Practical Monetary Policy: Examples from Sweden and the United States [*]

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Appendix

A1. Resource utilization as an indicator of inflationary pressures and as a target variable

It is important to distinguish between measures of resource utilization as indicators of inflationary pressures and as target variables. As an indicator of inflationary pressures, it is slack measured as the gap between the unemployment rate and any short-run NAIRU or equilibrium unemployment rate that is relevant. That gap will affect wage setting and eventually feed into prices and inflation. However, as a target variable, I am convinced that it is slack measured as the gap between the unemployment rate and the sustainable unemployment rate that is relevant.

Thus, as in Bernanke (2010b), the mandate-consistent unemployment rate should be the sustainable unemployment rate, that is, the long-run mean of the unemployment rate (the mean of a stochastic steady state), or the steady-state unemployment rate when the economy is in a steady state and the shocks are zero (the deterministic steady state).[1] The appropriate measure of resource utilization and the extent of slack as a target variable is then the gap between unemployment and this sustainable rate. This sustainable rate depends on demographics and the structural characteristics of the economy and the labor market and is little affected by temporary disturbances.[2]

From a welfare point of view, it makes sense to stabilize employment around a long-run equilibrium trend. Labor supply is probably rather inelastic, and any intertemporal substitution of labor due to wage and productivity variation is unlikely to bring substantial welfare benefits. Stabilizing the unemployment rate around the sustainable rate is likely to contribute to stable employment around a long-run equilibrium trend. It means that there is no attempt to achieve an optimal variation of employment due to temporary fluctuations in productivity or marginal rates of transformation between consumption and leisure. Trying to do that would to my mind be fine-tuning at a level that asks too much of monetary policy.

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[1] If the economy is not too nonlinear and/or the fluctuations not too large, the unconditional means of the steady state and the deterministic steady state are close.

[2] Sveriges Riksbank (2010c, p. 5) states that the Riksbank "in addition to stabilising inflation around the inflation target, [is] also striving to stabilise production and employment around long-term sustainable paths." This is consistent with stabilizing unemployment around the sustainable rate.

Trying to stabilize unemployment around measures of short-run equilibrium unemployment rates runs into both practical and principle difficulties. A practical difficulty is that concepts of short-run equilibrium unemployment rates are notoriously problematic from a theoretical point of view (Rogerson 1997). Furthermore, measures of the NAIRU, the rate of unemployment at flexible wages and prices, and so on, are very model-dependent and not robust. A measure of NAIRU depends on the model for wage-setting and inflation and requires a Phillips curve of the special "accelerationist" type to be intuitive.

A principle difficulty is that an objective that involves stabilizing unemployment around a short-term NAIRU just introduces a preference for stable inflation, inflation smoothing. It is not clear why this should be a general objective for monetary policy. To see this, assume a Phillips curve of a simple backward-looking form, where inflation, π_t, depends negatively on the unemployment rate, u_t, and positively on lagged inflation and some exogenous time-varying state variable, z_t, according to

$$\pi_t - \pi^* = \alpha(\pi_{t-1} - \pi^*) - \beta u_t + z_t, \tag{A1}$$

where π^* denotes the inflation target, the coefficients α and β satisfy $0 < \alpha \leq 1$ and $\beta > 0$. We can interpret the case when $\alpha < 1$ as a situation when the credibility of the inflation target results in some mean reversion towards the inflation target. When $\alpha < 1$, the Phillips curve is not of the accelerationist form. Next, define the short-run NAIRU as the unemployment rate, $\overline{u}_t$, for which inflation is constant, that is, $\pi_t = \pi_{t-1}$.[3] It is in this case given by

$$\overline{u}_t \equiv [z_t - (1-\alpha)(\pi_{t-1} - \pi^*)] / \beta \tag{A2}$$

and will depend both on the state variable and lagged inflation. Eliminating z_t from equations (A1) and (A2) results in

$$\pi_t - \pi_{t-1} = -\beta(u_t - \overline{u}_t). \tag{A3}$$

Note that (A3) follows from the definition of the short-run NAIRU; it will hold regardless of the precise form of the Phillips curve. Furthermore, assume that the central bank interprets its mandate as implying a loss function that involves stabilizing both inflation around the mandate-consistent inflation rate and unemployment around the short-run NAIRU. Such a loss function can be written

$$L_t = (\pi_t - \pi^*)^2 + \lambda(u_t - \overline{u}_t)^2, \tag{A4}$$

where π^* is the mandate-consistent inflation rate and λ is a positive weight, the relative weight on the stability of this unemployment gap relative to the stability of inflation. But it follows from (A3) and (A4) that the loss function can be written

$$L_t = (\pi_t - \pi^*)^2 + (\lambda / \beta^2)(\pi_t - \pi_{t-1})^2. \tag{A5}$$

That is, the loss function combines stability of inflation with inflation-smoothing, with the relative weight λ / β^2 on inflation smoothing. I do not see why a loss function involving inflation smoothing regardless of the form of the Phillips curve would generally be an appropriate loss function for monetary policy.

[3] As is well known but disregarded, the NAIRU is a misnomer. It should be called the NIIRU or the CIRU, the Non-Increasing Inflation Rate of Unemployment or the Constant Inflation Rate of Unemployment.

Instead, let the objectives be represented by the loss function

$$L_t = (\pi_t - \pi^*)^2 + \lambda(u_t - u^*)^2, \quad \text{(A6)}$$

where u^* denotes the sustainable unemployment rate.[4] Blanchard and Galí (2010) examine a New Keynesian model with labor-market frictions, unemployment, and real-wage rigidity. They show that an intertemporal loss function consisting of the expected discounted sum of period losses such as (A6) can be derived as a quadratic approximation to the welfare of a representative household. The unemployment target u^* is then the constant constrained-efficient unemployment rate, which is also the sustainable unemployment rate in the model. It is not the complex expression for the time-varying short-term NAIRU that can be defined from their Phillips curve. This supports the idea that the relevant unemployment gap as a target for monetary policy is the gap relative to the sustainable unemployment rate, not relative to a short-term NAIRU.

Using a loss function such as (A6), with the unemployment gap relative to the sustainable unemployment rate instead of some short-run equilibrium rate, does not mean that short-run slack in the economy is disregarded. Instead, such short-run slack has an impact on inflation and the inflation forecast. Thus, the short-run slack does not matter in itself but only to the extent that it affects inflation and the inflation forecast. It will hence affect monetary policy only to the extent that it affects the tradeoff between stabilizing inflation and stabilizing the unemployment gap relative to the sustainable rate.

A2. Mean forecasts and certainty-equivalent policy

The forecasts used to guide monetary policy should be *mean* forecasts, not mode or median forecasts. If the probability distribution is not symmetric and unimodal, then the mean, mode, and median forecasts may differ. The fact that mean forecasts are sufficient statistics is a result of the so-called certainty-equivalence theorem, which says that optimal policy with a quadratic loss function in a known linear model with additive uncertainty need only consider the mean forecasts. Stabilizing inflation around the mandate-consistent inflation rate/inflation target and resource utilization around the highest sustainable level can be well represented by minimizing a quadratic loss function.[5]

The certainty-equivalence theorem thus has the important implication that greater uncertainty that does not change the means (a mean-preserving spread) is not a reason to change policy. The best policy is the same, regardless of whether there is little or much uncertainty.

Model uncertainty and multiplicative uncertainty violate the assumption of a known linear model with additive uncertainty, but the size and the direction of the optimal adjustment of policy relative to the certainty-equivalent policy depends on the nature of the model and the multiplicative uncertainty

[4] The sustainable unemployment rate depends on the structural characteristics of the economy and demographics. In a model, it is the steady-state equilibrium unemployment rate, and depends on the exogenous parameters of the model, including demographics, unemployment insurance systems, labor-leisure preferences, and labor taxes. If these parameters change over time, the steady state and the sustainable unemployment rate change over time and should have a period index, u_t^*, indicating the sustainable unemployment rate given demographics and structural characteristics in period *t*.

[5] A quadratic loss function can also be seen as a quadratic approximation of a welfare loss function of a representative household, see Blanchard and Galí (2010) and Woodford (2003). Romer (2011) gives an example of a social-welfare loss function that is linear in output.

(Brainard 1967, Söderström 2002). In practice, there is normally not enough information to judge in what direction policy should be adjusted, so the certainty-equivalent policy remains a reasonable approximation. The certainty-equivalence theorem and the prominence of mean forecasts are independent of whether the probability distribution is symmetric or not; this seems to be frequently misunderstood.

Mean forecasts have the nice property that they are risk-adjusted; risks should already be incorporated in the mean forecast and need not be accounted for separately. For instance, a higher probability of a low outcome will reduce the mean outcome. Thus, if risks have been incorporated in the mean forecasts, there will be double-counting of the risks if they are allowed to influence the policy decision separately from the mean forecast.

Since February 2007, the Riksbank's forecasts are supposed to be mean forecasts. The Riksbank's forecasts can be seen as the result of a majority vote among the Executive Board members about the Riksbank's mean forecast. The Riksbank's *Inflation Report* that preceded the current *Monetary Policy Report* had, from December 1999, a table for risk-adjustment in which the mode forecast was adjusted for risk and a mean forecast constructed. This table was discontinued in the *Monetary Policy Report* of February 2007. In a box with the title "Calculation method for uncertainty bands", it says "[t]he forecasts in the main scenario show the path which the Riksbank expects the economy to take and represent a weighted consideration of various conceivable development paths (scenarios) and risks." (p. 22) A footnote adds: "There are therefore no grounds to revise the main scenario afterwards in light of a certain specific risk. This approach was adopted previously in the *Inflation Report*."

Whether all Board members in practice see the forecasts as mean forecasts remains an open question, given some of the discussions in the minutes. Occasionally there are references there to upside- and downside risks to the forecast, and the discussion of risk is sometimes less clear. Risks should in principle already be incorporated in the mean forecast, since they are risk-adjusted forecasts. All relevant information should be summarized in the mean forecasts; they are sufficient statistics.

The FOMC participants' projections appear to be mode forecasts. As stated in the box "Forecast Uncertainty" in "Summary of Economic Projections" (FOMC 2010), "in setting the stance of monetary policy, participants consider not only what appears to be the *most likely* economic outcome as embodied in their projections, but also the range of alternative possibilities, the likelihood of their occurring, and the potential costs to the economy should they occur." (Italics added.) If the probability distribution is sufficiently asymmetric, so the difference between the mode and mean is significant, the mode forecast needs to be risk-adjusted to form the mean forecast. Indeed, "[p]articipants also provide judgments as to whether the risks to their projections are weighted to the upside, are weighted to the downside, or are broadly balanced. That is, participants judge whether each variable is *more likely to be above or below their projections of the most likely outcome*." (Italics added.) However, this judgment provides information about whether the *median* forecast is above or below the mode forecast, not directly about the mean forecast relative to the mode. Depending on the shape of the probability distribution, the mean forecast may be below the mode even if the median is above the mode. In practice, I will assume that the probability distributions are sufficiently close to unimodal and symmetric distributions that the difference between the mode and the mean does not matter, except when explicitly discussing the distribution of risk.

A3. Household debt and housing prices

Consider the question of whether (1) household debt and housing prices present a problem for the macro economy and/or financial stability, and (2), if there is a problem, whether the policy rate is a suitable instrument or whether there are other, better instruments.

On (1), household debt is not considered a problem for financial stability in Sweden. The likelihood that Swedish banks would suffer any losses from mortgages is very small. The reason is that mortgages are full recourse, credit reviews are thorough, and the households' capacity to repay their debts is good, for several reasons.[6] Not even during the severe crisis in the early 1990s did mortgage issuers make any losses to speak of because of mortgage defaults. Sweden is indeed very different from the United States in these respects.[7]

The question remains whether household debt and housing prices could cause problems for the macro economy. Could a housing-price fall induce a deleveraging process and a fall in aggregate demand? The June/July 2010 *Monetary Policy Report* included some simulations using the Walentin and Sellin (2010) DSGE model that indicated that a fall in housing prices could trigger a fall in aggregate demand which would only partially be neutralized by more expansionary monetary policy. In the June/July minutes (Sveriges Riksbank 2010b), I argued that that model exaggerated the consequences of a housing-price fall because it assumes that households would have to immediately reduce their debt after a price fall. In Sweden, mortgage issuers would in such a situation not demand immediate debt reductions as long as households continued to service their debts. Even if the large fall in aggregate demand was assumed, I showed simulation results that revealed that more expansionary policy than assumed in the *Monetary Policy Report* could indeed neutralize the fall in aggregate demand and inflation, even taking into account the zero lower bound on policy rates.

Furthermore, Swedish households have assets (excluding pension liabilities) that are a three times the size of their debts, so household equity is two thirds of household assets, a quite low leverage. There is no trend towards higher leverage. The households' savings ratio is high, so there is no evidence of aggregate consumption financed by mortgage equity withdrawal.[8] In addition, the Riksbank's ambitious research project on the housing market (Sveriges Riksbank 2011d) has confirmed that housing prices are consistent with fundamentals and there is no evidence of a bubble or overvaluation. Demand for housing has increased and there has been very little construction; therefore housing prices have increased. Swedish construction of new homes has been low relative to other countries. Furthermore, the crisis subjected the Swedish housing market to a real-time stress test, with a rapid increase in unemployment, great uncertainty for households, and projections of unemployment much higher than eventually materialized. Under this severe real-time stress test, housing prices stabilized and fell a bit but eventually recovered. If there had been a bubble, it should have burst.

The size and probability of a housing-price fall should depend a lot on whether housing prices are consistent with fundamentals or not. If housing prices exceed a level consistent with fundamentals, so that

[6] Since mortgages are not securitized but stay with the mortgage institutions, the institutions have incentives to perform more thorough credit reviews.
[7] See Sveriges Riksbank (2010a, 2011d) and Finansinspektionen (2010).
[8] See Svensson (2010b) and Sveriges Riksbank (2010a, 2011d) and more recent *Financial Stability Reports* for further details.

there is a possible bubble, a quick correction could be triggered, which could even undershoot the level consistent with fundamentals. If housing prices are consistent with fundamentals, fundamentals themselves have to fall for a housing-price fall. That is very different from a bursting bubble.

Finally, even a debt-to-disposable-income ratio as high as 200 percent is fully sustainable, when not only nominal interest payments but the households' complete net cash flow, the net debt service including after-tax interest payments and net amortization, is taken into account. With a high mortgage rate of 7 percent, 30 percent deductible capital-income tax, 2 percent inflation, and a 2 percent real growth in disposable income, net debt service – the households' net cash flow – to maintain a constant debt-to-disposable-income ratio as high as 200 percent is only 2 percent of disposable income. Recall that no household is so large as to be systemically important. Therefore, for the macroeconomic effects, it is the aggregate of all households that matters, not the marginal households that may be more vulnerable. The marginal households are of course relevant from a consumer-protection point of view, but that is not part of the Riksbank's mandate.[9]

For a given household debt level, it makes a big difference whether households have assets that match and exceed it, and in particular whether these assets are correctly valued and in line with fundamentals. Swedish households – with large real and financial assets that are, according to a variety of models and studies, not out of line with fundamentals, with equity equal to two thirds of those assets, with a thorough and high credit ranking for those with debt, and with a high savings ratio adding to those financial assets – have very robust balance sheets. This is in sharp contrast to the situation in the United States at the onset of the financial crisis.

On (2), even if household debt and housing prices were considered to be a problem, there is considerable research, including the Riksbank's housing-market project and several studies using different methods from empirical DSGE to VAR models, that indicates that the policy rate has a limited impact on housing prices and household debt (which are highly correlated since most of the debt is mortgages to finance housing purchases) but can cause sizeable collateral damage in the form of negative effects on inflation and real activity.[10] There are a number of more efficient and available instruments to affect household debt and housing prices, such as loan-to-value ceilings, amortization floors, property taxes, deduction limitations, and so on. These instruments are more effective and have much fewer negative side effects (Sveriges Riksbank 2011d).

For the monetary-policy implications, the mechanism by which the policy rate would affect either the probability or the magnitude of a future housing-price fall would seem to be an important step in the argument. But there is no such discussion in the June/July *Monetary Policy Report*, or in any other *Monetary Policy Report*.

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[9] Assume a high mortgage rate of 7 percent (3 percentage points above the normal policy rate) and a deductible capital-income tax at a rate of 30%; then the after-tax nominal mortgage rate is about 5 percent. Assume inflation of 2 percent, so the real after-tax mortgage rate, r, is about 3 percent. Assume real growth of disposable income, g, of 2 percent. The change in the debt ratio equals the difference between $(r-g)/(1+g)$ times the previous debt ratio and the ratio of net debt service to disposable income. To maintain constant debt ratio, the net-debt-service ratio shall equal $(r-g)/(1+g)$ times the debt ratio, that is in this case 1 percent of the debt ratio. With a debt ratio of 200 percent, the net-debt-service ratio is then just 2 percent.

[10] See Assenmacher-Wesche and Gerlach (2010), Sveriges Riksbank (2011d) and references cited in Svensson (2010b).

A4. Conditional forecasts and the horizon

As an example, use the simplest AR(1) process for inflation,

$\pi_{t+1} = \bar{\pi} + \gamma(\pi_t - \bar{\pi}) + \varepsilon_{t+1}$,

where $\bar{\pi}$ is a constant, the coefficient γ satisfies $0 < \gamma < 1$, and ε_{t+1} is i.i.d. with mean zero and variance σ^2. Then the unconditional forecast for inflation is

$\mathrm{E}[\pi_{t+T}] = \bar{\pi}$.

The unconditional variance of inflation, which is also the unconditional variance of the forecast error of the unconditional forecast, $\pi_{t+T} - \mathrm{E}[\pi_{t+T}]$, is

$$\mathrm{Var}[\pi_{t+T}] \equiv \mathrm{Var}[\varepsilon_{t+T} - \mathrm{E}[\pi_{t+T}]] = \frac{1}{1-\gamma^2}\sigma^2 .$$

The conditional forecast for inflation is

$\mathrm{E}_t\pi_{t+T} = \bar{\pi} + \gamma^T(\pi_t - \bar{\pi})$,

and it approaches the unconditional forecast when the horizon lengthens,

$\mathrm{E}_t\pi_{t+T} \to \bar{\pi} \quad (T \to \infty)$.

The conditional variance of future inflation, which is also the conditional variance of the forecast error of the conditional forecast, $\varepsilon_{t+T,t} \equiv \pi_{t+\tau,t} - \mathrm{E}_t\pi_{t+T}$, is

$$\mathrm{Var}_t\pi_{t+T} \equiv \mathrm{Var}_t\varepsilon_{t+T,t} = \frac{1-\gamma^{2T}}{1-\gamma^2}\sigma^2 .$$

It *increases* towards the unconditional variance of inflation when the horizon lengthens,

$$\mathrm{Var}_t\pi_{t+T} \to \frac{1}{1-\gamma^2}\sigma^2 \quad (T \to \infty) .$$

The unconditional variance of the conditional forecast is

$$\mathrm{Var}[\mathrm{E}_t\pi_{t+T}] = \gamma^{2T}\mathrm{Var}[\pi_t] = \frac{\gamma^{2T}}{1-\gamma^2}\sigma^2 .$$

It *falls* towards zero when the horizon lengthens,

$\mathrm{Var}[\mathrm{E}_t\pi_{t+T}] \to 0 \quad (T \to \infty)$.

A5. The policy rate, the real rate, and the neutral rate in the simplest New Keynesian model

As an illustration, consider the aggregate-demand relation in the standard simplest New Keynesian model. It can be written

$$x_t = x_{t+1|t} - \sigma(r_t - r_t^*) , \qquad \text{(A7)}$$

where x_t denotes the output gap in period t, $x_{t+1|t}$ denotes private-sector expectations in period t of the output gap in period $t+1$, r_t is the short real interest rate in period t, r_t^* is the neutral (real) interest rate in period t, and the positive constant σ is in the simplest model the intertemporal elasticity of substitution in consumption. Furthermore, the short real interest rate satisfies

$$r_t = i_t - \pi_{t+1|t} , \qquad \text{(A8)}$$

where i_t denotes the policy rate during period t and $\pi_{t+1|t}$ denotes private-sector expectations in period t

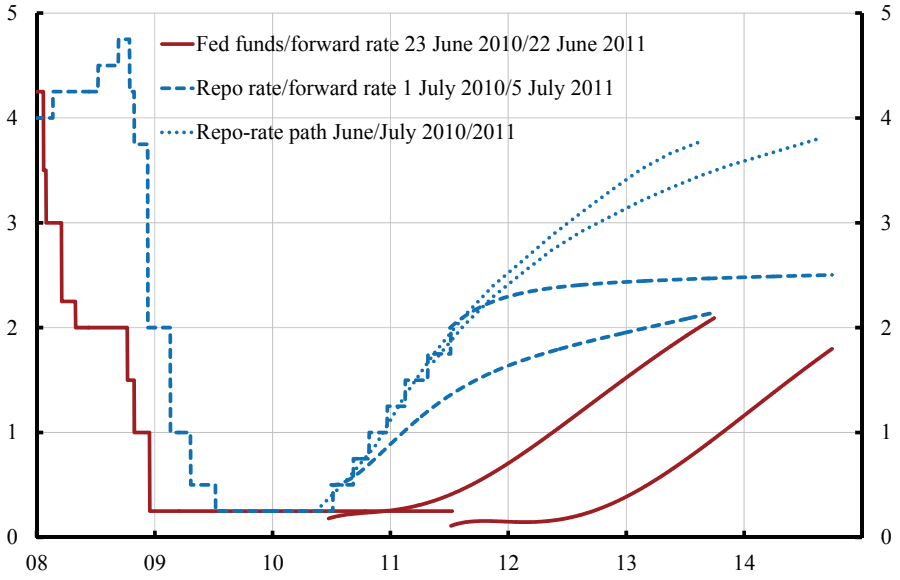
of inflation in period *t*+1. Importantly, the neutral real interest rate is determined by exogenous shocks and the structure of the economy and not by monetary policy. What monetary policy can do, and what monetary policy is responsible for, are only temporary deviations for a few years of the short real interest rate from the neutral interest rate, that is the interest-rate gap $r_t - r_t^*$. Monetary policy cannot affect the neutral interest rate and the general level of real interest rates over a longer period. In contrast, many discussions of the relation between monetary policy and financial stability seem to proceed as if monetary policy can affect the general level of real interest rates.

A6. A comparison between the situations in June/July 2010 and 2011

Figure A1 allows a comparison between the situation in June/July 2010 and 2011. The leftmost upward-sloping red line shows market expectations on June 23, 2010, after the Federal Reserve's policy announcement. The rightmost red line shows market expectations on June 22, 2011, also after the announcement. The Federal Reserve's forward guidance and other information and news have managed to shift the market-expectations line more than a year to the right. The actual financial conditions are substantially more expansionary in June 2011 than a year earlier.

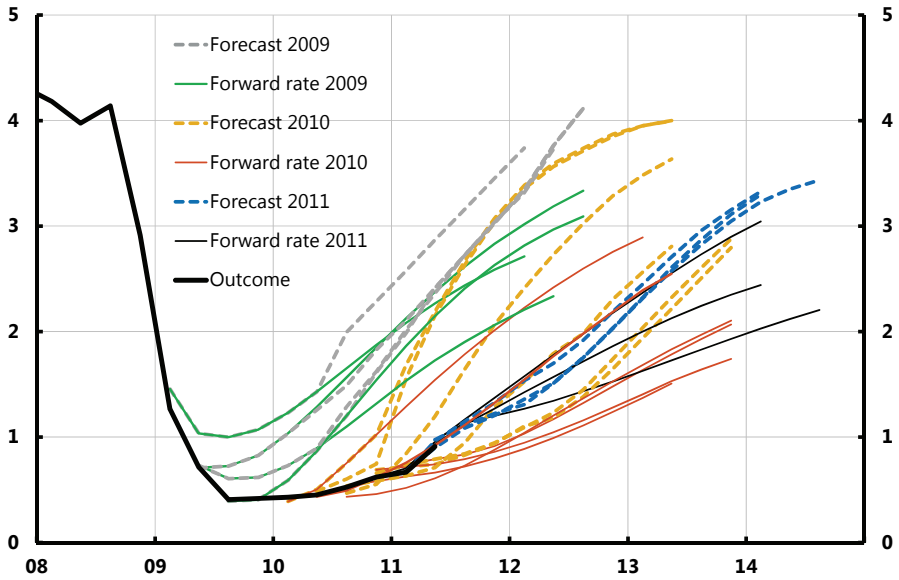
The two dashed blue curves show market expectations of future repo rates after the Riksbank's policy announcements on July 1, 2010, and on July 4, 2011. In terms of market expectations, the Riksbank managed to implement a more contractionary policy in July 2011 than in June/July 2010, but still not at all as contractionary as the published policy-rate path (which has been shifted down slightly in July 2011 compared to June/July 2010).

Figure A1. Policy-rate, policy-rate expectations and policy-rate path; FOMC and Riksbank; June/July 2010 and 2011



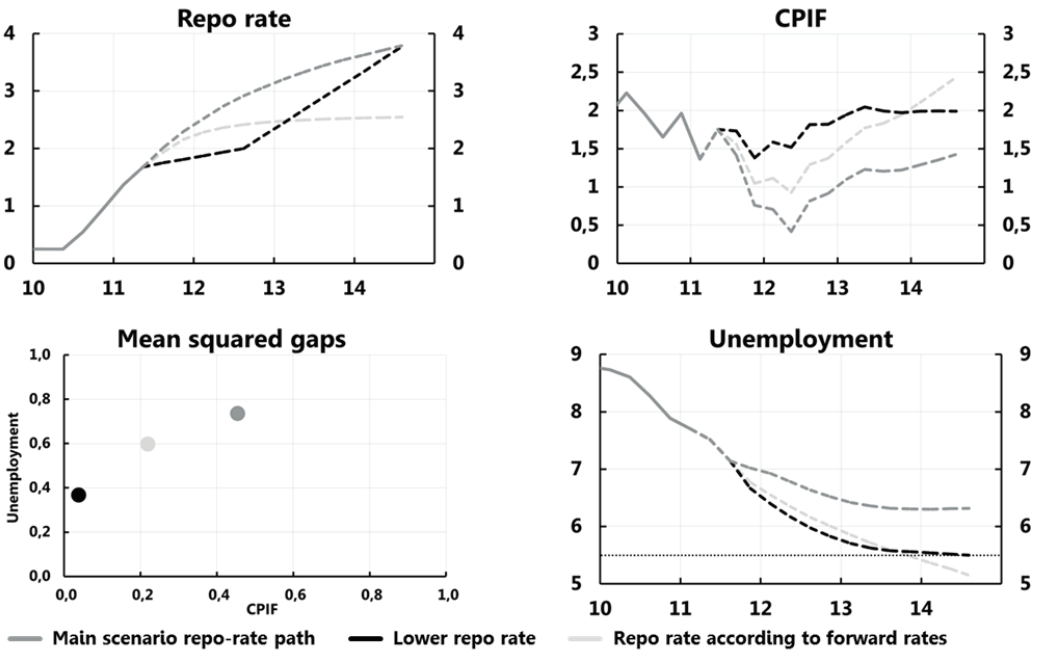
Sources: Reuters EcoWin and the Riksbank

A7. TCW-weighted foreign policy rates, Riksbank forecasts, and implied forward rates
Figure A2. TCW-weighted foreign policy rates, Riksbank forecasts and implied forward rates



Sources: Reuters Ecowin and the Riksbank.

A8. Riksbank policy alternatives in July 2011
Figure A2. Monetary policy alternatives for the Riksbank, July 2011
Foreign interest rates according to implied forward rates. Sustainable unemployment rate 5.5 percent



Sources: The Riksbank, Statistics Sweden, and own calculations.

Figure A2 (from the July 2011 minutes, Riksbank 2011a) shows monetary policy alternatives under the assumption that the forecast for foreign policy rates is given by implied forward rates and that the sustainable unemployment rate is 5.5 percent.

The high gray repo-rate path in the upper left-hand panel is the Riksbank's path. The lower black repo-rate path is the one Deputy Governor Karolina Ekholm and I preferred at the meeting. The long-dashed light grey line shows market expectations of future repo rates according to adjusted implied forward rates.

The upper right-hand panel shows forecasts for the CPIF for the different interest rate paths. The Riksbank's repo-rate path gives an inflation forecast – the gray line – that is well below 2 percent throughout the forecast period. The assumption of foreign policy rates according to adjusted implied forward rates, and thereby a stronger krona, means that the CPIF forecast is lower than the one in figure 6, since the latter is conditional on a higher forecast for foreign policy rates. The lower repo-rate path gives a CPIF forecast – the black line – that is much closer to 2 percent. It provides a distinctly better target attainment for CPIF inflation.

The lower right-hand panel shows forecasts for unemployment for the different repo-rate paths. The high grey line shows unemployment under the Riksbank's repo-rate path. The lower black line shows my assessment of the unemployment forecast for the lower repo-rate path (simulations with the Riksbank's main DSGE model, Ramses, give an even lower forecast for unemployment for the blue repo-rate path). The black line is much lower than the grey one and approaches the sustainable level of unemployment. Towards the end of the forecast period, unemployment is almost a full percentage point lower. The fact that unemployment falls more quickly is a major advantage from a welfare point of view, and counteracts the persistency problems that higher unemployment may give rise to. It also helps to attract people back into the labor force.

The lower repo-rate path thus provides better target attainment for both CPIF inflation and unemployment than the main scenario's repo-rate path, under the assumption that foreign policy rates follow adjusted implied forward rates. This is also shown in the lower left-hand panel, where the mean squared gaps for inflation and unemployment are both smaller for the lower repo-rate path than for the path in the main scenario.

References

Assenmacher-Wesche, Katrin, and Stefan Gerlach (2010), "Credit and Bubbles", *Economic Policy July 2010*, 437-482.

Bernanke, Ben S. (2010b), "Monetary Policy Objectives and Tools in a Low-Inflation Environment," speech at the Revisiting Monetary Policy in a Low-Inflation Environment Conference, Federal Reserve Bank of Boston, Boston, Massachusetts, October 15, 2010.

Blanchard, Olivier, and Jordi Galí (2010), "Labor Markets and Monetary Policy: A New Keynesian Model with Unemployment," *American Economic Journal: Macroeconomics* 2 (April 2010): 1-30.

Brainard, William (1967), "Uncertainty and the Effectiveness of Policy," *American Economic Review* 57, 411–425.

Federal Open Market Committee (2010), "Summary of Economic Projections, June 2010", www.frb.gov.

Finansinspektionen, Swedish Financial Supervisory Authority (2010), "The Swedish Mortgage Market and the Banks' Granting of Credit, (Den svenska bolånemarknaden och bankernas kreditgivning, in Swedish)," www.fi.se.

Rogerson, Richard (1997), "Theory Ahead of Language in the Economics of Unemployment," *Journal of Economic Perspectives* 11(1), 73-92.

Romer, David (2011), *Advanced Macroeconomics*, *4th Edition*, McGraw-Hill.

Söderström, Ulf (2002), "Monetary Policy with Uncertain Parameters," *Scandinavian Journal of Economics* 104, 125-145.

Svensson, Lars E.O. (2010b), "Some Problems with Swedish Monetary Policy and Possible Solutions," speech in Stockholm, November 24, 2010, www.larseosvensson.net.

Sveriges Riksbank (2010a), *Financial Stability Report 2010:2*, www.riksbank.se.

Sveriges Riksbank (2010b), Minutes of the Executive Board's Policy Meeting, No. 3, June 30, 2010, www.riksbank.se.

Sveriges Riksbank (2010c), *Monetary Policy in Sweden*, June 2010, www.riksbank.se.

Sveriges Riksbank (2011a), Minutes of the Executive Board's Policy Meeting, No. 3, July 4, 2011, www.riksbank.se.

Sveriges Riksbank (2011d), *The Riksbank's Inquiry Into the Risks in the Swedish Housing Market*, www.riksbank.se.

Walentin, Karl, and Peter Sellin (2010), "Housing Collateral and the Monetary Transmission Mechanism," Sveriges Riksbank Working Paper No. 239, www.riksbank.com.

Woodford, Michael (2003), *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.