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

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Abstract

In the summer of 2010, the Federal Reserve and Riksbank forecasts for inflation and unemployment were quite similar. The forecasts for inflation were below the Federal Reserve's mandate-consistent rate and the Riksbank's inflation target, and the forecasts for unemployment were above a sustainable unemployment rate. This situation seems to call for more expansionary policy, if more expansionary policy is feasible. The Federal Reserve and the Riksbank chose dramatically different policies. The Federal Reserve maintained a minimum policy rate, communicated possible future easing, and later in the fall launched QE2. The Riksbank started a period of rapid tightening. I examine the arguments against policy easing by the Federal Reserve and the arguments in favor of policy tightening for the Riksbank and find them unconvincing. Thus, I find that the Federal Reserve in easing policy did the right thing and the Riksbank in tightening policy the wrong thing. The Riksbank's published policy-rate path has been too high, which may to a large extent be explained by a too high forecast for foreign policy rates and a too high estimate and forecast of resource utilization. A year later, the Swedish economy has developed better than expected, whereas the U.S. economy has developed worse than expected. The good Swedish development may to a considerable extent be explained by the market implementing much easier financial conditions than those consistent with the Riksbank's policy-rate path. Development would have been better with even easier policy and financial conditions. The less good U.S. development depends on factors other than monetary policy, and development would have been worse without the Federal Reserve's policy easing.

1. Introduction

In the spring of 2011, the Swedish economy was referred to as a "Pippi-Longstocking economy" and a "tiger economy", reflecting high growth after a deep recession.[1] Meanwhile, the situation in the U.S. economy seemed to be more problematic. One might think that the strong state of the Swedish economy reflected, among other things, a good monetary policy, and perhaps that the situation in the United States reflected, among other things, a not as good monetary policy. Here, on the contrary and perhaps surprisingly, I argue that in the summer of 2010, when the forecasts for inflation (too low) and unemployment (too high) were similar in the two countries, the Riksbank's monetary policy, by starting a period of rapid policy-rate increases, was not appropriate. In contrast, the Federal Reserve kept the policy rate at its lower bound, communicated possible policy easing, and later launched QE2. The fact that the Swedish economy nevertheless grew better than expected may to a considerable extent be because the market implemented an actual yield curve and thereby actual financial conditions that were much more expansionary than those intended by the Riksbank. The fact that the U.S. economy developed worse than expected is due to factors other than monetary policy.

My starting point is that the objective of a good monetary-policy framework is twofold: to stabilize inflation around a low level and resource utilization around the highest sustainable level. Such a framework is fully consistent with the dual mandate of maximum employment and stable prices of the Federal Reserve, with its mandate-consistent inflation rate, and the flexible inflation targeting of the Riksbank, with its inflation target. There is no fundamental difference between the monetary-policy frameworks of the Federal Reserve and the Riksbank, although the communications strategies of the two institutions are somewhat different.[2]

The dual mandate and flexible inflation targeting boil down to "forecast targeting" (Woodford 2007, Svensson 2011c), that is, choosing a policy-rate path such that the corresponding forecasts for inflation and resource utilization "look good" in the sense that they best stabilize inflation around the mandate-consistent/target inflation rate and resource utilization around its highest sustainable level. Thus, "looking good" means an efficient tradeoff between the stability of inflation and the stability of resource utilization.

It is important to distinguish between the role of resource utilization as an objective and as an indicator of inflationary pressures. The gap between unemployment and an estimate of the lowest sustainable unemployment rate (the long-run equilibrium unemployment rate, the steady-state equilibrium unemployment rate), rather than a short-run NAIRU, is the appropriate indicator for resource utilization as an objective. The gap between unemployment and an estimate of some short-run NAIRU is an indicator of

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[1] The reference to Pippi Longstocking (a fictional character, known for her unusual strength, in children's books by the Swedish author Astrid Lindgren) was made by OECD Secretary-General Angel Gurría in a speech on January 20, 2011. The reference to a tiger economy was according to the media made by the British Chancellor of the Exchequer George Osborne and Swedish Minister of Finance Anders Borg.

[2] For instance, the Federal Reserve's mandate-consistent inflation rate has to be inferred from the FOMC participants' longer-term inflation forecasts, whereas the Riksbank has an explicit inflation target; the Federal Reserve's Greenbook and Bluebook (now replaced by the Tealbook) are published with a five-year lag, whereas the Riksbank publishes an extensive *Monetary Policy Report* or a shorter *Monetary Policy Update* (which also include a policy-rate path) after each policy meeting; and the Federal Reserve's minutes are non-attributed but attributed transcripts are published with a five-year lag, whereas the Riksbank's minutes are attributed.

wage and inflationary pressures. Using that gap also as an objective introduces an effective preference for constant inflation, "inflation smoothing," regardless of the level of inflation. That seems inappropriate.

The gap between unemployment and the sustainable unemployment rate is also a simpler, more robust, and more transparent indicator of resource utilization as an objective, compared to alternatives such as the gap between actual output and potential output.

The forecasts for inflation and unemployment published by the FOMC and the Riksbank make it possible to assess whether they "look good": more precisely, whether they look as good as possible, taking into account what policy actions are feasible.

What policy actions are feasible depends on restrictions such as the ZLB, the possibility to manage expectations of future policy rates and inflation, and the availability of unconventional policy tools such as the size and composition of the central bank's balance sheet.

This paper looks at two examples of practical monetary policy, namely the policies of the Federal Reserve and the Riksbank in the summer of 2010. At that time, FOMC and Riksbank forecasts for inflation and unemployment were similar, in the sense that the forecasts for inflation were too low relative to the mandate-consistent inflation rate/inflation target and the forecasts for unemployment were too high relative to a sustainable unemployment rate. All else equal, such a configuration of forecasts calls for more expansionary policy, if more expansionary policy is possible.

In that situation, the FOMC and the Riksbank chose very different policies. The FOMC maintained the 0 to 25 basis points target range for the federal funds rate and effectively eased policy by communicating possible future policy easing and, later in the fall, launching QE2. The Riksbank instead started a policy of rapid policy-rate increases.

Several arguments in favor of the Riksbank's policy tightening have been presented. They include the stabilization of growth rather than resource utilization, the mechanical revision of the policy-rate path from the difference between outcomes and forecasts for inflation and the real economy, the use of the policy rate to limit the increase in household debt and housing prices, and a possible desire to normalize the policy-rate level to prevent unspecified future financial imbalances. I will argue that these arguments are not convincing. Thus, I find that the Riksbank's policy tightening was a mistake. I find that the tightening was a mistake ex ante, taking into account only the information available at the time of the decision, but also ex post, taking into account information that became available during the following year.

Several arguments have been presented against the Federal Reserve's policy easing. These include concerns about inflation and the anchoring of inflation expectations, uncertainty about the effect of the unconventional policy measures, the possible negative consequences of low policy rates for financial stability and the allocation of investment, and the amount of slack in the economy. There have also been concerns that the Federal Reserve's balance sheet would be more exposed to possible capital losses. Finally, some emerging-market policymakers have expressed concerns that the policy would result in increased capital inflows into those countries, generating bubbles and other negative impacts abroad. I will argue that these arguments against and concerns about the Federal Reserve's policy easing are not convincing.

I also look at the example of the Riksbank's policy a year later, in July 2011.[3] The Swedish economy had by then developed better than had been anticipated in June/July 2010. Growth had been higher and unemployment had fallen more than forecast in the summer of 2010. However, the forecast for inflation, although higher, was still too low, and the forecast for unemployment, although lower, was still too high, so more expansionary policy was still called for in July 2011.

But does the better-than-expected development up to July 2011 mean that the policy tightening that began in June/July 2010 was not wrong but right? Was the policy tightening right or wrong ex post? When evaluating past policy, it is necessary to distinguish between evaluation ex ante and ex post (Svensson 2011b). Evaluation ex ante means assessing policy taking into account only the information available to the policymaker at the time of the decision. Evaluation ex post means assessing policy also taking into account the information that has become available after the policy decision; that is evaluating the policy after the fact.

Evaluation ex ante is more relevant when assessing the quality of policy decisions. Evaluation ex post, although still interesting, largely means assessing whether the policymaker was lucky or unlucky.

But the question remains, if the better performance of the Swedish economy had been known at the June/July policy meeting, would it have been right to initiate policy tightening? My answer is no. This is because a year later, in July 2011, inflation and the inflation forecast, although higher, were still too low, and unemployment and the unemployment forecast, although lower, were still too high. More expansionary policy in June/July 2010 would have resulted in a better outcome, with inflation higher and unemployment lower.

But why has the Swedish economy developed better during the last year than anticipated in the summer of 2010? Sveriges Riksbank (2011c) mentions higher-than-expected levels for exports, domestic demand, and productivity. A possible partial explanation (not mentioned in Riksbank 2011c) for higher-than-expected aggregate demand is that the *actual* financial conditions have been substantially more expansionary than the *intended* financial conditions. By the actual financial conditions I mean the actual market term structure of interest rates, whereas by the intended financial conditions I mean the market term structure of interest rates that would be consistent with a credible policy-rate path and normal term premiums.[4] For instance, from the beginning of 2010 until July 2011, a Swedish five-year interest rate was

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[3] Being a central banker, in line with central-bank custom I will refrain from making any comments on the current and prospective policies of the Federal Reserve.

[4] Behind this is the insight emphasized by Blinder (1998) and Woodford (2005) and others that in the monetary-policy transmission mechanism the policy rate in itself matters very little or not at all for inflation and the real economy. This insight goes back a long time in central banks, as shown in the discussion of LSAPs in a historical perspective in D'Amico, English, López-Salido, and Nelson (2011). What matters for inflation and the real economy are the longer interest rates that result from market expectations of future policy rates and term premiums. These longer interest rates have an impact on the economy through capital costs, the stock market, the exchange rate, and other asset prices. As Blinder (1998, p. 70) puts it: "Central banks generally control only the overnight interest rate, an interest rate that is relevant to virtually no economically interesting transactions. Monetary policy has important macroeconomic effects only to the extent that it moves financial market prices that really matter - like long-term interest rates, stock market values and exchange rates." Central banks through their communication and otherwise also affect private-sector expectations of future inflation and developments of the aggregate real economy and in this way affect private-sector decisions.

on average about 85 basis points lower than the average level consistent with a credible policy-rate path and normal term premiums. This means that the actual financial conditions were much more expansionary than the intended ones. Thus, the Swedish economy may have benefited from the market effectively implementing a more expansionary policy than the one intended by the Riksbank.

Three circumstances may have contributed to the high policy-rate path of the Riksbank. First, the forecast for foreign policy rates has consistently been too high. In particular, it has been much above levels consistent with foreign yield curves and implied forward rates. All else equal, this implies an upward bias in the domestic policy-rate path. Second, the forecast for future potential output and the estimate of past potential output are considered to have shifted downwards considerably, even though the shock to the Swedish economy has been an aggregate-demand shock in the form of a collapse of world demand for Swedish exports. Such an aggregate-demand shock should have little or no effect on potential output.[5] All else equal, the downward shift of the potential-output forecast implies an upward bias in the estimate of resource utilization and an upward bias in the policy-rate path. Third, substantial structural reforms with an impact on the labor market have been undertaken in Sweden over the last few years. Studies indicate that they have significantly lowered the sustainable unemployment rate. In spite of this, the Riksbank has made only a small adjustment of its estimate of the sustainable unemployment rate. This provides another upward bias in the policy-rate path.

With a lower forecast for foreign policy rates in line with market expectations and a lower estimated sustainable unemployment rate, the case for more expansionary policy in Sweden is further strengthened.

The paper is organized as follows. Section 2 discusses the monetary-policy framework in the United States and Sweden, section 3 shows how published FOMC and Riksbank forecasts can be used to analyze policy, and section 4 discusses the situation and policy decisions at the FOMC's June 2010 meeting and the Riksbank's June/July 2010 meeting. Section 5 scrutinizes arguments in favor of the Riksbank's policy tightening, and section 6 scrutinizes arguments against the FOMC's policy easing. Section 7 discusses the situation for the Riksbank in July 2011, why the Riksbank's policy-rate path was so high, and why the Swedish economy developed better than expected. Section 8 presents some broader conclusions. The appendix contains some details.

2. The monetary-policy framework

My starting point is that a good monetary framework has as its objective both price stability and real stability; more precisely, the objective is to stabilize both inflation around a low rate and resource utilization around a normal level. The mandates of the Federal Reserve and the Riksbank are both consistent with this. The Federal Reserve's dual objective of maximum employment and stable prices can be seen as stabilizing inflation around a mandate-consistent inflation rate and stabilizing employment around the highest sustainable level of employment. "Maximum employment" is in practice the same as the highest sustainable employment. The objective of the Riksbank is twofold: to stabilize inflation around

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[5] Furthermore, most shocks should have little or no effect on estimates of past potential output.

the inflation target and resource utilization around a normal level (Sveriges Riksbank 2010d). The "normal level" means the highest sustainable level.[6] [7]

In practice, the dual mandate and flexible inflation targeting both boil down to "forecast targeting" (Woodford 2007, Svensson 2011c) – choosing a policy rate and a policy-rate path (or, under special circumstances, using unconventional policy instruments) that best stabilize both the resulting inflation forecast around the mandate-consistent/target rate and the resulting resource-utilization forecast around a normal level. This can be made more precise by specifying a measure of inflation (PCE or core PCE inflation/CPIF inflation) and a measure of resource utilization (such as the unemployment gap between the unemployment rate and an estimate of the sustainable unemployment rate). It can also be made more precise by specifying a quantitative measure of stability, that is a measure of to what extent a particular forecast of inflation or resource utilization stabilizes inflation or resource utilization.

My favorite measure of stability is the mean squared gap, the mean over the forecast period of the squared deviation of the mean forecast from the target/normal level (the mean is of course not necessary; the sum of squared deviations is enough).[8] With a specified weight (the lambda) on the stability of resource utilization relative to the stability of inflation we are down to a standard quadratic loss function (with no discounting). One can go further and discuss to what extent mean forecast targeting (relying on certainty equivalence and hence only on mean forecasts) is still a good approximation when there is model uncertainty, multiplicative uncertainty, and so on – in practice there is usually not sufficient information to know if a policy should be more or less aggressive than the certainty-equivalent one, so that one is still usually warranted (the main exception is the nonlinearity caused by the lower bound for nominal interest rates).

I have come to the conclusion that the unemployment gap between the unemployment rate and an estimate of the sustainable unemployment rate is the best measure of resource utilization. The main reason is that the alternative of using the output gap requires estimating potential output. During my period at the Riksbank I have become more skeptical about measures of potential output and am therefore now more inclined to rely on the unemployment gap. Arguably, there are fewer and less severe problems and there

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[6] In a response to a question about an explicit inflation target for the Federal Reserve at the press conference on June 22, 2011, Chairman Bernanke explained why an inflation target is consistent with the Federal Reserve's mandate (Bernanke 2011c, p. 9-10, also available as video on www.frb.gov).
[7] There is a common misunderstanding about hierarchical and dual mandates. There is no fundamental difference between the dual mandate of the Federal Reserve and the hierarchical mandate of the Riksbank (which is consistent with the statutes of the European System of Central Banks). The Riksbank's mandate is considered hierarchical because price stability is its primary objective. Here we have to distinguish first and second moments, that is, means and variances. The hierarchical mandate applies to the first moment, the unconditional mean. When it comes to the first moment, there is an explicit inflation target (an inflation rate of 2 percent per year) that is chosen and enforced by the Riksbank. There is no explicit target that is chosen for resource utilization. Instead, what is normal resource utilization is determined by the properties of the economy and structural policies and is *estimated* by the Riksbank. Thus, the Riksbank has an independently chosen target for inflation but no independently chosen target for output, employment, unemployment, or any other resource-utilization-related variable. For the second moments, the variability of inflation and resource utilization, the Riksbank has a dual mandate in that it aims to stabilize both inflation around the chosen target and resource utilization around the estimated normal level.
[8] If the forecast is not close to its target/normal level at the end of the forecast period, the mean squared gap can be adjusted, using any information about the forecast beyond the forecast horizon or by assuming a gradual return to the target/normal level. For details on mean squared gaps, see Svensson (2011c).

can be a more open and transparent discussion about the sustainable unemployment rate than about potential output. It can also be argued that there is less risk of making big mistakes in estimating sustainable unemployment than in estimating potential output. Problems of Riksbank measures of potential output are further discussed in section 7.[9]

Furthermore, it is important to distinguish between measures of resource utilization as an indicator of inflationary pressures and as a target variable. 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).[10] 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.[11]

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.

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

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[9] Several years ago, when I was a big fan of the output gap and was discussing with Alan Blinder which of the many concepts of potential output was most suitable, he strongly recommended the unemployment gap instead – on grounds of simplicity and less measurement errors. I guess I have come around to his view.

[10] 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.

[11] Sveriges Riksbank (2010d, 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.

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

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

where π^* denotes the inflation target, the coefficients α and β satisfy $0 < \alpha \le 1$ and $\beta > 0$. We can interpret the case when $\alpha < 1$ as a situation when 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, $\bar{u}_t$, for which inflation is constant, that is, $\pi_t = \pi_{t-1}$.[12] It is in this case given by

$$\bar{u}_t \equiv [z_t - (1-\alpha)(\pi_{t-1} - \pi^*)] / \beta \tag{2}$$

and will depend both on the state variable and lagged inflation. Eliminating z_t from equations (1) and (2) results in

$$\pi_t - \pi_{t-1} = -\beta(u_t - \bar{u}_t). \tag{3}$$

Note that (3) 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

$$L_t = (\pi_t - \pi^*)^2 + \lambda(u_t - \bar{u}_t)^2, \tag{4}$$

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 (3) and (4) that the loss function can be written

$$L_t = (\pi_t - \pi^*)^2 + (\lambda / \beta^2)(\pi_t - \pi_{t-1})^2. \tag{5}$$

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.

Instead, let the objectives be represented by the loss function

$$L_t = (\pi_t - \pi^*)^2 + \lambda(u_t - u^*)^2, \tag{6}$$

where u^* denotes the sustainable unemployment rate.[13] 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 (6) can be

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[12] 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.

[13] 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 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.

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 (6), 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.

3. Using FOMC and Riksbank forecasts for inflation and unemployment to analyze policy

Published Riksbank forecasts for inflation, various resource-utilization measures, and the policy rate make it easy to describe the situation in Sweden in terms of forecasts and to assess whether easier or tighter policy would stabilize inflation and resource utilization better or worse.

Interestingly, the published FOMC participants' projections for inflation, GDP growth, and unemployment create considerable possibilities to do the same for the United States. Indeed, at Chairman Bernanke's press conferences after the policy meetings, the projections take center stage. As noted in Chairman Bernanke's opening remarks at the press conference on April 27, 2011:

> The Committee's economic projections provide important context for understanding today's policy action as well as the Committee's general policy strategy. Monetary policy affects output and inflation with a lag, so current policy actions must be taken with an eye to the likely future course of the economy. Thus the Committee's projections of the economy, not just current conditions alone, must guide its policy decisions. The lags with which monetary policy affects the economy also imply that the Committee must focus on meeting its mandated objectives over the medium term, which can be as short as a year or two but may be longer, depending on how far the economy is initially from conditions of maximum employment and price stability. (Bernanke 2011b, p. 4-5)

The FOMC's projections are usually presented in terms of an interval, the central tendency, where the three highest and three lowest projections for each year have been excluded. However, the individual FOMC participant's projections are presented in sufficient detail such that a smaller interval for the median of the projections can be identified. The midpoint of that interval can then be used as a reasonable point forecast of the FOMC. The median of the different FOMC participants' longer-run projections for inflation can by the median-voter theorem be interpreted as the result of a hypothetical majority vote among the participants about the FOMC's mandate-consistent inflation rate, and the median of the longer-run projections for unemployment can be interpreted as the result of a hypothetical majority vote among the participants about the FOMC's estimate of the sustainable unemployment rate. The median of the

different projections for growth, inflation, and unemployment can be interpreted as the result of a hypothetical majority vote among the participants about the FOMC's collective projection.[14] [15]

The forecasts 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.[16]

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 (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.

The Riksbank's forecasts are since February 2007 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, where 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 is a weighted

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[14] The "participants" of the FOMC are all the members of the Board of Governors and all the Federal Reserve Bank Presidents. The "members" of the FOMC are the voting participants of the FOMC. If members are considered more influential, one might argue that the relevant forecasts should be the forecasts made by only the voters, but the voters' separate forecasts are not available.

[15] Under the assumption that unpublished Federal Reserve forecasts for potential output are similar to published CBO forecasts for potential output, it is also possible to combine these FOMC growth forecasts with the CBO forecasts to form output-gap forecasts.

[16] 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.

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 discussion 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 2010b), "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.

Each FOMC participant's projections of inflation, unemployment, and growth are based on the participant's "assessment of appropriate monetary policy. 'Appropriate monetary policy' is defined as the future path of policy that each participant deems most likely to foster outcomes for economic activity and inflation that best satisfy his or her interpretation of the Federal Reserve's dual objectives of maximum employment and stable prices" (FOMC 2010b). Thus, behind each participant's projection is a policy-rate projection. Those policy-rate projections are not published, however. That is, the *intended* monetary policy and financial conditions are not directly available. Instead, only the *actual* financial conditions, in the form of the market term structure of interest rates, are available. Thus, whereas for the Riksbank, both intended and actual financial conditions are directly available, for the Federal Reserve only actual financial conditions are directly available.

As examples of practical monetary policy, I will look at the policy decisions in the summer of 2010, the June 22-23 meeting for the FOMC with the announcement on June 23 and the June 30 meeting for the Riksbank with the announcement on July 1 (therefore called the June/July meeting). For the Riksbank, I will also look at the policy decision a year later, that is, the July 4, 2011 meeting with the announcement on July 5.

4. The situation in June 2010 for the Federal Reserve and June/July 2010 for the Riksbank

In figure 1, the solid thick red line shows the outcome for PCE inflation and the FOMC forecast for PCE inflation at the June 2010 policy meeting, constructed as the median of the different participants' projections as reported in FOMC (2010b). The dotted vertical line for 2010q1 marks the last known outcome. The solid thin red line shows the outcome and FOMC forecast for core PCE inflation. The dashed blue line shows the outcome and Riksbank forecast for CPIF inflation (the CPI excluding direct effects on the CPI of changes in mortgage rates) from the June/July 2010 meeting.[17] The central tendency of the FOMC participants' longer-run PCE projections is reported as 1.7 to 2.0, but the median actually falls in the upper range of this interval, more precisely in the interval 1.85 to 2.05 percent, with the midpoint 1.95 (FOMC 2010b). I have rounded this to 2 percent and will for the purpose of this paper assume that this is the Federal Reserve's mandate-consistent inflation rate. The Riksbank's inflation target is 2 percent. The FOMC's mandate-consistent inflation rate and the Riksbank's inflation target are marked by the thin black line in figure 1. Both the FOMC and the Riksbank inflation forecasts are below target, except at the end of the forecast period for the Riksbank. The inflation forecasts alone indicate that more expansionary policy, if possible, is appropriate.[18]
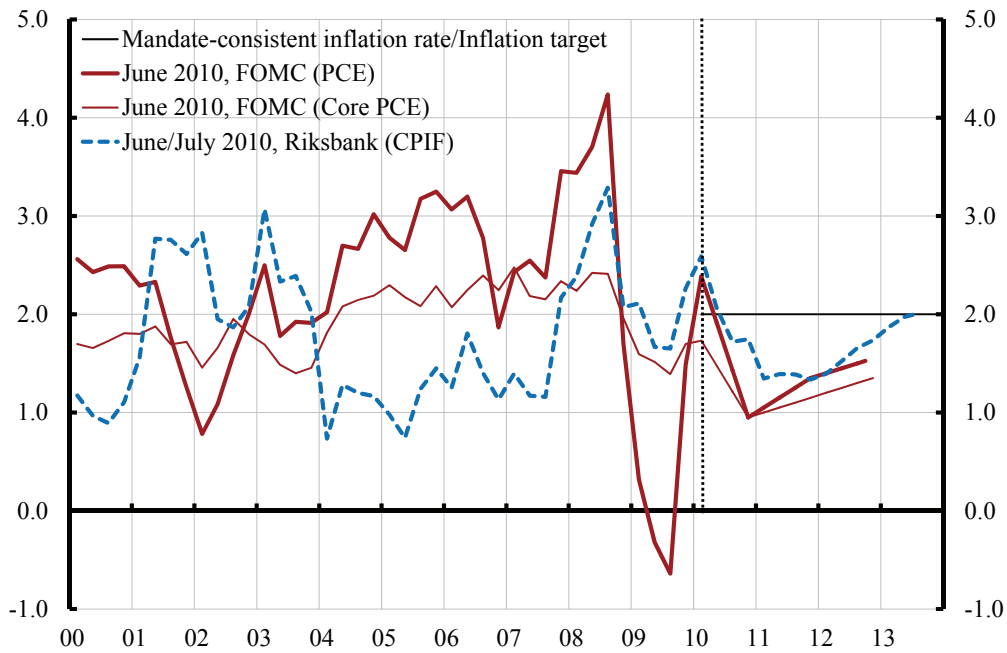
Figure 2 shows the FOMC and Riksbank forecasts for the unemployment rate at the same policy meetings. The median of the FOMC participants' projection of the longer-run unemployment rate falls in the interval 4.95 to 5.15 percent, with the midpoint 5.05. This could be rounded to 5, but all projections outside this interval are above the interval. Therefore, I round the median and the sustainable unemployment rate to 5.1 percent. This is marked as a solid thin red line in figure 2.

A graph in the *Monetary Policy Report, October 2010*, shows an estimate of the sustainable unemployment rate of 6.5 percent from 2010 onwards (figure B23, p. 61). At the June/July meeting, I considered a reasonable sustainable unemployment rate to be between 6 and 7 percent. Here I set the sustainable unemployment rate at the June/July meeting at 6.5 percent. This is marked as a dashed thin blue line in figure 2. Both forecasts are above the sustainable rate. The unemployment forecasts alone indicate that more expansionary policy, if possible, is appropriate.

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[17] During recent years, large changes in the Riksbank's policy rates has led to large differences between the CPI, which includes effect on housing costs of varying mortgage rates, and the CPIF, which excludes those effects. Most Executive Board members and therefore consider stabilizing CPIF inflation more relevant under current circumstances, and Riksbank communication has communicated the relevance of CPIF inflation.

[18] Appropriately calibrated more expansionary policy could shift the early part of the Riksbank forecast up towards the target without overshooting at the end of the forecast period. Even if there were some overshooting at the end of the forecast period and beyond, this would affect the mean squared gap very little, since the forecast would still be close to the target.

Figure 1. Inflation forecasts; FOMC and Riksbank; June/July 2010

Sources: The Bureau of Economic Analysis, the FOMC, the Riksbank, and Statistics Sweden

Figure 2. Unemployment forecasts; FOMC and Riksbank; June/July 2010
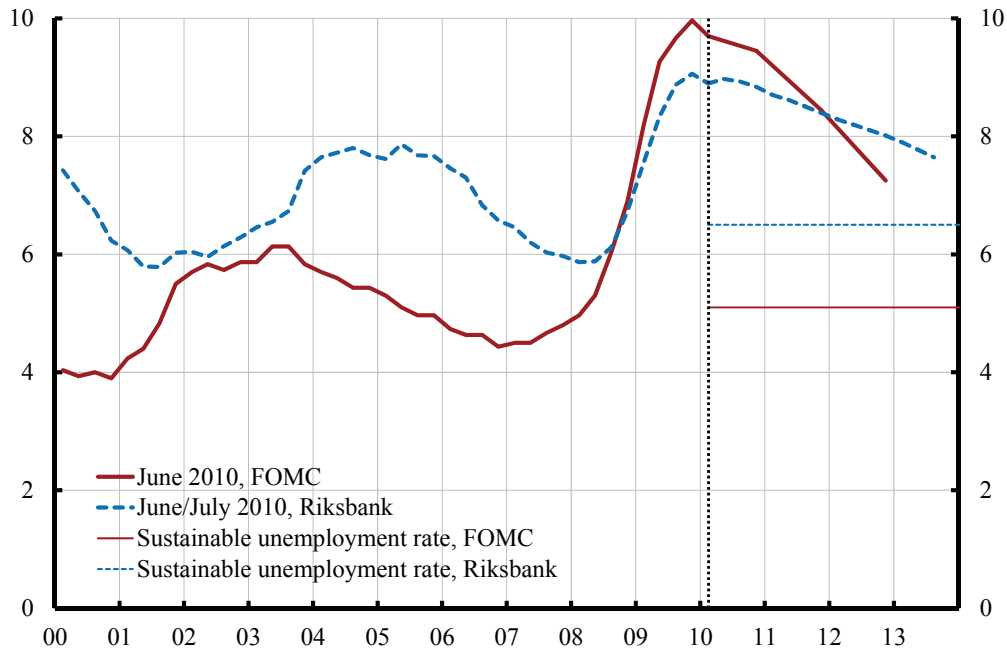
Sources: The Bureau of Economic Analysis, the FOMC, the Riksbank, and Statistics Sweden

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Both inflation and unemployment forecasts appear to call for more expansionary policy, if possible, in both the United States and Sweden. The Deputy Governor of Norges Bank, Jan Qvigstad, (2005) has suggested an intuitive criterion for optimal policy – the forecasts for inflation and resource utilization should not both be too low, or both be too high. The intuition is clear. If both forecasts are too low (high), easier (tighter) policy would stabilize both inflation and resource utilization better.[19] Application of this criterion in June/July 2010 implies that more expansionary policy is warranted, *if* more expansionary policy is possible. If policy is constrained, more expansionary policy may not be possible.

The FOMC announced after the June meeting that it "will maintain the target range for the federal funds rate at 0 to ¼ percent and continues to anticipate that economic conditions, including low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant exceptionally low levels of the federal funds rate for an extended period." In August, it announced that it would keep constant the Federal Reserve's holdings of securities at their current level by reinvesting principal payments from agency debt and agency mortgage-backed securities in longer-term Treasury securities. In November, after speeches by Bernanke (2010a,b) in August and September discussing additional policy measures, the FOMC launched QE2 by announcing that it intended to purchase a further $600 billion of longer-term Treasury securities by the end of the second quarter of 2011, a pace of about $75 billion per month.

The Riksbank instead raised the repo rate by 25 basis points from 25 to 50 basis points and launched a period of rapidly rising policy rates. It announced that "[t]he Swedish economy is developing strongly following the severe downturn. The repo rate now needs to be raised gradually towards more normal levels to attain the inflation target of 2 per cent and to ensure stable growth in the real economy. The Executive Board of the Riksbank has therefore decided to raise the repo rate by 0.25 of a percentage point to 0.5 per cent." Two Board members, Deputy Governor Karolina Ekholm and I, dissented.[20]

In figure 3, the solid red line shows the federal funds rate and the U.S. term structure of interest rates after the announcement on June 23, as measured by forward rates adjusted for normal term premiums.[21] The forward-rate curve indicates that the market expects the federal funds rate to remain at its very low level at least for another year.

The dashed blue line in figure 3 shows the Riksbank's repo rate and the Swedish term structure of interest rates after the announcement on July 1, as measured by adjusted forward rates. The dotted blue line shows the announced policy-rate path with the planned rapid rise of the policy rate. The forward-rate curve is much lower and indicates that the market expects the Riksbank to raise the policy rate at a much slower pace.

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[19] [It remains to discuss Qvigstad's criterion relative to policy under commitment and discretion.]

[20] Karolina Ekholm dissented against the increase in the repo rate, with reference to "the increased uncertainty prevailing as regards the sovereign debt problems in the euro area… [and] the relatively low inflationary pressure." I also dissented and "advocated a repo rate path with a repo rate of 0.25 per cent through the fourth quarter of 2010, and thereafter a gradual return to the repo rate path of the main scenario." I maintained that "such a repo rate path results in a better outcome for both resource utilisation and inflation, with both lower unemployment and CPIF inflation closer to the target."

[21] [IDetails of assets and derivatives used and adjustment for credit risk and term premiums to be added.]

Figure 3. Policy-rate, policy-rate expectation and policy-rate path; FOMC and Riksbank; June/July 2010
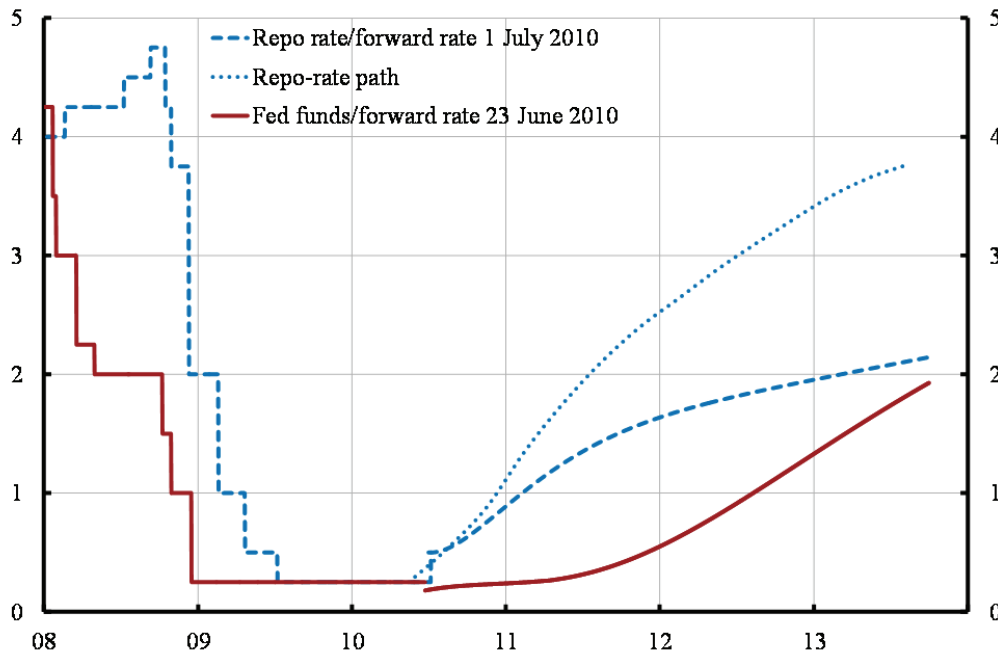
Sources: Reuters EcoWin and the Riksbank.

Thus, for the Riksbank, figure 3 shows both the actual financial conditions (market expectations of the future repo rate) and the intended financial conditions (the published repo-rate path). For the FOMC, the figure only shows the actual financial conditions (market expectations of the future federal funds rate). We do not know what policy-rate path corresponds to the median of the FOMC participants' "appropriate policy." Nor do we know whether appropriate policy for some participants includes some of the QE that the Federal Reserve implemented later in the fall.

As mentioned, for both the FOMC and the Riksbank, the forecasts in June/July 2010 of inflation and unemployment indicated that more expansionary policy was desirable, if possible. For the Riksbank, more expansionary policy was clearly possible. Obviously, the published policy-rate could have been shifted down. This should have had an impact on market expectations and shifted down the term structure of interest rates, in particular if the policy-rate path had been shifted down to or below the forward-rate curve in figure 3.

Was more expansionary policy possible for the FOMC? The FOMC was clearly more constrained than the Riksbank. The interval for the federal funds rate was 0 to 25 basis points and the ZLB is effectively binding. Arguably, it could have been lowered to zero, and zero interest rate could have been paid on reserves (Bernanke 2010a, 2011). The market expected a low federal funds rate for at least another year. The FOMC could have announced that it may keep the federal funds rate at a low level for longer than that, and possibly shifted the term structure of interest rates down further (Bernanke 2010a,b; Yellen 2011c); in the August 9, 2011 statement, the FMOC increased the extended period and announced that it anticipated that economic conditions were likely to warrant "exceptionally low levels for the federal funds rate at least through mid-2013." We do not know how successful such attempts to make monetary policy

more expansionary would have been in June 2010. Finally, the FOMC could manage its balance sheet so as to reduce longer interest rates, by reducing term premiums. Some simulations published later (Chung, Laforte, Reifschneider, and Williams 2011, Curdia and Ferrero (2011), Fuhrer and Olivei 2011) indicate that such an action would have had a significant effect on the economy. In the end, this is what the FOMC opted for later in the fall.

5. Arguments in favor of the Riksbank's policy tightening in June/July 2010

The argument *against* the Riksbank's policy tightening in June/July 2010 is straightforward. The forecast of inflation is too low, and the forecast for unemployment is too high. Easier policy would lead to better target attainment for both inflation and resource utilization. Several arguments *in favor of* the Riksbank's policy tightening were presented in the minutes of that meeting (Sveriges Riksbank 2010b) and at other policy meetings. They are essentially arguments why policy should, at least on this occasion, be based on other things than the forecast of inflation and resource utilization. The different arguments can arguably be grouped into four main arguments that can be called:[22]

(1) The growth-stabilization argument.
(2) The revision argument.
(3) The household-debt and housing-price argument.
(4) The normalization argument.

The growth-stabilization argument
Some arguments in favor of the Riksbank's policy tightening seem to concern the stabilization of growth rather than the level of resource utilization. The Riksbank's July announcement stated that "[t]he Swedish economy is developing strongly following the severe downturn. The repo rate now needs to be raised gradually towards more normal levels to attain the inflation target of 2 per cent and to ensure *stable growth* in the real economy." (Italics added.) This gives the impression that monetary policy was directed towards stabilizing growth rather than the level of resource utilization. However, the Swedish word translated into "growth" was "utveckling", which is more precisely translated as "development", so the announcement should arguably have ended "to ensure stable *development* in the real economy." Still, it is clear that the announcement emphasizes the change in the real economy rather than the level of resource utilization. And, as far as I know, there were no objections to the translation of "utveckling" into "growth."

Furthermore, the slide headings at the press conference on July 1, 2010, were: "Swedish economy developing strongly," "…despite fiscal problems in Europe," "Limited impact on the financial markets," "The global recovery is continuing," "Broad upturn in Swedish economy," "The upturn is continuing," "Employment is increasing," "Lower unemployment ahead," "Inflation in line with target," "Interest rate increased from low level," "A forecast, not a promise", and again, as clearly the main message, "Swedish economy developing strongly." I think it is fair to say that these slide headings reinforce the impression that the Riksbank was emphasizing the change and growth in the real economy rather than the level of resource utilization.

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[22] The Riksbank is unique, as far as I know, in having detailed attributed minutes (since the June 2007 meeting, my first policy meeting), so it is possible to identify Board members with the different arguments. This is not done here.

Figure 4, showing the level of GDP, and figure 5, showing the growth rate, give rather different impressions. In June/July 2010, Swedish realized and forecasted output was quite low. Realized quarterly growth in 2010Q1 was high, 6 percent at an annual rate, but the forecast of future growth was not much above normal. Stabilizing growth at the low level of output in June/July 2010 would seem to prolong the recession. Stabilizing growth and stabilizing resource utilization could imply very different policies.

Figure 4. Output and potential output; Riksbank; September 2008, June/July 2010, and July 2011
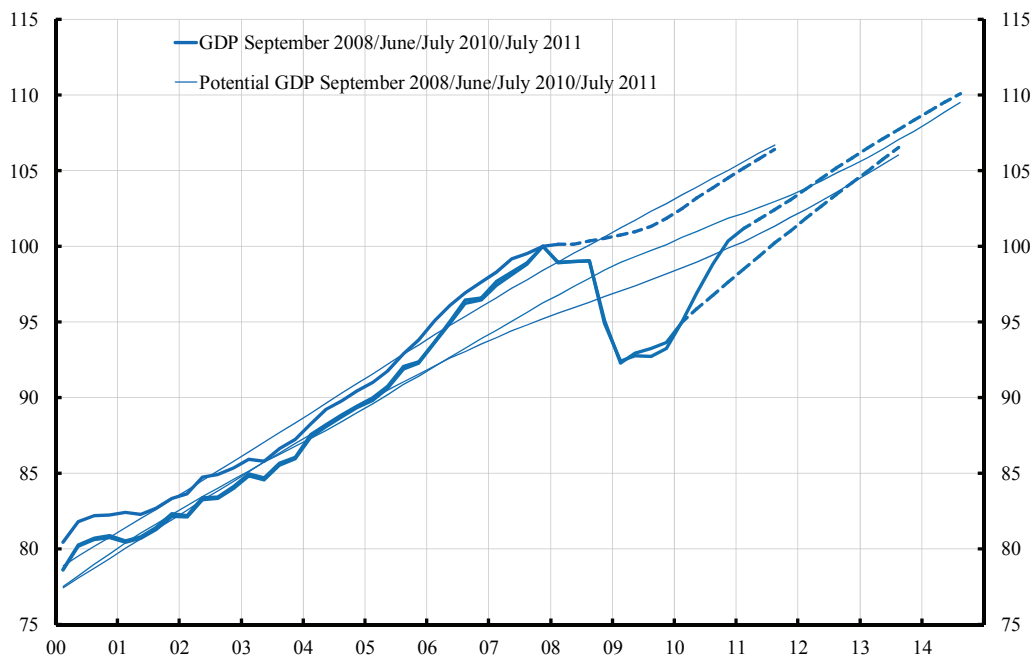
Sources: The Riksbank and Statistics Sweden

The *Monetary Policy Report* also traditionally emphasizes growth rather than the level of resource utilization, at least when it comes to the figures. The first four main graphs in the report show the repo-rate path and the forecasts of GDP growth, CPI inflation, and CPIF inflation. In the July 2010 report, forecasts of employment, unemployment and resource-utilization do not appear until in figure 18 on page 15 and later. It is not that obvious from the July 2010 report that inflation and resource utilization are supposed to be the two target variables of the Riksbank.

My experience from practical monetary policy is that there is often considerable ambiguity and confusion between growth and levels of the real economy. For monetary policy, I maintain that the level of resource utilization should be the relevant target variable, not the growth rate. In particular, stabilizing growth after a big fall in output and a rise in unemployment will prolong the period of low resource utilization. Higher than normal growth is then warranted in order to get back to the normal level of resource utilization.[23]

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[23] [Possible discussion of "speed limits" (Walsh, Orphanides-Williamson).]

Figure 5. GDP growth; the Riksbank; June/July 2010 and July 2011
Annualized quarterly growth, percent
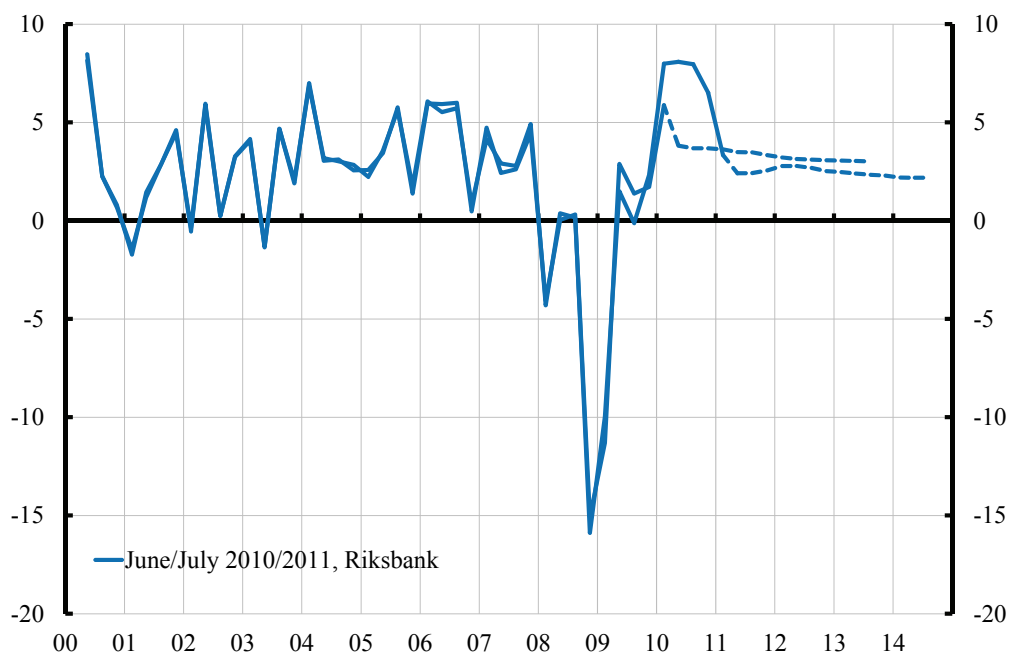
Sources: The Riksbank and Statistics Sweden

The revision argument

The outlook for the real economy at the meeting in June/July 2010 was a bit better than had been projected at the previous policy meeting, in April 2010. The outcome for GDP growth was a bit higher, and the outcome for unemployment was a bit lower, than had been anticipated. This was mentioned as a reason for tightening policy. Thus, the revisionist argument is that if the outcome of the real economy and/or inflation is higher (lower) than anticipated, policy should be tightened (eased) a bit. Of course, this assumes that previous policy was optimal. If previously the policy was at a corner solution, for instance, with a binding ZLB, this conclusion does not follow. Unfortunately, the Riksbank's communication was not clear about whether the period of a policy rate of 25 basis points from April 2009 through April 2010 was one of a binding effective lower bound or not (Svensson 2010a). Furthermore, since policy is never perfect and there are always policy errors, mechanically applying the revision argument means that error is added to error, and policy could drift away like a random walk. Therefore, policy should be checked against and mainly be based on forecasts of levels of inflation and resource utilization.[24]

Household debt and housing prices

Several Board members have at several policy meetings expressed worries about an increasing debt-to-disposable-income ratio for households – in June/July 2010 it was about 170 percent – and about rising housing prices. The suggestion is that a policy-rate increase would dampen the growth of household indebtedness and housing prices. This raises the question of whether (1) household debt and housing

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[24] The revision argument is further discussed in Svensson (2010d).

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 debt is good, for several reasons.[25] 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.[26]

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 2011a), 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.[27] In addition, the Riksbank's ambitious research project on the housing market (Sveriges Riksbank 2011c) 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 there is a possible bubble, a quick correction could be triggered, which could even undershoot the level

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

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 2 percent real growth of 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.[28]

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.[29] 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 less negative side effects (Sveriges Riksbank 2011c).

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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[28] 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.

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

In general, if there is some probability of a future housing-price fall, and such a price fall is deemed to have an impact on future aggregate demand, resource utilization, and inflation, then that impact should be taken into account in the construction of the mean forecasts of inflation and resource utilization. Thus, the impact of household debt and housing prices should be incorporated in the forecasts. This would make it possible to derive the correct implications for the policy rate. The impact could imply a downward shift of future resource utilization and inflation, which in itself would seem to imply more expansionary rather than contractionary policy. Furthermore, if the policy rate is deemed to have some effect on the probability and/or the magnitude of a housing-price fall, this should also be taken into account. It could imply more contractionary policy, if a higher policy rate was deemed to reduce the probability and/or magnitude of a housing-price fall. But in the absence of such an analysis it is not clear what the policy implications are.

Kohn (2006, 2008) mentions three conditions that should be fulfilled before central banks implement 'extraordinary measures' to handle possible asset-price bubbles, such as the unsustainable development of housing prices: "First, policymakers must be able to identify bubbles in a timely fashion with reasonable confidence. Second, a somewhat tighter monetary policy must have a high probability that it will help to check at least some of the speculative activity. And third, the expected improvement in future economic performance that would result from the curtailment of the bubble must be sufficiently great." These conditions will rarely be fulfilled in practice. Therefore, it will rarely be the case that it is motivated to use monetary policy in this way.[30]

Occasionally there are references in the minutes to the impact of the policy rate on outcomes beyond the forecast horizon of three years. However, the connection between these outcomes and the current policy rate is often difficult to articulate. Normally there is little or no information about the impact of the policy rate on the outcome beyond the forecast horizon. Responding to information that we do not really have introduces random errors in policy.

There is a general point about conditional forecasts that some think is trivial while others think it is not (see appendix A1 for a detailed example). With a longer horizon the conditional forecast approaches the unconditional mean. This means that the unconditional variance of the conditional forecast falls towards zero when the horizon increases. Thus, whereas the conditional variance of the outcome and the conditional variance of the forecast error *rises* with the horizon towards the unconditional variance, the unconditional variance of the conditional forecast *falls* with the horizon. Thus, a lack of information beyond a certain horizon just shows up in the conditional forecast being close to the unconditional mean. I find that this little insight helps a lot. A lot of debate about the forecast is just about how much relevant information we have. In practice, we normally have very little information beyond the forecast horizon, in particular about the impact of the policy rate on the outcome. This means that we should be wary of acting on information that we do not have (about tail risk that is unrelated – or loosely related – to the policy rate, say). But we should still do the best we can with the information we have (and try to get more useful information if this is possible).

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[30] In a public policy panel at SNS, Stockholm, Sweden, on June 17, 2011, Kohn maintained the relevance of these conditions. There is no revision of these conditions in the minutes of the hearing on May 17, 2011 by the U.K. House of Commons Treasury Committee (Kohn 2011) about the appointment of Kohn to the interim Financial Policy Committee.

The normalization argument

Another argument mentioned is that, all else equal, low levels of interest rates would lead to unspecified financial imbalances and unspecified threats to financial stability. This argument seems related to worries about increased leverage and increased risk-taking – consistent with the so-called risk-taking channel – and the misallocation of investment. Such arguments imply that, for given forecasts of inflation and resource utilization, more normal interest rate levels are preferred. It is like having an additional term $(i_t - \bar{i})^2$ in the loss function, where i_t denotes the policy rate in period t and $\bar{i}$ denotes the normal policy rate. This term represents undesirable impacts of lower than normal policy rates that are not included in the forecasts of inflation and resource utilization.[31] There are several references to "normalization" in Riksbank press releases, *Monetary Policy Reports* and *Updates*, minutes, and speeches.

What can be said about this is that there is no evidence that low interest rates lead to more leverage or more risk-taking in Sweden. The Swedish financial sector is dominated by an oligopoly of four large commercial banks, and there is no shadow-banking sector to speak of. There is no evidence that these commercial banks tend to increase their leverage when the policy rate is low. If anything, their leverage seems to fall with lower policy rates.[32] (A possible explanation is that lower policy rates increase real activity and the value of the banks' assets, which all else equal reduces leverage. Banks then do not seem to increase lending sufficiently to maintain leverage.) Furthermore, even if there was more risk-taking with lower policy rates, it does not follow that there would be too much risk-taking. That depends on what the optimal level of risk-taking is. After the crisis, it might be that risk aversion and the perception of uncertainty are exceptionally high and that there is overall too little risk-taking. Without further analysis, this cannot be known.[33]

The argument that low interest rates would lead to misallocation of investment is much weakened by the fact that the level of investment in Sweden has been very low and is still lower than before the crisis. There has been little construction; there has certainly not been any construction boom and no overinvestment in housing. The argument would further require that there is a downward bias in the estimate of capital costs during the life-time of the investments that are undertaken. I am not aware of any evidence of this.

Furthermore, the general discussion and the existing models about policy rates, the risk-taking channel, and so on (see, for instance, Adrian and Shin 2011 and Diamond and Rajan 2011) consistently seem to suffer from confusion between nominal policy rates and the general level of real interest rates. There is no distinction between nominal and real short rates. There is much less distinction between the short real rate

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[31] Since only problems with low and not high policy rates are mentioned, perhaps the term should not be symmetric but only apply to low interest rates, such as $[\min(i_t - \bar{i}, 0)]^2$, which equals $(i_t - \bar{i})^2$ when $i_t \leq \bar{i}$ and equals 0 when $i_t > \bar{i}$.

[32] [References or evidence to be supplied.]

[33] Furthermore, the optimal adjustment of risk when real rates of return fall depends on the precise preferences for expected real rates of return and risk, as the simplest mean-variance analysis reveals. "Search for yield" regardless of the risk is difficult to understand in such mean-variance analysis, other than as an unfortunate and ill-conceived promise that regulators should prohibit.

and the neutral real rate.[34] What monetary policy can do is only to temporarily make the short real interest rate deviate from the neutral real interest rate, which in turn is beyond the control of monetary policy. The effects that are attributed to monetary policy should be the effect of the difference between the short real rate and the neutral rate, not the level of the neutral rate and the overall level of the real rate. The neutral real rate is affected by many things and can be low for many years for several reasons, including global imbalances, fiscal policy, and shocks to aggregate demand and supply.[35]

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

$$x_t = x_{t+1|t} - \sigma(r_t - r_t^*),$$ (7)

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

$$r_t = i_t - \pi_{t+1|t},$$ (8)

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.

6. Arguments against the FOMC's policy easing

The argument *in favor of* more expansionary U.S. monetary policy, if possible, in June 2010 is pretty straightforward. Indeed, after noting that the FOMC projections for underlying inflation were below the mandate-consistent level and that the FOMC projections for unemployment were above the mandate-consistent level, Bernanke (2010b) concluded: "Given the Committee's objectives, there would appear – all else equal – to be a case for further action." However, some arguments *against* more expansionary monetary policy have been put forward. From my reading of the FOMC minutes and the debate about U.S. monetary policy, I find that the various arguments against more expansionary policy can be organized as follows:

(1) Concerns about increased inflation and the anchoring of inflation expectations.
(2) Uncertainty about the effects on the economy of unconventional policy measures.

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[34] In particular, the discussion about "search for yields" seem to suffer from money illusion and the lack of the insight that the nominal rate can be low because the real rate is low.
[35] Adrian and Shin (2011) and Diamond and Rajan (2011) do not even contain the frictions that allow meaningful modeling of the effects of monetary policy.

(3) Concerns about possible negative effects on financial stability and the allocation of investment of low policy rates for an extended period.

(4) Concerns about the amount of slack in the economy.

(5) Concerns on the part of emerging market policymakers that the policy would result in increased capital inflows into those countries, possibly generating bubbles and other negative impacts abroad.

(6) Concerns that the Federal Reserve's balance sheet would be more exposed to possible capital losses.

Concerns about increased inflation and the anchoring of inflation expectations

Some have argued that an expansion of the Federal Reserve's balance sheet risks reducing public confidence in the Federal Reserve's commitment to price stability. Some observers might erroneously think that a large increase in the balance sheet, since it implies a larger monetary base, will automatically bring higher inflation, especially since future circumstances may make it difficult to quickly reduce the size of the balance sheet. This may increase longer-run inflation expectations. Furthermore, if inflation expectations were to increase, there is a possibility of a ratchet effect, so that it would be costly and require a recession to reduce them.

Why do inflation expectations matter for monetary policy? They matter for two reasons. First, they matter because inflation expectations affect actual inflation and the inflation forecast. All else equal, high (low) inflation expectations increase (decrease) actual inflation and the inflation forecast. If inflation expectations are anchored on the mandate-consistent inflation rate, it is easier for the Federal Reserve to stabilize both inflation and resource utilization. Second, they matter because the proximity of long-run inflation expectations to the mandate-consistent inflation rate provides a good indicator of the Federal Reserve's credibility, more precisely the credibility assessed to the Federal Reserve's ability to attain the mandate-consistent inflation rate. This indicator of credibility is of some independent interest, for instance for policy evaluation. But, importantly, the Federal Reserve's mandate includes price stability, not inflation-expectations stability. It is inflation and resource utilization that are the target variables. Inflation expectations should not be an independent target variable. At most, they are an intermediate target variable, whose stability simplifies the stabilization of the actual target variables.

As an illustration, consider the standard New Keynesian Phillips curve,

$$\pi_t - \pi^* = \delta(\pi_{t+1|t} - \pi^*) + \kappa x_t + \varepsilon_t, \tag{8}$$

where π_t denotes inflation in period t, π^* is the mandate-consistent inflation rate/inflation target, δ is the private-sector discount factor, $\pi_{t+1|t}$ denotes private-sector expectations in period t of inflation in period $t+1$, x_t denotes the output gap, ε_t denotes a possibly serially correlated cost-push shock, and κ is a positive constant.[36] Shocks to private-sector inflation expectations will imply shocks to inflation or output, or both. Stable inflation expectations make it easier to stabilize inflation around the mandate-consistent inflation rate and the output gap around zero. Higher inflation expectations will, all else equal, imply higher actual inflation. Inflation expectations above the mandate-consistent inflation rate will, all else equal (zero cost-push shocks) require a negative output gap to keep inflation at the mandate-consistent rate.

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[36] Calvo-style price-setting firms are assumed to index prices to the mandate-consistent inflation rate when not setting the optimal price.

Thus, inflation expectations are important because they affect inflation and the inflation forecast. An increase in inflation expectations shifts up the inflation forecast. A good inflation forecast implicitly incorporates a forecast for inflation expectations. Note that there is a possible risk of double-counting: If inflation expectations are forecast to increase and this is taken into account in the inflation forecast, the increase in inflation expectations contains no additional information that is not already contained in the inflation forecast. Responding to inflation expectations beyond a response to the inflation forecast could then imply an excessive response to inflation expectations.

Let $\pi_{t+\tau,t}$ denote the central bank's mean forecast in period t of inflation in period $t+\tau$. It is by (8) given by

$$\pi_{t+\tau,t} = \pi* + \delta(\pi_{t+\tau+1|t+\tau,t} - \pi*) + \kappa x_{t+\tau,t} + \varepsilon_{t+\tau,t} \tag{9}$$

and hence depends on the central bank's forecast in period t of private-sector inflation expectations in period $t+\tau$, $\pi_{t+\tau+1|t+\tau,t}$, and forecasts in period t of the output gap and the cost-push shock in period $t+\tau$, $x_{t+\tau,t}$ and $\varepsilon_{t+\tau,t}$. The effect of private-sector inflation expectations is fully incorporated in the inflation forecast.[37]

Arguably, an increase in shorter-run inflation expectations above the mandate-consistent inflation rate would not actually be a problem. On the contrary, a temporary increase in inflation expectations would reduce the real interest rate and stimulate the economy. It would therefore be desirable. Furthermore, according to Qvigstad's (2005) criterion, if the unemployment forecast is above the sustainable unemployment rate, optimality requires that the inflation forecast is above the mandate-consistent inflation rate.

What is a problem is if longer-run inflation expectations were to increase and need a tight policy for a significant period to be brought down. Clear communication about the purpose of the expansion should mitigate the risk of a reduction in public confidence in the Federal Reserve's long-run commitment to price stability.

Regarding the increase in the monetary base that follows from the Federal Reserve's asset purchases, the fact that the Federal Reserve can pay interest on reserves means that a large monetary base no longer by itself leads to inflation. In the standard textbook treatment, a large monetary base implies a zero policy rate. But the fact that the Federal Reserve can pay interest on reserves implies that a large monetary base does not prevent the Federal Reserve from setting the policy rate at any level required to restrict aggregate demand and prevent too high inflation. Clear communication of this fact should reduce naïve beliefs of the opposite. However, admittedly these beliefs seem quite stubborn, in spite of pretty clear communication by the Federal Reserve. In any case, short- and long-run inflation expectations are monitored very closely

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[37] Note that (9) incorporates the central bank's forecast for private-sector inflation expectations as a separate variable. This means that private-sector inflation expectations need not be assumed to be rational, and the central bank's forecast for private-sector inflation expectations can be different from its forecast for inflation. In the special case of rational expectations and symmetric information, the Philips curve can be solved forward, private-sector inflation expectations are endogenous and equal to the central-bank forecast, and the inflation forecast depends only on the forecast/expectations of the output gap and the cost-push shock.

in real time, and the Federal Reserve has the option of reacting and modifying its policy if inflation expectations start to move in undesirable directions.

Regarding the possibility of a ratchet effect making inflation expectations sticky downwards, there seems to be little reason to fear this now. The Federal Reserve's mandate of price stability is well established. Long-run inflation expectations are well anchored in the United States, the euro area, and in advanced countries with inflation targeting. As argued by Posen (2011), nervousness about inflation expectations being sticky downwards may stem from the stagflation experience in the 1970s. The struggle of some new inflation targeters with a bad inflation history to achieve credibility for their inflation targets in the early 1990s may also be behind this nervousness. But the success of inflation targeting in an increasing number of advanced and emerging-market countries in bringing low and stable inflation should dampen this nervousness.

Uncertainty about the effects on the economy of unconventional policy measures
It has been argued that additional expansionary policy measures with a binding ZLB may have limited effects on the economy. Attempts by the Federal Reserve to use unconventional policy measures that have little impact could, furthermore, perhaps reduce the credibility and perceived competence of the Federal Reserve and make it less effective in its future stabilization of inflation and resource utilization.

There is a lively debate and now a considerable body of research on the effects of large-scale asset purchase programs (LSAPs).[38] Estimates based on a number of recent studies, as well as Federal Reserve estimates, suggest that, all else equal, QE2 lowered longer-term interest rates by 10 to 30 basis points. Federal Reserve analysis further indicates that a reduction in longer-term interest rates would be roughly equivalent in terms of the effect on the economy to a 40 to 120 basis points reduction in the federal funds rate (Bernanke 2011). This is a large reduction in the federal funds rate. In FRB/US simulations discussed by Yellen (2011b) and reported by Chung, Laforte, Reifschneider, and Williams (2011), QE2 is assumed to lower 10-year yields by about 15 basis points, which reduces the unemployment rate by about 0.3 percentage points and increases core PCE inflation by about 0.2 percentage points. This is to my mind a substantial effect.

According to the so-called portfolio-balance channel, the LSAPs affect long interests by changing the quantity and mix of financial assets held by the public. This assumes that different financial assets are not perfect substitutes in investors' portfolios, so changes in net supply of an asset affect its yields and also those of broadly similar assets.

The LSAPs can be seen as a shortening of the duration of the public debt; it results in privately held public debt consisting of relatively less long Treasury bonds and relatively more deposits in the Federal Reserve. It also simply reduces the amount of Treasury securities available to the public, replacing them by deposits in the Federal Reserve. Regarding the shortening of duration, one realizes that a change in Treasury issues of short and long debt can to some extent undo the shortening of the duration done by the Federal Reserve.

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[38] The papers on the effect of the LSAPs in the United States include Baumeister and Benati (2010), Chung, Laforte, Reifschneider and Williams (2011), D'Amico, English, López-Salido and Nelson (2011), D'Amico and King (2011), Curdia and Ferrero (2011), Fuhrer and Olivei (2011), Gagnon, Raskin and Remache (2011), Hamilton and Wu (2011), Krishnamurthy and Vissing-Jorgensen (2011), Liu, Mumtaz and Theodoridis (2011), Swanson (2011), and Wright (2011).

This possibility has been emphasized by Hamilton and Wu (2011). Figure 6, from data made available by them, shows that the average maturity of publicly held nominal Treasury debt fell during 2008 but is now back at pre-crisis levels. It should matter for the effect of the LSAPs whether the Treasury issue of debt is considered exogenous and independent of the LSAPs, or whether the Treasury issue is endogenous and the Treasury takes advantage of lower long yields by issuing relatively more long Treasury bonds. From this point of view, cooperation by the Treasury and a commitment of the Treasury not to undo the LSAPs may be desirable and may increase the effect of the LSAPs.

Figure 6. Average maturity of total and publicly held nominal U.S. Treasury debt. Weeks (left scale) and years (right scale).
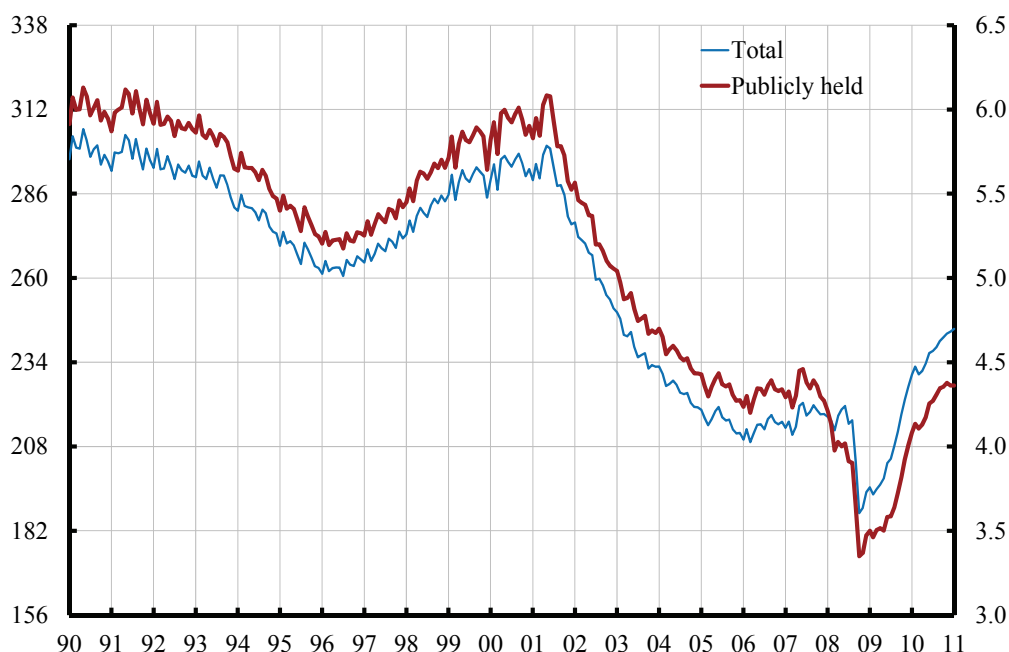
Source: Hamilton and Wu (2011).

The Federal Reserve's purchases of Treasury securities also remove substantial quantities of Treasury securities from the market. This should induce private investors to buy other assets that serve as substitutes for Treasury securities in the financial market, such as corporate bonds and mortgage-backed securities. In this way, the LSAPs serve to reduce the yields and increase the prices of those other assets as well, lowering borrowing costs and easing financial conditions throughout the economy. (Bernanke 2011).

As discussed above in section 3, greater uncertainty that does not change the means (a mean-preserving spread) should normally not change the optimal policy. The direction of the optimal policy adjustment to increased more complex uncertainty, such as model and multiplicative uncertainty, is usually not clear from the available information. Then there is no reason to deviate from the normal response to mean forecasts, that is, from the certainty-equivalent policy.

A somewhat related argument against Federal Reserve policy easing is that tight money is not the problem for the U.S. economy, so easier policy is not the solution. I fail to understand this argument. If the economy is affected by negative shocks independent of monetary policy, it seems that easier monetary

policy would remedy the situation, if easier policy is possible. The best thing would be to directly undo the negative shocks, but if this is not possible, easier monetary policy is an obvious second best.

About a decade ago, many academics – for instance, Ben Bernanke, Paul Krugman, Ben McCallum, Allan Meltzer, Adam Posen, and I – criticized the Bank of Japan for not doing more when facing the ZLB. In Svensson (2000), I argued at the time: "The gist of the Bank of Japan argument [for not doing more at the time], as far as I can see, seems to be that, since one cannot be absolutely sure that any given policy action or change in the monetary policy regime will succeed in getting the economy out of the liquidity trap, it is safer not to try. The logic of this argument escapes me. Instead, … it seems that, if a monetary expansion is deemed desirable, prudent policy calls for trying a number of the suggested remedies (as long as they are not inconsistent), in the hope that some may work." I remain convinced that that uncertainty about the effects of unconventional policy is not a valid reason to do nothing. The Federal Reserve has indeed acted very forcefully in undertaking the very large asset purchases even though ex ante the magnitude of the effect on the economy was very uncertain.

Concerns about possible negative effects on financial stability and the allocation of investment of low policy rates for an extended period
Although I feel confident in rejecting this argument for Sweden, I am less informed about the U.S. situation, with its substantial shadow-banking sector and complicated supervision and regulation framework with responsibilities divided among several authorities.

Yellen (2011a) describes how the Federal Reserve is engaged in monitoring a number of financial-market indicators of potential imbalances. These include indicators of asset valuations relative to historic norms such as forward price-to-earnings ratios in the stock market and price-to-rent ratios in the real-estate market, various measures of risk premiums and debt growth. The Federal Reserve has also intensified its monitoring of leverage, particularly outside the traditional banking system. This includes both supervisory and market surveillance data and an ongoing dialogue with a range of market participants to obtain more detail on the complex use of leverage in the U.S. shadow-banking sector. At present, the Federal Reserve sees few indications of significant imbalances, and the use of leverage seems well below pre-crisis levels.

As noted above in section 5, the theoretical and empirical work on possible consequences of low interest rates on leverage and risk-taking confuses the policy rate, the real rate, and the neutral real rate and does not appreciate that the relevant impact of monetary policy is the impact of temporary deviations of the short real rate from the neutral real rate. This means that the conclusions of this work for monetary policy are not clear.

The situation in the United States regarding the housing market and housing construction is hardly an argument against more expansionary policy. Continued housing-price falls and a construction slump are rather arguments for more expansionary policy. As for any misallocation of investment, this requires a systematic bias in the estimates of capital costs during the life-time of the investment.

In a second-best situation, without appropriate supervision and regulation, if the policy rate is the only available tool and there is a tradeoff between its effect on the monetary-policy objectives and financial stability, that tradeoff should be taken into account. Normally, however, the policy rate is not the only available tool, and much better instruments are available for affecting financial stability. Monetary policy

and the policy rate should only be the last line of defense, when other policy measures have been exhausted. Kohn's three conditions, discussed above, apply also here.

Concerns about the slack in the economy
It has been argued that the extent of slack in the U.S. economy may be less than commonly appreciated and that the structural unemployment rates, NAIRU, and the short-term equilibrium unemployment rate may have increased. For instance, longer-term unemployment leads to an erosion of skills and needs to reallocate labor across sectors that require new skills and may make the matching of unemployed to vacant jobs more difficult. However, even if there may have been an increase in measures of short-term equilibrium unemployment rates, it seems obvious that any such increase is dwarfed by the large rise in unemployment during the crisis.

Furthermore, as discussed in section 2, as in Bernanke (2010b) the mandate-consistent unemployment rate should be the sustainable unemployment rate, that is, the long-run equilibrium unemployment rate. Thus, the relevant target variable, besides inflation, is the gap between unemployment and the sustainable rate, not any short-run NAIRU or other equilibrium unemployment concept. The gap to the latter is relevant for the impact on inflation and the inflation forecast, but not as a target variable. Using the gap to the short-run NAIRU in effect introduces a preference for constant inflation, which I find difficult to motivate.

In particular, in a situation with high actual unemployment, increased longer-term unemployment, an erosion of skills, increased needs to reallocate labor across sectors, a less effective matching, and thereby a higher short-run equilibrium rate (if this can be defined), expansionary policy may quickly drive down unemployment towards the sustainable unemployment rate, will speed up the reallocation, limit the erosion of skills or speed up the acquisition of new ones, and bring down not only actual unemployment but also the short-run equilibrium unemployment rate. The cost of this may be higher inflation, but this cost is appropriately taken into account by the squared inflation gap between the actual inflation rate and the mandate-consistent inflation rate. The benefit is measured by the reduction in the squared gap between unemployment and the sustainable unemployment rate times the relative weight, λ.

Concerns about increased capital inflows into emerging-market countries, possibly generating bubbles and other negative impacts abroad
Some emerging-market policymakers have expressed concerns about increased capital flows into emerging-market countries and related risks of bubbles and other negative effects there. However, the Federal Reserve's mandate concerns U.S. inflation and employment, and it is not responsible for inflation, real developments, and monetary policy in other countries except as they feed back into the United States. That responsibility should rest with the policy authorities in those countries. Countries with a peg to the dollar will tend to import U.S. expansionary monetary policy into to their own country. This monetary policy may in many cases be too expansionary for the countries concerned, creating an overheated economy with related problems. A flexible exchange rate gives countries the option to run an independent monetary policy appropriate for the country in questions. If countries nevertheless choose a peg to the dollar, with capital inflows, bubbles, and other negative effects, they are themselves responsible for those effects.

In principle, more expansionary monetary policy in the U.S., for instance in the form of lower long rates, tends to depreciate the dollar, all else equal.[39] Does this mean that the U.S. is conducting a beggar-thy-neighbor policy that hurts other countries? I do not see it that way. A weaker currency is a normal consequence of more expansionary policy in an open economy. Each of the countries affected has the option of adjusting its own monetary policy in response. All countries cannot depreciate their currency against each other, but all countries can conduct more expansionary policy if they prefer, with conventional (lower policy rates) or unconventional methods (such as asset purchases). More expansionary monetary policy will increase real activity, world trade, and imports, which in a situation of underutilized resources is to the benefit of all. Monetary policy is not a zero-sum game.

Concerns that the Federal Reserve's balance sheet would be more exposed to possible capital losses
Large holdings of long Treasury bonds may imply realized capital losses if those holdings are sold at higher interest rates and lower prices. However, any capital loss on Treasury bonds for the Federal Reserve is a (possibly unrealized) capital gain for the Treasury, so the consolidated government sector is not affected. If the Federal Reserve makes capital losses that are considered a problem, then a possible solution is that the Federal Reserve is compensated by the authority that makes corresponding gains. Also, since the Federal Reserve can raise the interest on reserves, it need not sell assets to tighten policy but can keep them to maturity. Furthermore, central banks are different from commercial banks in that they can operate with negative capital, as long as the seignorage exceeds operating costs by a sufficient margin, so they have a positive cash flow. For the Federal Reserve to get a negative cash flow would require very high interest rates on reserves. Even then, the Federal Reserve could actually sell assets to finance the negative cash flow for a long time. Nevertheless, these facts do not preclude that capital losses for the Federal Reserve might cause political and/or communication problems.

7. The situation in June/July 2011
What was the situation a year later, at the FOMC's June meeting and the Riksbank's July meeting in 2011? Figure 7 shows the outcome and FOMC's forecast for PCE and core PCE inflation and the outcome and Riksbank's forecast for CPIF inflation. The FOMC's forecast for PCE inflation is above the mandate-consistent rate for 2011 but is below that rate for 2012 and 2013. The forecast for core PCE is below the mandate-consistent rate throughout the forecast period, consistent with the higher PCE inflation for 2011 being due to temporary factors.[40] The Riksbank's inflation forecast reaches the inflation target in 2013 but is on average below the target.

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[39] The tendency to depreciate the dollar is counteracted by the impact on the real exchange rate of the expansion of the real economy. As always, the exchange rate is affected by a number of shocks that are difficult or impossible to identify.
[40] In the June 2011 minutes (FOMC 2011a), the FOMC provided the following clarification: "In the discussion of inflation in the statement, members decided to reference *inflation* – meaning overall inflation--rather than *underlying inflation* or *inflation trends*, in order to be clear that the Committee's objective is the level of overall inflation in the medium term." This indicates that the FOMC puts little weight on developments of PCE inflation in the short term.

Figure 7. Inflation forecasts; FOMC and Riksbank; June/July 2011
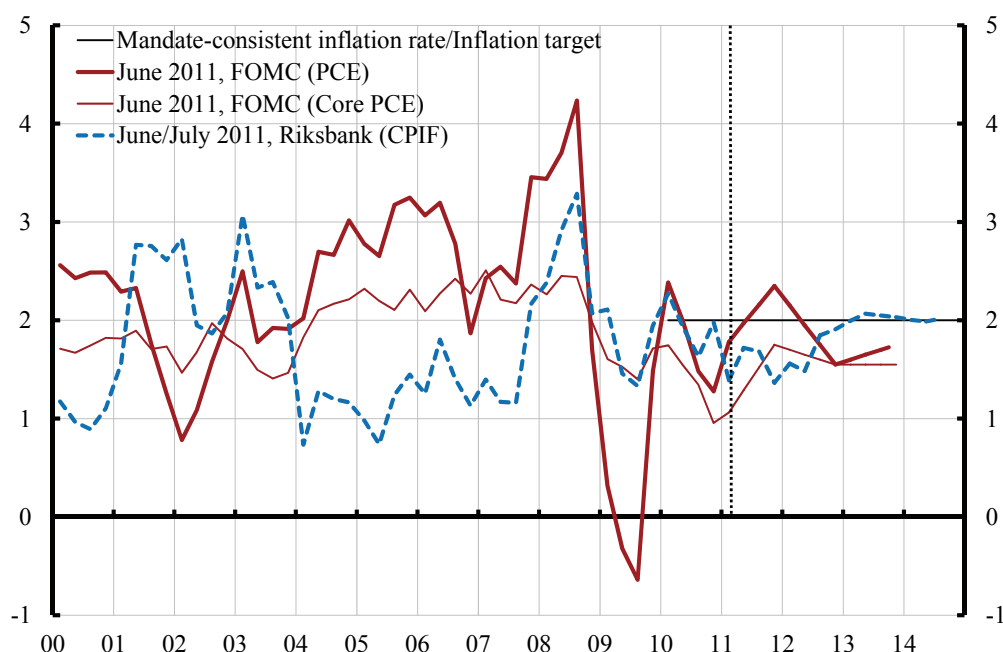
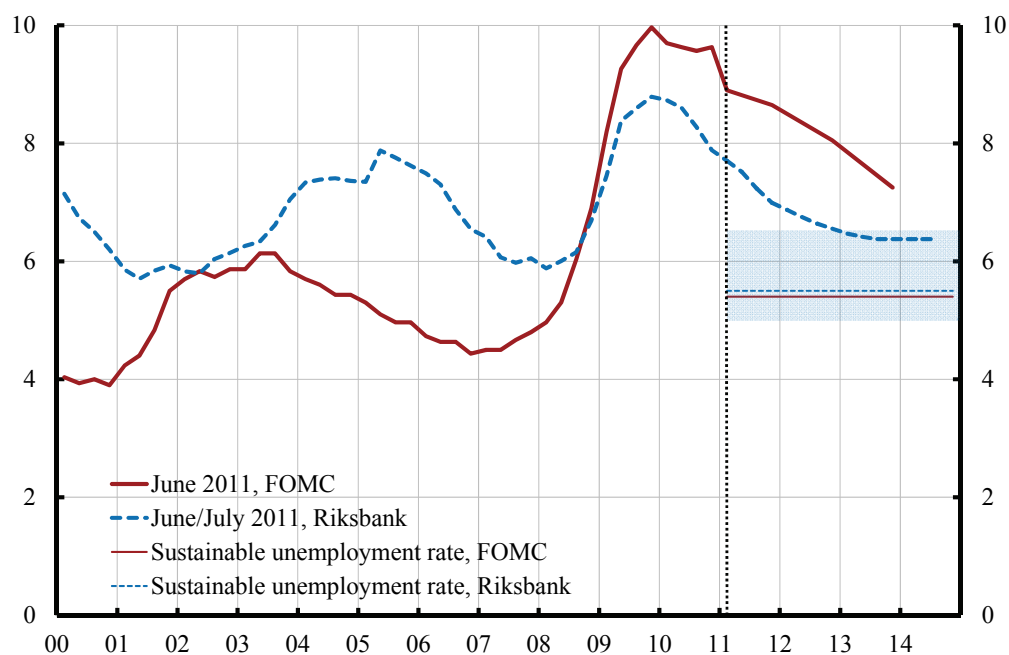Sources: The Bureau of Economic Analysis, the FOMC, the Riksbank, and Statistics Sweden

Figure 8 shows the FOMC's and the Riksbank's unemployment forecast. The FOMC's estimated sustainable unemployment rate is set to 5.4 percent.[41] This is higher than the estimate in June 2010, which was 5.1 percent. The sustainable unemployment rate is marked as the thin red line in figure 8.

The Riksbank estimated unemployment rate was still 6.5 percent. In October 2010, I revised my preliminary estimate of the sustainable unemployment rate down from between 6 and 7 percent to 5.5 percent, in line with Forslund (2008) and after consultation with Swedish labor-market experts. This is marked as the thin dotted blue line in figure 8. The National Institute for Economic Research had an estimate of about 6.5 percent in June 2010. In March 2011, it revised its estimate down to just above 6 percent. In May, it published a report that estimated the sustainable unemployment rate at either 6 or 5 percent, depending on how the wage-formation process would work. In April 2011, the Ministry of Finance published an extensive analysis of the effects of the substantial structural reforms, tax changes, and other factors that have an impact on the sustainable unemployment rate. It arrived at an estimate of 5 percent. I consider this study the best analysis so far. Thus, my own preliminary estimate is now approximately the midpoint between that of the Ministry of Finance and the National Institute of Economic Research. The range of estimates is marked by the light-blue range in figure 8.[42]

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[41] The median of the FOMC participants' projection of the longer-run unemployment rate falls in the interval 5.35 to 5.55, with midpoint 5.45. I round this to 5.4.
[42] National Institute of Economic Research (2010, 2011a) (estimates of sustainable unemployment are included in the longer Swedish version of the publication), National Institute of Economic Research (2011b), Ministry of Finance (2011a, b).

Figure 8. Unemployment forecasts; FOMC and Riksbank; June/July 2011

Sources: The Bureau of Economic Analysis, the FOMC, the Riksbank, and Statistics Sweden

The FOMC's unemployment forecast is above the sustainable unemployment rate. The Riksbank's unemployment forecast is on average above the light-blue range of estimates of the sustainable unemployment rate. It is clearly above the estimates of the NIER, the Ministry of Finance, and my estimate of 5.5 percent.

In this situation, the FOMC kept its policy rate unchanged and announced: "To promote the ongoing economic recovery and to help ensure that inflation, over time, is at levels consistent with its mandate, the Committee decided today to keep the target range for the federal funds rate at 0 to 1/4 percent. The Committee continues to anticipate that economic conditions – including low rates of resource utilization and a subdued outlook for inflation over the medium run – are likely to warrant exceptionally low levels for the federal funds rate for an extended period. The Committee will complete its purchases of $600 billion of longer-term Treasury securities by the end of this month and will maintain its existing policy of reinvesting principal payments from its securities holdings."[43]

Instead, the Riksbank continued to raise the policy rate, this time from 1.75 percent to 2.0 percent, and announced: "The Executive Board of the Riksbank has decided to raise the repo rate by 0.25 percentage

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[43] In the August 9, 2011 statement, after the outlook had deteriorated significantly during the summer, the FMOC increased the extended period and announced that it anticipated that economic conditions were likely to warrant "exceptionally low levels for the federal funds rate at least through mid-2013."

points to 2.0 per cent to stabilise inflation around the target of 2 per cent and resource utilisation around a normal level. The forecast for the repo rate is held unchanged." Karolina Ekholm and I dissented.[44]

In figure 9, the solid red line shows the federal funds rate and market expectations of future federal funds rates after the announcement of the policy decision. The market expects the federal funds rate to be exceptionally low for more than another year. The dashed blue line shows the Riksbank's repo rate and the forward-rate curve. The dotted blue line shows the announced policy-rate path. The market expects a noticeably lower policy-rate path, more than 100 basis points lower at the end of the forecasting period.

Figure 9. Policy-rate, policy-rate expectations and policy-rate path; FOMC and Riksbank; June/July 2011
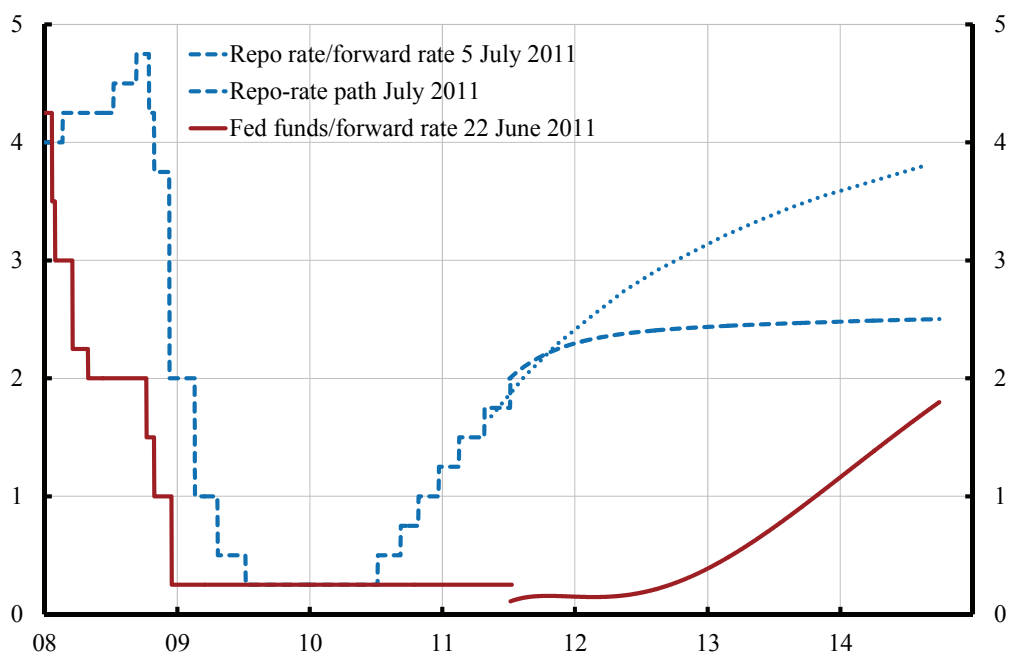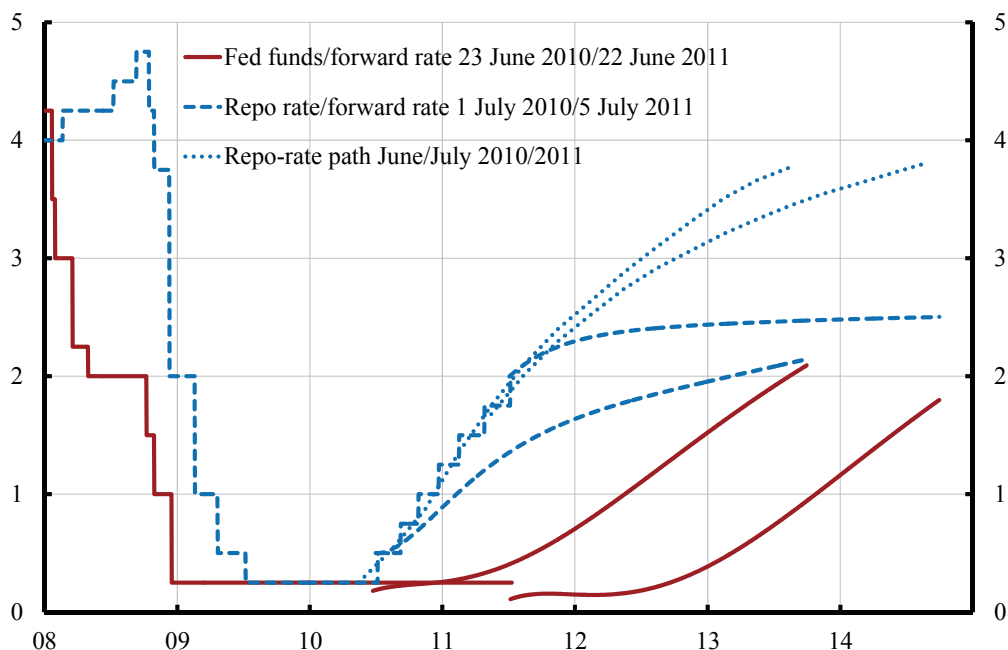

Sources: Reuters EcoWin and the Riksbank.

Figure 10 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

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[44] As stated in the press release, we "preferred a repo rate equal to 1.75 per cent and a repo rate path that first rises slowly to 2 per cent in the third quarter of 2012 and then rises faster to about 3.8 per cent by the end of the forecast period. This is motivated by [our] assessment that the Report's forecasts for foreign policy rates and Swedish resource utilization are both too high. [Our] repo rate path would imply CPIF inflation closer to 2 per cent and a faster reduction of unemployment towards a longer-run sustainable rate."

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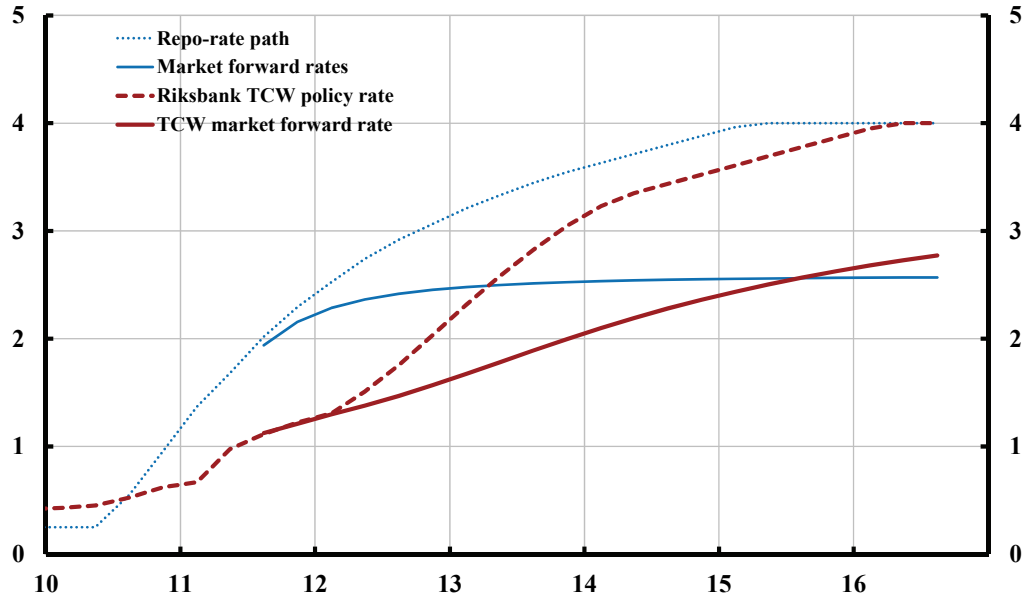

Sources: Reuters EcoWin and the Riksbank

Why is the Riksbank policy-rate so high?

One reason for the high Riksbank policy rate is a high forecast for foreign policy rates. In figure 11, the solid thick red line shows market expectations of future foreign policy rates, more precisely TCW-weighted (that is, Swedish trading-partner weighted) foreign policy rates.[45] The dashed red line is the forecast for foreign policy rates adopted by the Riksbank. Karolina Ekholm and I consider it more appropriate to adopt a forecast for foreign policy rates that starts from market expectations and is then adjusted according to any further information about foreign monetary-policy intentions. The Riksbank's forecast for foreign policy rates has arguably been systematically too high for a long time. Figure 12 shows that this was the case also in June/July 2010.

Figure 13 shows TCW-weighted policy rates, Riksbank forecasts, and implied forward rates from 2009 through July 2011. Riksbank forecasts have been much above the implied forward rates. The forward rates have not been very good forecasts, but they have been much better forecasts than the Riksbank ones.

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[45] The solid red curve shows market expectations of future foreign policy rates as indicated by adjusted implied market forward rates. (The curves have been extended beyond the standard three-year horizon by me.)

Figure 11. Riksbank policy-rate forecasts and market forward rates, July 2011
Percent

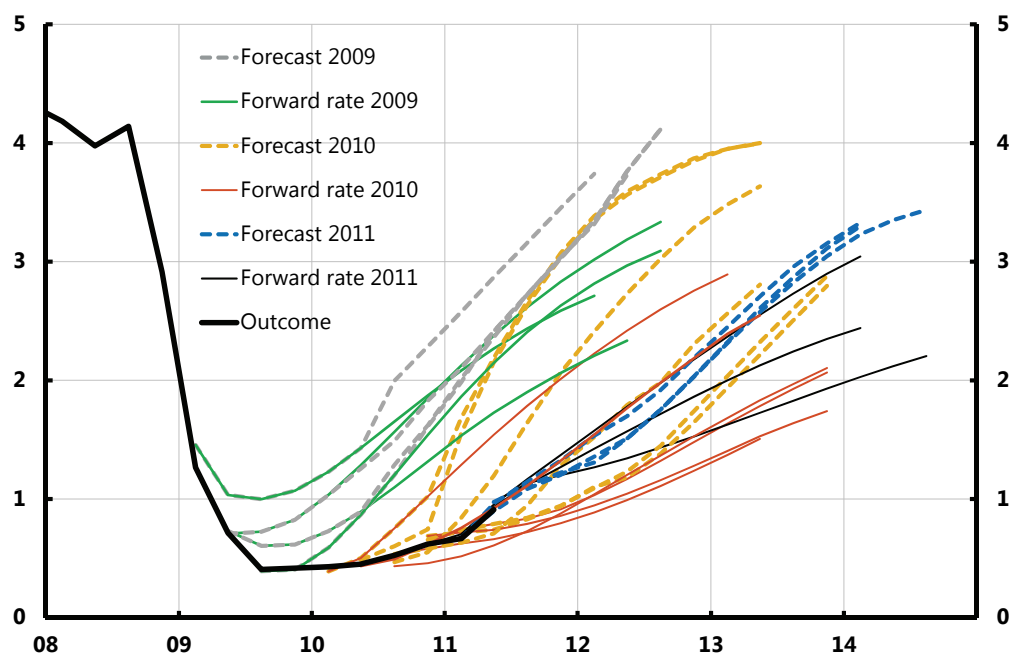Sources: Reuters Ecowin, the Riksbank, and own calculations

Figure 12. Riksbank policy-rate forecasts and market forward rates, June/July 2010
Percent
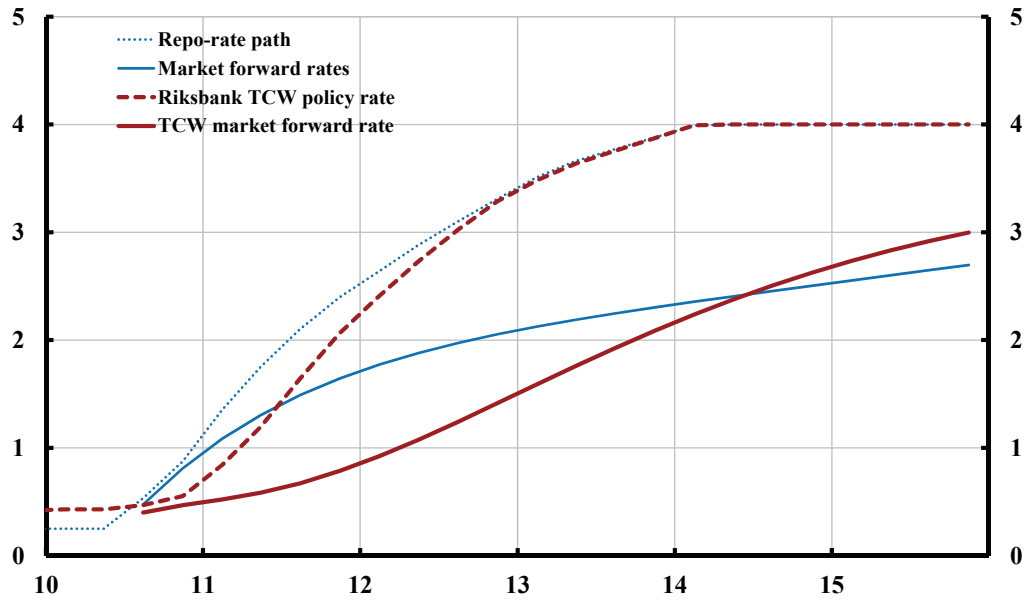
Sources: Reuters Ecowin, the Riksbank, and own calculations

A box in the *Monetary Policy Report the October 2010* mentions as reasons for the Riksbank's high forecast of policy rates: "It is also difficult, on the basis of current information, to draw the conclusion that the neutral equilibrium interest rate has become much lower. More data is required before it is possible to comment on this with any great certainty. A further reason is that normal historical patterns for interest rates (for instance, Taylor rules of various types) indicate that interest rates should be much higher than is indicated by the implied forward rates. Finally, other measures of monetary policy expectations, such as surveys, point to higher interest rates. In these comparisons, the implied forward rates appear to be exceptionally low." (p. 52) But the sluggish development in the U.S. and Europe in spite of exceptionally low interest rates indicate precisely that neutral interest rates are indeed very low for the U.S. and Europe. The current situation in the world may be so special that the standard models do not apply very well. They have been estimated on normal periods, and they may not include features essential in the current situations, such as the possibility of very low neutral real interest rates. If reality and models differ, it is reality that should count. When it comes to surveys versus markets rate, behind the market rates are people who put their money where their mouth is, which is not the case for survey respondents.

Figure 13. TCW-weighted foreign policy rates, Riksbank forecasts and implied forward rates

Sources: Reuters Ecowin and the Riksbank.

A too high forecast for foreign policy rates leads to a bias towards a too high repo-rate path, all else equal. A higher policy-rate path for foreign rates, all else equal, leads to a weaker forecast for the krona via a lower interest-rate differential between Sweden and abroad. The Swedish repo-rate path must be higher to counteract this.

Put differently, a higher forecast of policy rates implicitly implies assuming a higher foreign term structure of interest rates and a higher forecast of the future foreign term structure of interest rates. This means effectively assuming tighter current foreign financial conditions and forecasting tighter future

foreign financial conditions. All else equal, this implies a bias towards tighter financial conditions in Sweden.

A second source of upward bias in the policy-rate path is a possible overestimation of the sustainable unemployment rate (see above) and the underestimation of potential output. The Riksbank's measures of potential output have shifted down substantially relative to pre-crisis levels (figure 4). This implies a less negative output gap and a bias towards higher resource utilization. If the shock to the Swedish economy is mainly a shock to aggregate demand through a fall in exports, it is not clear that potential output would fall very much. In figure 4, potential output for September 2008 and June/July 2010 are constructed with an HP filter, which has a well-known endpoint problem, which implies that the output gap always tends to be closed at the end of the forecast horizon. Potential output for July 2011 is constructed with a production-function approach, but it retains the properties of an HP filter, and potential productivity is still estimated with an HP-filter. From an economic point of view, it is not clear why potential output would be affected so much by an aggregate-demand shock. Nor is it clear why potential output would be adjusted so much back in time, so that in June/July 2010 the fourth quarter of 2007 would be considered a boom as high as the recession in the first quarter of 2009 was deep. Particularly when in September 2008 the previous boom was considered quite moderate.

In figure 14, the thin lines show the CBO's estimates and forecasts of potential output of September 2008 and August 2010 and 2011, together with FOMC GDP forecasts of GDP in June 2008, 2010, and 2011. It is noticeable that the CBO does not adjust past estimates of potential output as much as the Riksbank and that the CBO estimates and forecasts do not look like HP filters. For these reasons, as discussed in Svensson (2011a), I have become skeptical about Riksbank estimates of potential output and regard the gap between unemployment and the sustainable unemployment rate as a more robust, reliable, and transparent indicator of resource utilization as a target variable.

The Riksbank maintains that it adopts a broad approach to the analysis of resource utilization and that there is no single measure that reflects this overall assessment. The Riksbank's final assessment of resource utilisation is instead qualitative in nature and is often expressed as "higher than normal," "normal," or "lower than normal." Nevertheless, the policymakers are of course influenced by the quantitative measures and in the end they have to make quantitative decisions on the impact on the policy rate.[46] Although the output gap is only one of the indicators used by the Riksbank, it is representative and similar to several others, so underestimation of potential output will have an impact on the Riksbank's overall assessment of resource utilization.

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[46] As stated in the box "The driving forces behind trends in the economy can be analysed using a production function" in the *Monetary Policy Report October 2010* (p. 56): "The Riksbank has chosen to adopt a broad approach to the analysis of resource utilisation and presents a number of different indicators of resource utilisation in its Monetary Policy Reports and Monetary Policy Updates. Some of these indicators come from surveys in which the respondents are asked about the current situation or future prospects in their companies. Other indicators, such as the employment rate or unemployment, can say something about how strained the situation is on the labour market as a whole. Another indicator is the production gap. This is used to try to estimate how total production relates to what can be assumed to be a normal level. On the basis of all these indicators and other information, the Riksbank makes an overall assessment of resource utilisation. There is no single measure that reflects this overall assessment. The Riksbank's final assessment of resource utilisation is instead qualitative in nature and is often expressed as 'higher than normal', 'normal' or 'lower than normal'."

Figure 14. Output and potential output; FOMC and CBO; June/September 2008 and June/July 2010
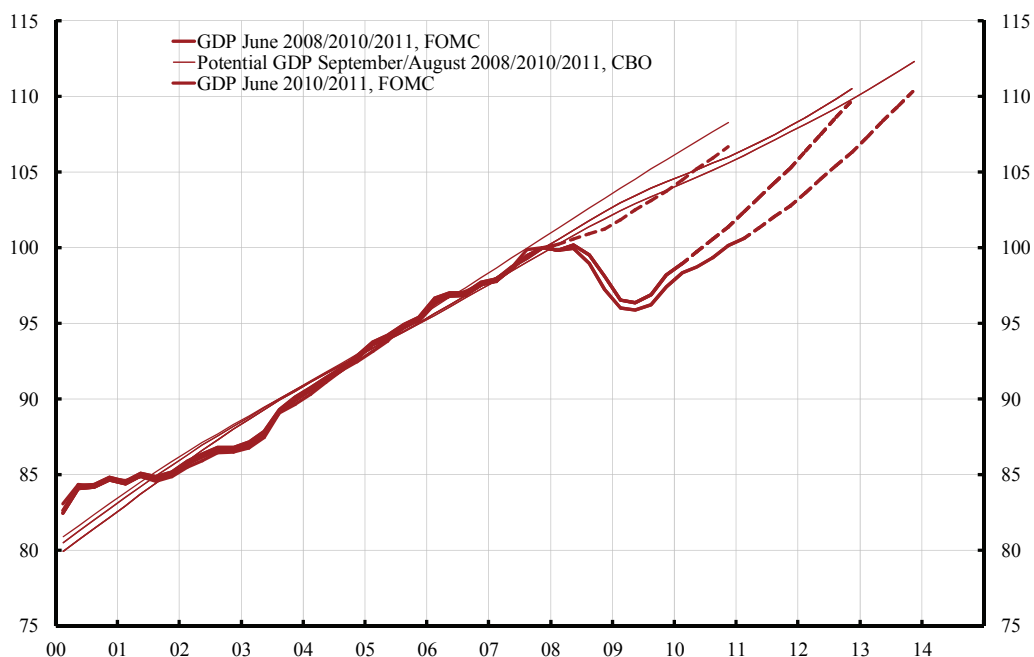
Sources: The CBO, the FOMC, the Riksbank, and Statistics Sweden

Appendix A2 shows Riksbank policy alternatives in July 2011 under the assumption of forecasts of foreign policy rates in line with market forward rates and a sustainable unemployment rate of 5.5 percent. These alternatives are also discussed in the minutes of the July 2011 meeting (Sveriges Riksbank 2011a).

Why did the growth in GDP and fall in unemployment in Sweden during 2010 exceed the forecasts?
As reported above, at the June/July 2010 meeting the Riksbank began to raise the repo rate and tighten monetary policy, despite the CPIF forecast undershooting the target and despite the forecasts for all measures of resource utilisation falling below normal levels. The Riksbank thus began to raise the repo rate despite monetary policy not being well-balanced to begin with, and despite Jan Qvigstad's (2005) criterion for a well-balanced monetary policy not being met.

Under these conditions one might expect that the development of the real economy would be rather poor. Instead, GDP growth in 2010 was higher than expected. This is shown in figures 4 and 5. Although GDP in July 2011 is just above the pre-crisis level, it has increased much more than the forecast in June/July 2010. Unemployment, although still high, has also come down more than forecast in June/July 2010, as can be seen when comparing figures 2 and 5. Does the better-than-expected development up to July 2011 mean that the policy tightening that began in June/July 2010 was not wrong but right? Was the policy tightening right or wrong ex post?

Recall that when evaluating past policy it is necessary to distinguish between evaluation ex ante and ex post. Evaluation ex ante means assessing policy taking into account only the information available to the policymaker at the time of the decision. Evaluation ex post means assessing policy also taking into account the information that becomes available after the policy decision, that is, evaluating the policy after the fact.

38

Evaluation ex ante is more relevant when assessing the quality of policy decisions. Evaluation ex post, although still interesting, largely means assessing whether the policymaker was lucky or unlucky.

But the question remains, if the better performance of the Swedish economy had been known at the June/July policy meeting, would it have been right to start the policy tightening? My answer is no. Because a year later, in July 2011, inflation and the inflation forecast, although higher, were still too low, and unemployment and the unemployment forecast, although lower, were still too high. More expansionary policy in June/July 2010 would have resulted in a better outcome, with inflation higher and unemployment lower.

But why has the Swedish economy developed better during the last year than anticipated in the summer of 2010? Sveriges Riksbank (2011c) mentions higher-than-expected export, domestic demand, and productivity. A possible partial explanation (not mentioned in Riksbank 2011c) for higher-than-expected aggregate demand is that *actual* financial conditions have been substantially more expansionary than the *intended* financial conditions. Here, as discussed in section 1, by the actual financial conditions I mean the actual market term structure of interest rates, whereas by the intended financial conditions I mean the market term structure of interest rates that would be consistent with a credible policy-rate path and normal term premiums. From the beginning of 2010 until July 2011, a Swedish five-year interest rate was on average about 85 basis points lower than the average level consistent with a credible policy-rate path and normal term premiums. This means that actual financial conditions were much more expansionary than the intended ones. Thus, the Swedish economy may have benefited from the market effectively implementing a more expansionary policy than the one intended by the Riksbank. But since the inflation forecast is still too low and the unemployment forecast too high, even more expansionary policy would have been better.

We can see this in the following way. In figure 15, the dotted blue line shows the yield curve that is compatible with the repo-rate path in figure 9 (and in figure 11); that is the yield curve that would arise if the repo-rate path was fully credible and credit and forward premiums were normal.[47] This yield curve represents the intended financial conditions. The solid thin blue line in figure 15 shows the actual yield curve in July 2011. This represents the actual financial conditions. It corresponds to the dashed blue line in figure 9 (and the solid thin blue line in figure 11), the market expectations according to implied forward rates. When there is a discrepancy between the announced policy-rate path and the actual financial conditions, it is the solid thin blue line in figure 15 that affects the Swedish economy, not the dotted blue line. According to the solid thin blue line the five-year rate is about 100 basis points lower than the five-year rate compatible with the repo-rate path. A five-year rate that is 100 basis points lower entails actual financial conditions that are much more expansionary than the intended ones. An increase of the five-year interest rate by 100 points would be very bad for the Swedish economy and negatively affect the recovery. The krona would appreciate substantially and affect exports negatively. In terms of the equivalent policy-rate increase, a regression of the five-year rate on a three-month rate indicates that a factor of 2 to 3 may

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[47] Recall that expected future short rates equal the forward rate less the forwards term premium. Thus, with normal positive term premiums, market expectations of future short rates are a bit below the forward rate curve. When term premiums vary and are substantial, one needs to treat market expectations of future short rates and the term structure of interest rates separately.

be appropriate. Then, an increase of 100 basis points in the five-year rate is equivalent to an increase in the policy rate of between 200 and 300 basis points.

Figure 15. Yield curves, June/July 2011
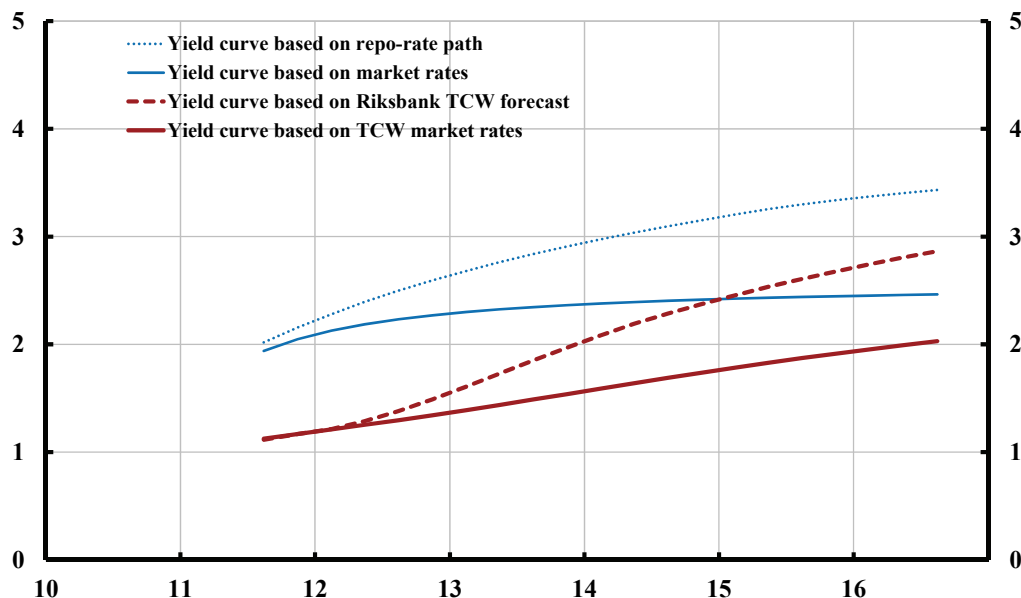
Sources: Reuters Ecowin, the Riksbank, and own calculations

The five-year rate has been substantially below the level consistent with the policy-rate path since February 2010. Figure 16 shows the situation in June/July 2010. The five-year rate was then more than 100 basis points lower than the level consistent with the policy-rate path. From the beginning of 2010 until now, the five-year rate has been on average almost 85 basis points lower than the level consistent with the policy-rate path. This is equivalent to a fall in the policy-rate path by between about 175 to 250 basis points. The actual financial conditions have thus been much more expansionary than the intended ones. This could be a large part of the explanation as to why growth was unexpectedly high in 2010. If the five-year rate had been on average 85 points higher, the krona would all else equal have appreciated substantially and the recovery would probably have come to a halt.

One could say that the Riksbank's repo-rate path does not pass what one can call the "credibility test." It would not have been good for the Swedish economy if the repo-rate path had become credible and the five-year rate attained a level compatible with the repo-rate path.

Figure 16. Yield curves, June/July 2010
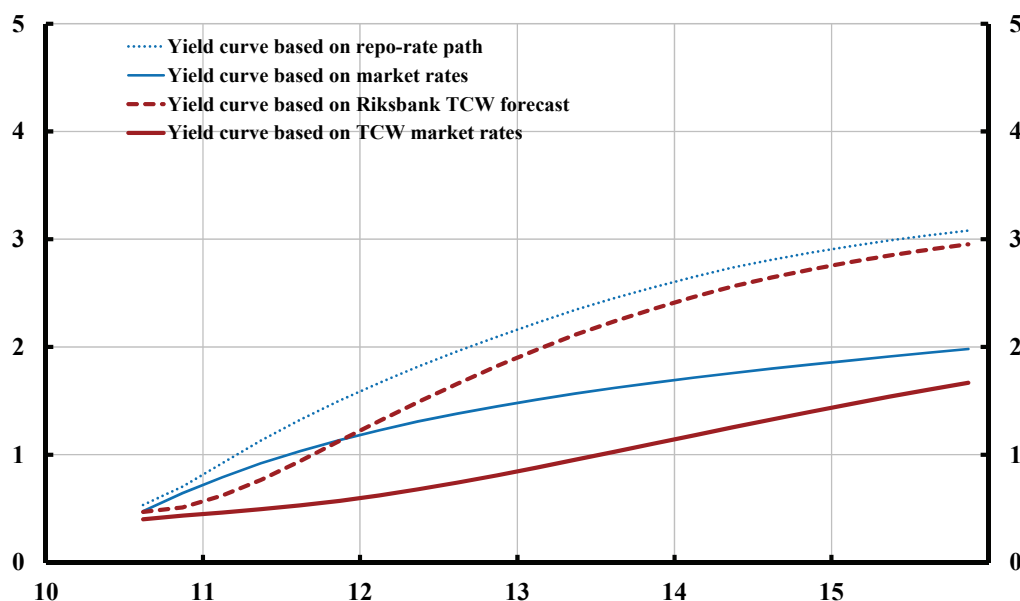
Sources: Reuters Ecowin, the Riksbank, and own calculations

As mentioned, the effect of lower long-term rates has been discussed at length in the United States, in connection with the discussion of the effects of QE. A common view is that QE in total may have reduced ten-year rates by around 50 basis points or more, primarily by lowering forward premiums. According to several analyses (Chung, Laforte, Reifschneider, and Williams 2011, Curdia and Ferraro 2011, Fuhrer and Olivei 2011, Yellen 2011b) this may have had significantly positive effects on the U.S. economy and prevented unemployment from being even higher and inflation from being even lower. With a factor of 4 (as in Bernanke 2011), the 50 basis points lower 10-year rate is equivalent to a reduction of the federal funds rate of about 200 basis points. The Swedish economy may be at least as sensitive to long-term rates as the U.S. economy, as exports and the exchange rate play a more important role in Sweden. As mentioned, with a factor of 2 to 3, the 85 basis points lower five-year rate would be equivalent to a fall in the policy rate of about 175 to 250 basis points.

8. Conclusions

In this paper, I have started from the observation that, in the summer of 2010, the Federal Reserve and Riksbank forecasts for inflation and unemployment were quite similar. The forecasts for inflation were below the Federal Reserve's mandate-consistent rate and the Riksbank's inflation target, and the forecasts for unemployment were above a sustainable unemployment rate. This situation seems to call for more expansionary policy, if more expansionary policy is feasible. But the Federal Reserve and the Riksbank chose dramatically different policies. The Federal Reserve maintained a minimum policy rate, communicated possible future easing, and later in the fall launched QE2. The Riksbank started a period of rapid policy tightening. I have examined the arguments against policy easing by the Federal Reserve and the arguments in favor of policy tightening for the Riksbank and have found them unconvincing. Thus, in comparison I find that the Federal Reserve in easing policy did the right thing, while the Riksbank in tightening policy did the wrong thing.

As a partial explanation of the Riksbank's high policy-rate path, I have pointed to a possible bias in the Riksbank forecast of foreign policy rates, which are much higher than foreign implied forward rates. This effectively implies an assumption and a forecast of the foreign term structure of interest rates much above the actual foreign term structure of interest rates. I have also argued that the Riksbank's estimate and forecast of potential output are problematic and in recent years imply a bias towards too high estimated and forecasted resource utilization. The unemployment gap between unemployment and an estimate of the sustainable unemployment rate is a more reliable and transparent indicator of resource utilization. Ambiguity regarding the stabilization of GDP growth or the level of resource utilization may also be part of an explanation of the high policy-rate path of the Riksbank. A year later, the Swedish economy has developed better than expected, whereas the U.S. economy has developed worse than expected. The good Swedish development may to a considerable extent be explained by the market implementing much easier financial conditions than those consistent with the Riksbank's policy-rate path and implicitly intended by the Riksbank.

What are the broader conclusions from these examples of practical monetary policy? A simple and transparent monetary policy framework has great benefits. The dual mandate of the Federal Reserve and the flexible inflation targeting of the Riksbank provide such frameworks. They boil down to "forecast targeting," that is, setting the policy rate and choosing a policy-rate path (and managing the balance sheet to affect the term structure of interest rates and thereby the financial conditions) so as to best stabilize the forecast of inflation around the mandate-consistent inflation rate/inflation target and the forecast of resource utilization around a sustainable level. Furthermore, an inflation index, a measure of resource utilization, and a measure of stability need to be specified. It is important not to confuse measures of resource utilization to be used as an indicator of inflationary pressure and as a target variable. As the latter, the unemployment gap between unemployment and the sustainable unemployment rate seems to be more reliable and transparent than the alternatives. I am convinced that the framework is more effective if only one inflation index and only one measure of resource utilization is chosen. With multiple inflation and resource-utilization measures, the framework becomes more opaque and accountability becomes difficult to enforce. With many measures, policymakers can often find at least one or two that are close to the desired level and thus motivate quite different policies.

Such a simple and transparent framework is a great help to policymakers in making the right decision and motivating this decision. Publication of the forecasts of inflation and resource utilization also makes external evaluation easier and more effective, and it makes it possible to hold powerful and independent policymakers accountable for their decisions. This paper and its comparison of Federal Reserve and Riksbank monetary policy could not be written without the public availability of Federal Reserve and Riksbank forecasts.

I remain quite suspicious of arguments that a lack of instruments, policy ineffectiveness, or other concerns are reasons why one should not try to best stabilize the forecasts of inflation and resource utilization around their desired levels. Such arguments often seem too vague to be convincing.

Regarding the ongoing debate about the general role of financial-stability concerns in monetary policy, I am not aware of any evidence for Sweden that low policy rates pose risks to financial stability. Furthermore, the general literature on the connection between monetary policy and financial stability seems to largely miss the fact that monetary policy can only achieve temporary deviations of the short real rate from the neutral real rate, which depends on other things than monetary policy, so monetary policy is

not responsible for the real rate over a longer period. In almost all cases, there are better instruments for dealing with financial stability than the policy rate. Indeed, financial(-stability) policy and monetary policy are quite distinct. Financial policy has its objective (financial stability), its set of instruments (micro- and macroprudential instruments, credit easing, and lending of last resort), and its responsible authority or authorities (which vary a lot from country to country and may still work well). Monetary policy has its objective (stabilizing inflation and resource utilization), its instruments (the policy rate and the management of the size and composition of the balance sheet of the central bank), and its responsible authority (the central bank). As with fiscal policy and monetary policy, I believe financial policy and monetary policy should normally be handled separately, each taking the other into account as in a Nash equilibrium rather than in a coordinated equilibrium. I am convinced that monetary policy should only be the last line of defense of financial stability when other possibilities have been extinguished.

In retrospect, the policy tightening by the Riksbank in the summer of 2010 was followed by a better-than-expected outcome for the economy during the following year, whereas policy easing by the Federal Reserve at the same time was followed by a worse-than-expected outcome. Does this mean that Riksbank policy was right and Federal Reserve policy was wrong? I think not. Rather, I think that for the Riksbank it is a case of the wrong policy followed by good luck and for the Federal Reserve a case of the basically right policy followed by bad luck. It is important to remember that the economy is affected by a lot of other things besides monetary policy. Monetary policy affects the economy with a lag, and the outcome is affected by many different intervening shocks. But good monetary policy should move the economy in the right direction, all else equal. The Riksbank's good luck includes higher-than-anticipated domestic and export demand and upward revisions of GDP data. Also, the big shock during the crisis was an aggregate demand shock stemming from a collapse of exports and there are no structural problems. This facilitates a bounce-back of the economy. Importantly, the market implemented much more expansionary financial conditions than those consistent with the Riksbank's policy-rate path. The Federal Reserve's bad luck includes fiscal-policy problems (too large a subject to go into here), a slower recovery of the housing market, and substantial downward revisions of GDP data.

I find it very helpful to distinguish between ex ante and ex post evaluations of policy. Ex ante evaluation means evaluating policy while taking into account only the information available to the policymaker at the time of decision. Ex ante evaluation is most relevant when assessing the quality of decisions. Given the available information, was policy right or wrong? For the monetary frameworks of the Federal Reserve and the Riksbank, the most relevant available information consists of the forecasts of inflation and resource utilization. Therefore, the publication of those forecasts is essential for external evaluation. Ex ante evaluation can be performed in real time as soon as the forecasts are available.

Ex post evaluation means evaluating policy while also taking into account information that became available after the policy decision was made. In ex post evaluation, the most interesting question is usually not whether, given ex post information, the policy was right or wrong. It is self-evident that policy mostly could have been better if ex post information had been available ex ante. In ex post evaluation, the most relevant issues are more often to identify the relevant unanticipated shocks and explain how they have impacted the outcome, whether policymakers could have anticipated such shocks, whether the forecasts of inflation and resource utilization have been biased, and whether any information about potential later shocks or problems was disregarded.

Still, it may be of some interest to ask in what direction policy should have been adjusted, had later developments been known. In the Swedish case, although the inflation forecast was subsequently higher, it was still too low, and although the unemployment forecast was subsequently lower, it was still too high. Therefore, even ex post more expansionary policy was warranted in the summer of 2010. Only if the economy had subsequently become subtantially overheated, with current and forecast inflation too high and current and forecast unemployment unsustainably low, could it be argued that policy in the summer of 2010 should have been tightened. In the U.S. case, the inflation forecast was subsequently higher but still too low, and the unemployment forecast was subsequently higher and even more too high. This certainly does not imply that policy should not have been loosened in the summer of 2010. Thus, if ex post inflation and unemployment forecasts are still too low and too high, respectively, earlier policy should not have been less expansionary. Arguably, ex post it should have been more expansionary, both in Sweden and in the United States, even though the outcome was better than expected for Sweden and worse than expected for the United States.

Appendix

A1. 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,

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

A2. Riksbank policy alternatives in July 2011

Figure A1 (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.[48]

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

Figure A1. 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.

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 red 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 7, since the latter is conditional on a higher forecast for foreign policy rates. The lower repo-rate path gives a

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[48] [Figure to be adapted to black-and-white printing.]

CPIF forecast – the blue 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 red line shows unemployment under the Riksbank's repo-rate path. The lower blue 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 blue line is much lower than the red 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.

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