# Cost-benefit analysis of leaning against the wind

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The views expressed in this presentation are those of the author and do not necessarily represent those of the IMF or IMF policy.



## Outline

- Should standard flexible inflation targeting be combined with some leaning against the wind, in order to promote financial stability?
- "Leaning against the wind [of rising debt and/or asset prices]": Tighter monetary policy than justified by stabilizing inflation around the inflation target and resource utilization (unemployment) around its long-run sustainable rate
- Leaning strongly promoted by BIS (incl. latest *Annual Report*)
- Skepticism against leaning elsewhere (Draghi, Yellen, Bernanke, Williams, Evans), but debate continues

## Outline

- Sweden a case study: Quite aggressive leaning since summer 2010, because of concerns about household debt (in spite of inflation forecast below target and unemployment forecast far above its long-run sustainable rate)
- Outcome June 2015: Inflation close to zero, very high unemployment, most likely higher real debt, policy rate equal to -0.25%
- Was Riksbank leaning (and liftoff) in 2010-2011 justified?
- More generally, what are the conclusions of a cost-benefit analysis of leaning?
- What is the optimal monetary policy with regard to financial stability?



## Conclusions

- Benefits of leaning seem in most cases to be much smaller than costs, especially in a weak economy. Then benefits are as small as a few percent of the cost (or even less)
- Therefore, before using monetary policy for financial-stability purposes, *always* do a cost-benefit analysis
- The optimal amount of leaning seems to be tiny, with tiny net benefits
- Leaning against the wind for financial-stability purposes seems inherently flawed (inflation below target, below expectations or expectations unanchored)
- For financial stability, there seems to be no choice but to use other policies than monetary policy (micro- and macroprudential policy, fiscal policy, housing policy, …, depending on the nature of the problem)

# John Williams, May 27, 2015

"Despite the clear need to consider all potential tools to avoid a financial crisis, I am unconvinced that monetary policy is one of them. Three observations lead me to this conclusion. First, monetary policy actions offer unfavorable and costly tradeoffs between macroeconomic and financial stability goals. Second, using monetary policy in pursuit of financial stability could undermine the credibility of the central bank's commitment to its inflation target and unmoor inflation expectations. Third, the great uncertainty about, and long lags between, monetary policy actions and risks to the financial system argue against their playing a meaningful role."



# Editorial in FT, Oct 30, European edition



FINANCIAL TIMES



October 29, 2014 6:23 pm

## Tactic of 'lean against the wind' has failed Sweden

### The Riksbank erred when it tightened policy to fight a housing bubble

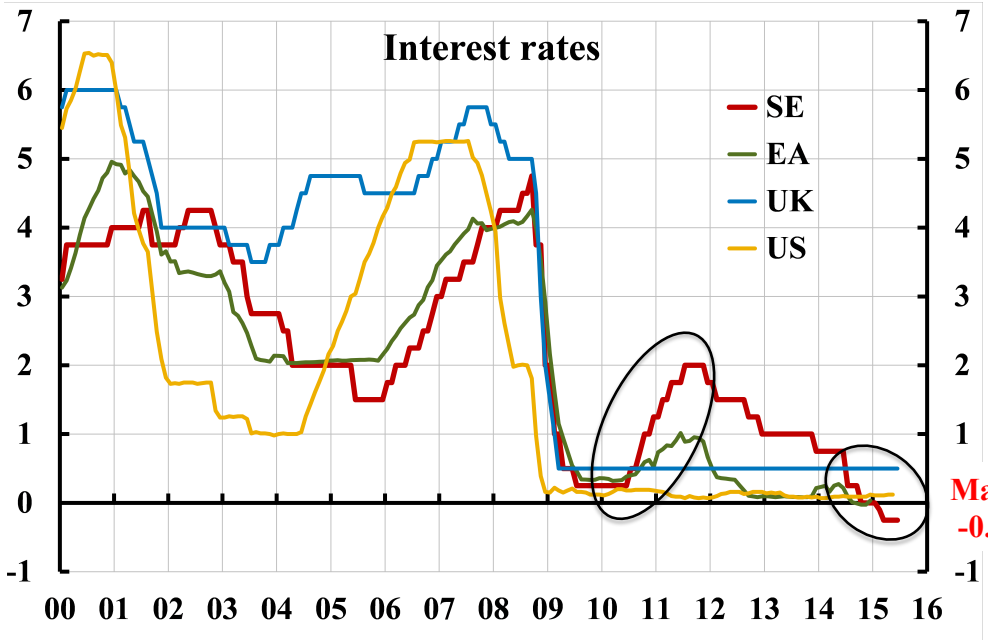

A view of central Stockholm from Strandvägen, a waterfront street in the upmarket Östermalm district

Four years ago Sweden appeared to be a model for the global recovery. A monetary policy innovator, it had brought in negative interest rates in 2009. Having already cleaned up its banks and taken strenuous efforts to spruce up a hitherto overtaxed economy, it was rewarded with growth above 6 per cent. It looked as though the Swedes would show others the way out of recession.

Sweden did indeed provide an example, but not one that others should follow. From 2010 the Riksbank started to tighten monetary policy. Initially the reason was concern about rising prices, but as inflation fell the Riksbank appeared to downplay its statutory objective of keeping inflation to "around 2 per cent per year", and instead started to set interest rates with an eye on high levels of household debt. Even as the eurozone stumbled into crisis, Sweden's policy rate rose progressively to the middle of 2011, and has only fallen gradually during the intervening years of weak growth.

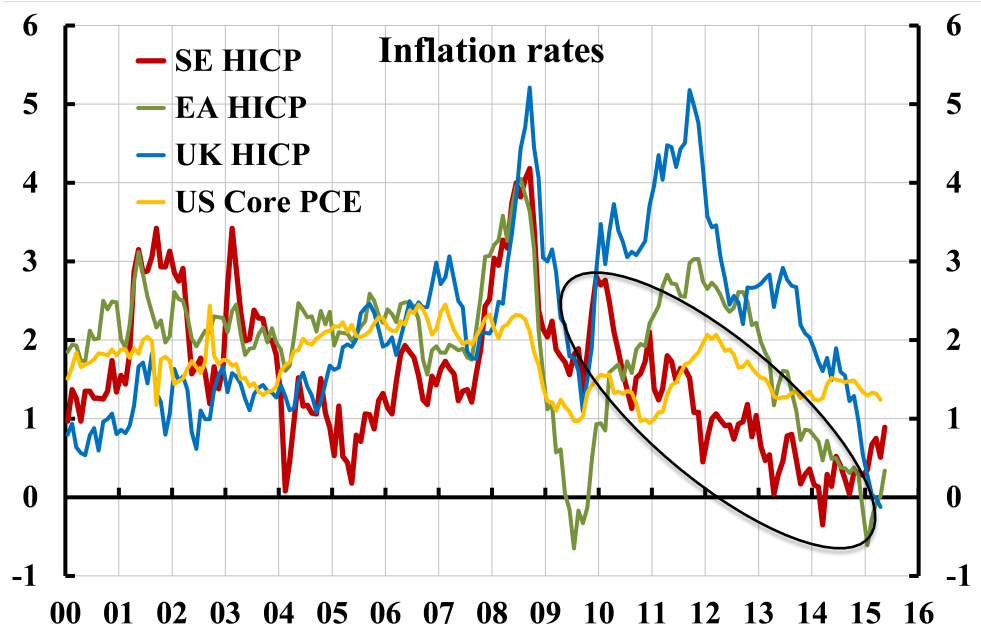
This week the Riksbank cut its main interest rate to zero, in what must be a final recognition that for too long its monetary stance was much too tight. Alongside persistently low inflation, unemployment has stayed well above the low levels the Swedes are accustomed to. Lars Svensson, a former member of the Riksbank board and recently its foremost critic, argued that unnecessarily tight policy has cost the Swedish economy about 60,000 jobs.

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

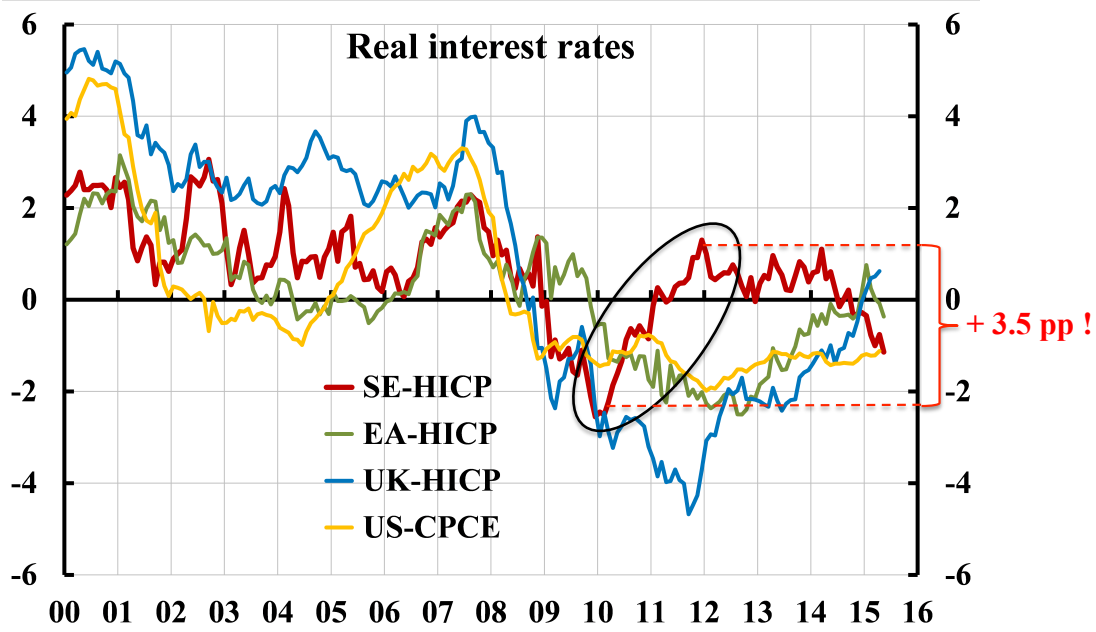





## The leaning: Inflation in Sweden, euro area, UK, and US

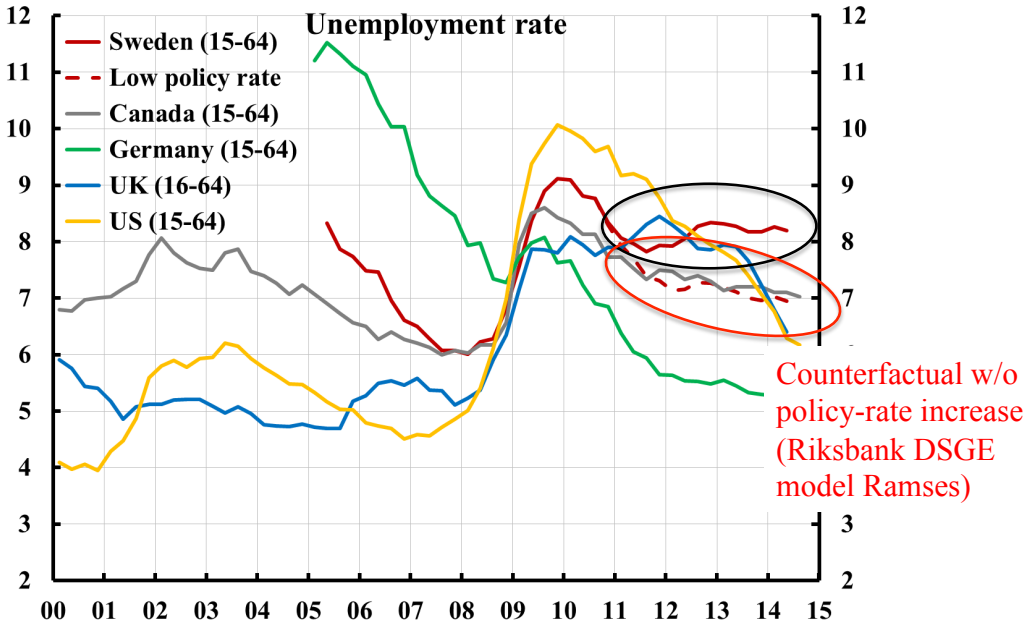


## The leaning: Real policy rate in Sweden, UK, and US, real Eonia rate in euro area

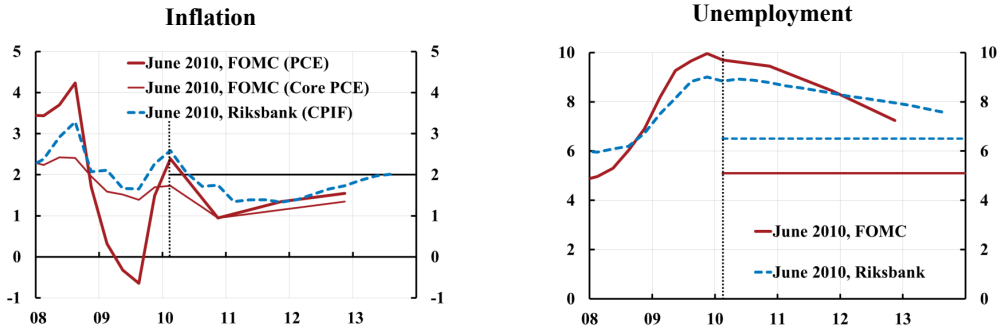





## The leaning: Unemployment in Sweden (w/ and w/o policy-rate increase), Canada, Germany, UK, and US



# Ex ante evaluation (in real time): Compare Fed and Riksbank forecasts, June 2010




- Riksbank and Fed forecasts quite similar
- Policies very different
  - Fed: Keep policy rate between 0 and 0.25%, forward guidance, prepare QE2
  - Riksbank: Start raising the policy rate from 0.25 to 2% in July 2011
  - Imagine if Fed had raised the Fed Funds rate by 175 bp starting in June 2010!
- Riksbank: Premature tightening, Sweden's 1937

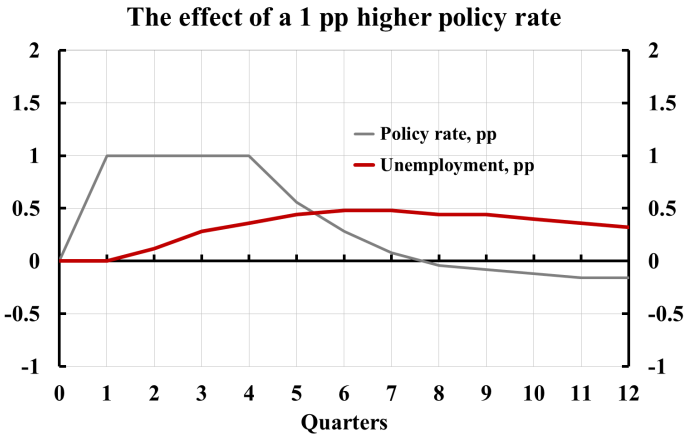
Source: Svensson, Lars E.O. (2011), "Practical Monetary Policy: Examples from Sweden and the United States," *Brookings Papers on Economic Activity*, Fall 2011, 289-332.



# 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?
- One answer can be found with the estimates in the Riksbank's MPRs of July 2013 and February 2014, plus Schularick and Taylor (2012) and Flodén (2014)
- Putting numbers on the cost and benefit of leaning

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

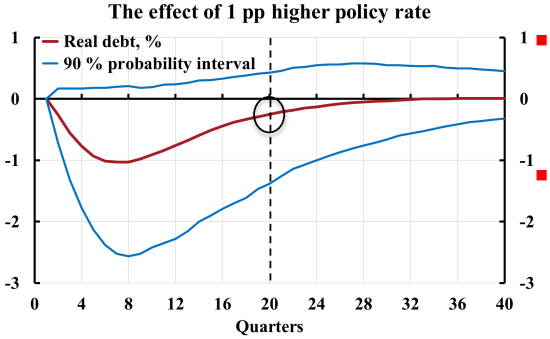



Source: Riksbank MPR July 2013, chapt. 2; Svensson, post on larseosvensson.se, March 31, 2014.



# 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%/yr)
- Riksbank MPR Feb 2014, box:

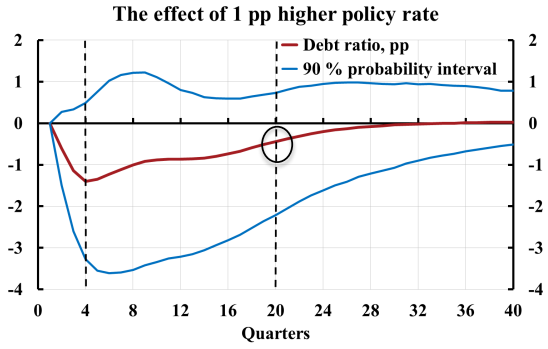



- 1 pp higher policy rate leads to 0.25% lower real debt in 5 years
- Lower probability of crisis: 0.25*0.4/5 = 0.02 pp
- Assume 5 pp higher unemployment in crisis (Riksbank crisis scenario, MPR July 2013, box):
- **Benefit (1)**:
  Lower expected future unemployment: 0.0002*5 = **0.001 pp**
- **Cost**: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

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

# 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 4%, multiply by 0.04
- **Benefit (2)**:
  Lower expected future unemployment:
  **0.00036 pp**
- **Cost**:
  Higher unemployment now: **0.5 pp**

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



# Cost-benefit (linear): Expected lower future unemployment relative to the increase in current unemployment

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

Cost: Higher current employment: $\Delta u_1 = 0.5$ pp = 50 bp

Period 2:

Benefit 1: Lower probability of crisis ($p_2$): $\Delta p_2 = -0.02$ pp/yr

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

Lower expected future unemployment:

$$\Delta \mathrm{E}_1 u_2 = \Delta p_2 (u_{2c} - u_{2nc}) = -0.0002 * 5 = -0.001 \text{ pp}$$

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

Probability of crisis: $p_2 = 4\%$/yr (previously used 10%/yr)

Lower expected future unemployment: $\Delta \mathrm{E}_1 u_2 = p_2 \Delta u_{2c} = -0.00036$ pp

Total benefit: $\Delta \mathrm{E}_1 u_2 = -0.001 - 0.00036 = -0.00136$ pp = $-0.136$ bp

**Benefit / Cost ≈ 1 / 350** **Should have been ≥ 1**

# Cost-benefit (quadratic): Quadratic loss function

Period-1 loss: $L_1 = (u_1 - u_1^*)^2$, $u_1^*$ optimal when disregarding financial stability

Expected period-2 loss: $\mathrm{E}_1 L_2 = p_2(u_{2c} - u_2^*)^2 + (1-p_2)(u_{2nc} - u_2^*)^2 = p_2(u_{2c} - u_2^*)^2$ (Assume $\approx 0$)

Total expected loss $= L_1 + m\mathrm{E}_1 L_2$, $m$ relative length of crisis

Initial period-1 unemployment gap (Sweden): $u_{10} - u_1^* = 8.5 - 6.5 = 2$

Cost: $\Delta L_1 = (u_{10} - u_1^* + \Delta u_1)^2 - (u_{10} - u_1^*)^2 = (2+0.5)^2 - 2^2 = 2.25$

Benefit: $-m\Delta\mathrm{E}_1 L_2 = -m\{\Delta p_2(u_{2c} - u_2^*)^2 + p_2[(u_{2c} - u_2^* + \Delta u_{2c})^2 - (u_{2c} - u_2^*)^2]\}$

$= -m\{-0.0002 * 5^2 + 0.04[(5-0.009)^2 - 5^2]\} = 0.0085m$

**Benefit / Cost** $= -m\Delta\mathrm{E}_1 L_2 / \Delta L_1 \approx m / 260$



# Optimal policy

Period-1 loss: $L_1 = (u_1 - u_1^*)^2$; Expected period-2 loss: $\mathrm{E}_1 L_2 = p_2(u_{2c} - u_2^*)^2$

Expected loss $= L_1 + m\mathrm{E}_1 L_2$, $m$ relative length of crisis

FOC: $\frac{d(L_1 + mE_1 L_2)}{di_1} = 2(u_1 - u_1^*)\frac{du_1}{di_1} + m\frac{dp_2}{di_1}(u_{2c} - u_2^*)^2 = 0$, (Disregard $p_2 \frac{du_{2c}}{di_1} \approx 0$)

$$\mathrm{MC}(u_1) \equiv \frac{dL_1}{du_1} = 2(u_1 - u_1^*) = -m\frac{dp_2}{di_1}(u_{2c} - u_2^*)^2 / \frac{du_1}{di_1} \equiv \mathrm{MB}(u_1)$$

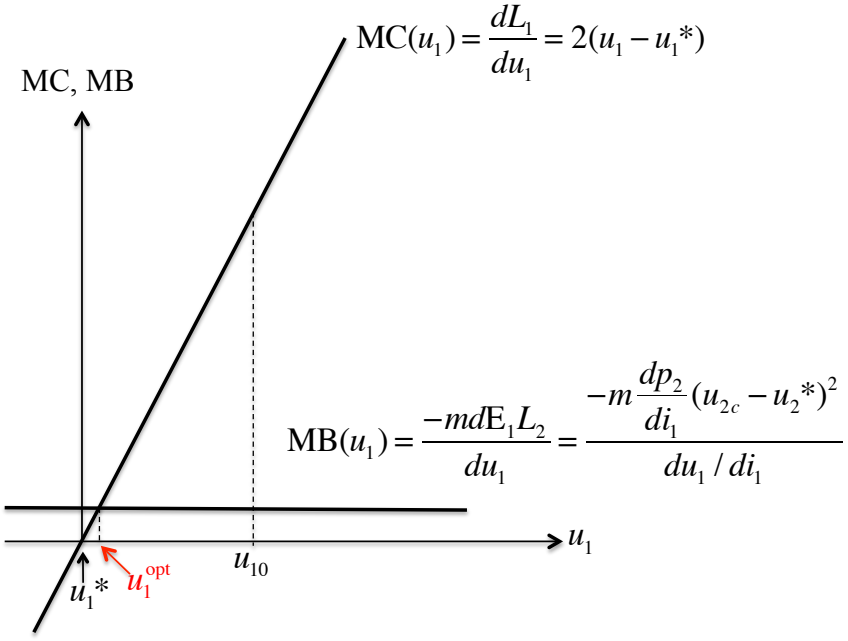
Optimal unemployment gap: $u_1^{\mathrm{opt}} - u_1^* = -m\frac{dp_2}{di_1}(u_{2c} - u_2^*)^2 / (2\frac{du_1}{di_1})$

Optimal policy-rate adjustment ($i_{10}$, $u_{10}$ initial policy, unemployment rate):

$$i_1^{\mathrm{opt}} - i_{10} = (u_1^{\mathrm{opt}} - u_{10}) / \frac{du_1}{di_1}$$

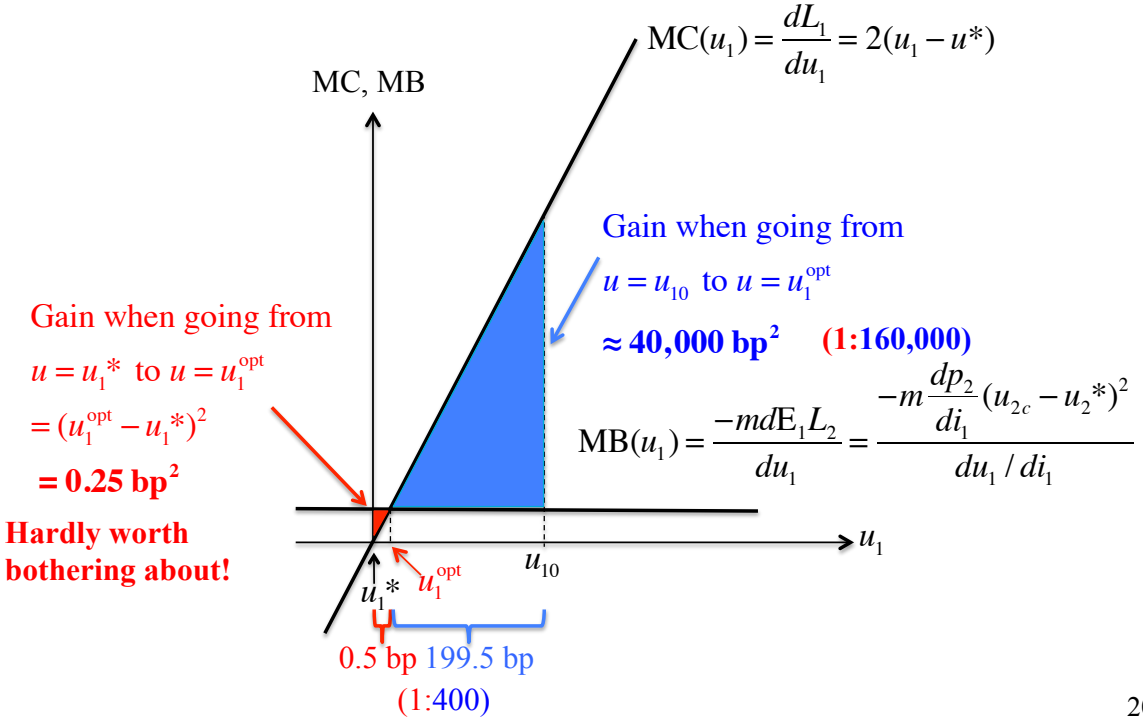
Net benefits with optimal policy: $L_1 + E_1 L_2 = (u_1^{\mathrm{opt}} - u_1^*)^2$

# Optimal policy: Marginal cost = Marginal benefit



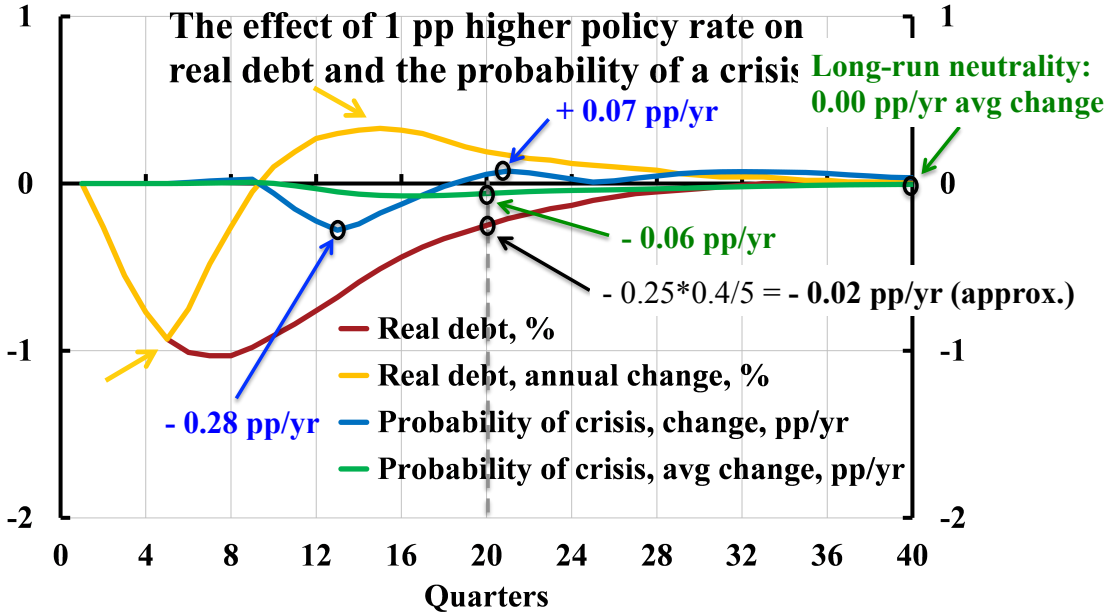



# Optimal policy: Marginal cost = Marginal benefit



# More details on the change in the probability of crisis

Schularick-Taylor: $p_t = -0.028(d_{t-4} - d_{t-8}) + 0.301(d_{t-8} - d_{t-12}) + 0.049(d_{t-12} - d_{t-16})$
$+0.005(d_{t-16} - d_{t-20}) + 0.098(d_{t-20} - d_{t-24})$ $p_t$ = Probability/yr of crisis, $d_t = \log(D_t / P_t)$






# Quadratic loss: Alternative cases

| Assumptions and estimates | Sweden | No initial unemployment gap | High average probability | No initital unemployment gap, higher average prob., long severe crisis |
|---|---|---|---|---|
| Initial unemployment gap, % | 2 | 0 | 2 | 0 |
| Higher current unemployment, pp | 0.5 | 0.5 | 0.5 | 0.5 |
| Lower crisis probability, pp/yr | 0.02 | 0.02 | 0.1 | 0.2 |
| Relative duration of crisis | 1 | 1 | 1 | 2 |
| Unemployment increase in crisis, pp | 5 | 5 | 5 | 7 |
| Benefits (quadratic loss) | 0.005 | 0.005 | 0.025 | 0.196 |
| Costs (quadratic loss) | 2.25 | 0.25 | 2.25 | 0.25 |
| **Ratio (Benefits:Costs)** | **0.22%** | **2.00%** | **1.11%** | **78.40%** |
| Optimal unemployment gap, % | 0.005 | 0.005 | 0.025 | 0.196 |
| Optimal policy-rate adjustment, pp | -3.99 | 0.01 | -3.95 | 0.392 |
| Net benefits of optimal leaning | | 0.000025 | | 0.038416 |

Note: Policy rate increase 1 pp for 4 quarters. Only effects on the probability of crisis; effects on the severity of crisis (increase in crisis unemployment) disregarded.

## Comments

- The probability and severity 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 severity of a crisis than the policy rate
- Thus, use macroprudential policy rather than monetary policy for achieving and maintaining financial stability
- Preliminary results (IMF team): 15-20% Basel III capital might have avoided 80-90% of banking crises in advanced countries since 1970



## Additional costs: Inflation below credible target causes negative real effects or credibility loss

- Credible target: Inflation expectations anchored at target
- Inflation below credible target means inflation below expectations
- Causes bad real effects:
  - Higher unemployment
  - Higher *real* debt for households…

    due to Fisherian "debt deflation," inflation less than expectations
- May increase debt-to-income ratio by affecting disposable income faster than nominal debt (Svensson 2013, Alpanda & Zubairy 2014, Gelain, Lansing & Natvik 2015, Robstad 2014)

## Additional costs: Inflation below credible target causes negative real effects or credibility loss

- If instead inflation expectations adjust downwards, hard-earned credibility is lost
- May be difficult to get inflation back on target
- Like shift to a lower inflation target
- But then, any effects on real debt?
- And higher risk of hitting the lower bound for the policy rate
- Inherent flaws in leaning against the wind



## Conclusions

- Benefits of leaning seem in most cases to be much smaller than costs, especially in a weak economy. Then benefits are as small as a few percent of the cost (or even less)
- Therefore, before using monetary policy for financial-stability purposes, *always* do a cost-benefit analysis
- The optimal amount of leaning seems to be tiny, with tiny net benefits
- Leaning against the wind for financial-stability purposes seems inherently flawed (inflation below target, below expectations or expectations unanchored)
- For financial stability, there seems to be no choice but to use other policies than monetary policy (micro- and macroprudential policy, fiscal policy, housing policy, …, depending on the nature of the problem)

# Extra slides

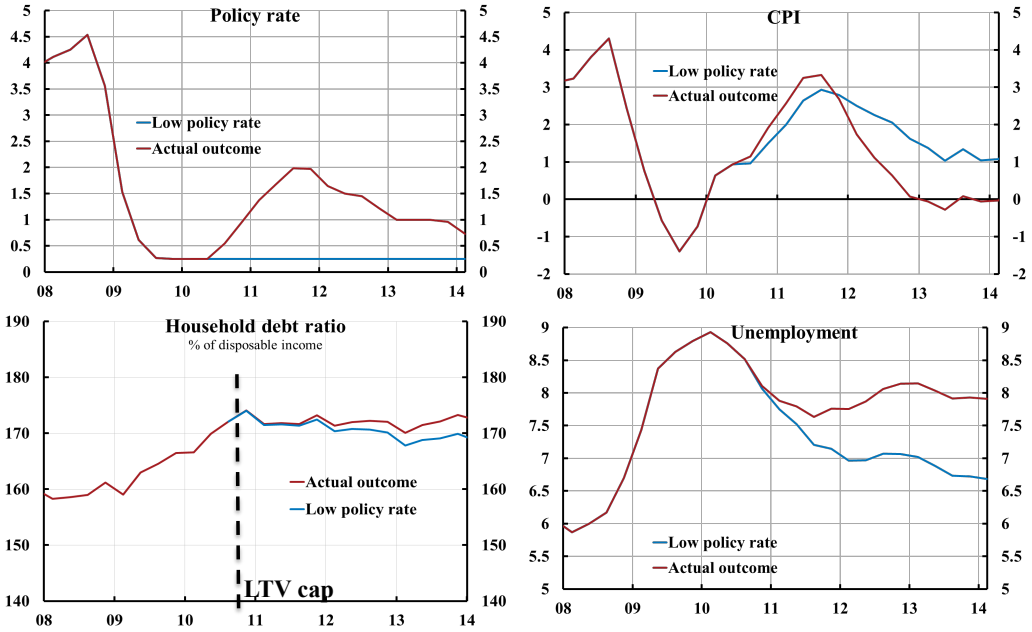


## Marginal cost and benefit w.r.t. the period-1 unemployment rate

$$\mathrm{MC}(u_1) \equiv \frac{dL_1}{du_1} = 2(u_1 - u_1^*) = \frac{dL_1}{di_1} / \frac{du_1}{di_1},$$

$$\mathrm{MB}(u_1) = -\frac{md\mathrm{E}_1 L_2}{du_1} = -\frac{md\mathrm{E}_1 L_2}{di_1} / \frac{du_1}{di_1} = -m\frac{dp_2}{di_1}(u_{2c} - u_2^*)^2 / \frac{du_1}{di_1}$$

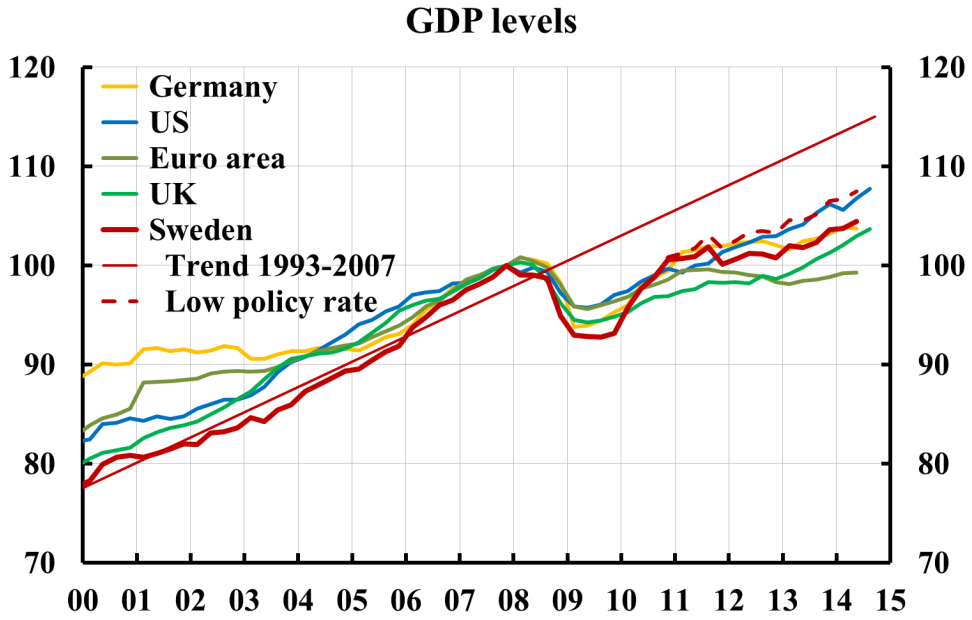
## Ex post evaluation: Policy-rate increases from summer of 2010 have led to inflation below target and higher unemployment (and probably a higher debt ratio)



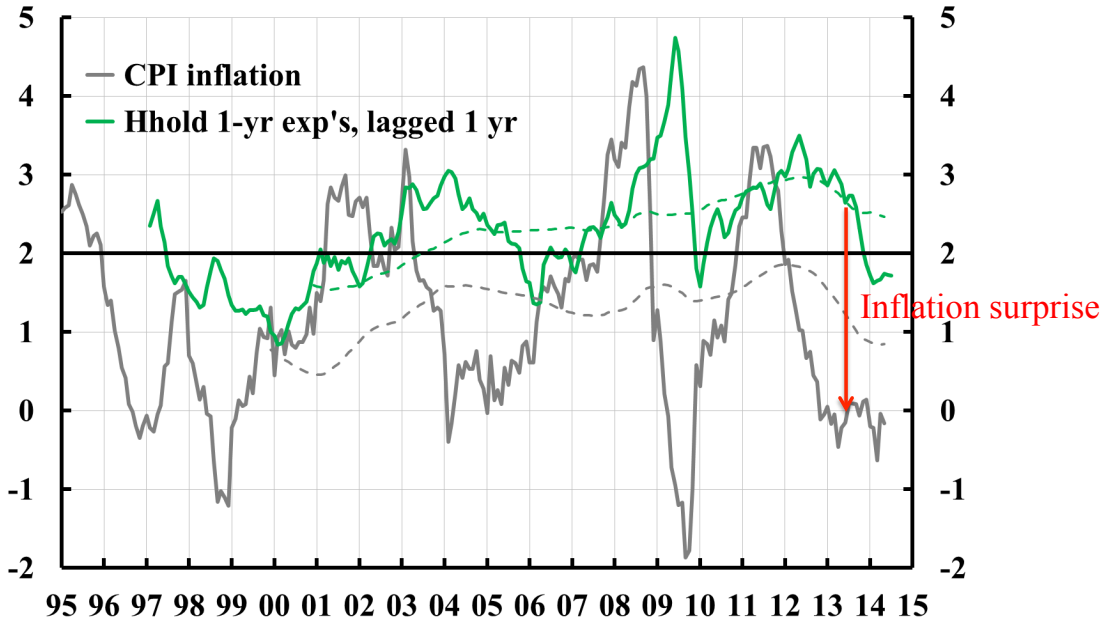

Source: Svensson (2013), "Unemployment and monetary policy – update for the year 2013," Svensson (2013), "Leaning against the wind increases (not reduces) the household debt-to-GDP ratio", posts on larseosvensson.se.



# The leaning: GDP in Sweden (incl. w/o leaning), the Euro area, Germany, UK, and US



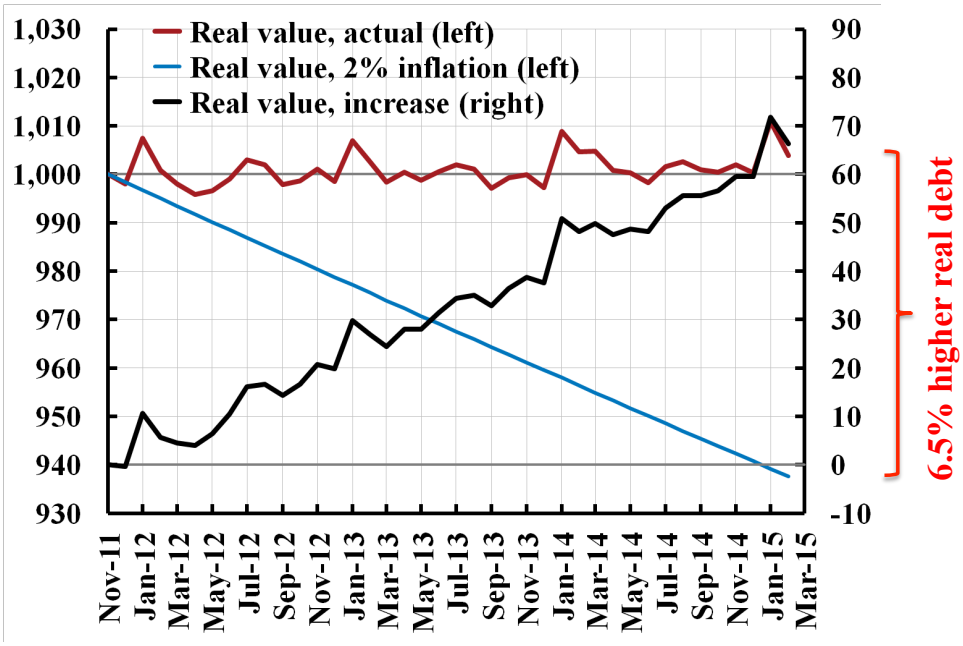
# Inflation below household's expectations




Note: Dashed lines are 5-year trailing moving averages



# The real value of an SEK 1 million loan taken out in Nov 2011, actual and for 2 percent inflation



## Additional cost: Inflation below household's expectations has increased household real debt burden

- Since November 2011, price level more than 6% lower than if inflation had been 2%
- The real value of fixed nominal debt taken out in Nov 2011 is more than 6% higher than if inflation had been 2%
- Leaning against the wind may have *increased* real debt, not reduced it
- Schularick-Taylor: 5% higher real debt in 5 years increases the probability of a crisis by 0.4 pp
- Leaning counterproductive



## Finansinspektionen, the Swedish FSA

- Introduced an LTV cap of 85% in October 2010
- Introduced higher risk weights on mortgages (25%)
- Introduced higher capital requirements for systemically important banks (16% CET1)
- Proposed individual amortization plans for borrowers
- Produces an annual mortgage market report, with stress test on individual data on new borrowers, according to which
  - lending standards are high
  - households' repayment capacity is good
  - households' resilience to disturbances in the form of mortgage rate increases, housing price falls, and income falls due to unemployment is good
- Macroprudential tools and policy are arguably effective and good in Sweden
- Definitely not an "inaction bias," counter to statements from the Riksbank