Ajello, Laubach, López-Salido, and Nakata, "Financial Stability and Optimal Interest-Rate Policy"

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"The New Normal for Monetary Policy"
The Federal Reserve Bank of San Francisco
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The views expressed in these slides are those of the author and do not necessarily represent those of the IMF or IMF policy.

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Issue

- Monetary policy and financial stability
- Assume that a higher policy rate (leaning against the wind) somehow reduces the probability of a future financial crises
- What are the tradeoffs between current costs and future benefits of leaning?
- What is the optimal monetary policy?

Results of the paper

- Optimal policy implies very small policy-rate increase in standard case
- Somewhat larger policy-rate increase if uncertainty about parameters taken into account
- Robust policy (worst-case policy) implies larger policy-rate increase

Comments

- Little theoretical and empirical support for an economically significant policy-rate effect on the probability of a financial crisis
- Mechanism? Very indirect and very weak.
  - "Good" and "bad" credit growth should have different effects
  - Monetary policy is the *deviation* from the neutral rate, *not* the general *level* of interest rates.
  - Direction of effect? Tighter policy may affect price level and disposable income faster than the stock of debt, thereby *increasing* real debt and debt-to-income, or at least have very small effects (Svensson 2014, Gelain, Lansing, Natvik 2014)

Comments

- The probability and consequences of a crisis depends on the resilience of the financial system and the magnitude and nature of disturbances
- The resilience of the financial system depends directly on supervision and regulation (macroprudential policy)
- Macroprudential policy therefore has a much bigger and direct effect on the probability and consequences of a crisis than the policy rate
- Thus, use macroprudential policy rather than monetary policy for achieving and maintaining financial stability

Comments

- Nevertheless, one may want to have an idea of the tradeoffs from using monetary policy
- Estimate tradeoff between current and expected future macroeconomic outcomes for policy-rate changes
- Cost and benefit in terms of unemployment (linear calculation, marginal rate of transformation)
- Cost and benefit in terms of quadratic loss function
- First-order conditions for optimal policy: Benefit ≥ Cost

Other comments

- Inherent problem with robust optimal control
  - Optimal policy often on boundary of assumed feasible set of models/parameters
  - Optimal policy hence very sensitive to assumptions (not robust at all)
  - Any probability assigned to boundary of feasible set very small
  - Very unlikely outcomes determine policy
  - Not practical
  - Instead, Bayesian optimal control

The Riksbank's case for leaning against the wind

- A higher policy rate (leaning) implies lower household debt
- Lower debt implies (1) a lower *probability* of a future crisis and/or (2) a less *deep* future crisis if it occurs
- **Benefit** of leaning: Better expected macroeconomic outcome in the future
- **Cost** of leaning: Worse macroeconomic outcome in the next few years
- Riksbank *assumption* (gut feeling): The benefit exceeds the cost
- Is that assumption true?
- The answer can be found in the Riksbank's own boxes in MPRs July 2013 and February 2014, plus Schularick and Taylor (2012) and Flodén (2014)
- This involves putting numbers on the cost and benefit of leaning (Svensson 2015, Inflation targeting and leaning against the wind)

Intertemporal tradeoff faced by Riksbank (Svensson): Simple linear calculation in terms of unemployment

Higher policy rate: $\Delta i_1 = 1$ pp

Cost: Higher current employment: $\Delta u_1 = 0.5$ pp

Benefit 1: Lower probability of crisis: $\Delta \gamma_1 = -0.02$ pp/yr

Unemployment increase in crisis: $u_{2c} - u_{2nc} = 5$ pp

Lower expected future unemployment:

$$\Delta \mathrm{E}_1 u_2 = \Delta \gamma_1 (u_{2c} - u_{2nc}) = -0.0002 * 5 = -0.001 \text{ pp}$$

Benefit 2: Lower unemployment in crisis: $\Delta u_{2c} = 0.009$ pp

Probability of crisis: $\gamma_1 = 4\%$/yr (previously used 10%/yr)

Lower expected future unemployment: $\Delta \mathrm{E}_1 u_2 = \gamma_1 \Delta u_{2c} = -0.00036$ pp

Total benefit: $\Delta \mathrm{E}_1 u_2 = -0.001 - 0.00036 = -0.00136$ pp

Benefit / Cost ≈ 0.3% **Should have been ≥ 100%**

Cost / Benefit ≈ 350

Intertemporal tradeoff faced by Riksbank (Svensson): Simple quadratic calculation in terms of unemployment

$$L_1 = (u_1 - u^*)^2$$

$$\mathrm{E}_1 L_2 = \gamma_1 (u_{2c} - u^*)^2 + (1 - \gamma_1)(u_{2nc} - u^*)^2 = \gamma_1 (u_{2c} - u^*)^2$$

Cost: $\Delta L_1 = 2(u_1 - u^*)\Delta u_1 = 2 * (8 - 6) * 0.5 = 2$

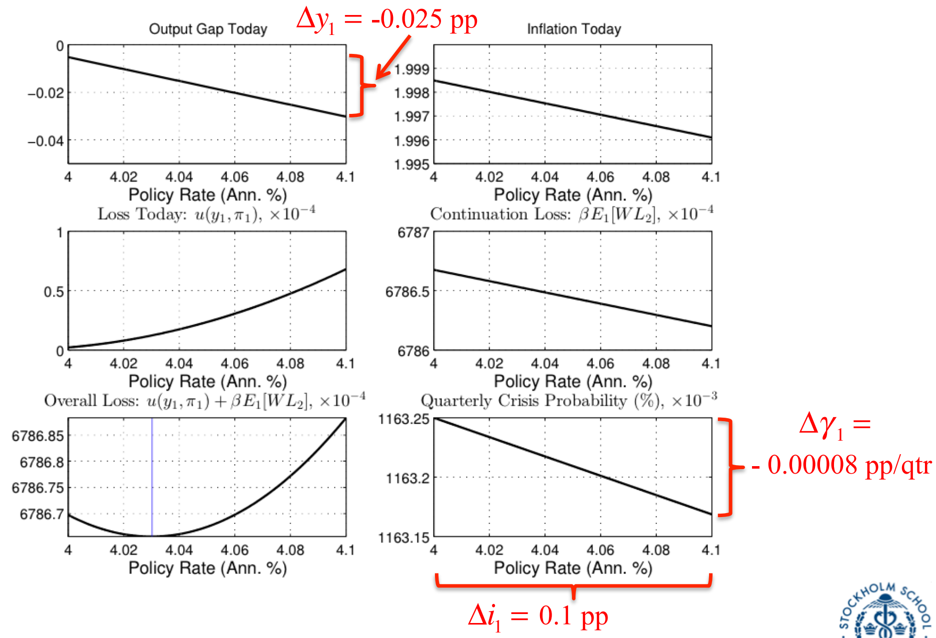
$$\Delta \mathrm{E}_1 L_2 = \Delta \gamma_1 (u_{2c} - u^*)^2 + 2\gamma_1 (u_{2c} - u^*)\Delta u_{2c}$$
$$= -0.0002 * 5^2 - 2 * 0.04 * 5 * 0.009 = -0.0086$$

Benefit / Cost $= \Delta \mathrm{E}_1 L_2 / \Delta L_1$ **≈ 0.4%**

Cost / Benefit ≈ 230

Intertemporal tradeoff faced by central bank (figure 1 in paper): Simple linear calculation in terms of output

Figure 1: A Key Trade-off Faced by the Central Bank



Intertemporal tradeoff faced by central bank (figure 1 in paper): Simple linear calculation in terms of output

Higher policy rate: $\Delta i_1 = 1$ pp (scaled up from figure 1)

Cost: Lower current output: $\Delta y_1 = -0.25$ pp

Benefit: Lower probability of crisis: $\Delta \gamma_1 = -0.0008$ pp/qtr $= -0.0032$ pp/yr

Output in crisis: $y_{2c} - y_{2nc} = -10$ pp

Higher expected future output:

$$\Delta E_1 y_2 = \Delta \gamma_1 (y_{2c} - y_{2nc}) = 0.000032 * 10 = 0.00032 \text{ pp}$$

Benefit / Cost : 0.00128%

Cost / Benefit ≈ 750

Intertemporal tradeoff faced by central bank (paper) : Simple quadratic calculation in terms of output

$$\Delta i_1 = 1 \text{ pp}$$

$$L_1 = y_1^2$$

$$\mathrm{E}_1 L_2 = \gamma_1 y_{2c}^2$$

$$\text{Assume } y_1 = -2 < 0!$$

$$\Delta L_1 = 2 y_1 \Delta y_1 = 2 * (-2) * (-0.25) = 1$$

$$\Delta \mathrm{E}_1 L_2 = \Delta \gamma_1 y_{2c}^2 = -0.000032 * 10^2 = -0.0032$$

$$\textbf{Benefit / Cost} = \Delta \mathrm{E}_1 L_2 / \Delta L_1 = 0.3\%$$

$$\textbf{Cost / Benefit} \approx \textbf{300}$$

Depends on assumption about initial y_1 !

Intertemporal tradeoff faced by central bank (paper)

- Quadratic loss function does not make much difference (benefits are mainly linear)
- Uncertainty and Bayesian optimal policy does not make much difference
- Robust (worst-case) optimal policy simply assumes worst feasible outcome. But very sensitive to assumed feasible set. If probability to outcomes assigned, very unlikely outcomes determine policy

Conclusion

- Do not let monetary policy lean against the wind for financial-stability purposes
- There is no choice but to use macroprudential policy to achieve and maintain financial stability

Additional slides

A detail: The financial-stability mechanism

$$y_1 = E_1^{ps} y_2 - \sigma \left[i_1 - E_1^{ps} \pi_2 \right] \quad (1)$$

$$\pi_1 = \kappa y_1 + E_1^{ps} \pi_2 \quad (2)$$

$$L_1 = \rho_L L_0 + \phi_i(i_1) + \phi_y y_1 + \phi_\pi \pi_1 + \phi_0. \quad (3)$$

$$\gamma_1 = \frac{\exp(h_0 + h_1 L_1)}{1 + \exp(h_0 + h_1 L_1)} \quad (4)$$

$$L_t^q := \sum_{s=0}^{19} \Delta \log \frac{B_{t-s}}{P_{t-s}} \quad (13)$$

$$L_t^q \approx \Delta \log \frac{B_t}{P_t} + \frac{19}{20} L_{t-1}^q \quad (14)$$

$$\Delta \log \frac{B_t}{P_t} = \Delta \log B_t - \pi_t \quad (15)$$

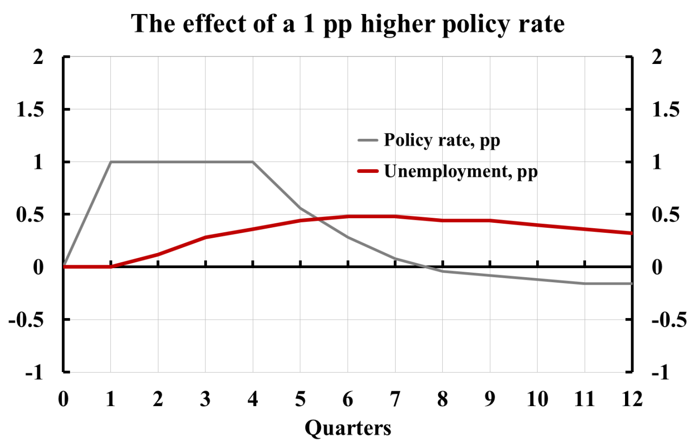
$$\Delta \log B_t = c + \phi_i i_t + \phi_y y_t + \varepsilon_t^B \quad (16)$$

$$\Delta \log B_t = c + \phi_y y_t + \varepsilon_t^B \quad (17)$$

$$L_t \approx \rho_L L_{t-1} + \phi_0 + \phi_y y_t + \phi_\pi \pi_t + \epsilon_t \quad (18)$$

$$L_1 \approx \rho_L L_0 + \phi_0 + \phi_y y_1 + \phi_\pi \pi_1 + \epsilon_1 \quad (19)$$

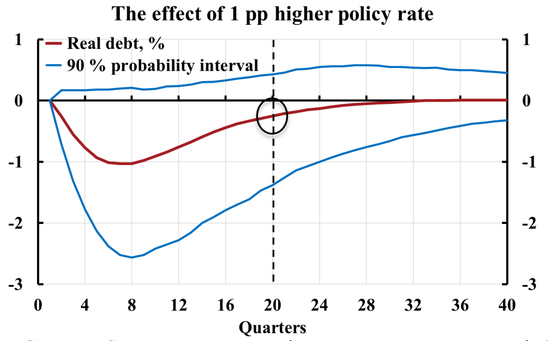
Cost of 1 pp higher policy rate: 0.5 pp higher unemployment rate



Source: MPR July 2013, chapt. 2; Svensson, post on larseosvensson.se, March 31, 2014.

Benefit (1) of 1 pp higher policy rate: Lower probability of a crisis

- Schularick & Taylor (2012): 5% lower real debt in 5 yrs implies 0.4 pp lower probability of crisis (average probability of crises about 4%)
- Riksbank, MPR Feb 2014, box:

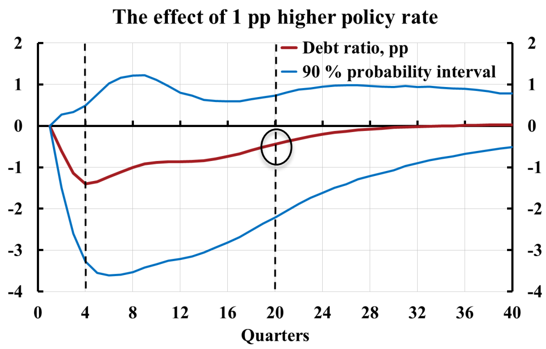


Source: Svensson, post on larseosvensson.se, March 31, 2014.

- 1 pp higher policy rate leads to 0.25% lower real debt in 5 years
- Lowers probability of crises by 0.25*0.4/5 = 0.02 pp
- Assume 5 pp higher unemployment in crisis (Riksbank crisis scenario, MPR July 2013, box):
- Benefit (1): Expected lower future unemployment: 0.0002*5 = **0.001 pp**
- Cost: Higher unemployment rate now: **0.5 pp**

Benefit (2) of 1 pp higher policy rate: Smaller increase in unemployment if crisis

- Flodén (2014): 1 pp lower debt ratio may imply 0.02 pp smaller increase in unemployment rate in crisis
- Riksbank MPR Feb 2014, box:



- 1 pp higher policy rate leads to 0.44 pp lower debt ratio in 5 yrs
- Smaller increase in unemployment in crisis: 0.44*0.02 = 0.009 pp
- With probability of crisis as high as 10%, divide by 10 (Schularick & Taylor: 4%)
- Benefit (2): Expected lower future unemployment: **0.0009 pp**
- Cost: Higher unemployment now: **0.5 pp**

Source: Svensson, post on larseosvensson.se, March 31, 2014.

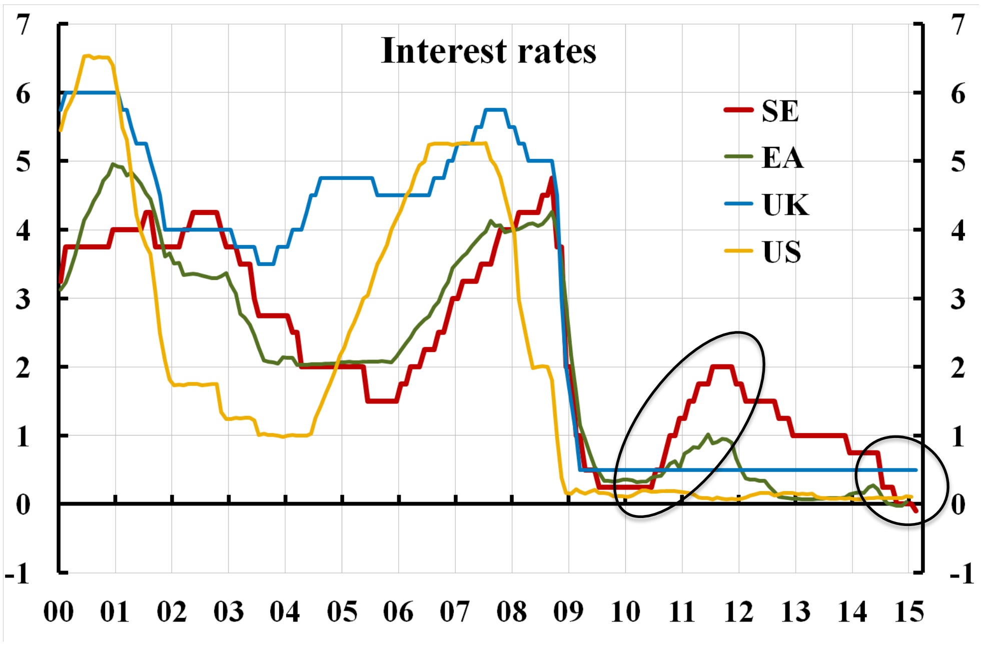
Summarize cost and benefit of 1 pp higher policy rate

Table 1. Cost and benefit in unemployment of 1 percentage point higher policy rate during 4 quarters

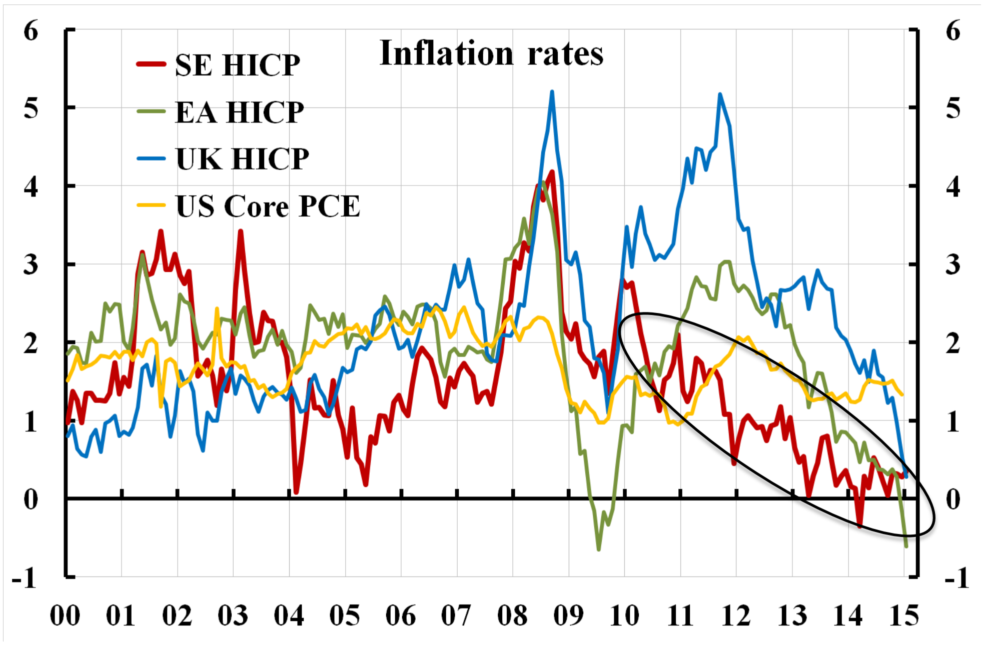
Cost: Higher unemployment during the next few years, percentage points	0.5
Benefit: Lower expected future unemployment, percentage points	
1. Because of lower probability of a crisis	0.001
2. Because of a smaller increase in unemployment in a crisis	0.0009
Total benefit, percentage points	0.0019
Total benefit as a share of the cost Should have been > 1!	**0.0038**

- Riksbank's case does not stand up to scrutiny

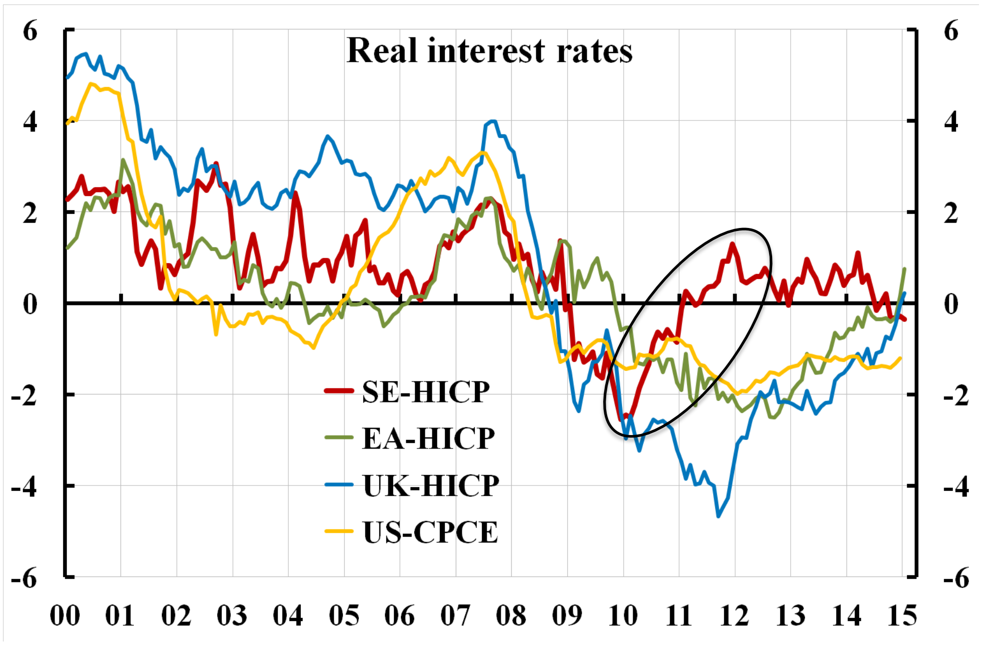
The leaning: Policy rates in Sweden, UK, and US; Eonia rate in euro area



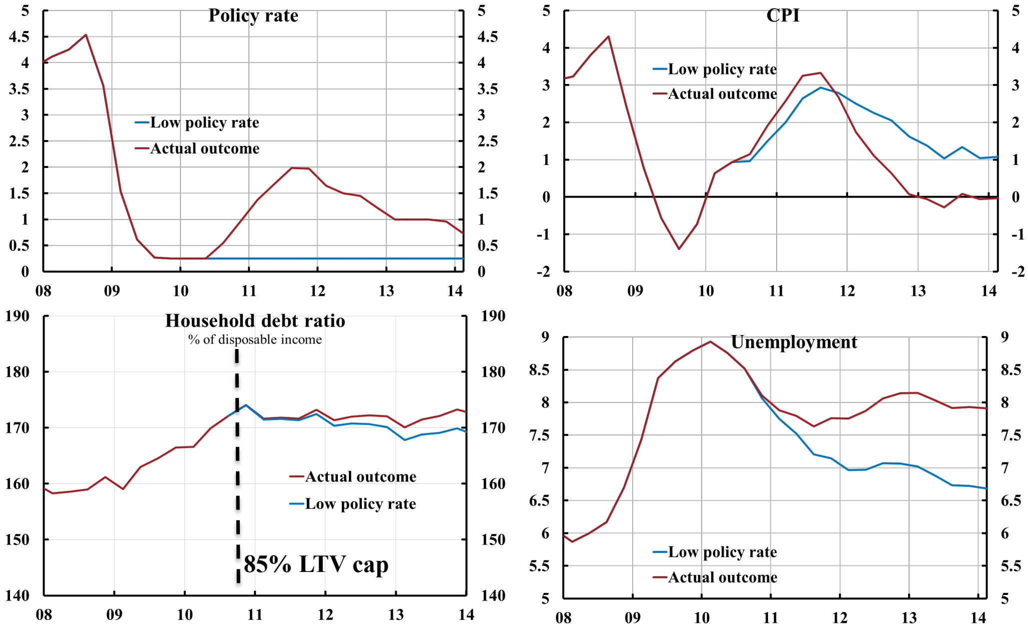
The leaning: Inflation in Sweden, euro area, UK, and US



The leaning: Real policy rate in Sweden, UK, and US, real Eonia rate in euro area



Ex post evaluation: Riksbank policy-rate increases from summer of 2010 have led to inflation below target and higher unemployment (and probably a higher debt ratio)



Source: Svensson (2013), "Unemployment and monetary policy – update for the year 2013,"
Svensson (2013), "Leaning against the wind increase (not reduces) the household debt-to-GDP ratio",
posts on larseosvensson.se.