation expectations, and oil prices into
  - Idiosyncratic trends;
  - A *business cycle* common to output, unemployment, and inflation;
  - A *oil price cycle* common to oil prices, inflation, and inflation expectations; and
  - *Idiosyncratic cycles* (persistent errors in the measurement equations)

- Active part of empirical macro literature since at least Clark (1987), ... Berger, Everaert & Vierke (2016)

- Estimation period is Great Moderation

The model – trends

- Trends of real variables follow random-walks with drift
- Trends of nominal variables (oil^* and π^*) are random-walks

Labor market: $u_t = u_t^* + cycle_t + e_{u,t}$

Output: $y_t = y_t^* + \delta_y \times cycle_t + e_{y,t}$

Inflation: $oil_t = oil_t^* + cycle_t^{oil} + e_{oil,t}$

$$\pi_t = \phi_\pi \pi_t^* + \delta_\pi \times cycle_t + \gamma_\pi \times cycle_t^{oil} + e_{\pi,t}$$

Inflation expectations:

$$\pi_t^{UM} = \mu_{UM,t} + \phi_{UM}\pi_t^* + \delta_{UM}(L) \times cycle_t + \gamma_{UM} \times cycle_t^{oil} + e_{UM,t}$$

$$\pi_t^{SPF} = \mu_{SPF,t} + \phi_{SPF}\pi_t^* + \delta_{SPF}(L) \times cycle_t + \gamma_{SPF} \times cycle_t^{oil} + e_{SPF,}$$

The model – business cycle

- The *business cycle* links together unemployment, output and inflation via Okun's law and Phillips curve relationships

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The model – oil cycle

- An *oil cycle* affects realized inflation and inflation expectations

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The model – errors

- Persistent idiosyncratic cycles (e_i) capture error in measurement equations

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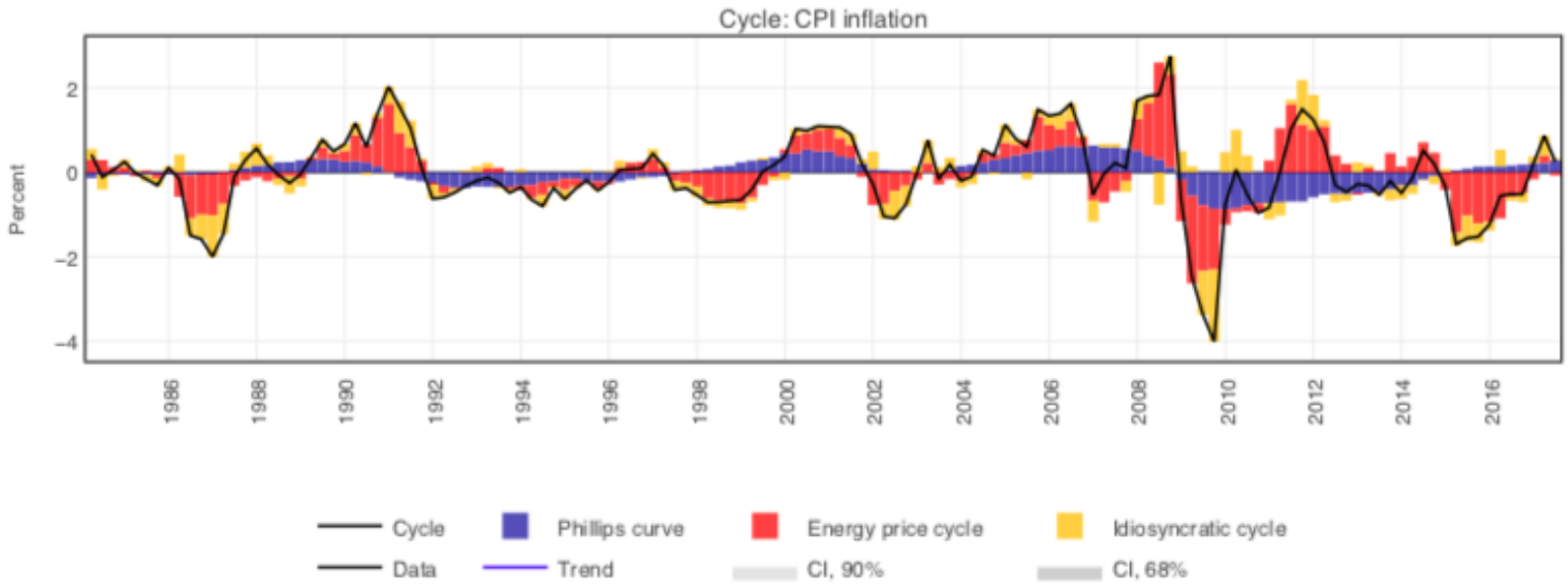
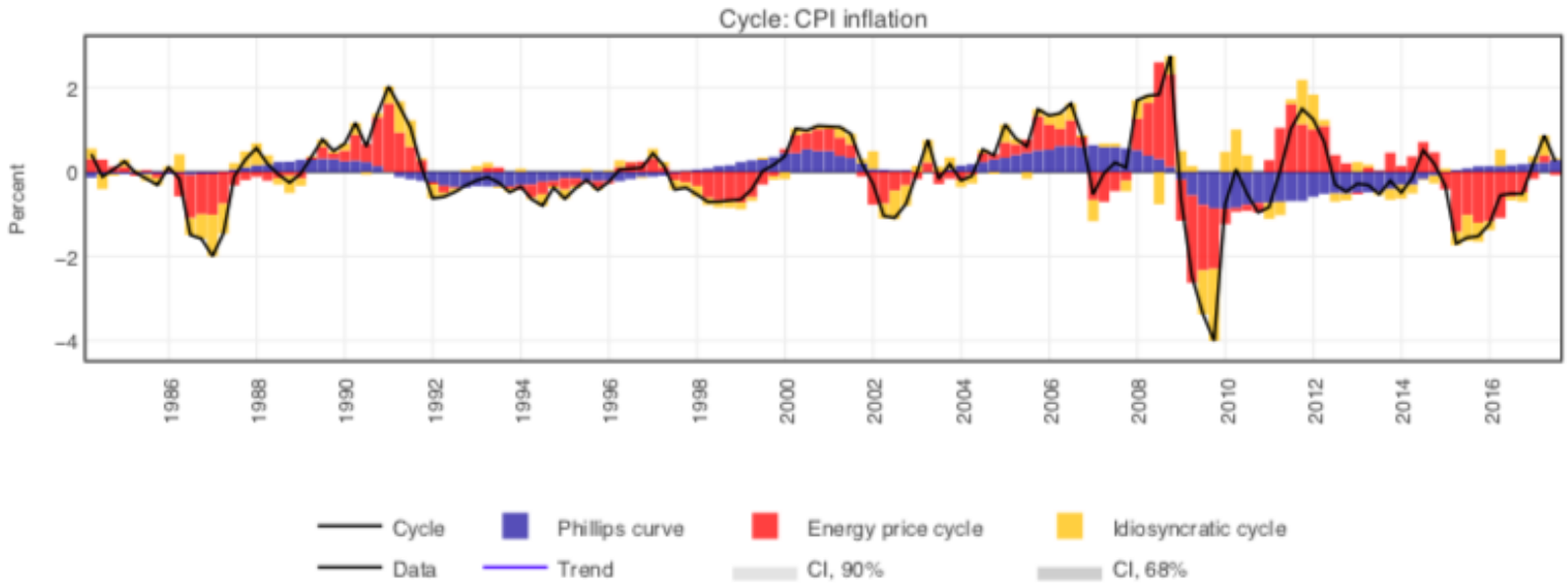
Decomposition of inflation

$$\pi_t - \pi_t^* = \delta_\pi cycle_t + \gamma_\pi cycle_t^{oil} + e_{\pi,t}$$



Decomposition of inflation

- Phillips curve is not dead: slack explains a notable portion of CPI inflation since mid 1980s
  - Phillips curve is *steep*. At the last two business cycle peaks, output contributes nearly 1/2 pp to year-on-year inflation
- Nevertheless, the influence of slack often overwhelmed by other factors



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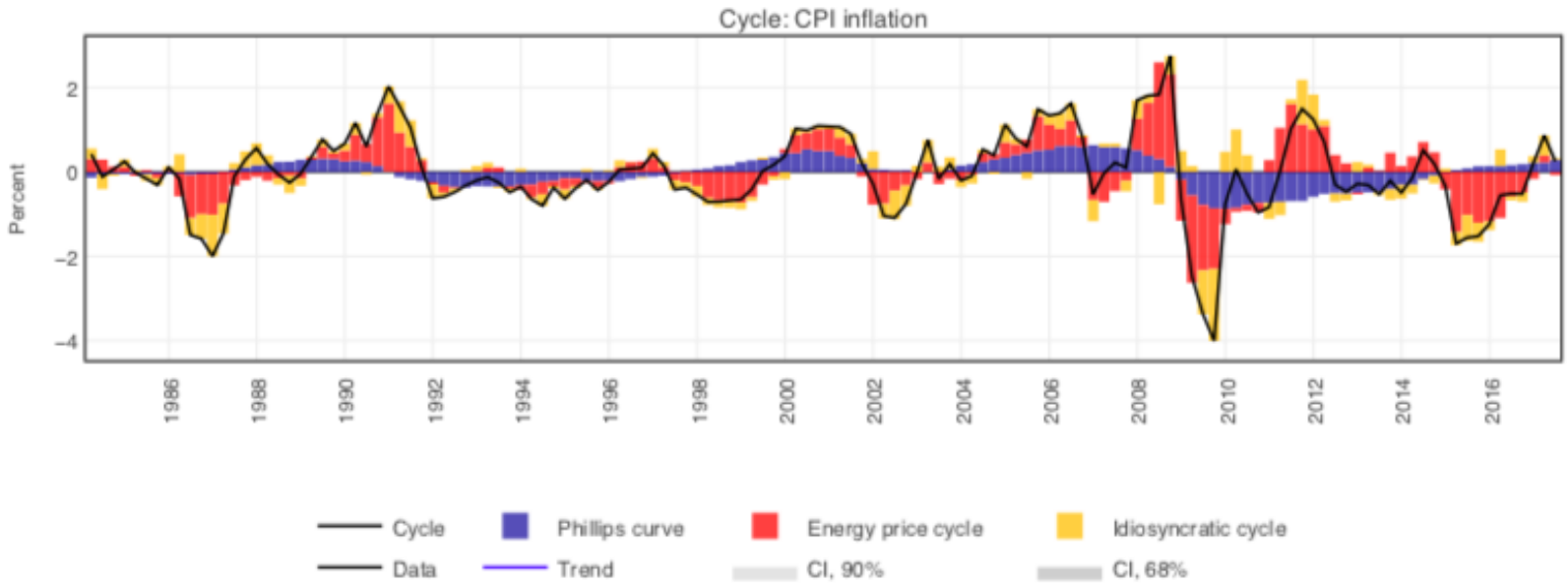
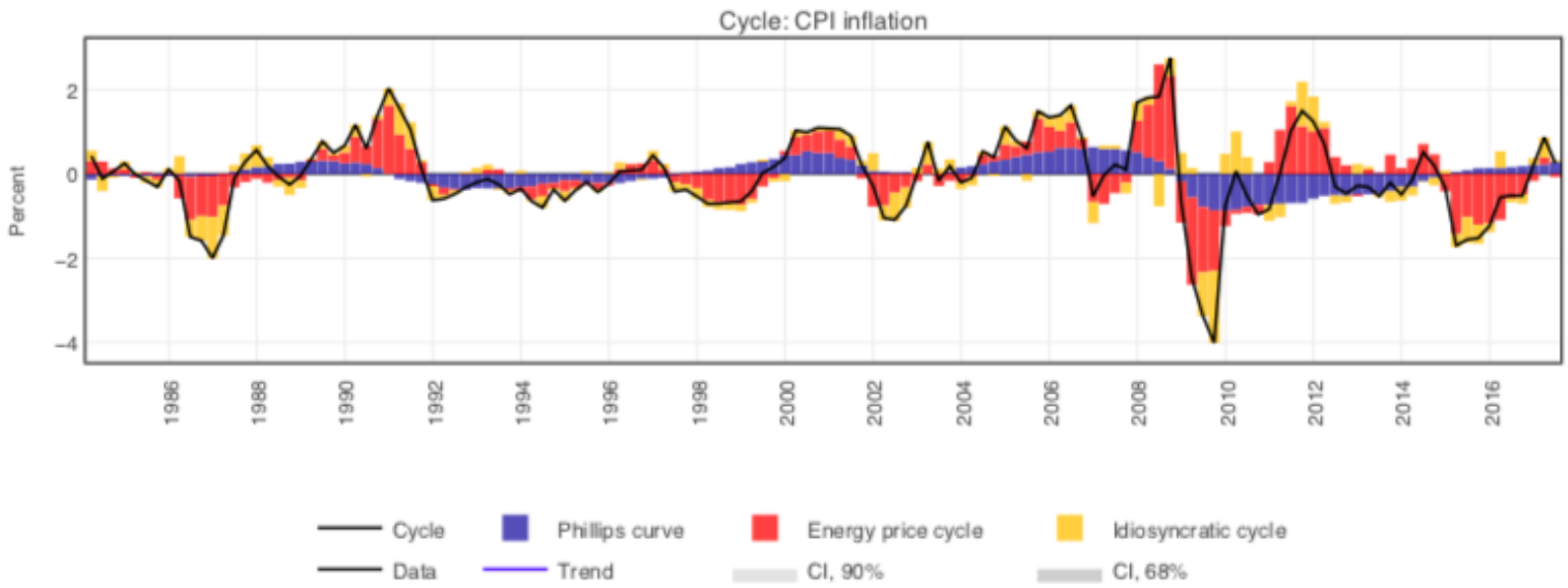


Comment 1: What is an idiosyncratic *cycle*?

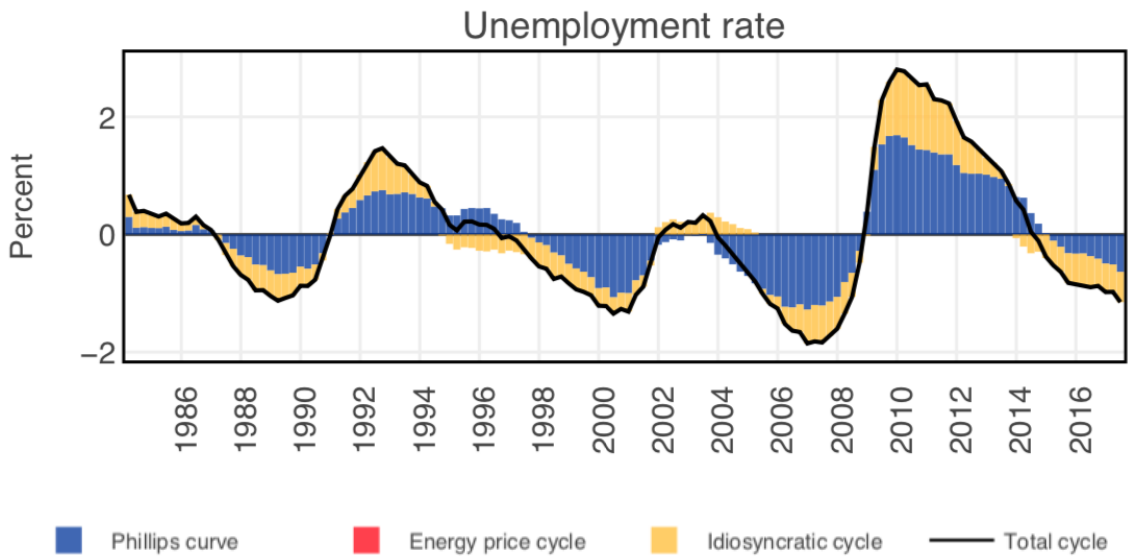
- 'Inflation cycle' also has a notable imprint. But what is an inflation cycle?
  - Import prices
  - Non-oil cost push shocks; e.g. energy/commodity prices
  - Something else?



Comment 1: What is an idiosyncratic cycle?

- I am more unsettled by the unemployment rate cycle
- What is an *unemployment rate cycle*?... It's an extremely persistent Okun's law error

$$u_t - u_t^* = cycle_t + e_{u,t}$$



Comment 1: What is an idiosyncratic cycle?

- In a world with a Phillips curve and Okun's law, why would a deviation of the unemployment rate from its trend as persistent as the yellow area *not* affect output or inflation?
  - Are the deviations predictable?

- Greater contribution of unemployment cycle since mid-2000s $\rightarrow$ flatter Phillips curve relative to unemployment rate

- An equivalent model would not allow for persistent Okun's law errors. Resulting model would feature: flatter Phillips curve; larger or time-varying Okun's law coefficient; more variable u^*, π^*

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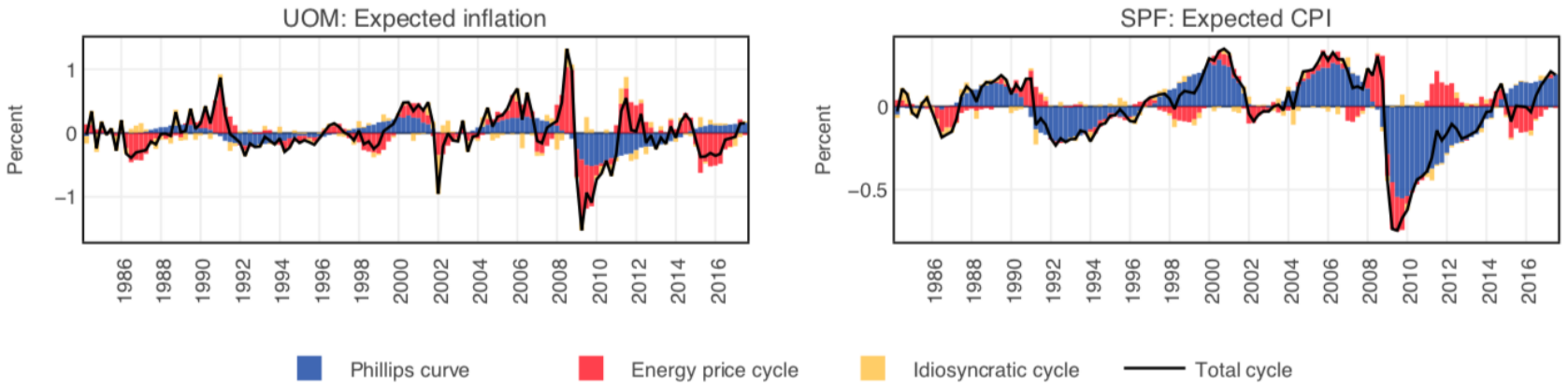
Comment 2: Inflation trends and forecasting

- Authors decompose inflation expectations into trend, business cycle and oil cycle

- Inflation expectations of households and professionals differ
  - Johannsen (2014); CG (2015); Ehrmann, Pfajfar & Santoro (2015); Binder (2016)



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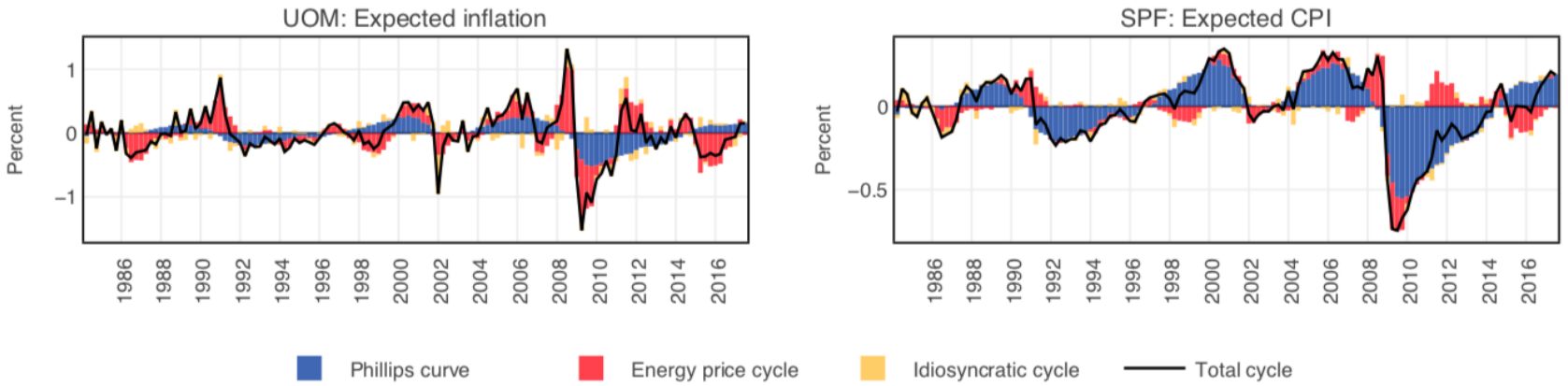

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- Policymakers care about measured expectations because
  - They provide real-time feedback about the inflation target
  - They forecast inflation well

- TC model performs well when forecasting inflation, especially 4 and 8 quarters hence, but we don't know *why*
  - Authors provide some evidence comparing forecasts to alternative models, but evidence is not emphatic

- Within the model, explore the influence of slack on the predictability of inflation
  - Is it because the model has a "better" trend?
  - How well do trend expectations forecast realized inflation?
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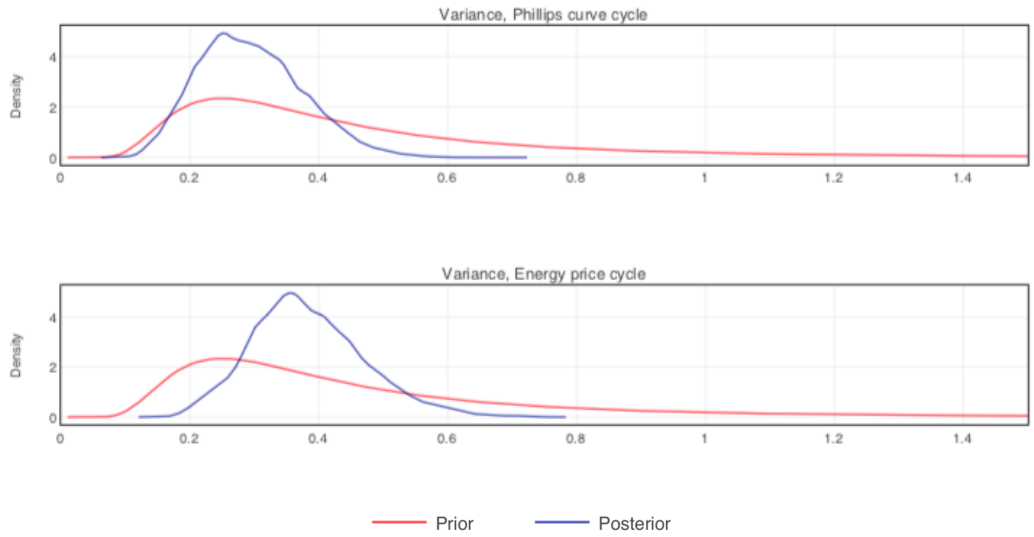
Comment 3: Model robustness

- Trend-cycle decompositions are sensitive to variances of trends
- Bayesian estimation with IG priors is delicate, especially if true values of variance of shocks are small
  - Trend output and trend unemployment
- How did you choose the priors you use? Are the results robust to uninformative priors? Different priors?



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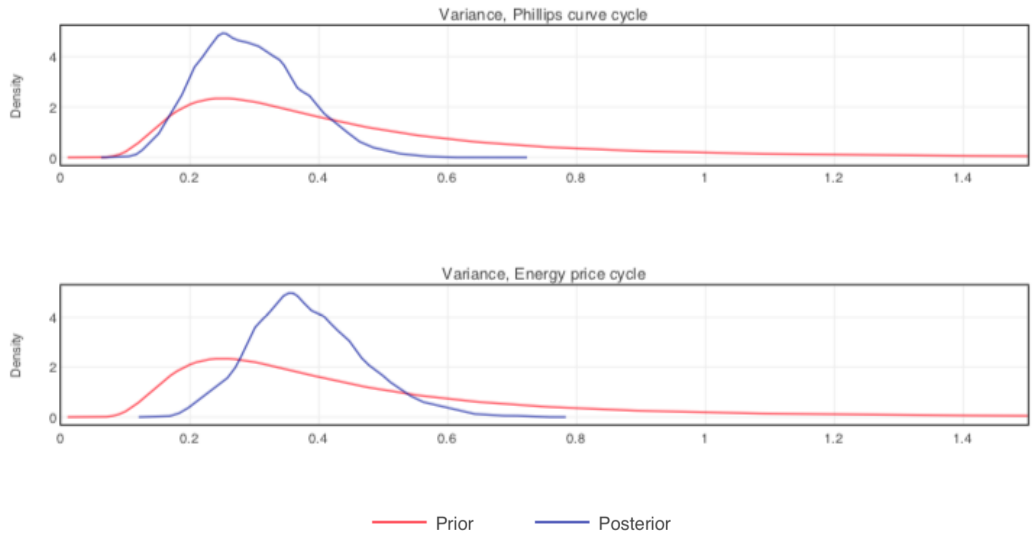

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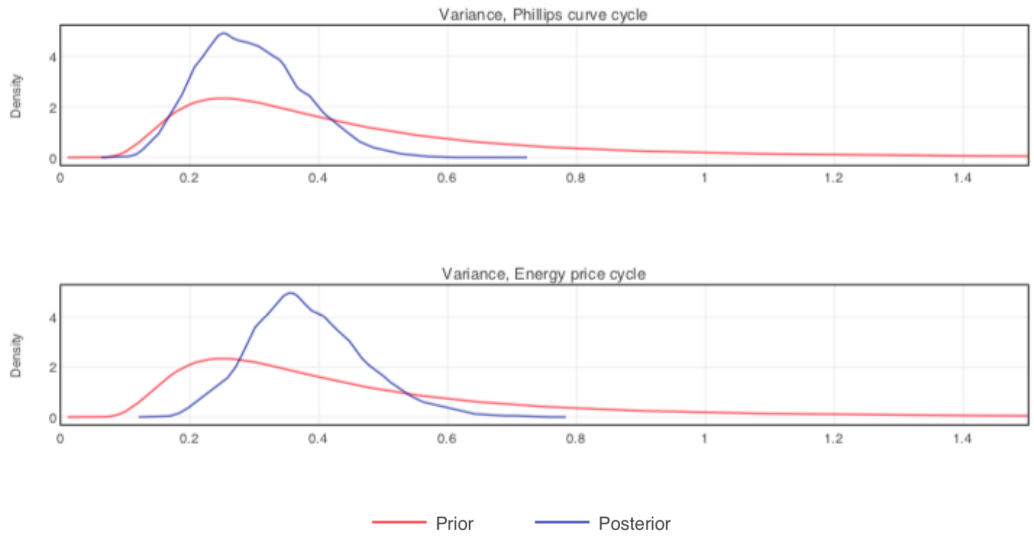

Some minor comments

- I'd strongly suggest allowing the drift component of output to be time-varying in order to capture the slowdown in growth over this period
  - This would reduce the output gap estimates in mid 2000s that are, in my view, implausibly large
- Why does u^* trend have drift?
- Oil price cycle is unrelated to the business cycle. Is this approximation reasonable?
- Interesting parameter estimates never reported
  - Trend output/unemployment rate; Okun's law parameter; sensitivity of expected inflation to oil price movements; prior/posterior distributions for variances

Final thoughts

- Timely and thought-provoking paper about the relationship between slack and inflation

- Broad comment is to focus on the takeaway of the model
  - If focus on cycles, important to understand what they capture and what they do not
  - If focus is on trends, why are your trends different than others? How should they be used?