Commentary on Monetary Policy and Financial Stability

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Challenges to Financial Stability in a Low Interest Rate World
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Outline

- Using monetary policy to deal with financial stability
- My approach to cost-benefit analysis of "Leaning against the wind"
- Estimates of effects on the magnitude of a crisis
- Recent criticism
- Bauer and Granziera
- Gerdrup, Hansen, Krogh, and Maih
- A general problem with Taylor rules
- Credible conclusions

Introduction 1

- Using monetary policy to deal with financial stability
- Leaning against the wind (LAW): Somewhat tighter policy than justified by standard inflation targeting
- Strongly promoted by BIS, practiced by Norges Bank, previously practiced and now abandoned by Riksbank
- Scepticism elsewhere (Bernanke, Draghi, Evans, Williams, Yellen, IMF 2015, FOMC 2016, ...)

Introduction 2

- IMF 2015:
  "The question is whether monetary policy should be altered to contain financial stability risks. ...
  Based on our current knowledge, and in present circumstances, the answer is generally no."
- Williams 2015:
  "monetary policy is poorly suited for dealing with financial stability, even as a last resort."
- FOMC minutes, April 2016:
  "Most participants judged that the benefits of using monetary policy to address threats to financial stability would typically be outweighed by the costs ... ;
  some also noted that the benefits are highly uncertain."

Introduction 3

- LAW has costs in terms of a weaker economy, but possibly benefits in terms of a lower probability or smaller magnitude of a crisis
- Is LAW justified?
- Requires a cost-benefit analysis: Numbers!

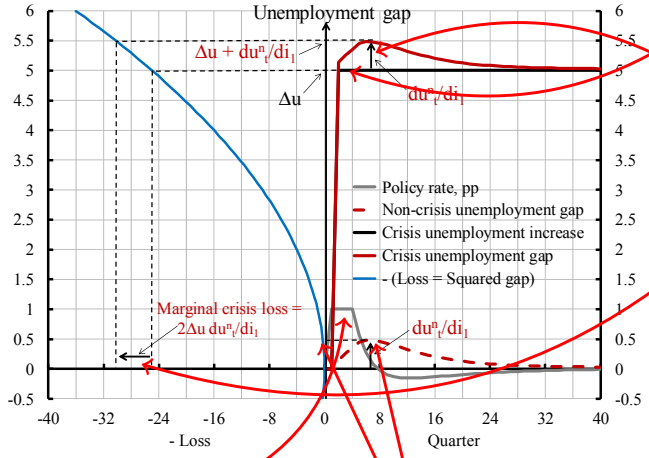
My approach to cost-benefit analysis of LAW

- Compare MC and MB of raising the policy rate when policy is optimal according to standard flexible inflation targeting (probability of financial crisis set to zero)
- Is "One-off" LAW (policy-rate increase) different from "systematic LAW? (argued by BIS)
- Not really, just test of first-order conditions for optimal policy
- Recall "calculus of variations"
  - If policy is optimal, for any deviation from policy, $\Delta\text{Loss} \geq 0$
  - For any marginal deviation, $\Delta\text{Loss} = \text{MC} - \text{MB} = 0$
  - Indeed, MC = MB is a first-order condition for optimal policy
- Testing policy by comparing MC and MB of policy change therefore OK

Svensson (2016a), "Cost-Benefit Analysis of Leaning Against the Wind: Are Costs Larger Also with Less Effective Macroprudential Policy?" www.larseosvensson.se

Understanding the marginal cost of LAW

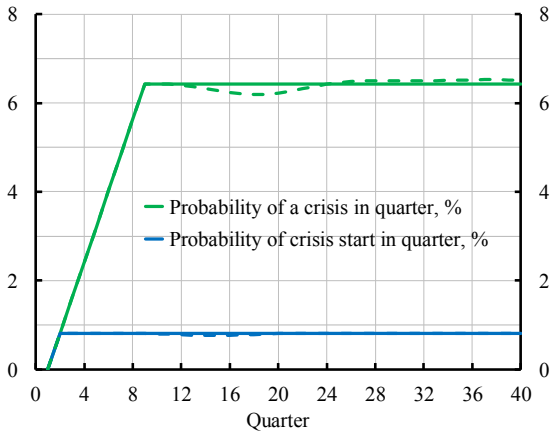
Loss = (Unemployment gap)^2



- Policy-rate effect on non-crisis unemployment, $d\mathrm{E}_1 u_t^{\mathrm{n}} / d\bar{i}_1$
- Marginal *non-crisis* loss = 0, a 2nd-order loss (at zero u gap)

- Crisis unemployment increase (net of policy respons), Δu
- Effect on *crisis* unemployment, $d\mathrm{E}_1 u_t^{\mathrm{n}} / d\bar{i}_1$
- Marginal crisis loss = $2\Delta u \frac{d\mathrm{E}_1 u_t^{\mathrm{n}}}{d\bar{i}_1}$, a 1st-order loss
- Probability of crisis in quarter t, p_t
- Marginal cost = $2p_t\, \Delta u\, \frac{d\mathrm{E}_1 u_t^{\mathrm{n}}}{d\bar{i}_1}$
- Cost of crisis (loss increase in crisis) is higher with a higher non-crisis unemployment gap due to LAW

The probability of a crisis, p_t



- Benchmark probability of crisis start in qtr t: $q_t = 0.8\%$, solid line
- Benchmark crisis duration: $n = 8$ quarters
- Benchmark probability of crisis in qtr t: $p_t = \sum_{\tau=0}^{n-1} q_t$, solid line
- Dashed lines: Effect of LAW, $dq_t / d\bar{i}_1$, $dp_t / d\bar{i}_1$

Policy-rate effect on the probability of a crisis 1

- Schularick and Taylor (2012): Probability of crisis start in qtr t, q_t, depends on real debt growth (14 countries, 1870–2008)
- Main logit equation, adapted to quarterly data

$$q_t = \frac{1}{4}\frac{\exp(X_t)}{1+\exp(X_t)}$$

$$X_t = [-3.89] - \underset{(2.110)}{0.398}\, g_{t-4} + \underset{(2.631)}{7.138^{***}}\, g_{t-8} + \underset{(2.948)}{0.888}\, g_{t-12} + \underset{(1.378)}{0.203}\, g_{t-16} + \underset{(1.640)}{1.867}\, g_{t-20}$$

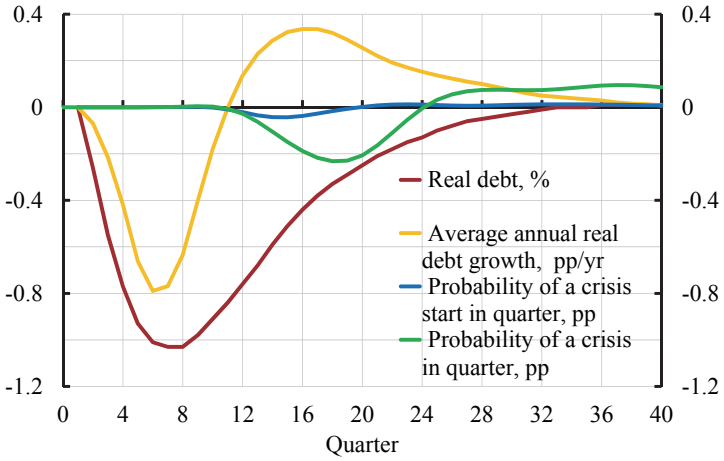
$$g_t \equiv (\textstyle\sum_{\tau=0}^{3} d_{t-\tau}/4)/(\sum_{\tau=0}^{3} d_{t-4-\tau}/4) - 1$$

d_t real debt, g_t annual growth rate of average annual debt

- Main determinant is 2-year lag of annual credit growth, *not* cumulative 5-year growth as in GHKM (coefficients different)

Policy-rate effect on probability of a crisis 2

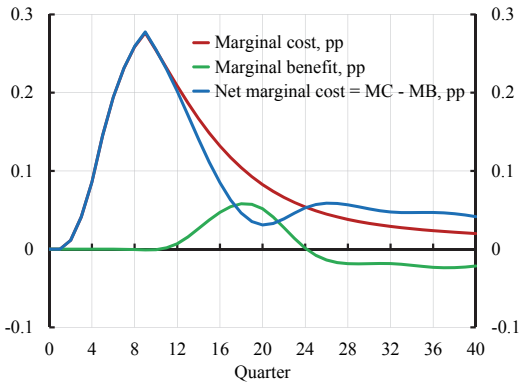
- Policy-rate effect on real debt, $\frac{d(d_t)}{di_1}$, $t \geq 1$, example and benchmark: Riksbank estimate (not significant)



- Determines effects on average annual real debt growth, $\frac{dg_t}{di_1}$, on the probability of a crisis start, $\frac{dq_t}{di_1}$, and on the probability of a crisis, $\frac{dp_t}{di_1} = \sum_{\tau=0}^{n-1} \frac{dq_t}{di_1}$

Benchmark marginal cost and marginal benefit

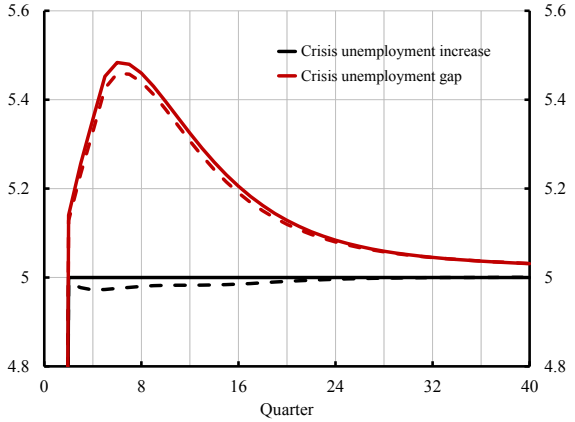
- $\mathrm{MC}_t = 2p_t \Delta u \frac{d\mathrm{E}_1 u_t^{\mathrm{n}}}{d\bar{i}_1}$; $\mathrm{MB}_t = \mathrm{MB}_t^p + \mathrm{MB}_t^{\Delta u}$
- $\mathrm{MB}_t^p = (\Delta u)^2(-\frac{dp_t}{d\bar{i}_1})$; $\mathrm{MB}_t^{\Delta u} = 2p_t \Delta u(-\frac{d\Delta u_t}{d\bar{i}_1})$
- $\mathrm{NMC}_t = \mathrm{MC}_t - \mathrm{MB}_t$



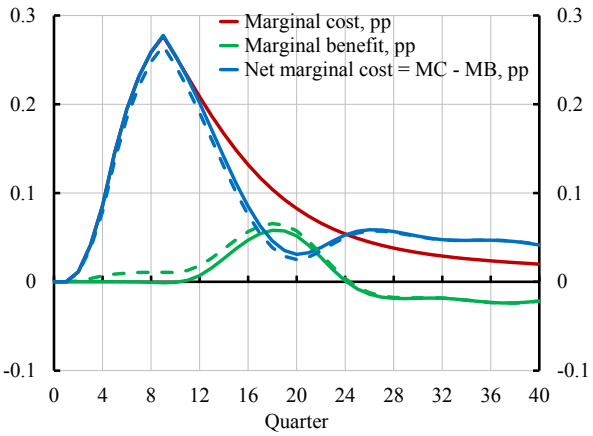
- Marginal cost exceeds marginal benefit
- $\sum_{t=1}^{40} \mathrm{NMC}_t > 0 \Rightarrow$ LWW!
- Cumulative marginal benefits: $\sum_{t=1}^{40} \mathrm{MB}_t \approx 0$
- MC exceeds MB also if MC, MB beyond qtr 24 disregarded

Effect of LAW on the magnitude of a crisis

- Flodén (2014) OECD: 1pp higher DTI implies 0.02pp larger unemployment increase 2007-2012
- Implies maximum fall in Δu 0.03pp in quarter 4 (dashed lines)



- Small modification of MB and net marginal cost (dashed)



- Jorda, Schularick, Taylor (2013) implies 1pp higher credit/GDP implies 0.04pp higher unemployment increase (double Flodén's)

The effect on the magnitude of a crisis

- Flodén (2014), OECD:
  1pp higher DTI ratio 2007 is associated with a (statistically) significant) 0.02pp larger unemployment increase 2007–2012
- Jorda, Schularick, and Taylor (2013), 14 countries, 1870-2008:
  1pp higher credit/GDP: GDP lower by 0.08% (avg over 5 yrs)
  - For Okun coefficient of 2, 0.04pp higher unemployment; twice as large as Flodén's estimate
- Krishnamurthy and Muir (2016), 14 countries, 1869–2014:
  1pp higher 3-year growth in the credit-to-GDP ratio: (statistically insignificant) 0.05pp larger GDP decline from peak to trough in a financial crisis
  - For Okun coefficient of 2, 0.025pp larger unemployment increase
- Similar small magnitudes
- Gerdrup, Hansen, Krogh, and Maih rely on JST; should have about double effect on effect on magnitude as in slide 15, still very small

Understanding JST's estimate

- JST: +1 SD "excess credit" reduces output by 2% on average over 5 years in "financial recession"
- 1 SD is 2.5pp, so +1pp "excess credit" reduces output by 0.8%
- "Excess credit" is yearly percentage-point excess rate of change of credit (bank loans) relative to GDP over the previous expansion phase (previous trough to peak, excess is relative to mean)
- Post-WWII, average duration of expansion phase is 9.46 yrs; mean growth rate of credit/GDP is 3.26%/yr
- 1pp excess credit is $((1+0.0426)/(1+0.0326))^{9.46} - 1 = 9.55\%$ higher credit/GDP
- 1% higher credit/GDP reduces output by 0.8/9.55 = 0.084%
- For an Okun coefficient of 2, unemployment increases by 0.042pp
- For credit/GDP $\approx$ 100%, 1% is 1pp, so 1pp higher credit/GDP increases unemployment by 0.042pp

Recent criticism of my approach 1

- BIS Annual Report:
  - (1) Uses credit growth instead of "financial cycle", (2) assumes exogenous magnitude of crisis, (3) only examines one-off policy-rate increase instead of systematic optimal LAW, and (4) implies responding too late and ignoring cumulative impact (Juselius, Borio, Disyatat, and Drehmann 2016)
  - But (1) empirical issue: best predictors of crises, policy-rate impact on predictors; (2) examined in Svensson (2016a, appendix D); (3) optimal policy examined in Svensson (2016a, section 3); (4) all empirical lags and cumulative effects taken into account.
  - Now detailed response in new appendix, Svensson (2017, appendix K)
- Filardo and Rungcharoenkitkul, and Gourio, Kashyap, and Sim
  - Assume fixed cost of a crisis (fixed crisis loss increase)
  - Then small positive LAW optimal (Svensson 2016a, section 3, figures 3.4 and 3.5; 2016b)
  - But too small to matter. Previously similar result in Ajello et al.

Svensson (2016b), "Discussion of Filardo and Rungcharoenkitkul, 'Quantitative case for leaning-against-the-wind'," www.larseosvensson.se

Recent criticism of my approach 2

- Adrian and Liang
  - Suggest "reasonable alternative assumptions" about effect on probability and magnitude of crisis will overturn my result
  - But their "reasonable" assumptions imply effects that are 13 standard errors larger than ST's estimate, and 40 (27) standard errors larger than Flodén's (JST's) estimates

Svensson, 2016c, "The Robustness of the Result that the Cost of "Leaning Against the Wind" Exceeds the Benefit: Response to Adrian and Liang," www.larseosvensson.se

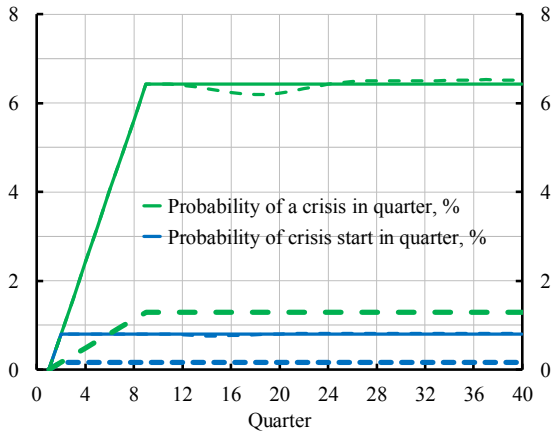
Bauer and Granziera

- My interpretation: Policy-rate effect on debt/GDP ambiguous, uncertain sign, small, not significant
- It follows that policy-rate effect on crisis probability also ambiguous, uncertain sign, small, not significant
- In general: Monetary policy normally small and ambiguous effects on financial stability
- Macroprudential policy much more effective than LAW
- For an example, see DDLRT 2016

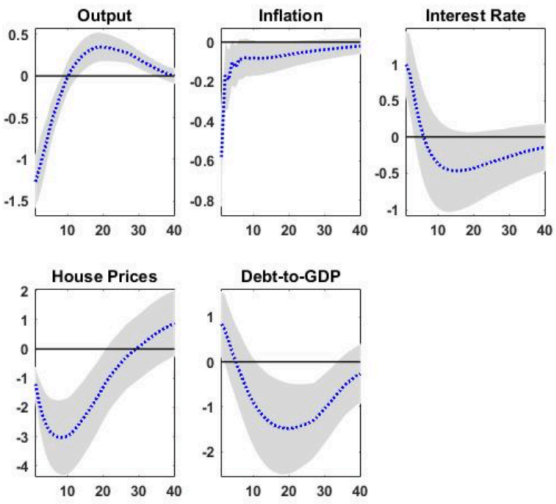
Dagher, Dell'Ariccia, Laeven, Ratnovski, Tong (2016, "Benefits and Costs of Bank Capital," IMF SDN/16/04)

Bank-capital effect on probability of crises

- 20% bank capital relative to RWA might have avoided 80% of historical banking crises in OECD since 1970 (DDLRT(2016, fig. 7)
- Dramatic effect on probability of crises with enough bank capital: Shift from solid lines to thick dashed lines



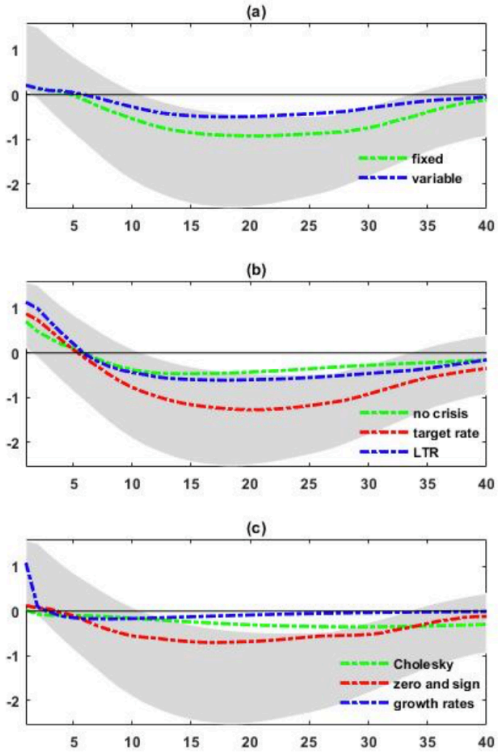
Bauer and Granziera: Policy easing or tightening? Significance of effects?



- Policy tigthening or easing?
- Integral of policy rate (nominal and real)?

- Policy easing after qtr 6?
- *Fall* in debt/GDP due to policy *easing* after qtr 6?
- Tightening (easing) implies debt/GDP increases (decreases)?
- Policy rate that responds positively to debt/GDP that increases in policy rate may imply indeterminacy (Gelain, Lansing, Natvik)
- Effects not significant for 90 and 95% confidence intervals (only 68% shown, 90 and 95% are 1.7 and 2 times as large)

Bauer and Granziera: Robustness tests



- Furthermore, robustness tests indicate weaker effects on debt/GDP, closer to zero

Gerdrup, Hansen, Krogh, and Maih 1

- Not easy to relate to my approach and compare numbers and sizes of effects
- Main result: LAW beneficial only if effect on magnitude (negative demand shock) sufficiently large
  - If effect on magnitude as small as JST, how can it matter?
  - What do figures on slide 12 above look like for GHKM?
  - In figure 6, bottom-right panel, cumulative credit growth is about 2pp lower with LAW
  - In figure 7, right panel, output during crisis falls by 0.97pp less with LAW.
  - This means 0.97/2 = 0.48pp less fall in output for 1pp less cumulative credit growth
  - Why is this more than 10 times 0.04, the JST effect of debt/GDP on the fall in output?

Gerdrup, Hansen, Krogh, and Maih 2

- The interest rate has immediate effect on output (not realistic humpshape); can (disregarding any lower bound) be adjusted to completely neutralize demand shock; then no effect on output in crisis; complete "clean" and no "lean"
- Does any LAW happen only because of arbitrary interest-rate smoothing and suboptimal Taylor rule?
- If so, model is arguably not appropriate for cost-benefit analysis of LAW; conclusions may be arbitrary and not robust
- In cost-benefit analysis, it is crucial to get the numbers, effects, and impulse responses realistic and empirically supported

A general problem with Taylor rule

- A simple instrument rule, such as the Taylor rule, is not optimal, also when coefficients optimized; it has too few arguments
- Optimal policy responds to all state variables or shocks
- Adding an argument means that the arguments better span the space of relevant state variables or shocks
- Not surprising if adding an argument leads to better outcome, but arguably need not prove anything
- To avoid such problems, do optimal policy, with and without positive probability of a crisis

Credible conclusions

- A complex model such as a typical DSGE model, in practice to a considerable extent a black box, can be calibrated to give almost any result
- Any such result is normally quite model-dependent, and, in particular, any numerical result depends on assumptions, relations and distortions included and excluded, and calibration
- Thus, any such result does not necessarily prove anything
- Chris Sims has said: "DSGE models are story-telling devices, not science" (I agree with at least the first part)
- For credible conclusions, empirical support, simplicity, transparency, and robust relations are desirable, even necessary