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Transparency under Flexible Inflation Targeting: Experiences and Challenges

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ABSTRACT

I report some personal views and reflections on transparency experiences and transparency challenges following my first year and a half as Deputy Governor at Sveriges Riksbank regarding (1) flexible inflation targeting, (2) the role of transparency in inflation targeting and committee decisions on instrument-rate paths, (3) the management of interest-rate expectations, and (4) the publishing of attributed minutes. I also mention some future developments and improvements in transparency and flexible inflation targeting that I believe would be desirable.

1. Introduction

This paper reports some personal views and reflections on transparency experiences and transparency challenges following my first year and a half as Deputy Governor and Executive Board Member of the Riksbank. They are eclectic and preliminary first words, not my final word on the topic.

The paper is organized as follows. Section 2 discusses flexible inflation targeting, section 3 discusses the role of transparency in inflation

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targeting, section 4 reviews the arguments for and against publishing instrument-rate paths, and section 5 discusses aspects of committee decisions on instrument-rate paths and some of my experience from decision-making on the Riksbank's Executive Board. Section 6 reviews the Riksbank's management of interest-rate expectations, and section 7 discusses some aspects of having attributed minutes. Section 8, finally, mentions some future developments and improvements in transparency and flexible inflation targeting that I believe would be desirable. Appendices include a chronological list of important events in Riksbank communication and documents reporting the Riksbank's communication policy.

2. Flexible inflation targeting

Like other inflation-targeting central banks, the Riksbank conducts so-called flexible inflation targeting.[1] This means that the Riksbank conducts monetary policy so as to stabilize inflation around the inflation target, but it also attaches some weight to stabilizing the real economy. By stabilizing the real economy I mean stabilizing a measure of resource utilization, such as the output gap, properly defined. Flexible inflation targeting can then be represented by the standard quadratic loss function,

$$L_t = (\pi_t - \pi^*)^2 + \lambda(y_t - \overline{y}_t)^2,$$

where L_t denotes the loss in period t, π_t denotes inflation in period t, π^* denotes the inflation target, $\lambda > 0$ is the relative weight placed on output-gap stabilization, y_t denotes (log) output, $\overline{y}_t$ denotes (log) potential output, and $y_t - \overline{y}_t$ denotes the output gap in period t. Strict inflation targeting $(\lambda = 0)$, corresponding to King's (1997) "inflation nutter", would mean that the Riksbank only aims at stabilizing inflation around the inflation target without any concern for the stability of the real economy.[2] Maximum stability of inflation around the inflation target would require very aggressive contractionary or expansionary policy depending on whether inflation seems to fall above or below the inflation target and would cause a lot of instability of the real economy. No inflation-targeting central bank that I know of, and certainly not the Riksbank, behaves in this way. Real-world inflation targeting is always flexible inflation targeting $(\lambda > 0)$, not strict. The relative weight placed on the stability of the real economy, λ, may vary between different countries and central banks, but it is never zero.

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1 The terms "strict" and "flexible" inflation targeting were to my knowledge first introduced in a paper of mine presented at a conference at the Bank of Portugal in 1996, later published as Svensson (1999).

2 The term "inflation nutter" for a central bank that is only concerned about stabilizing inflation was introduced in a paper by Mervyn King at a conference in Gerzensee, Switzerland, in 1995. This was later published as King (1997).

When discussing flexible inflation targeting and the weight placed on stabilizing the real economy, it is important to remember that there is a crucial difference between the inflation target and the implied target for resource utilization. The inflation target is subject to choice by the central bank, government, or parliament. The central bank can achieve sustainable inflation at any nonnegative level. The central bank can affect both the average level and the stability of inflation. In contrast, the average level of resource utilization is not subject to choice. The central bank can only affect the stability of resource utilization, not its sustainable level. The central bank can only affect the stability of output around its normal level, not that normal level itself. What corresponds to a normal level of resource utilization is determined by other factors than monetary policy, such as technical change and the workings and efficiency of the economy.[3]

Some authors (for instance, Meyer 2004) have emphasized a suggested contrast between so-called hierarchical and dual mandates for central banks. Such a contrast is a red herring. Under flexible inflation targeting, regarding *average* inflation and *average* resource utilization (the *first* moments of these variables), there is a *hierarchical* mandate in the sense that there is an explicit central-bank target only for the former and the central bank cannot do anything about the latter. Regarding the *stability* of inflation and resource utilization, there is a *dual* mandate in the sense that the central bank tries to achieve both. Under flexible inflation targeting there is hence both a hierarchical and a dual mandate, and there is no conflict between the two. Whether the central bank's mandate is described as dual (as is often the case for the Fed) or as hierarchical (as is often the case for the ECB and the Riksbank), there is no implication that the implicit loss function or the actual policy is different in any essential way.[4]

We can see this in more detail by taking the unconditional mean, the (long-run) average of the loss function above. We then get

$$\mathrm{E}[L_t] = (\mathrm{E}[\pi_t] - \pi^*)^2 + \mathrm{Var}[\pi_t] + \lambda\, \mathrm{Var}[y_t - \bar{y}_t],$$

where $\mathrm{E}[\ ]$ denotes the unconditional mean (the [long-run] average), $\mathrm{Var}[\ ]$ denotes the unconditional variance and we have assumed that the unconditional mean of the output gap is zero, $\mathrm{E}[y_t - \bar{y}_t] = 0$ (when potential output is properly defined). That is, the average loss equals the sum of

[3] Except that very bad and unstable monetary policy, for instance with very high and variable inflation, will cause the market mechanism and the real economy to work less well and therefore reduce average resource utilization.

[4] See Svensson (2002) and (2004) for more discussion of this point.

three terms. The first term is the square of the gap between average inflation and the inflation target, the second term is the variance of inflation and the last term is the relative weight placed on output-gap stabilization times the variance of the output gap. The second and the third term represent the dual part of the mandate. There is substitution between the variance of inflation and the variance of the output gap, with λ being the marginal rate of substitution of inflation variance for output-gap variance. The first term represents the hierarchical part of the mandate. Only average inflation appears. In order to minimize this term, average inflation should just be set equal to the inflation target. There is no substitution between average inflation and average output or the average output gap.

Because of the lags between monetary-policy actions and the effect on inflation and the real economy, effective flexible inflation targeting has to rely on forecasts of inflation and the real economy. Flexible inflation targeting can be described as "forecast targeting". The central bank chooses an instrument-rate path so that the forecast of inflation and resource utilization "looks good." That the forecast "looks good" means that inflation is on target and resource utilization normal or, when inflation and/or resource utilization deviate from target and/or normal, respectively, inflation goes to target and resource utilization goes to normal at an appropriate pace.[5] From a more technical perspective, that the forecast "looks good" means that it is optimal in the sense of minimizing a standard intertemporal quadratic loss function that is the expected discounted sum of future period losses,

$$\mathrm{E}_t \sum_{\tau=0}^{\infty} \delta^{\tau} L_{t+\tau},$$

where E_t denotes expectations in period t and $0 < \delta < 1$ is a discount factor.[6]

Previously, flexible inflation targeting has often been described as having a fixed horizon, such as two years, at which the inflation target should be achieved. However, as is now generally understood, under optimal stabilization of inflation and the real economy there is no such fixed horizon at which inflation goes to target or resource utilization goes to normal. The horizon at which the inflation forecast is close to the tar-

[5] The idea that inflation targeting implies that the inflation forecast can be seen as an intermediate target was introduced in King (1994). The term "inflation-forecast targeting" was introduced in Svensson (1997), and the term "forecast targeting" in Svensson (2005). See Svensson and Woodford (2005) and especially Woodford (2007a, b) for more discussion and analysis of forecast targeting.

[6] In a situation with forward-looking private-sector expectations, the minimization of the loss function should be under so-called commitment in a timeless perspective. This means that the central bank behaves with a certain consistency over time and does not try to manipulate private-sector expectations for short-run benefits. See Svensson and Woodford (2005) for details and Bergo (2007) for an example of a real-world application for Norges Bank.

get and/or the resource-utilization forecast is close to normal depends on the initial situation of the economy, the initial deviation of inflation and resource utilization from target and normal and the nature and size of the estimated shocks to the economy (Faust and Henderson 2004, Giavazzi and Mishkin 2006, Smets 2003). In line with this, many or even most inflation-targeting central banks have more or less ceased to refer to a fixed horizon and instead refer to the "medium term".[7] With the linear models of the transmission mechanism that are standard for central banks, reasonable or optimal paths for inflation and resource utilization approach target and normal asymptotically. This makes it difficult to specify a horizon. From this point of view, half times (the time it takes to reduce the inflation or output gap by half) would have been better statistics than horizons. As noted in Svensson (1997, p. 1132):

> [S]ome weight on output[-gap] stabilization motivates a gradual adjustment of the … inflation forecast towards the … inflation target… The less weight on output[-gap] stabilization, the faster the adjustment towards the … inflation target.

In more technical terms, in a variant of the simple model of Svensson (1997), the inflation forecast that "looks good" in period t for inflation in period $t+\tau > t$, $\pi_{t+\tau,t}$, will satisfy

$$\pi_{t+\tau,t} - \pi^* = c(\lambda)(\pi_{t+\tau-1,t} - \pi^*) = c(\lambda)^{\tau}(\pi_t - \pi^*),$$

where the coefficient $c(\lambda)$ satisfies $0<c(\lambda)<$ and is an increasing function of the relative weight on output-gap stabilization, λ. That is, if inflation initially deviates from the inflation target, $\pi_t - \pi^* \neq 0$, the inflation forecast approaches the inflation target gradually so the deviation from the target of the inflation forecast τ periods ahead is a fraction $c(\lambda)^{\tau}$ of the initial deviation from the target. Thus, the inflation forecast approaches the target asymptotically and is in finite time never exactly equal to the target. The half-time, the number of periods after which the deviation has been halved, is then equal to the number – log 2 / log $c(\lambda)$.[8] If the half-time is

[7] The *Policy Target Agreement* for the Reserve Bank of New Zealand (2007) states that "the policy target shall be to keep future CPI inflation outcomes between 1 and 3 per cent on average over the medium term." The Bank of England states that "the MPC's aim is to set interest rates so that inflation can be brought back to target within a reasonable time period without creating undue instability in the economy." The Reserve Bank of Australia states "[m]onetary policy aims to achieve this [a target for consumer price inflation of 2-3 per cent per annum] over the medium term." Norges Bank states in its *Monetary Policy Report* that "Norges Bank sets the interest rate with a view to stabilising inflation close to the target in the medium term." In contrast, the Bank of Canada (2006) mentions a more specific target time horizon: "[T]he present policy of bringing inflation back to the 2 per cent target within six to eight quarters (18 to 24 months) is still appropriate generally, although specific occasions may arise in which a somewhat shorter or longer time horizon might be appropriate."

[8] The half-time T period is the solution to the equation $c(\lambda)^T = ½$ and will be an increasing function of λ.

one year, the deviation to the target at a one-year horizon is a half of the initial deviation, at a two-year horizon the deviation is a quarter and at a three-year horizon the deviation is an eighth of the initial deviation. If the initial inflation rate is 4 percent and the target is 2 percent, at a one-year horizon the inflation forecast is at 3 percent, at a two-year horizon the forecast is at 2.5 percent and at a three-horizon the forecast is at 2.25 percent. If the central bank puts less relative weight on output-gap stabilization (λ is lower), the coefficient $c(\lambda)$ is lower and the inflation forecast approaches the inflation target at a faster rate and shorter half-time, but still asymptotically. Thus, there is no specific horizon at which the inflation forecast reaches the target and, at any given horizon, the distance between the forecast and the target is proportional to the initial distance between inflation and the target. This behavior of the optimal inflation forecast is typical also for more complicated models of the transmission mechanism, such as Ramses, the Riksbank's dynamic stochastic general-equilibrium (DSGE) open-economy model (Adolfson, Laséen, Lindé, and Villani (ALLV) 2007).[9]

The above implies that imposing the constraint that the inflation forecast must equal the inflation horizon at a specific horizon, say two years, will lead to an inefficient policy, in the sense that removing the constraint will allow for more stable inflation without destabilizing the real economy, a more stable real economy without destabilizing inflation, or both more stable inflation and a more stable real economy.

After each policy decision, the Riksbank publishes and explains its interest-rate path and its forecast of inflation and the real economy, presented as mean forecasts with uncertainty intervals. Such publication is an example of the exceptionally high degree of transparency (in a historical perspective) that characterizes inflation targeting. Let me now turn to the role of transparency in flexible inflation targeting.

3. The role of transparency in flexible inflation targeting

What is the role of transparency in monetary policy in general and in flexible inflation targeting in particular? It is now well understood that monetary policy in general and inflation targeting in particular comprise what is

[9] In a more complicated model with several predetermined variables and shocks, the optimal inflation forecast will be a weighted sum of terms similar to the right-hand side in the above equation, with different initial sizes and coefficients c (eigenvalues), which may result in more complicated shapes of the inflation forecast. The optimal inflation forecast will still approach the inflation target asymptotically, sometimes with cycles of decreasing amplitude around the target, and for long horizon the term with the largest coefficient (eigenvalue) will dominate the shape of the inflation forecast. See Klein (2000) and Svensson (2007) for the solution of stochastic linear difference equations with forward-looking variables, optimal policies, and their properties.

called "management of expectations" (Woodford 2004, 2005). Monetary policy affects inflation and the real economy mainly through its effects on private-sector expectations about future interest rates, inflation and the real economy. Expectations of future instrument rates (the expected instrument-rate path) matter and affect the yield curve and longer nominal interest rates. Expectations of future inflation affect actual inflation and longer real interest rates. Expectations of future developments of the real economy and longer real interest rates affect current decisions and plans for the real economy. Thus, transparency makes monetary policy more effective in a direct way by enabling more effective management of private-sector expectations.

Interestingly, as emphasized by Blinder, Ehrmann, Fratzscher, De Haan, and Jansen (2008) and Blinder (2008b), in a hypothetical world of a fully-informed and rational private sector in a stationary environment with a stationary monetary policy, symmetric information between the central bank and the rest of the economy, and rational expectations, there is no specific role for central bank communication. The private sector would be fully informed about monetary policy and be able to make the best predictions of future policy. Any central-bank communication would be redundant. Many macroeconomic models assume this world, but the fact that we discuss the role of transparency and believe that transparency matters means that we have left this hypothetical world.

In the realistic situation of information asymmetry when the central bank knows more about its monetary policy and its policy intentions than the private sector, transparency about monetary policy can reduce private-sector uncertainty about monetary policy and make monetary policy easier to predict. One reason for information asymmetry about policy is that monetary policy may change, for instance, because new monetary policy committee (MPC) members have been appointed with a different interpretation of the central bank's mandate or because on-the-job learning and policy improvements better achieve the mandate. Furthermore, since the central bank normally devotes more resources to analyzing and forecasting the economy than any private-sector agent, transparency in the form of central-bank information about and forecasts of the economy in general may provide additional information to the private sector and hence reduce its uncertainty about the state and development of the economy.

Transparency also enables more effective external scrutiny and evaluation of monetary policy. This strengthens the incentive of the central bank to achieve its stated objectives and to provide good analysis

and decisions. This provides another role for transparency in monetary policy.[10]

Finally, independent central banks are powerful and headed by unelected officials. Transparency ensures more effective democratic accountability of these officials and banks. This is also important for the legitimacy of independent central banks in democratic societies (Blinder, Goodhart, Hildebrand, Wyplosz, and Lipton 2001).

The Riksbank is ranked among the world's most transparent central banks (Dincer and Eichengreen 2007, Eijffinger and Geraats 2006).[11] After much internal work, in May 2008 the Riksbank's Executive Board adopted an explicit communication policy for all the Riksbank's activities, not only monetary policy (Sveriges Riksbank 2008a, reproduced below as appendix 2). The communication of monetary policy was revised and is described in a separate appendix (Sveriges Riksbank 2008b, reproduced below as appendix 3). A separate document provides the Riksbank's detailed rules for communication (Sveriges Riksbank 2008c). These documents are all available on the Riksbank's website, www.riksbank.com. Thus, the Riksbank is not only very transparent; it is also very transparent about its transparency and communication.

4. Publishing instrument-rate paths

Publishing inflation and real-economy forecasts is already common among inflation-targeting central banks. The Fed has also taken steps toward publishing more informative forecasts by the FOMC. Publishing an interest-rate path is still relatively rare. The Reserve Bank of New Zealand (RBNZ) started doing this in 1997.[12] Norges Bank followed in 2005, the Riksbank in February 2007 (Ingves 2007, Rosenberg 2007), Sedlabanki Islands (the central bank of Iceland) in March 2007 (Sedlabanki Islands 2007), and the Czech National Bank in 2008 (Czech National Bank 2007).

Why is publishing an interest-rate path so rare? An interest-rate forecast or some assumption about the interest-rate path is necessary for an inflation and real-economy forecast. Central banks have used different assumptions about the interest-rate path, such as a constant interest rate or a path given by market expectations as revealed by the forward rates implied by the yield curve. A constant interest rate is often a conspicuously unrealistic and time-inconsistent interest-rate forecast. Implied for-

[10] In Faust and Svensson (2001), increased transparency induces the central bank to pursue a policy closer to the socially optimal one.

[11] Apel and Vredin (2007) provide a thorough account of the development of the Riksbank's transparency and communication up to the early spring of 2007. Geraats (2008) provides a detailed survey of transparency trends in central banking.

[12] The June 1997 *Monetary Policy Statement* of the RBNZ contains in table 2 (p. 10) and in figure 9 (p. 22) a projection of the nominal 90-day interest rate for the next three years.

ward rates may result in inflation and real-economy forecasts that do not "look good," and central banks using this interest-rate assumption have sometimes felt compelled to comment that an interest-rate path higher or lower than the implied forward rates would be more appropriate. A sizable literature has demonstrated the different problems that anything other than the central bank's best interest-rate forecast may lead to (see, for instance, Woodford 2007a).[13]

Furthermore, a published forecast of the interest rate is useful to the private sector and a better forecast is more useful to the private sector. The central bank should have an obvious information advantage about its own intentions for its instrument rate and be able to produce the best forecast, and, as argued in the previous section, publishing its own interest-rate forecast should be the most effective way for the central bank to manage private-sector interest-rate expectations. Given this logic, and given the increased acceptance of the idea that monetary policy is about managing expectations, it is rather strange that still so few central banks publish their own interest-rate forecast.

One argument against publishing an interest-rate forecast that has been voiced is that the private sector might believe that the forecast is a firm commitment and not a conditional forecast that is based on the current state of the economy and the nature and size of the estimated shocks to the economy. However, I did not learn of any such misunderstanding in New Zealand when I conducted my review in 2000 of monetary policy in New Zealand (Svensson 2001), where an interest-rate forecast had been published since 1997. Nor have I learned of any such misunderstanding in Norway since 2005 or in Sweden since 2007 (in Sweden at least not after the first few months, see below). Central banks that publish interest-rate forecasts emphasize the conditional nature of the forecast in their publications and also emphasize the uncertainty of the forecasts by publishing uncertainty intervals around the central forecast (except in New Zealand where the private sector and the financial market seem to understand this even without any explicit uncertainty intervals in the graphs). The Riksbank has many times repeated the mantra "it is a forecast, not a promise." The private sectors and financial markets in the relevant countries seem to have understood this. It would be a very strange coincidence if the private sectors and financial markets in New Zealand, Norway, Sweden, Iceland, and the Czech Republic are systematically more sophisticated and more understanding than those in the rest of the world.

[13] Jansson and Vredin (2004) provide a discussion of decision-making at the Riksbank and related problems before the introduction of the Riksbank's own repo-rate path.

Some recent arguments in the literature against publishing instrument-rate paths seem somewhat contrived. A much-noted paper by Morris and Shin (2002) shows that public information may reduce social welfare. Because public information is known by all private agents and will affect the behavior of all private agents, it is rational for each private agent to attach more weight to public information than to private information. If the public information is of poor quality, private agents end up attaching more weight to poor-quality information, which may deteriorate social welfare. However, Svensson (2006) shows that this requires public information to be extremely bad and have a variance of measurement errors (a noise level) that is at least eight times that of private information. In contrast, central-bank information is likely to be at least as good as private-sector information, and central-bank information about its own intentions could be much better than private-sector information. For a conservative benchmark of equally good public and private information, public information always improves social welfare in the Morris-Shin model. In more realistic variants of the Morris-Shin model, several papers have demonstrated that public information is usually beneficial (see Svensson 2006 for references).

Gersbach and Hahn (2008b) assume that announcing a plan for the future instrument-rate path would introduce a new term in the central-bank loss function, corresponding to a loss from deviating from previously announced paths (due to the resource costs of providing explanations for, or diminished prestige from, such deviations). Under this assumption they show that the central bank will deviate from the optimal policy in order not to surprise the market and argue therefore that such announcements may imply a social loss. Given the assumption, this result is not surprising. However, it is really an argument that the central bank should regard its instrument-rate path as a forecast and not as a commitment. Dale, Orphanides, and Österholm (2008) show that the communication of poor central-bank information that is perceived by the private sector as good can be costly. This is not surprising either. However, as mentioned, central-bank forecasts of their future policy actions should for obvious reasons normally be more informed than outsiders' forecasts of these intentions. Furthermore, central banks can and do provide information about the accuracy of their information, for instance in the form of uncertainty intervals (fan charts). Providing information about the whole probability distribution of a central-bank forecast is an obvious way to allow the private sector to assess its quality.

5. Committee decisions on instrument-rate paths: difficult or even impossible?

Another argument that has been voiced is that a genuine committee would find it difficult or even impossible to agree on an instrument-rate path (Goodhart 2005). Agreeing on a single number, the current instrument rate, can be difficult enough; agreeing on a sequence of numbers, the instrument-rate path, would be too difficult. Therefore, only a central bank with a single decision maker can determine an instrument-rate path. According to this argument, publishing an instrument-rate forecast may work for RBNZ, where the Governor is the single decision maker, and for Norges Bank, where the instrument-rate forecast can be seen as the Bank's and the Governor's forecast presented to the Board, but it would not work for a genuine committee. From this point of view, the experience at the Riksbank is very relevant, since there the instrument-rate forecast is decided by the Executive Board, and the Board is a six-member individualistic committee where each member has equal weight and influence (except that the Governor has the tie-breaking vote). How can the Riksbank's Executive Board ever agree on an instrument-rate path?

In previous work (Svensson 2007), I have actually suggested a simple aggregation mechanism with which a committee of any size can agree on a path, the median path. According to this mechanism, each board member would draw his or her preferred instrument-rate path in the same diagram, with the instrument rate along the vertical axis and the time along the horizontal axis. Then a new path, the median path, is created by for each time (along each vertical line) taking the median instrument rate. This mechanism has the advantage that extreme paths by any member do not affect the median path. It has the disadvantage that the median path would often be composed of sections of different individual paths and not necessarily be an optimal path. Therefore, the median path should be seen as the starting point for new negotiations among the members and resulting adjustments of the path. My guess is that such a mechanism would normally converge after a few rounds of negotiation.

However, at the Riksbank, there has never been any need to propose this mechanism. The Executive Board has been able to agree on a path by majority voting without any such aggregation mechanism. How can this be possible?[14]

The way it has worked so far is that interactions between the staff and Board members during a series of meetings (see Rosenberg 2008 for

[14] Actually in Swedish public administration, more precisely in the *Administrative Procedure Act* 1986:233, there are explicit procedures for voting, dissenting, and decision-making that can be applied if needed in more complicated decisions.

details on the decision-making process) result in a main interest-rate path (and corresponding forecast of inflation and the real economy) in a main scenario, which as a result of these discussions is a likely majority view. At the final policy meeting, the Executive Board then discusses this main scenario and possible alternatives, and then votes on the main scenario and possible alternatives. Dissenters state what interest-rate decision and path they prefer and the reasons for this. It has not been more complicated than that. One or several Board members could request that one or several detailed scenarios with alternative instrument-rate paths and corresponding forecasts of inflation and the real economy are included as an alternative to the main scenario and voted on. This has not yet happened, but it might in the future, and I do not see that it would be a problem.

That it need not be more complicated than this should not come as a surprise. Most committees other than MPCs deal with multidimensional rather than one-dimensional objects and vote on such multi-dimensional objects. Monetary policy is actually exceptional in terms of the simplicity and low-dimensionality of both the objectives and controls (although a path rather than a single instrument rate increases the control dimension somewhat). Most committees have more complex objectives and more complicated multi-dimensional control variables. The way it works in practice in most committees is that normally only a few representative alternatives of multi-dimensional objects are prepared and voted on. For instance, think about a parliament or a government voting on a few tax proposals, each involving a myriad of different taxes.

The publishing of an interest-rate path and the need therefore to decide on an instrument-rate path has some very desirable side effects. As noted above, there is general agreement that the whole interest-rate path rather than the current short rate is what matters for the forecast of inflation and the real economy. Publishing the instrument-rate path seems to focus the minds of the Executive Board and the staff on the right thing, the path rather than the current instrument rate. The policy discussion naturally becomes forward-looking, as it should be. At the Riksbank, I have noticed that the discussion in the Board and among the staff is mostly about the path and its consequences for inflation and the real economy, not about the current instrument rate. The decision about the current instrument rate is mostly just a consequence of the decision about the path.

Since my colleagues on the Board decided to publish an instrument-rate path in February 2007, before my appointment in May 2007, I only have experience of policy meetings where the instrument-rate path is the focus. I do not have any experience from policy meetings where the instrument-rate path is not discussed. Indeed, I find it difficult to imag-

ine how one can have a coherent monetary-policy discussion while only discussing the current instrument-rate level and not the instrument-rate path.

If agreeing on publishing an instrument-rate path works fine for a genuine committee of six, I would think that it would work for a committee of nine, and why not twelve or nineteen? However, one thing that may facilitate working with an instrument-rate path is that at the Riksbank we are full-time Board members that participate continuously in the several-week long decision-making process during which the main and alternative instrument-rate paths are worked out. There may be some special difficulties for MPCs with part-time members or members that are not located in the same place. Still, I believe these difficulties can be overcome, with some good will, and that it is likely to be worth it given the considerable benefits of working with an instrument-rate path.

Inflation targeting is unique among alternative monetary-policy regimes in that there seem to be no regrets and no drop-outs, at least not so far (but almost two decades have already passed). Compare this to monetary targeting or fixed exchange rates! Instead, central banks that have introduced inflation targeting seem, at least so far, to have concluded that it is the only sensible thing to do. If anything, they may regret that they did not begin earlier. (This does not, of course, imply that no improvements and innovations can be made. The rate of improvements and innovations among inflation-targeting central banks is pretty impressive, I would say, especially compared to other monetary-policy regimes.) In particular, with today's problems of high inflation, weak real-economy outlooks, and the transmission mechanism and aggregate demand in some countries affected by a credit crunch, what monetary-policy regime could be better designed to find the best available compromise between stable inflation and a stable real economy?

I believe the same lack of regret will be the case for publishing the instrument-rate path. I am not aware of any regrets in New Zealand, which has the longest experience, and I am not aware of any regrets in Norway. I have never heard any regrets from my colleagues at the Riksbank. Instead, we believe discussing, deciding on and publishing an instrument-rate path is the only sensible thing to do. I believe we are becoming more and more convinced about this. Is it not obvious that not considering and not deciding on an instrument-rate path implies an incomplete decision-making process? And is it not obvious that not publishing an internal instrument-rate path implies hiding the most important and useful information for the private sector?

6. The Riksbank's management of interest-rate expectations

As mentioned above, one reason for increased transparency and publishing the instrument-rate path is that this enables the central bank to more effectively manage interest-rate expectations. What then is the Riksbank's record in managing interest-rate expectations? How have market expectations of future interest rates been affected by the repo-rate paths the Riksbank has published (the repo rate is the Riksbank's instrument rate). Figures 1-10 illustrate this by comparing the announced repo-rate path with the implied market forward interest rates at the end of the day before the announcement ("Before") and at the end of the day of the announcement ("After"). The implied forward-rate curves have been adjusted by the staff for possible risk premia, so as to be the staff's best estimate of market expectations of future repo rates. Depending on the maturity, the forward-rate curve is derived from the rates for STINA (Tomorrow-Next Stibor interest-rate swaps) contracts, FRAs (Forward Rate Agreements), or interest-rate swaps.

Figure 1 is from the first announcement of a repo-rate path, on February 15, 2007. The black step-shaped solid curve shows the actual repo rate. The black dotted curve shows the announced repo rate. The yellow (gray for a black-and-white printer) solid curve shows the implied forward rates the day before the announcement, and the red (black for a black-and-white printer) solid curve shows the implied forward rates after the announcement. Comparing the yellow/gray and the black dotted curve, we see that the market expected a higher repo-rate path than the Riksbank announced. Comparing the yellow/gray and the red/black curve, we see that market expectations shifted down slightly, but not all the way to the announced repo-rate path. The market seemed not to believe that the Riksbank would actually follow its own path, and there were many comments expressing surprise and criticism of how low the path was.

There were policy announcements on March 30 and May 4, 2007, when the repo rate was held unchanged. On these occasions no full *Monetary Policy Report,* no repo-rate path and no forecasts of inflation and the real economy were published (the *Monetary Policy Report* is published three times a year). Figure 2 is from the next time a repo rate was published, on June 20, 2007. This was my first policy meeting. During the spring of 2007, wage settlements were higher and productivity outcomes were lower than the Riksbank had forecasted. Because of the resulting increase in inflation pressure and the strong outlook for the real economy, the Riksbank shifted up the repo-rate path quite a bit. The old repo-rate path from February 15 is shown as the grey dotted curve. On

this occasion, market expectations before the announcement were quite in line with the new repo-rate path for the first year and a half, but higher than the path at longer horizons. After the announcement, market expectations shifted up slightly. Interestingly, they then shifted away from the new repo-rate path, as if the market anticipated future upward revisions of the repo-rate path. Perhaps the market still did not believe that the Riksbank was likely to follow its own path.

The next policy announcement was on September 7, 2007. The repo-rate was increased in line with the path published in June. On this occasion, no repo-rate path and no forecasts of inflation and the real economy were published, but the Riksbank stated that it would from the next policy announcement, in October, publish a repo-rate path and forecasts of inflation and the real economy after each policy meeting, not only at the three policy meetings per year with a full *Monetary Policy Report*.

Figure 3 shows the announcement on October 30, 2007. The Riksbank kept the repo-rate path unchanged. Market expectations were quite in line with the repo-rate path and there were no significant shifts in expectations at the announcement. Now the market seemed to take the repo-rate path more seriously than in February and in June.

Figure 4 shows the announcement on December 19, 2007. The Riksbank again kept the repo-rate path unchanged, which was expected by the market, and there were no significant changes in expectations at the announcement. During the fall, the inflation forecast shifted up and the real-economy forecast became weaker. On balance, the Riksbank thought that the old repo-rate path was still good.

Figure 5 shows the announcement on February 13, 2008. Again the Riksbank kept the repo-rate path unchanged, and it increased the repo rate accordingly. This time market expectations were not in line. Bad news about the U.S. economy and increasing problems in financial markets in the U.S. and Europe led the market to expect no repo-rate increase and a much lower repo-rate path. The Riksbank already had a rather pessimistic forecast for the U.S. economy, and the bad news was not out of line with this forecast. Furthermore, the direct effects of the U.S. economy on the Swedish economy are not so large, which the market seemed to underappreciate. In any case, there was a big surprise for the market, and there were many angry comments. Although ex post the Riksbank's explanation and decision seemed to be accepted, there were complaints about the Riksbank not having prepared the market for the forthcoming decision. As seen in figure 5, market expectations shifted up significantly towards the Riksbank's repo-rate path, but expected forward rates were still up to 50 basis points below the published repo-rate path about 1.5 years ahead.

Repo-rate paths and market expectations
Per cent

Figure 1. February 15, 2007

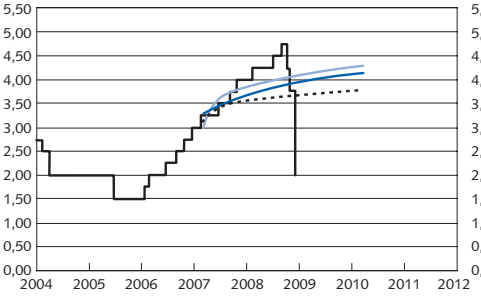


Figure 2. June 20, 2007

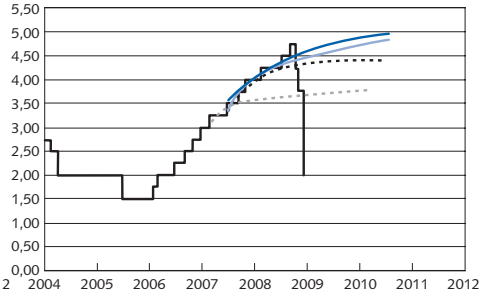


Figure 3. October 30, 2007

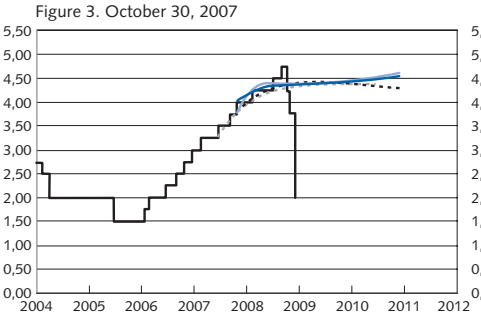


Figure 4. December 19, 2007

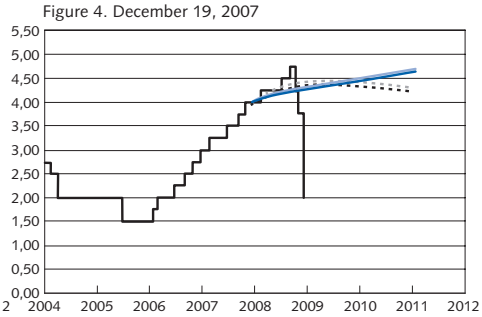


Figure 5. February 13, 2008

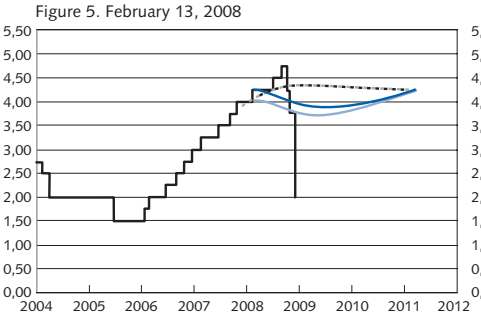


Figure 6. April 23, 2008

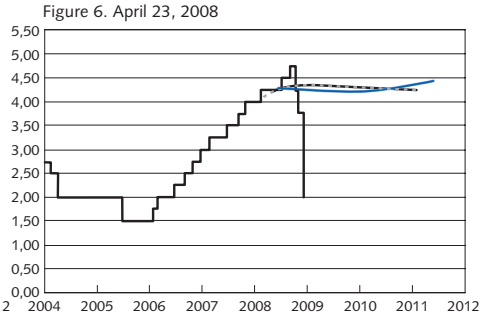


Figure 7. July 3, 2008

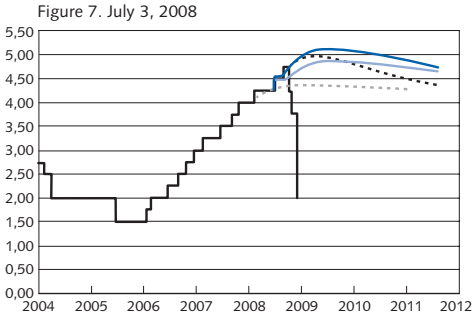


Figure 8. September 4, 2008

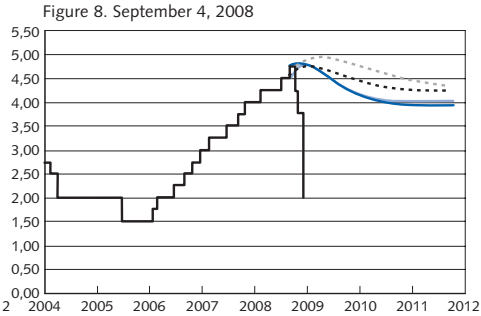


Figure 9. October 23, 2008

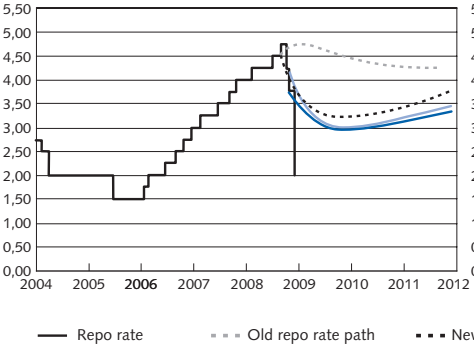
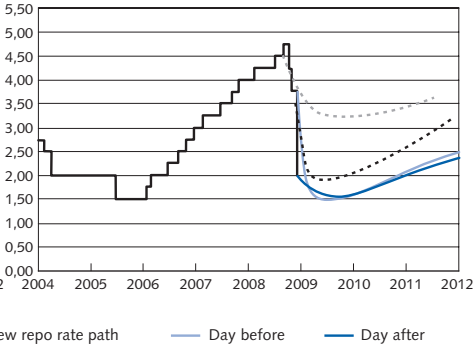


Figure 10. December 4, 2008



Apparently the market did not at this time believe that the Riksbank would follow the new repo-rate path but soon adjust it downwards.

Figure 6 shows the next policy announcement, on April 23, 2008. The repo-rate path was kept unchanged and the repo rate was held constant in line with the path. This was expected by the market and there were no shifts in expectations at the announcement.

Figure 7 shows the next policy announcement, on July 3, 2008. Because of increased inflation and inflation pressure with the outlook for the real economy only marginally weaker, the repo-rate path was shifted up quite a bit and the repo rate was increased by 25 basis points to 4.50 percent. The market had expected an increase and a higher repo-rate path, but not quite as high. Expectations of the future repo rate shifted up significantly towards the path and even exceeded the repo-rate path at horizons longer than a year.

Figure 8 shows the next policy announcement, on September 4, 2008. The Riksbank increased the repo rate by 25 basis points to 4.75 percent, but the future repo-rate path was shifted down. The market had anticipated a shift down in the repo-rate path but was surprised about the increase in the current repo rate. There were no changes in market expectations at the announcement except at the very short horizon.

The next few announcements were dominated by a rapidly deteriorating situation and outlook for the real economy and a rapidly falling inflation forecast after mid-September. On October 8, 2008, after an extra policy meeting, the Riksbank announced that it had lowered the repo by 50 basis points to 4.25 percent in a coordinated move to lower instrument rates by the Bank of Canada, the Bank of England, the European Central Bank, the Federal Reserve and the Swiss National Bank. No repo-rate path was published on this occasion.

Figure 9 shows the next policy announcement, on October 23, 2008, after a regular policy meeting. The Riksbank lowered the repo rate by 50 basis points to 3.75 percent and lowered the repo-rate path substantially.

The market expected a somewhat lower path and there were minor shifts in expectations following the announcement.

On December 1, the Riksbank announced that it would move its planned policy meeting for December 16 to December 3. Figure 10 shows the announcement on December 4. The Riksbank lowered the repo rate by 175 basis points to 2 percent, the largest change since the start of inflation targeting in January 1993. The repo-rate path was lowered substantially. The market had expected an even lower repo-rate path and there were hardly any shifts in expectations at the announcement.

These ten observations are of course too few to draw any reliable conclusions, and too few for much quantitative analysis. They also coincide with a period of several changes in the Riksbank's communication and corresponding learning by both the Riksbank and the market (see the appendix for major events in Riksbank communication). The last two are from the period of increased financial stress after mid-September and hence from a very abnormal situation. However, the observations show that the Riksbank may both keep the repo-rate path unchanged and change it quite a bit, depending on the situation. Any observer should, after these observations, realize that the repo-rate path is a conditional forecast, not an unconditional commitment. Furthermore, whereas the market may not have taken the first repo-rate paths in February and June 2007 very seriously, the market seems to have taken the repo-rate path more seriously thereafter, except in February 2008 when the market expected a much lower path and adjusted only part of the way towards the new repo-rate path. When there has been a significant shift in market expectations, they have always shifted in the direction of the Riksbank's repo-rate path, except for longer maturities in June 2007 and July 2008. On seven or eight out of ten occasions, the market has done quite a good job of predicting the Riksbank's new repo-rate path, also when it has shifted quite a bit from the previous path, and even during the last two dramatic announcements with big downward adjustments (although the market expected even lower repo-rate paths). I believe one cannot reject the hypothesis that the Riksbank has managed interest-rate expectations pretty well, although it has not been a complete success. It will be good when we have a few more years of data to better evaluate the Riksbank's management of expectations.

The big surprise in February 2008, when the Riksbank kept the previous path and increased the repo rate, is notable. On this occasion, according to surveys, the market was absolutely sure that the Riksbank would not increase the repo rate and would adjust its previous repo-rate path downwards. I remember thinking at the time that it was strange that the market was so sure about the majority vote in the Executive Board, when

I was not quite so sure myself what was the best decision. This incident raises the question of whether some independent weight should be put on not surprising the market. Everything else being equal, it is of course positive if the market can predict accurately, and the less it is surprised by policy actions the better. But should there be some independent weight on not surprising the market that would justify some policy adjustment? Should the period loss function include a term consisting of a weight times the squared gap between the repo rate and the expected repo rate? In this particular case, should the Riksbank have deviated from the path it thought would best stabilize inflation and the real economy just to avoid too large a surprise for the market?

I thought then, and I still think, that the Riksbank should always choose the best repo rate and repo-rate path regardless of any surprise to the market. Accommodating market expectations could lead to instability and less predictability in the medium run. Woodford (1994) gives an example of how monetary policy that actively tries to satisfy private-sector expectations of monetary policy may lead to instability and nonuniqueness of equilibria. As expressed by Geraats (2008):

> Although the predictability of monetary policy actions certainly has merits, it should not be considered an end in itself. In particular, it is important not to distort monetary policy actions to achieve predictability, but rather to use central bank communications to this effect. For instance, by delaying policy decisions to avoid market surprises it becomes harder for the public to understand the central bank's monetary policy reaction. As a result, a focus on short-term predictability could actually undermine monetary policy transparency, harm credibility and reduce predictability in the medium and long run.

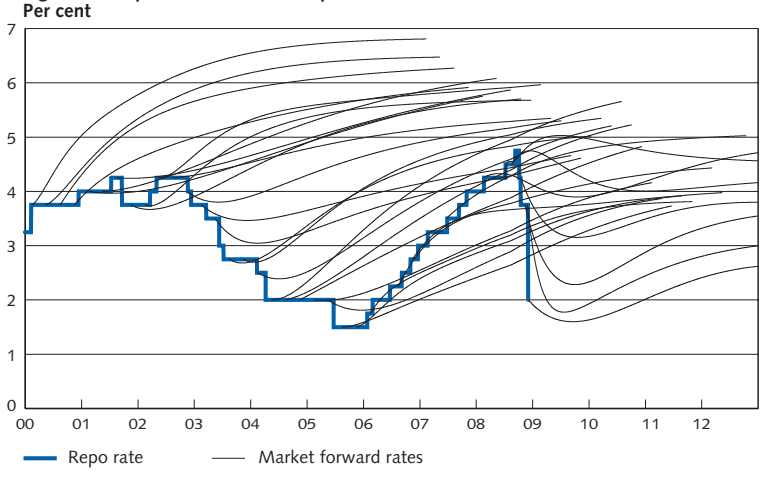
One might think that an obvious way to reduce the surprise at the policy announcement would be to signal or leak the policy decision on an earlier occasion. There are at least two problems with this approach. First, it would require a decision by the Executive Board on what to signal. This would in practice move the policy decision to a point in time earlier than the final policy meeting. Second, it would move the surprise to an earlier date. Evaluating the predictability of monetary policy in terms of the degree of surprise at the official policy announcement would then be misleading, and the "true" predictability might not have improved.

Particularly after the February 2008 surprise, the market was quite insistent about receiving more information about future decisions. In previous years, the market had become used to receiving some hints about the forthcoming decision, and the Riksbank had developed a prac-

tice of signaling the forthcoming decision. During 2007, the Riksbank instituted changes in its Rules of Procedure and Instructions that, among other things, reinforce the principle that all Board members should have an equal influence on monetary-policy decisions, thus strengthening the individualistic character of the Board and the individual accountability of its members. Since the majority decision is not made until the final policy meeting, any signaling might pre-commit some members and distort the final decision, and since the published repo-rate path should provide a fair amount of forward-looking information, the Riksbank decided in May 2007 not to signal future decisions between policy meetings unless there are exceptional changes in the economic situation. However, in order to accommodate the persistent demands from the market and other interested parties, in the new communication policy of May 2008, Board members have agreed that they may comment on new developments in relation to previous Riksbank forecasts and the relevant tradeoffs, still without anticipating the member's or Board's position on upcoming decisions unless there are exceptional circumstances.

How good is the market at predicting the future repo rate? Will the published repo-rate path improve the precision of the market expectations? We will need more data to assess this. Figure 11 shows the repo rate (black stepwise curve) and implied market forward rates (thin gray curves) from 1995 until now.[15] The figure gives the strong impression that the market has not been particularly good at forecasting the future repo rate, so there does seem to be room for some improvement.

Figure 11. Repo rate and market expectations
Per cent



[15] The inflation target of 2% for the CPI was announced in January 1993 with the proviso that it would apply from 1995.

7. Publishing attributed minutes, not only attributed votes

In May 2007, shortly before my term started, my colleagues to be on the Executive Board decided that the minutes published two weeks after each monetary-policy meeting would be attributed. Before, the votes had been named, but the various points raised and statements made during the discussion were not named. Now they would be. I must admit that, when I learned about this, I had some doubts. I had previously thought and written that non-attributed minutes would be best, since attributed minutes might restrict the discussion and make it more scripted.

Attributed minutes are unique to the Riksbank among major and inflation-targeting central banks, as far as I know. How has it worked? Again, I do not have any experience of being a member of the Executive Board during the previous setup with non-attributed minutes, so I cannot make a direct comparison.[16]

A good thing with attributed minutes is that they might induce more individual preparation and consistency by each Board member and discourage free-riding, what has been called social loafing (Blinder 2008a). I myself think through in advance what I think about the decision, and I bring talking points that summarize the policy tradeoffs and my reasons for my decision. Then I make pencil revisions of these talking points during the meeting and may add to or subtract from them when speaking. I certainly would not feel good if the minutes gave the impression that I am not well prepared for the decision.

I believe the attributed minutes improve the individual accountability of Board members. They provide more detailed information about individual committee members' views, and they allow external observers to evaluate the depth of each member's analysis and reasoning and their consistency over time, for instance. They should contribute to greater predictability regarding each member's future vote.

It is also said that full-time professional Riksbank observers could still with a high degree of precision infer who the speakers were when minutes were not attributed. Certainly, when I have read the minutes in previous years, I have often been pretty sure who said what (although I was of course rarely able to check the accuracy of my guesses). If this is true, the attributed minutes provides less of an information advantage for full-time professional observers, and indeed less need for full-time observ-

[16] Gersbach and Hahn (2008a) show that transparency may induce committee members to invest more effort in information acquisition and thereby lead to better decision-making.

ers. More evenly spread information about Board members' views should be a good thing.[17]

Do attributed minutes reduce the risk of group-think, that is, that the Board gets inefficiently stuck in particular narrow-minded analysis approaches or views of the world? I would think that the risk of group-think is larger with collegial committees, and particularly large with autocratically collegial committees (Blinder 2008a), and smaller with individualistic committees with individual accountability. To the extent that attributed minutes contribute to individual accountability, I would think that they reduce the risk of group-think. Furthermore, attributed minutes would reveal to external observers which members develop group-think.

Is there less free discussion and less of a genuine interchange of views because of the attributed minutes? This is what I was nervous about before I was appointed to the Riksbank. Again, I do not have any direct experience of the discussions before the attributed minutes were introduced. However, several staff members who have observed the Executive Board meetings for many years have assured me that the current discussion is actually better and more thorough than ever before and have suggested that increased preparation by the Board members has indeed generated a better discussion and interchange, not worse. I also believe that I have noticed an increase in the amount of free, more spontaneous discussion and a more relaxed atmosphere at the policy meetings I have attended, perhaps reflecting the fact that we Board members feel more experienced and more comfortable over time. There have been quite a few changes in procedures, methods of analysis and communication that may take some time to get used to.

Importantly, given the way things work at the Riksbank, the final policy meeting is the culmination and summary of a long series of meetings, as detailed in Rosenberg (2008). During these previous meetings, the state of the economy, the nature and the size of the estimated shocks, the policy tradeoffs and the alternative interest-rate paths have been discussed and debated in a lively and robust way. During these meetings, there is a lot of spontaneous discussion and a genuine exchange of views, and minds are also gradually made up or changed. The discussion and exchange at the final policy meeting with the attributed minutes do not start from scratch but are the culmination and summary of these meetings. Therefore, one would not expect too much spontaneity but rather the presentation of the essential summaries and the reasons for the decision by each member.

[17] Of course, the trend towards more transparency about monetary policy does in general reduce the usefulness of and demand for central-bank watching and leads to structural adjustments in that industry.

Finally, the attributed minutes are edited. They are not transcripts. Having transcripts (and more extreme alternatives such as televised meetings) would be a very bad idea. To have edited minutes is a good idea, I believe. The way it works at the Riksbank is that two staff members make notes and prepare a draft that is sent to the Board and to senior staff. I go through and revise my part of the draft, improve the grammar, sometimes shorten statements to avoid redundancy and repetition, sometimes clarify a statement a bit more, and return the draft to the two staff members. Adding a point that was not made, or deleting an essential point that is not made elsewhere in the minutes, would be wrong. Then the two staff members provide a new draft, the Board and senior staff members go through the minutes at a special meeting and the minutes are published two weeks after the policy meeting. Making the delay shorter than two weeks without reducing the quality of the minutes would be difficult, I believe.

8. Desirable future developments and improvements

Even though the Riksbank's transparency ranking is high, there is of course some room for improvement. For instance, there is room for increased transparency about the flexibility of the Riksbank's inflation targeting. In Giavazzi and Mishkin's (2006) evaluation of monetary policy in Sweden for the Committee on Finance of Sweden's Parliament, the first recommendation is (p. 77):

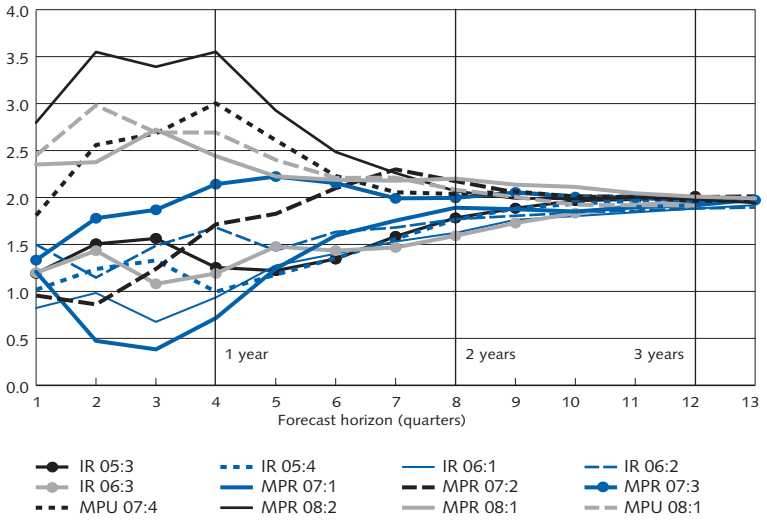
> **Recommendation 1: The Riksbank should more clearly explain that flexibility in its inflation targeting regime implies that the conduct of monetary policy should try to reduce both inflation and employment (output) fluctuations**. Focusing on an inflation target in a flexible manner is a means to stabilize not only inflation fluctuations but also employment fluctuations. At the outset of the Riksbank's Inflation Report, there should be a statement and explanation that the Riksbank is operating a flexible inflation targeting regime which seeks to reduce employment (and output) as well as inflation fluctuations. [Boldface in original. I believe that the references to employment and output should be understood as to refer to employment and output *gaps*.]

In the Committee on Finance's (2007) own report in June 2007 on the evaluation and the comments by the Riksbank and other interested parties, the Committee states that (p. 47):

> … there is still some uncertainty about what the Riksbank's regime of flexible inflation targeting in practice means. In the Committee's view there are therefore reasons for the Riksbank to further clarify that the bank pursues a flexible monetary policy that takes into account both inflation and employment and in a clear way set forth the account of what the flexibility means for the monetary policy framework. [My translation from Swedish.]

The Riksbank is working on a clarification of what flexible inflation targeting is, but this work has not yet been completed. In the summary of the monetary-policy framework at the outset of each *Monetary Policy Report*, there is still an emphasis on a fixed horizon, with the statement "Monetary policy is normally focused on achieving the inflation target within two years." This statement I consider dated and undesirable, since imposing such a fixed-horizon constraint is inefficient, given the discussion above on the problems of a fixed horizon in flexible inflation targeting. Furthermore, in practice, during the last few years the horizon at which the Riksbank's inflation forecast has been close to the inflation target has varied quite a lot and often been longer than two years. Figure 12 shows CPIX forecasts as functions of the forecast horizon at policy decisions during 2005-2008 (before 2007 they were conditional on market expectations as given by implied forward rates).[18] The forecast has

Figure 12. CPIX forecasts from Inflation Reports, Monetary Policy Reports, and Monetary Policy Updates 2005-2008
Percent



[18] The CPIX is a core inflation price index that excludes mortgage costs and effects of indirect taxes and subsidies. After June 2008, the Riksbank has downgraded the role of the CPIX and increased the emphasis on CPI (see Wickman-Parak 2008).

normally differed from 2 percent at an 8-quarter horizon but been very close to 2 percent at a 12-quarter horizon.

Thus, as I have mentioned several times, flexible inflation targeting involves not only stabilizing inflation around the inflation target but also stabilizing the real economy (stabilizing measures of resource utilization). Unfortunately, the measures of resource utilization are very imperfect and improvements are much needed. The Riksbank reports several measures of resource utilization in the *Monetary Policy Report*, including Hodrick-Prescott (HP) gaps for output, hours worked, and employment. That is, the gaps are computed as the actual time series less a "potential" time series defined as an HP-filtered time series. These are very imperfect measures of resource utilization. In practice, HP output gaps in Ramses are similar to the so-called trend output gaps in Ramses, where the trend output gap is computed relative to the stochastic trend of output (the stochastic steady state of output). A major problem with defining potential output as trend output is that it does not incorporate persistent but stationary productivity shocks, only non-stationary productivity shocks.

My view is that it would be practical and transparent to combine all the different measures of resource utilization into a one-dimensional measure, say an output gap between output and potential output, where the gap and potential output combine all the relevant information about resource utilization. From an efficiency and welfare point of view, potential output should incorporate all persistent productivity shocks and be related to the hypothetical output level that would arise if the economy did not have the distortions associated with nominal price and wage stickiness and nominal prices and wages were completely flexible. This potential output level should be equal to a constant (proportion) of the Pareto-efficient output level (where the constant is chosen such that potential output equals the unconditional mean of output and potential output normally is less than Pareto-efficient output due to existing real distortions). Adolfson, Laséen, Lindé, and Svensson (ALLS) (2008) report possible alternative output gaps and potential outputs in Ramses.[19] Much more work is needed to provide better and more reliable measures of potential output and resource allocation that can be used in monetary policy and published in the *Monetary Policy Report*. Transparent flexible inflation targeting requires that a central bank can make and publish forecasts of potential output and the gap between output and potential output, that the trade-off between stabilizing inflation and stabilizing the real economy can be correctly shown and that the best compromise between stabilizing inflation and the real economy can be found and explained.

[19] Justiniano and Primiceri (2008) provide some recent discussion of potential output concepts.

Most popular discussions of monetary policy refer to the nominal instrument rate and the path of future nominal instrument rates. However, standard macro theory shows that it is the real instrument rate and the expected future real instrument rates that matter for the effect of monetary policy on the real economy and inflation. For instance, in a situation where, everything else equal, inflation and inflation expectations have shifted up, a given path for the nominal instrument rate implies that the path for the real instrument rate has shifted down. Unless the path for the neutral real instrument rate has shifted down to the same extent (which depends on what shocks have hit the economy), monetary policy has then become more expansionary. This basic insight from conventional theory is hardly universal and part of the conventional wisdom, but it should be, I believe. Furthermore, the translation of a nominal instrument-rate path into a real instrument-rate path requires consideration of what path of inflation expectations to use to deduct from the nominal instrument rate path. This is normally obvious in theoretical models. In the real world, there are numerous measures of inflation expectations and these measures vary across different categories of economic agents. Which ones should we use?

Even though changes in the real repo rate and the real repo-rate path provide a better measure of changes in the monetary-policy stance, they are still imperfect measures. The most adequate measure of monetary-policy stance would be the gap between the real repo rate and a state-contingent neutral real interest rate and, in particular, the forecast path of that gap. State-contingent neutral real interest rates are related to expected potential-output growth and estimating such neutral interest rates is closely related to estimating and forecasting potential output. Estimates and forecasts of neutral interest rates may be a very useful by-product of estimating potential output and could be used to improve the discussion and explanation of the monetary-policy stance. ALLS (2008) show how to construct and project neutral real interest rates in Ramses.

The instrument-rate paths considered by the Riksbank's staff and Executive Board have so far been constructed mostly from estimated historical reaction functions with considerable judgmental adjustments. It would be very useful to have alternative instrument-rate paths be generated from optimal policy projections that minimize a given intertemporal loss function. Paths generated by such optimization for different parameters in the loss function have the advantage that they are efficient, in the sense that it would not be possible to stabilize inflation more without stabilizing resource utilization less. In contrast, policy projections generated by different empirical reaction functions would not normally be optimal

and hence not efficient. ALLS (2008) show how optimal policy projection can be constructed in Ramses.

Choosing the path for the repo rate among paths generated by different parameters in intertemporal loss functions would allow for checks that the Executive Board and its members show some consistency over time and assist in making the Executive Board's implicit loss function more explicit and identified. In this context, there are some challenges that optimization under commitment in a timeless perspective pose which are too technical to discuss here (see Svensson and Woodford (2005) and ALLS (2008) for such discussion). However, then Deputy Governor Jarle Bergo (2007) provides a fascinating non-technical discussion of a practical example from Norway. To judge from this speech and presentations by Norges Bank staff that I have attended, Norges Bank seems quite a bit ahead of other central banks, including the Riksbank, in applying optimal-policy considerations in practical monetary policy. For instance, some policy projections are generated as optimal projections for different loss-function parameters, and the consistency of decisions over time is monitored by examining whether the loss-function parameters revealed by the decisions are stable over time. Needless to say, I hope the Riksbank will catch up, and I will try to contribute to this.

The evolving financial crisis over the last year has made the role of the financial sector and financial factors in the transmission mechanism for monetary policy more conspicuous. There have been many conferences devoted to this role and much recent work that can be applied in practical policy. Christiano, Trabandt, and Walentin (2007) have developed a variant of Ramses with an elaborate financial sector. More work is needed before this model can be used for analysis of the role of financial factors in practical policy simulations.

In Ramses, as in most central-bank DSGE models, private-sector expectations are modeled as rational expectations. I believe it is uncontroversial that there are many situations in which rational expectations are a very unrealistic assumption and that policy projections under the assumption of rational expectations may be misleading. From introspection I have noticed that I often tend to think of real-world Swedish inflation expectations as a weighted average of rational expectations, adaptive expectations and the Riksbank's inflation target. The recent large literature on learning and rational inattention might be helpful in developing a deeper and more realistic view of the formation of private-sector expectations. It is certainly possible and may be useful to policy simulations under alternative assumptions of expectations formation.

From this perspective, we can think of increased transparency in monetary policy also as an attempt to provide the private sector with a

better understanding of monetary policy and to assist the private sector in forming better and more rational expectations, hence making the assumption of rational expectations more realistic.

From the above discussion, it is obvious that I see no shortage of possible improvements in the Riksbank's flexible inflation targeting, in spite of the many advances already made. But do all these possible improvements have to do with transparency, the main focus of this paper? Yes, I believe that in order to be transparent about monetary policy, one must also have clear and consistent analyses and measures to be transparent about.

But is it not so that these improvements refer to concepts that are difficult to estimate and forecast and whose estimates and forecasts will be subject to considerable uncertainty? This may be the case, but I do not think that this is a valid argument against these improvements. The same argument could be and was used against making inflation forecasts in the first place, since making inflation forecasts is difficult and the result is uncertain. I think we all agree that starting to make and apply inflation forecasts in inflation targeting was a good thing, even though they are still difficult to make and uncertain. But they are necessary. In the same way, finding the best compromise between stabilizing inflation and the real economy requires the best available measures of resource utilization. Such measures and forecasts of resource utilization are also necessary, even if constructing and making them is difficult and the result is uncertain.

Furthermore, in practical monetary policy, so-called certainty equivalence is often a good approximation or at least a good starting point. Certainty equivalence (see, for instance, Svensson and Woodford 2003) means that only the mean forecast is needed for policy decisions. This implies that the uncertainty of the forecast does not affect the policy decision. Certainty equivalence holds for optimal policy with a linear model of the transmission mechanism and a quadratic loss function when the only source of uncertainty is additive shocks. These conditions are not fulfilled exactly, but in most cases certainty equivalence is still an acceptable approximation, I believe. Then the uncertainty of estimates and forecasts is not an argument against the usefulness of these estimates and forecasts.

Appendix 1: Major Events in Riksbank Communication

January 1993. The Riksbank announces the inflation target of 2 percent, to be applied from 1995.

October 1993. The Riksbank starts to publish the report *Inflation and Inflation Expectations in Sweden*, which includes a discussion of the inflation pressures.

June 1995. The Riksbank starts to publish approximate inflation forecasts under the assumption of a constant repo rate in *Inflation and Inflation Expectations in Sweden*.

March 1996. The report *Inflation and Inflation Expectations in Sweden* is renamed *Inflation Report*.

December 1997. The Riksbank starts to publish more precise inflation forecasts in the *Inflation Report*.

January 1999. The new Executive Board announces that the minutes from the monetary-policy meetings shall be published.

February 1999. The Riksbank publishes a clarification of the monetary-policy framework.

March 2005. The Riksbank starts to publish an alternative forecast under the assumption of a repo-rate path given by implied market forward interest rates. The horizon for this forecast is lengthened to three years.

October 2005. The Riksbank starts to publish a main scenario in the Inflation Report under the assumption of implied forward rates and a horizon of three years.

May 2006. The Executive Board publishes the document *Monetary Policy in Sweden*, which describes the monetary-policy objectives and strategy and replaces the clarification of February 1999.

February 2007. The Riksbank starts to publish a repo-rate path. The *Inflation Report* is renamed *Monetary Policy Report* and includes an extensive explanation of the monetary-policy decision.

May 2007. The Riksbank announces that press conferences will be held after each monetary-policy meeting, that normally no information about the repo-rate decision will be conveyed before monetary-policy meetings and that minutes from monetary policy meetings will be attributed.

September 2007. The Riksbank announces that it will, from December 2007, publish a repo-rate path at each of the six monetary-policy meetings, not only after the three meetings at which a *Monetary Policy Report* is published.

May 2008. The Riksbank announces an updated communication policy for all Riksbank activities, including monetary policy. Before monetary-policy meetings, some public comments on data and outcomes relative to previous Riksbank forecasts and on policy trade-offs may be now given but no indication of the coming repo-rate decision.

Appendix 2: The Riksbank's communication policy

1. OBJECTIVES OF THE RIKSBANK'S COMMUNICATION

The purpose of the Riksbank's communication is to:

- contribute to fulfilling the Riksbank's objectives and vision,
- enable scrutiny and evaluation and
- contribute to internal quality and efficiency.

The Riksbank's communication shall contribute to achieving the Riksbank's objective and vision. The objective of the Riksbank's operations is to ensure that inflation remains low and stable. One of our main tasks is also to ensure safe and efficient payments in the economy. The Riksbank's vision is to be among the best as regards quality, efficiency and confidence.

The Riksbank is a public authority under the Riksdag (the Swedish Parliament) and accordingly, communication must enable scrutiny and evaluation. Both the general public and the principal, the Riksdag, must be able to follow and scrutinise the work of the Riksbank easily.

Communication must also contribute to internal efficiency. Each employee must have the information required to be able to do their job and to feel job satisfaction and that they belong. All employees should be able to be "ambassadors" for the Riksbank.

The Riksbank's communication must be an integrated part of its activities. This means, for example, that communication planning must be part of operational planning.

2. TARGET GROUPS AND COMMUNICATION CHANNELS

Target groups

There are several target groups for the Riksbank's communication and these include members of the Riksdag, companies, households, banks and other participants in the financial markets, government agencies, organisations, media and the Riksbank's employees.

Communication channels

The Riksbank's own most important channel for external information to the various target groups is www.riksbank.se. Other important channels are reports on monetary policy and financial stability, speeches, press releases and ongoing dialogue in various forms and forums with prioritised target groups.

The various levels of management of the Riksbank are responsible for informing their employees about their own operations and about the Riksbank's overall activities. The intranet is also an important internal information channel.

3. THE RIKSBANK'S COMMUNICATION – APPROACH

The Riksbank's communication must be open, comprehensible, objective and up to date:

- All information must be accessible both internally and externally with the exception of the restrictions that follow from secrecy rules.
- For the Riksbank's operations to be comprehensible they must be described in simple and clear language. Information from the Riksbank is to be adapted to the needs and wishes of the target group in order to get the message across effectively.
- The information provided must be relevant and objective.
- Information that is assessed to have an impact on financial markets must be published as quickly as possible.

The Riksbank also has a statutory obligation if an individual so requests, to supply data from a public document unless that data is classified as confidential. The Riksbank is also obliged to provide information concerning the Bank's area of operations.

All employees of the Riksbank must attach great importance to being open and comprehensible concerning all the Bank's activities, both internal and external. All target groups must be able to understand what the Riksbank does and why. There are several reasons why this is important.

Popular support for the Riksbank is a basic premise for a high level of confidence. This makes it easier for the Riksbank to achieve the objective of price stability and to promote a safe and efficient payment system. Consequently, the Riksbank publishes forecasts and analyses that form the basis for decisions in all the Bank's operations.
The Riksbank's independent position makes considerable demands in terms of openness, comprehensibility, objectivity and being up to date. It facilitates external scrutiny and evaluation of the Riksbank's operations and makes democratic control possible. It is then easier to discuss and evaluate the Riksbank's operations internally as well. This contributes to quality and efficiency in the organisation.

4. RESPONSIBILITY FOR INFORMATION AND COMMUNICATION

The responsibility for information and communications is decentralised at the Riksbank. This means that each head of department makes statements on questions dealt with in that department and that factual data is provided by the person dealing with the matter. The Bank is represented by the Governor or another member of the Executive Board in relation to overall matters. The Director of Communications, the Chief Press Officer and the Head of the General Secretariat may also make statements. Only the members of the Executive Board issue independent statements on monetary policy and financial stability.

To ensure that external communications are well-coordinated all media contacts must be reported to the Riksbank press service.

In crisis situations communications are coordinated by the Communications Secretariat together with the Riksbank's Management Group.

Information and communication is a managerial responsibility. Managers must give their employees the information they need in their daily work and ensure that they are well informed about the Riksbank's operations. Information on the Riksbank's vision, objectives, strategies and values is formulated and spread by the Executive Board and the managers.

All employees have a responsibility for keeping themselves sufficiently informed to be able to perform and develop their work. Sharing knowledge, ideas and viewpoints is important for internal quality and efficiency. It is also important for a good working climate.

The Communications Secretariat:

- provides support in the work of communication as internal consultants,
- guides, coordinates and develops information and communication and

- is responsible for ensuring that messages, target groups, choice of channel and timing of communication are planned in consultation with the members of the Executive Board, Department Heads and relevant experts.

The Director of Communications is responsible for communication policy compliance.

Appendix 3: Monetary Policy Communication: A separate appendix to the Riksbank's Communication Policy

1. OPEN AND CLEAR COMMUNICATION

The Riksbank aims to be as open and clear as possible in its monetary policy communication. There are several reasons for this:

- It should be easy for all the Riksbank's target groups to understand the background to the monetary policy decisions that are made. For that reason the Riksbank publishes the forecasts and analyses on which the decisions are based. By clarifying its reasoning in this way, the Riksbank increases the possibilities of our target groups not only to understand but also to predict monetary policy. This strengthens the credibility of the inflation target and makes it easier to establish expectations around an inflation rate of two per cent.
- The Riksbank is subject to the principle of public access to official documents. The Bank's independent position also imposes considerable demands for it to be open, comprehensible, objective and up to date. This is essential to enable both the general public and the Bank's principal, the Riksdag (the Swedish parliament), to scrutinise and assess monetary policy.
- Communication that promotes discussion and examination of monetary policy also contributes to raising the quality and effectiveness of internal analyses.

2. TARGET GROUPS AND THE COMMUNICATION PROCESS

There are several target groups for the Riksbank's communication and they include members of the Riksdag, companies, households, banks and other participants in the financial markets, government agencies, organisations, media and employees of the Riksbank.

Information on monetary policy decisions and intentions is important to all of the target groups and it is market sensitive. The Riksbank must therefore have a clear procedure for how these issues are communicated. As the Riksbank specifies when, where and how information is to be given, all target groups have equal opportunities to obtain information about monetary policy.

Market-sensitive information about the Riksbank's actions must be published as soon as it is deemed possible, via one or more of the channels that are normally used. The communication must fulfil the simultaneous publication requirement.

3. MEETINGS AND REPORTS

The Executive Board normally holds six monetary policy meetings a year, when the members decide on the repo rate. In connection with three of these meetings the Riksbank publishes a monetary policy report with complete forecasts for the economy and inflation, alternative scenarios and risks. In connection with the three other monetary policy meetings a monetary policy update is published, with forecasts of a number of important macroeconomic variables. At each monetary policy meeting the Riksbank presents a new three-year repo rate forecast.

4. INFORMATION IN CONNECTION WITH MONETARY POLICY DECISIONS

The day after each monetary policy meeting the Riksbank publishes the Executive Board's decision in a press release and holds a press conference. Up to the time until the minutes of the monetary policy meeting are published it is the majority decision that is published. In the press release the Bank gives an account of the decision and the deliberations behind it. The report or the update is published at the same time on the Riksbank's external website. Internally, a presentation is given to employees.

On the same day the Riksbank invites analysts and financial market participants to a presentation of the Monetary Policy Report, which is also presented to participants in the foreign financial markets at various meetings. Monetary policy roadshows are arranged throughout the country aimed at spreading knowledge to various target groups and regions.

About two weeks after each monetary policy meeting the Riksbank publishes minutes which reflect the discussion at the meeting. Since the members of the Executive Board are named it is possible to follow their reasoning and how they finally voted on various issues.

The Riksbank must submit a written report on monetary policy at least twice a year to the Riksdag Committee on Finance. During the spring special material for assessing monetary policy is submitted and in the autumn this material is the Monetary Policy Report.

5. MONETARY POLICY COMMUNICATION BETWEEN MEETINGS

The monetary policy decisions are followed by concentrated information work. Even between the decisions there is a need to communicate relevant information; via speeches, press releases and economic commentaries on the Riksbank's external website.

Members of the Executive Board can give an account of important monetary policy issues. They can also, after the minutes are published, give an account of their own personal deliberations in connection with decisions and forecasts made or comment on new statistics and relate them to the previous forecast. The members can also report on the decision-making material, that is to say which variables are always important and which may be particularly important at the time in question. Common to communication between the monetary policy meetings is that the information given does not anticipate the member's or the Executive Board's position on coming monetary policy decisions.

To avoid disrupting the monetary policy process, the Riksbank is restrictive with information close to a monetary policy meeting.

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The new macro models: washing our hands and watching for icebergs

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The 1960s were an exciting time – at least for macroeconomic modelers. An impressive new kind of macroeconometric model was entering central banking, and cutting-edge central banks were beginning to analyze policy as a problem of optimal control. The December 1965 edition of *Time*, the popular U.S. news magazine, has Keynes on the cover, quotes the experts of the day extensively, and is almost giddy in tone regarding the successes of countercyclical policy. Indeed, one gets the impression that the future of the business cycle might be rather dull: '[U.S. businessmen] have begun to take for granted that the Government will intervene to head off recession or choke off inflation.'

By the revealed practice of central bankers, the new econometric models of the 1960s were a long-term success. The original models and their direct descendents remained workhorses of policy analysis at central banks for the next forty years or so. Were it not for the role the models played in the tragic economic events of the 1970s, this would be a very happy tale of scientific advance.

We are once again in exciting times for macro modelers: a new breed of policy analysis model is entering central banking. Cutting-edge central banks are again beginning to analyze monetary policy as an optimal control problem within those models. For the first time since the mistakes of the 1970s, *science* is gaining ground in discussions of the art and science of monetary policymaking (e.g., Mishkin, 2007). At a central banking conference in 2007, I heard a senior central banker lament that the modern strategy of model-based flexible inflation targeting might render central banking rather dull.

[1] The views in this article have evolved over many years and have greatly benefited from myriad discussions, especially those with John Geweke, Dale Henderson, Eric Leeper, John Rogers, Chris Sims, Lars Svensson, and Jonathan Wright.

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I suspect that boredom is not currently the greatest concern of central bankers anywhere. When organizers of the Riksbank Conference on Refining Monetary Policy asked me to write a paper about the proper role of model-based, optimal policy calculations in real-world policymaking, the topic seemed to be at the forefront of technical issues facing the most advanced central banks.[3] This issue has at least momentarily faded in importance – models by their very nature have a limited domain of applicability, and most of us would agree that the current versions of the new macro models are not built to analyze a complete breakdown in credit markets. The role of model-based optimal policy calculations remains an important one, however, and the current turmoil presents a sobering yet informative backdrop against which to discuss the issue.

I am optimistic about the role the new macro models can play in the policy process once the crisis subsides. The point of this paper, however, is to discuss how we can minimize the risk of repeating the startup mistakes that were associated with bringing online the macro models of the 1960s. In this paper, I invite policymakers, central bank staff, and other concerned parties to consider two claims:

1. The adoption of new technologies, models, and ways of thinking is often accompanied by catastrophic and avoidable mistakes.
2. Answering some hard-nosed, common sense questions about the new macro models may help us maximize the benefits and minimize the risk of catastrophe.

To put the point a bit more aggressively: It would be very foolish to forgo the immense benefits that can come from rapid adoption of the new macro models; it would be similarly foolish to ignore the lessons of history regarding catastrophic mistakes that often accompany such advances.

The issues are too large and complex to be fully developed and documented in this brief article; this article is mainly meant to entice the reader to consider these points and to provoke further discussion and study of their merit. I first give some cautionary tales of technical advance, and draw some tentative lessons. I then attempt to clearly describe the sort of hard-nosed questions we should be asking of the new models. While I offer of few of my ideas on the answers to those questions, my answers are not the point. My hope is that concerned parties will ask and then answer questions like these for themselves.

Finally, let me note that this project was initiated on behalf of organizers of a Riksbank conference, despite the fact that that I have been

[3] The conference was held September 5 and 6, 2008.

critical of some aspects of inflation targeting at the Riksbank and elsewhere. The particular macro model I use to illustrate some points below is a version of the Riksbank's Ramses model. I could not have completed the work without an immense amount of help from the developers; these economists – Jesper Linde and others – went out of their way to help me, knowing that the point of my work was to invite policymakers to ask hard questions about the value of the model. This all is testament to the commitment to transparency and open, honest discussion of difficult issues that, in my view, is one unambiguously positive aspect of the inflation targeting framework. The Riksbank, in my experience, is unsurpassed in its commitment to this hallmark of modern central banking.

1. Advance and catastrophe

History suggests that bringing new technologies into expert practice is often accompanied by catastrophic error. Of course, some mistakes might be an inevitable part of applying new ideas. People make more mistakes when they are new to an idea than they do after considerable experience. What I will discuss is a different kind of mistake that is not inevitable. In particular, we often see the following pattern: a new idea is adopted and experiences some initial success; inflated optimism arises among experts regarding what has been achieved; traditional cautions are neglected; catastrophe follows; after a period of recovery, the new idea settles into its more modest but rightful productive place.

I am not new in making these observations. The ancient Greeks wrote of this elegantly under the heading of hubris. Jumping forward a few centuries, Fenn and Raskino (2008) state a 5-phase 'hype cycle' for how society, in general, reacts to new technology: 1. Technology Trigger, 2. Peak of Inflated Expectations, 3. Trough of Disillusionment, 4. Slope of Enlightenment, 5. Plateau of Productivity. While the `hype cycle' is meant to characterize a media-driven societal dynamic, the elements are very close to what I argue regularly accompanies the transfer of scientific advances into practice by expert practitioners. Perhaps the point is that experts are subject to some the same tendencies as other mortals.

The simplest example of the dynamic I am describing is that surrounding the Titanic – unquestioned advances in ship building, inflated optimism about the magnitude of the advance, neglect of traditional cautions, catastrophe, and finally the technological advances settling in as part of a general improvement in ship building. As noted in the introduction, I see this same dynamic in the adoption of new models in the 1960s, but before returning to that case, consider a case from medicine.

1.1 Antibiotics and hand washing

Fleming's 1928 discovery of the antibiotic properties of penicillin revolutionized the science of infectious disease. The expanding array of antibiotics over the following decades led to striking decreases in mortality and morbidity from these diseases (e.g., Lewis, 1995).

By the 1970s, some authorities were declaring the problem of infection to be solved, or nearly so. William Stewart, the U.S. surgeon general, is quoted (Upshur, 2008) as saying that we would wipe out bacterial infection in the U.S. Nobel Prize winner Macfarlane Burnett with David White (1972, p. 263) speculated that, `the future of infectious disease … will be very dull.'

Of course, these predictions have been radically wrong. Many infectious diseases are making a major comeback (e.g., Lewis, 1995; Upshur, 2008). The emergence of multi-drug resistant bacteria is a major problem in hospitals and elsewhere. Many failed to take note of the adaptability of bacteria – a sort of bacterial Lucas critique – and a slowed pace of discovery of new antibiotics.

Two additional factors highlight the ways in which this is a case of a sort of expert hype cycle. First, cautious observers were well aware of potential problems with antibiotics. In his Nobel lecture, Fleming (1945, p. 93) noted that it `is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them…' In the concluding passages of his lecture he warned of problems that might come from antibiotic misuse in practice. His hypothetical discussion reads like an astute prediction of the path medicine subsequently took.

The second tragic factor involves a revolution that did not take place. Around 1850, Ignaz Semmelweis demonstrated the best defense against bacterial transmission in hospitals: hand washing. While this finding was largely undisputed, and the underpinnings became ever more solid over the next 150 years, the hand washing lesson went substantially ignored. An editorial by William Jarvis in *The Lancet* (1994, p.1312) entitled 'Handwashing – The Semmelweis lesson forgotten?' summarized one recent study on the subject: '[Health care workers] in intensive care units and in outpatient clinics, seldom wash their hands before patient contacts.' Why? Studies state that one of the most important barriers is that doctors are so busy bringing patients the benefits of modern science that they simply do not take the mundane step of hand washing.

Of course, the misuse of antibiotics and the failure to wash hands in hospitals interact: the pair may have played a significant role in making hospitals the incubators of nasty bugs (e.g., Jarvis, 1994; Stone, 2000).

As you probably have noticed if you have been in a hospital recently, the hand washing revolution in hospitals is now well underway, arguably, 150 years late.

1.2 MACRO MODELING IN THE 1960S AND RISK MODELING IN THE 1990S

The adoption of new macro models arguably demonstrates a similar dynamic. Unquestioned advances in modeling were associated with modest successes in the 1960s, and were part of excessive optimism on the part of many experts over what had been achieved. The December 1965 edition of *Time* magazine quoted in the introduction provides a clear view of the tenor of certain experts at the time; Lucas (1981) broadly documents and pillories the hubris of the times. In my view, this optimism was accompanied by the abandonment at many central banks of traditional cautions about inflation and debasing the currency. We all know the catastrophe that followed.

It is too early to fully understand the role of modern risk modeling in the current financial crisis, but public information about the collapse of the insurance giant AIG suggests that excessive confidence in risk models for predicting losses on credit default swaps played an important role. Former Chairman Greenspan of the Fed (2008) concludes:

> The whole intellectual edifice, however, collapsed in the summer of last year because the data inputted into the risk management models generally covered only the past two decades, a period of euphoria. Had instead the models been fitted more appropriately…

we might not be in the current mess. The thought that small, unrepresentative samples may lead to unreliable inference is not, to use a Wall Street term, rocket science: this is a major point in any good undergraduate course in applied econometrics. Advising modelers to carefully attend to sample adequacy is the econometric equivalent of advising doctors to regularly wash their hands.

1.3 TENTATIVE CONCLUSIONS

These examples follow a pattern: Excess optimism – Titanic unsinkable, infection defeated, business cycle tamed, swaps will never default – paired with what looks *ex post*, at least, like failure to heed common wisdom--watch out for ice bergs, wash your hands regularly, keep your eye on

inflation, check if your sample is representative. Experts may, it seems, be capable of excessive faith in the merits of technological advance – faith that seems to overrule conventional expert wisdom or common sense in the area in which they work.

The tales just given are not proof of anything, of course. They are meant only to motivate taking seriously some modest advice: when experts come bearing a miraculous new technology, ask hard-nosed questions about what has actually been achieved.

2. Macro models, old and new

In the remainder of the paper, I articulate the sort of hard-nosed questions I think we should ask of the new macro models as they enter the policy process. I start with the collapse of the last generation of models.

Robert Lucas won a Nobel prize in part for his critique of the models of the 1960s and 1970s:

> More particularly, I shall argue that the features which lead to success in short-term forecasting are unrelated to quantitative policy evaluation, that the major econometric models are (well) designed to perform the former task only, and that simulations using these models can, in principle, provide *no* useful information as to the actual consequences of alternative economic policies. (emphasis in orig.; 1981, p.105)

As noted by King, Lucas's critique, along with the events of the day, had devastating effect:

> Taken together with the prior inherent difficulties with macroeconometric models, these two events [stagflation and publication of Lucas's criticism] meant that interest in large-scale macroeconometric models essentially evaporated. (1995, p.72)

Lucas argued that what was needed was a new kind of model in which macroeconomic behavior was derived as the equilibrium outcome of dynamic optimization by rational agents. Lucas set us on a path to creating what have become known as dynamic stochastic general equilibrium (DSGE) models. When we can model behavior as a rational response to risk, Lucas argued, we are on solid ground; otherwise, *economic reasoning* itself is worthless:

> In situations of risk, the hypothesis of rational behavior on the part of agents will have valuable content, so that behavior may be explainable in terms of economic theory. In such situations, expectations are rational in Muth's sense. In cases of uncertainty, economic reasoning will be of no value. (1981, p.224)

Let us concede that the Lucas ideal is indeed the legitimate and ultimate goal of macro modeling.[4] This might lead one to believe that the first hard-nosed question we should ask of the new models is, 'Do the models meet the Lucas ideal?

This is, however, the wrong question, in part, because the obvious answer is 'no'. To see this, we need a brief history of DSGE modeling.

2.1 A BRIEF HISTORY OF DSGE MODELS

Following the failures of the 1970s, Lucas laid out a roadmap for a new class of models with microfoundations that would be less prone to such failure. In particular, the models would begin with explicit statement of objectives and the information sets for all agents and of the constraints they face. Equilibrium behavior is then derived as the result of explicit constrained optimization problems. In 1981, Lucas put it this way:

> I think it is fairly clear that there is nothing in the behavior of observed economic time series which precludes ordering them in equilibrium terms, and enough theoretical examples exist to lend confidence to the hope that this can be done in an explicit and rigorous way. To date, however, no equilibrium model has been developed which meets these standards and which, at the same time, could pass the test posed by the Adelmans (1959) [of fitting basic facts of the business cycle]. My own guess would be that success in this sense is five, but not twenty-five years off. (1981, p. 234)

The modeling efforts began with Kydland and Prescott's (1982) Nobel Prize winning work; notable contributions include (Chrisitiano, et al., 2001,2005; Erceg, Henderson, Levin, 2000; Greenwood, Hercowitz, Huffman, 1988) It did not take long, however, to recognize that the task would take considerably longer than five years. A number of new technical tools were needed, but the main roadblock was that it proved difficult

[4] Many would debate this point, especially in the details, but these issues are not essential to the argument here.

to specify explicit individual decision problems in such a way that the aggregate dynamics matched the kind of persistent co-movement that we associate with the business cycle. In short, producer and consumer behavior tended to adjust too quickly to new information in the early models.

Modelers began to look for the sorts of constraints that would generate persistent dynamics. For obvious reasons, the general class of constraints that would do the trick are known as 'frictions,' and to a large extent, the development of DSGE models became a broad-ranging search to discover a set of frictions that, when layered onto the conventional core model, might pass the Lucas-Adelman-type tests of reproducing realistic dynamics.

By of the turn of the century, we were arguably beginning to produce models with realistic dynamics. In what was a major set of advances, Smets and Wouters (2003, 2007), building most specifically on work of Christiano, Eichenbaum and Evans, added a larger set of persistent exogenous shocks to the core model than had previously been typical, employed a large set of promising frictions,[5] specified a diffuse prior over the parameters, and then applied a Bayesian estimation scheme. The resulting posterior met various criteria of fit to 7 macro variables – criteria that had previously been impossible to attain. In particular, forecasts using the DSGE model compared favorably to certain well-respected benchmarks.

DSGE models that follow approximately this recipe are being formulated and coming into use at central banks around the world. Notably, a version of the Smets-Wouters model is used at the ECB, and a model that is similar in form, called Ramses (e.g, Adolfson, et al. 2006, 2007), is now used by the Swedish Riksbank.

Once an acceptable model has been formulated, it is natural to perform optimal policy computations. This project was initiated in the 1970s, but largely died when the models were abandoned academically. The new DSGE models have a much more sophisticated treatment of expectations and other features, which make optimal policy computations more complicated analytically. There have been many important advances in the study of optimal monetary policy in DSGE models (e.g. Woodford, 1999, 2000, 2001, 2003). Until recently, there has been little work on the way optimal policy calculations might be used in day-to-day policymaking. Recently, Adolfson, et al. (2006) has filled this void, showing how to produce optimal policy projections that are the natural analog of the *ad hoc* model projections commonly used in policy discussions at central banks. If

[5] Sticky wages and prices, sticky adjustment of capacity utilization, investment adjustment cost; habit formation in consumption.

we are to use the models in this way, it is natural to ask whether we have attained the Lucas ideal.

2.2 DO THE NEW MODELS HAVE SOLID MICROFOUNDATIONS?

The essence of the question about achieving the Lucas ideal is whether we have replaced *ad hoc* behavioral assumptions of the old models with economic behavior that is derived as an equilibrium response of optimizing agents. In the profession, a short-hand for this question is, 'Do we now have solid microfoundations?'

The profession uses the term *microfoundations* fairly informally, but it is important to be clear on this matter. A model has what I will call *weak-form* microfoundations if decisions by agents are governed by explicit dynamic optimization problems: the modeler states the constraints, information sets, and objectives explicitly and derives optimal behavior.

Note that turning a model with *ad hoc* assumptions about behavior into one with weak-form microfoundations is conceptually trivial: just replace the *ad hoc* assumptions on behavior with *ad hoc* technological constraints. Instead of assuming that agents behave in a certain way, we specify constraints such that the only reasonable optimizing choice is that they behave in the way formerly assumed.

Of course, this cannot represent (much) real progress,[6] and one might suppose that the profession would recognize the limited value of this step. As we shall see, however, current DSGE models in key respects take this approach.

A model has strong-form microfoundations if, in addition to weak-form foundations, the formulation of the optimization problem faced by agents is consistent with relevant microeconomic evidence on the nature of those problems. Further, fixed aspects of the constraints (parameters, etc.) are specified in terms of features that are reasonably viewed as immutable in practice, or at least as not continuously subject to choice by the agents involved.

Whereas the DSGE research agenda began as a search for strong-form microfoundations, the reliance on well-founded micro and arguably fixed parameters gave way, to a significant degree, to a search to discover what sort of *ad hoc* frictions might make the model fit. In my view, the publication of the work of Smets and Wouters (2003) may be a reasonable point to mark the end of the search for a model with weak-form microfoundations.

[6] Even this minimal step may provide a building block for further model development.

What has actually been achieved? I will focus on one aspect of behavior arguably at the core of the models: sticky prices and wages. Of course, sticky prices and wages have always been at the center of the Keynesian story of business cycles. At least since Lucas's arguments it has been clear that providing a solid rationale for the stickiness is an important project for Keynesians.

Whereas old models simply assumed that prices are sticky, the new models allow the firms to optimize in the setting of prices. The firms are, however, subject to the technological constraint that they can only change their price when an oracle tells them they can. Imagine each firm has a beacon in its business office, which generally shows red; it periodically flashes green and at that point the firms can change prices. The beacon turns green at random times unrelated to economic fundamentals.

While this assumption has proven extraordinarily productive in practical modeling terms, it is obvious that it provides no rationale for stickiness. Relative to old models, we have replaced an *ad hoc* assumption about behavior with an *ad hoc* constraint essentially forcing firms to behave as formerly assumed.

Setting aside the heavy-handed form of the assumption, one might ask whether at least the parameter determining the frequency with which the beacon turns green might reasonably be viewed as a fixed and immutable economic fact as required for solid microfoundations. Of course, there is no such argument,[7] and if one wants some contrary evidence, a quick check of recent events in Zimbabwe confirms that firms are perfectly capable of changing the frequency with which they adjust prices. Moreover, are we really confident that, in the current economic crisis, firms will wait for their beacon to blink green before lowering prices?

From the standpoint of the Lucas critique, one might at least hope that the exogenous average frequency of price adjustment in the models is chosen to be consistent with the microeconomic evidence summarized, e.g., by Bils and Klenow (2004) and Nakamura and Steinsson (forthcoming). Even this is true in only a peculiar and limited sense. The microeconomic evidence overwhelmingly supports the view that different sorts of goods have different average frequencies of price adjustment. While heterogeneity dominates the data, we have barely begun to explore this topic (see e.g., Carvahlo (2006) and Nakamura and Steinsson (2008)). At this point it is clear that there is no strong support for the microfoundations of calibrating the model to a single average frequency of price adjustment.

The assumption that firms' prices are exogenously fixed for extended periods until a beacon blinks does not constitute a microeconomic ration-

[7] Leeper (2005) also makes this argument.

ale for price stickiness; it is not specified in terms of a plausibly fixed parameter; and serious consideration of existing theory does not resolve how to condense the heterogeneous micro data into a single frequency of price adjustment.

One could continue this analysis with other aspects of the micro-foundations (as in Faust 2005, 2008). In this paper, though, my object is mainly to invite the reader to ask in a hard-nosed way whether we have met the Lucas Ideal. In my view, the answer is clear.We have made immense progress in attaining weak form foundations; we are, however, probably closer to the end of the beginning than the beginning of the end in the construction of a model with strong form microfoundations.

2.3 GIVEN OUR STATE OF KNOWLEDGE, THE LUCAS QUESTION IS THE WRONG QUESTION

I am not arguing that the DSGE literature has gone astray. In the search for a model with strong-form microfoundations, achieving a plausible DSGE model with weak-form microfoundations is a major achievement, setting the stage for assault on the larger goal.

From a practical policymaking perspective, however, as we await ultimate success, there are other questions we should be asking. Here we run up against a stubborn view in the profession, which seems to be rooted in Lucas's emphatic argument that models are of no value outside the class of models he was advocating. This view is not only wrong, it has become quite dangerous. It has created a worrisome urge to declare some sort of victory in overcoming the Lucas critique This pressure probably accounts for the tendency in some parts to view the sort of microfoundations just discussed (blinking beacons, etc.) to be solid microfoundations. Declaring false victory – over icebergs, infectious disease, or the Lucas critique – is surely one way we start down the path to catastrophic error.

Thus, I think it is important that we set aside the view that policy modeling is valueless unless we meet the Lucas ideal. While Sims (e.g., 2006) and others have taken up this case before, it seems to have gone largely unappreciated that nothing in Lucas's Nobel prize winning critique contained a proof that the critique rendered economic modeling *valueless*. I suspect that Lucas's absolutist claims were simply hyperbole of the sort that marked all sides during the violent upheaval in the profession that was the rational expectations revolution. As the new DSGE models enter the policy process, though, it is time we re-examine the value of less-than-ideal models.

3. Less-than-ideal DSGE models: a more pragmatic standard

How should we assess the value of models that do not meet the ideal? Lucas's brilliant statement of the ideal does not help us much here, and this subject has not received vigorous debate in the profession in part because of the absolutist view that anything less than the ideal must be worthless. In this section, I attempt to resurrect a more traditional perspective on macro modeling, and to articulate the sort of hard-nosed questions I think we should be asking of less-than-ideal models used in the policy process.

3.1 PRAGMATIC AMBITIONS IN MACRO

In the inaugural Hicks lecture in Oxford (1984), Solow laid out a case for limited modeling ambitions in macro. He did this in the context of defending young Hicks's IS/LM model against older Hicks's outright rejection:

> But suppose economics is not a complete science … and maybe even has very little prospect of becoming one. Suppose all it can do is help us to organize our necessarily incomplete perceptions about the economy, to see connections the untutored eye would miss, to tell plausible stories with the help of a few central principles… In that case what we want a piece of economic theory to do is precisely to train our intuition, to give us a handle on the facts in the inelegant American phrase. (1984, p.15)

Hayek (1989) makes the same argument in general terms in his Nobel lecture, and in 1948, Milton Friedman's case for the k-percent money growth rule was clearly based in this perspective.[8] Because the optimality properties of the k-percent rule have been much studied, one might forget that Friedman's original justification was based not on optimality, but on the fact that we could not possibly derive a rule that is optimal in any meaningful sense. Friedman stated,

> It is not perhaps a proposal that one would consider at all optimum if our knowledge of the fundamental causes of cyclical fluctuations were considerably greater than I, for one, think it to be\ldots (1948, p.263)

[8] In later writings, Friedman sometimes takes a harder line.

Continuing with a fairly thorough discussion of the main dangers in the proposal, he concluded, 'The proposal may not succeed in reducing cyclical fluctuations to tolerable proportions… I do not see how it is possible to know now whether this is the case.' (p.264)

In this view, we have not attained a model in which the implied optimal policies are ones we can feel confident will, in any meaningful sense, be optimal in practice. We should aspire, then, to design well-behaved policy in light of our conceded inability to design meaningfully optimal policy. How do we appraise models for use in this project?

3.2 DSGE MODELS AND LAB RATS

The question of how best to use an admittedly flawed and incomplete model in policy is a subtle one. While discussion of this topic in macro has been somewhat stunted, one can find some guidance in other fields. One interesting parallel comes from regulatory policymaking regarding human exposure to potentially dangerous chemicals. Monetary policy and toxicological policymaking share an important feature: in neither case is it acceptable to simply run experiments on the actual target population. We do not randomly change monetary policy to learn its effects on people's spending; nor do we randomly expose them to chemicals to find out what makes them ill. Thus, we find ourselves forming policy based on models.

Policymakers in environmental and pharmaceutical toxicology understand that one would ideally make policy based on a model with biological microfoundations matching the human case. But humans are large, complex dynamic, general equilibrium systems; and we currently have no ideal model. Instead, regulators turn to imperfect models in the form of nonhuman mammals: we check how the chemical works in, say, rats as a basis for drawing conclusions about its potential toxicity for humans. Like the DSGE model, rats match a large number of the stylized facts regarding the human system; still, they do not constitute an ideal model of a human.

What is strikingly different from the case in macro, however, is that in toxicology there is a robust discussion of what sort of framework should be used for drawing conclusions based on a less-than-ideal model.[9] A joint working group of the U.S. EPA and Health Canada conducted a detailed study of the human relevance of animal studies of tumor formation. They summarized their proposed framework for policy in the following four steps:

[9] For example, a scholar google search on 'human relevance' and 'animal studies' or 'in vivo studies' turns up hundreds of studies. Examples are Cohen, et al. 2004 and Perel, et al. 2006, and Zbindin, 1991.

1. Is the weight of evidence sufficient to establish the mode of action (MOA) in animals?
2. Are key events in the animal MOA plausible in humans?
3. Taking into account kinetic and dynamic factors, is the animal MOA plausible in humans?
4. Conclusion: Statement of confidence, analysis, and implications. (Cohen, et al., 2004)

In the first step, we get clear about the result in the model. The remaining steps involve asking serious questions about whether the *transmission mechanism* in the model – to borrow a monetary policy term – plausibly operates similarly in the relevant reality. This process is inherently judgment based, and unavoidably subject to error,[10] but an active literature exists deriving and assessing ways to refine this process.

This discussion dovetails nicely with Solow's perspective discussed above. Even in the face of incomplete understanding, models can play an important role in organizing our thinking, placing some structure on our interpretation of the data, and helping us 'get a handle on' the facts. The essential element highlighted by the toxicology case is that, crucially, a key part of this reflection is forming a judgment about which features of the model are plausibly shared by the target of the modeling and which are not.

3.3 PRACTICAL QUESTIONS ABOUT DSGE MODELS

DSGE models are incredibly sophisticated. Still there is a substantial gap between a DSGE model of a dozen or so macro variables and the actual economy. Indeed, this gap strikes me as not so different in magnitude from that between lab rats and humans. In the face of this gap, I am advocating that we follow the toxicologists. To paraphrase the framework above: Are key events in the DSGE mode of action of monetary policy plausible in the actual economy? Taking into account kinetic and dynamic factors, is the DSGE mode of action plausible in reality? In more macroeconomic terms: Is the model broadly consistent with our understanding of real world business cycles? Of the transmission mechanism of monetary policy?

If the model's implications surprise us, we have a choice. It might be that we should alter our understanding; alternatively, we might decide that the surprise is an artifact of some implausible feature of the model

[10] A large part of the literature documents the mistakes and steps and missteps the field has taken in response.

that we had not previously noticed or had not yet found a way to fix. The issue then, is how to deal consistently with these problem areas in making policy.

Unfortunately, these questions are not trivial to answer. Moreover, the development path of these models makes the answers more opaque. To harshly condense the model development process described above, the Bayesian estimation is based on a largely unmotivated prior belief over the parameters of a large, imperfectly understood model, which has a large and weakly justified set of frictions and is driven by a large and weakly motivated set of exogenous shocks. It is very difficult to determine from this process in which ways the economic mechanisms in the model will reflect reality and in which ways they will not.[11]

It is true that these models have been shown to match some broad aspects of reality. They fit the handful of data series in the estimation sample well and forecast about as well as standard benchmark models. Of course, the 1960s models fit and forecasted well. Lucas and other critics took their task to be explaining why the models contributed to catastrophe despite these facts.[12] Surely the excellent forecasting of the 1960s models helped bring false confidence to the users, a mistake we should avoid this time.

As we bring the new models into the policy process, I think there is no substitute for careful checking of where the mechanisms in the model reflect the common understanding and wisdom of the policymakers and where they do not. The natural way to proceed is by stating a set of beliefs, perhaps corresponding to common wisdom about the macroeconomy, and then comparing those beliefs with the mechanisms in the model.

3.4 ILLUSTRATION BASED ON THE RAMSES MODEL

Given the Bayesian approach to model estimation used in this area, it is natural to use Bayesian tools to perform this sort of comparison. The formal Bayesian tools I use in the following are standard and described in Geweke (2005). I mainly sketch a small portion of a more complete analy-

[11] In contrast, I observed, though did not participate directly in, the development of the Fed's more traditional models (FRB/US, FRB/Global) introduced in 1995. The development process was *ad hoc*, opaque, and difficult to characterize. It involved heavy involvement of economists and policymakers at every level of the organization. Whatever else one says about this highly problematic process, it had one virtue: the model development phase did not stop until the relevant group of decisionmakers agreed that the model broadly reflected the views of the group on key questions about the business cycle and monetary transmission mechanism.This is consistent with the descriptions of these issues in Reifschneider et al. 2005, and Stockton 2002.

[12] Lucas makes this point explicitly in the quote that begins section 2. Sims's (1980) famous critique likewise is based in the fact that good fit notwithstanding, the economic mechanisms in the model lead to bad policy prescriptions.

sis here. The more complete approach is based on Geweke's (2007) recent suggestions about inference in incomplete models and is worked out more fully in Faust (2008), Gupta (2009) and Faust and Gupta (2009).

The illustrative results presented below are based on a version the Ramses model, a model used in the policy process at the Riksbank. The model fits the general framework described above: a core model with a large number of frictions and exogenous shocks, with exogenously specified dynamic structure for the shocks. The model is well documented elsewhere (e.g., Adolfson, et al. 2006); and Adolfson et al. (2007) have recently shown how to use the model for practical optimal policy calculations. It is important to emphasize that the particular version of the model I am discussing is not identical to the one used in the policy process and that these results should be viewed only as illustrative. The suggested evaluation process begins by stating a few core beliefs.

Consider two.

Consumption growth is insensitive to short-term changes in short-term interest rates. Based on data from many countries and time periods, combined with a certain amount of theory that has been built up to explain these facts, many economists believe that aggregate consumption is not very sensitive to short-run changes in short-term interest rates. Indeed, a key problem in DSGE models has been that agents in the model seem to be too willing to substitute between current and future consumption when given a small incentive to do so. This problem explains why habit formation, adjustment costs, and persistent shocks to marginal conditions have been added to the core model. Based on this belief, we might want to investigate what the model says about the consumption growth-interest rate correlation.

Long and variable lags of monetary policy. Historically, central bankers and academics have been concerned about the long, and potentially variable, lags in the response of the economy to monetary policy shocks. In practical discussions, one regularly hears statements from central bankers that policy does not have its main effects for up to a year. Of course, a linearized model will not produce variable lags (except as sampling fluctuation), but we can assess whether the lags are long. For example, we might simply consider how much the economy reacts in the very quarter a policy is adopted.

In the Bayesian estimation approach used with these models there are at least two questions of interest when we consider economic features such as the two just discussed. The estimation begins with a statement of prior beliefs about the economy.[13] The prior beliefs might be thought

[13] Where prior is meant to mean before considering the data at hand.

of as the personal *biases* one brings to the analysis: the stronger the prior belief, the less subject the belief will be to alteration based on the data. Ideally, the prior beliefs used in model estimation would reflect the actual beliefs of key participants in the process. In practice, this is difficult to implement, so the prior used in estimation is largely arbitrary. Thus, it becomes interesting to ask how the formal prior compares to ones actual prior beliefs and how much the arbitrary formal prior is affecting the results of the analysis.

For the version of the Ramses model we are examining, the formal prior belief regarding the interest rate-consumption correlation is shown by the roughly bell shaped curve in figure 1, top panel. The horizontal axis gives values of the correlation. The height of the curve reflects the prior plausibility of the corresponding correlation value on the horizontal axis – where the curve is highest, the corresponding correlation is assigned higher prior plausibility.

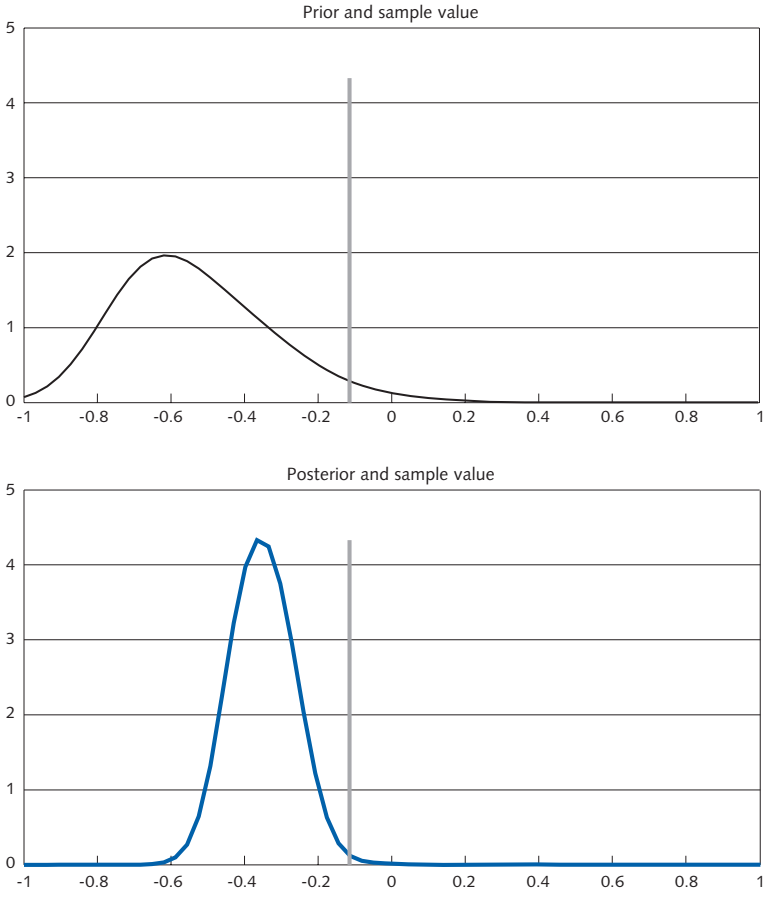
The prior used in estimating Ramses fairly strongly favors a strongly negative contemporaneous correlation (in quarterly data) between the short-term interest rate and consumption growth. Correlation of about –0.6 is most likely in the prior and values near zero are viewed as quite improbable. The correlation value in the estimation sample (vertical line, Fig. 1) reflects the common finding of little systematic relation between these variables.

The Bayesian estimation approach combines the model, the prior belief, and the data to form a new assessment of all aspects of the model, including this correlation. This new assessment, called the posterior belief, is shown in the bottom panel. The posterior still fairly strongly favors a negative correlation with the most likely value around –0.4, and once again values near zero are very implausible.

Thus, this estimation of the Ramses model was based on a strong prior belief that consumption is quite sensitive to interest rates and this prior belief continues to be reflected in the posterior. What should we make of this? This is precisely the challenging question I believe policymakers using this model should confront. Is the low correlation as found in the Swedish data and many advanced economies a fluke? Should we make policy based on the belief in a strong sensitivity of consumption to changes in short-term interest rates? Or should we view correlation as a possibly unfortunate artifact of the model building process – an important difference, as it were, between the laboratory rat and the human?

The analogous examination of long lags in the effects of monetary policy is depicted in Fig. 2, which shows the effect on the growth rate in GDP of a one-quarter percentage point rise in the policy interest rate. To emphasize, the growth effect is in the same quarter as the change in the

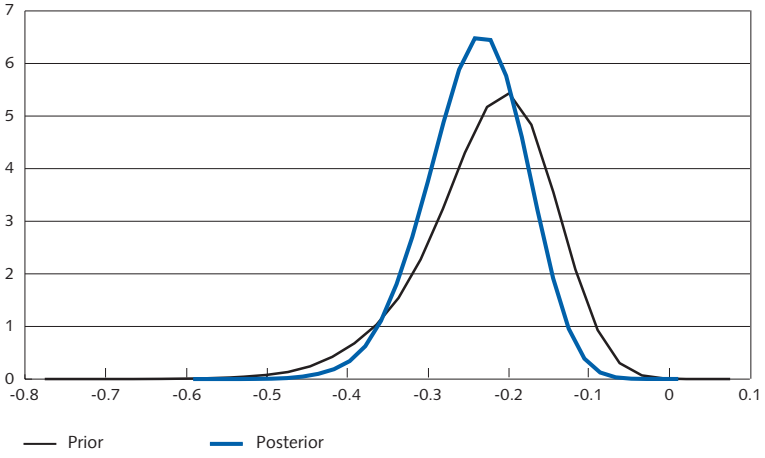
Figure 1. Prior and posterior densities along with the sample value for the contemporaneous correlation between the short-term interest rate and quarterly consumption growth in a version of the Ramses model.
Percent



Source: Author's calculation using computer code provided by Riksbank staff.

policy rate. In this case, the prior and the posterior beliefs for the immediate effect of an unanticipated change in policy roughly correspond. That is, the posterior belief is largely driven by the (largely arbitrary) prior belief. That prior belief puts maximum plausibility on a one-for-one immediate effect of a surprise change in the policy rate. That is, the one-quarter percentage point rate increase immediately gets you a one-quarter point fall in the annualized quarterly growth rate of GDP. This one-for-one immediate effect does not capture the conventional wisdom; it is common to assume that the immediate effect is actually zero. Further, some structural VAR work (e.g., Faust, 1998) suggests that conclusions about the effects of policy may be sensitive to what is assumed about the immediate effects of the policy shock.

Figure 2. Density for the effect of a one-quarter percentage point surprise rise in the policy interest rate on the growth rate in the quarter the cut takes place. A value of –0.25 means that the quarter point rise in the interest rate leads to an immediate quarter point fall in the annualized quarterly growth rate of GDP.
Percent



Source: Author's calculation using computer code provided by Riksbank staff.

What should we make of this result? Should the policy predictions of this model be taken seriously in this dimension, or is this one of the implausible aspects requiring careful translation between the model results and reality? Once again, this is the sort of question that I believe policymakers and other users of these models should be addressing.

The particular 'core beliefs' that I employ as illustrations may not in fact be core beliefs of the reader or of policymakers at central banks, but I hope the point is clear. Nothing guarantees that the economic mechanisms in the model correspond to the ways macroeconomists generally organize their thinking. Hopefully, the two examples given at least suggest that there may be areas of important tension here. Where model and standard thinking conflict, there may be no strong presumption about which should change – on one hand we have myriad unmotivated aspects of the specification of the model and prior beliefs, on the other hand known failures of existing professional wisdom. Before we use these models in the Solow-style mode of helping to organize our thinking and refine our trained intuitions, it seems only sensible that we check first where the models reflect and where they contradict common understanding. This investigation can then provide the basis for building a systematic framework for use in translating between model results and reality.

4. Conclusion

History teaches us that, despite advances in shipbuilding, sea captains should watch out for icebergs and that, despite advances in antibiotics,

doctors should wash their hands regularly. To this list, I would add that macro policymakers should explicitly note and make allowance for their less-than-ideal models. As we bring new models into the policy process, we should familiarize ourselves with the most and least plausible parts of the models and then formulate standard ways of accommodating the perceived flaws.

Of course, one way to do this is to simply begin using the models. If the history of modeling has taught us anything, it has taught us that the flaws will become apparent with use. Policymakers and staff can evolve ways to deal with the flaws 'on the fly' as policy is made. This haphazard process, however, is prone to just the sort of policy breakdowns and even catastrophes associated with macro modeling in the 1960s and with risk modeling in financial markets more recently. My argument amounts to little more than advocating a hard-nosed common sense at the outset in bringing these models into the policy process.

Advocates of the new models sometimes react in mild horror to the suggestion that we add a layer of judgment – based in explicit examination of model flaws – to the process of applying the model. The very purpose of the model, in this view, is to remove discretion and ensure consistency and transparency in policymaking. Of course, consistency is important. As the American sage, Ralph Waldo Emerson argued, though, 'a foolish consistency is the hobgoblin of little minds.' The approach I am advocating is intended to help attain a sophisticated consistency: be clear at the outset about model flaws and the ways in which these will systematically be accommodated. The list of flaws will undoubtedly change with use of the model – some problems fixed, new ones discovered – but the framework for use of model results can remain relatively static, consistent, and transparent.

Opponents of the new models sometimes hear in my critique of flawed models a neo-Luddite argument in favor of rejecting the models entirely. In concluding, let me emphasize that, to the contrary, I believe that these models are essential to progress. Over the nearly 20 years I spent at the Fed, I observed a considerable increase in the sharpness with which dynamic economics was discussed – an advance that would have been hard to attain had many participants in the process not sharpened their skills using DSGE models. So long as we incorporate some simple cautions – and wash our hands regularly – I am confident that we are only beginning to obtain the immense policy benefits that can come from further work with these models.

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The decision-making process – how the Executive Board of the Riksbank decides on the repo rate

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The statutory objective of the Riksbank is to maintain price stability. In the preparatory works for the Sveriges Riksbank Act, it was also stated that the Riksbank, without prejudice to the price stability target, should support the goals of general economic policy with a view to maintaining sustainable growth and a high rate of employment. The Riksbank thus conducts what is generally referred to as flexible inflation targeting. To achieve this, the Riksbank decides what the level of the repo rate should be. The aim of this article is to describe the process that the Riksbank follows when making decisions about the repo rate. The article also aims to describe the factors that have an impact on the form and structure of the decision-making process.

Independent central bank

The basis for the present form of the decision-making process was established in 1999, when the statutory objective of maintaining price stability was adopted and the Riksbank was given a more independent role in relation to its principal, the Swedish Parliament. Since then, the Riksbank has been managed by an Executive Board consisting of six full-time members, one of whom acts as the Governor and Chairperson of the Executive Board. The members are appointed by the General Council of the Riksbank, usually for a period of six years at a time. Normally the periods of office for the different members overlap to create continuity in the

[1] We would like to thank Jesper Hansson, Kerstin Mitlid, Marianne Nessén and Anders Vredin for their valuable comments.

work of the Bank. The General Council is made up of 11 members and the same number of deputies, all of whom are appointed by the Swedish Parliament. Prior to 1999, the Riksbank was managed by the General Council together with the Governor. Today, the General Council has a more supervisory function.

Figure 1.

The Executive Board makes independent decisions on the repo rate and thus has what is known as instrumental independence. The objective for monetary policy – maintaining price stability – is stipulated in the Sveriges Riksbank Act. In this sense, the Executive Board is not independent in terms of the objective. However, the Executive Board does decide on the exact wording of the objective. The Executive Board also decides what interest rate should be set to achieve this objective.

The Executive Board has chosen to organise as an individualistic committee.[2] This means that the decisions are made jointly, but that each member has an individual responsibility. The interest rate decisions are made by means of a majority vote and the Chairperson of the Executive Board has the casting vote. The minutes that are published approximately two weeks after the monetary policy meetings provide a record of how each of the members reasoned and voted. Once the minutes have been published, the members may express their own views publicly, which highlights the members' individual responsibility and also makes it easier to evaluate monetary policy.

The way that a central bank chooses to organise its work is reflected in how it then communicates its monetary policy to the public. In many other central banks, the decisions are made by a collegial committee.[3] In such a committee, the members agree on a decision that is then publicly supported by all members. Any differences of opinion are kept within the

[2] For a review of the different monetary policy decision-making models, see Blinder and Wyplosz (2004).
[3] See, for example, Pollard (2004).

group; outwardly they speak with one voice. The European Central Bank (ECB) is an example of this type of committee. Consequently, the ECB does not publish any minutes following its monetary policy meetings.

Demands for openness and clarity

The fact that the Riksbank is independent in relation to the Swedish Parliament means that there is a particular need for the Riksbank to be open and clear – transparent – regarding the decisions that the Executive Board makes and the basis for these decisions. One component of this transparency is that the Governor of the Riksbank attends hearings held by the Parliamentary Committee on Finance twice a year on the monetary policy that the Riksbank has conducted in the immediately preceding years. In connection with one of these hearings, the Riksbank compiles data and background information for the evaluation of monetary policy.

Another component of this transparency is that in connection with each of the monetary policy meetings, which are usually held six times a year, the Riksbank publishes a report that summarises the material on which the Executive Board has based its decision, as well as the view of economic development supported by the majority of the Executive Board.[4] A press release is also published when the decision on the interest rate is announced. This contains the most important reasons for, and considerations, the majority's decision. A press conference is also held at which journalists have the opportunity to ask questions. Two weeks after every meeting, minutes are published which relate in detail how each of the members reasoned and voted. If any of the members of the Executive Board have a different view of monetary policy than the majority, they can enter a reservation against the interest rate decision and/or against the report and the forecasts presented in it. Any such reservations are recorded in the minutes.

One step the Riksbank has taken to further increase transparency is to publish its own forecast for the repo rate since the beginning of 2007. The idea is that this will make it easier for the public to understand how the Executive Board reasons when it makes decisions on monetary policy and the considerations behind these decisions. However, this has also had an impact on the way that the internal work is organised. For the Executive Board to be able to make a forecast for the repo rate, they must assess which repo rate path will provide a well-balanced monetary policy during the forecast period. This means that the members of the Executive

[4] At three of the meetings the Riksbank publishes a comprehensive Monetary Policy Report and at the remaining three a shorter version called a Monetary Policy Update.

Board participate in the work on the forecast in a more concrete way than previously.

Demands regarding background material and data

In order for the Executive Board to be able to make a decision on the repo rate path, they need background material and data that describe the current state of the economy. As there is a certain time lag before the interest rate affects the economy, they also need a description of the outlook for the period ahead. Another reason for making forecasts for a number of years ahead is that the Riksbank wants the development of inflation and the real economy – production and employment – to be stable over time. To arrive at an appropriate repo rate path, the Executive Board needs to see how different repo rate paths and different assumptions about, growth abroad, affect future economic development in Sweden. The background material is produced by the Monetary Policy Department in cooperation with the Executive Board. Below is a detailed description of how the internal work on producing background material and data as a basis for the interest rate decision of the Executive Board is conducted in a process which concludes with the publication of a Monetary Policy Report. In those cases where a Monetary Policy Update is published the process is shorter.

The forecasts represent an interplay between models and assessments

In order to form a picture of how the economy is expected to develop in the period ahead, the Riksbank uses a toolbox consisting of assessments, theory and empirical studies. These tools complement one another and have different roles in the forecast work. They are all important and necessary to make the best forecasts as possible.

As the economy is enormously complex, the Riksbank uses various macroeconomic models to create a cohesive picture of the development of the economy and how any new information that becomes available should be interpreted. These models are based on modern economic theory, empirical studies and practical experience of different correlations in the economy. If one merely studies individual correlations one misses the interdependence that exists between the different parts and sectors of the economy. There is then a considerable risk that the different parts of the analysis will not hold together.

However, models – no matter how sophisticated they may be – are only simplifications of reality. They must be supplemented with analyses

and assessments by experts in different fields. These experts have important insights into the real situation that the models are unable to capture. Forecasts based on models provide a good starting point and help to structure the discussions. The experts then adjust the models' forecasts on the basis of their specific knowledge and assessments. The assessments become particularly important when unusual events and structural changes take place that alter functioning of the economy. Models that are only based on historical correlations find it hard to handle such changes.

In recent years, models have played an increasingly important role in the work on forecasts. A similar trend has also been seen at many other central banks. The reason for this is that methods have improved very quickly with regard to the empirical properties and forecasting performance of large structural macro models. There have also been major advances with regard to time series models, which focus on regularities in economic data and are based to a lesser extent on economic theory. Increasingly powerful computers have been of considerable importance in this context. They make it easier to make advanced and time-consuming calculations.[5]

The Riksbank has developed its own macro model for the Swedish economy. This is designated Ramses and now plays a very important role in the forecast work.[6] Ramses is a general equilibrium model and belongs to the group of DSGE models of the neo-Keynesian type.[7] The term "general" means that the model attempts to explain large parts of the economy and not just a single component such as private consumption or the labour market. If a particular variable changes, the entire system is adapted in the model simultaneously with the change. The fact that it is an equilibrium model means that it assumes that market mechanisms create a balance between supply and demand in the different markets of the economy.

Ramses is used, to make forecasts, interpret the development of the economy, study alternative scenarios and calculate the effects of monetary policy. Some areas, such as the credit market the credit market, are as yet not particularly well developed in general equilibrium models such as Ramses.[8] Ramses is therefore complemented by partial models that focus on certain individual variables. Bayesian VAR models are also used for forcasting. A VAR model is a system of equations that can be used to capture the average variation in data. In a Bayesian VAR model a prior is

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5 For a review of the results from the models and their forecasting performance see Adolfson et al (2007a).
6 Adolfson et al. (2007b).
7 DSGE stands for Dynamic Stochastic General Equilibrium Models.
8 Extensive work is currently underway at the Riksbank to also include financial frictions in Ramses. See for example Christiano, Trabandt and Walentin (2007).

used, which is an assessment made in advance of, for example, how high the sustainable growth rate will be.[9]

In general, the further ahead we look, the more importance we give to economic theory and the assumptions of long-term equilibrium in Ramses and the Bayesian VAR models. In order to determine the current status of the economy we instead use various times series models and indicator models. These are used to make forecasts one to two quarters ahead. These short-term forecasts are then used as starting values in the large macro models.

The decision-making process develops

As pointed out above, the decision-making process has been affected by the fact that the Riksbank has an independent position and that the members of the Executive Board have an individual responsibility for monetary policy. In recent years, the process and the form of the Monetary Policy Reports have also been affected by the fact that the Riksbank presents its view of the future development of the repo rate and that this interest rate forecast forms the basis for other forecasts. In addition, there has been a relatively rapid development of methods and models at the Riksbank. This has improved the background material and data produced for the Executive Board and the structure of the Board's meetings about the forecast.

As the Executive Board is fairly small and the composition of the Board changes over time, it is also natural that the process is affected by the individuals that make up the Executive Board at any one time. The Board members do not, for example, always share exactly the same view of what is a relevant basis for the latest monetary policy decision. It is important, however, that the decision-making process is not changed too often. The aim has instead been to design the process so that it creates scope for the Executive Board to influence the assessments in a structured way.

The process begins with a discussion of alternative scenarios

The material for the monetary policy meetings is mainly produced in the Monetary Policy Department in close cooperation with the Executive Board. Figure 2 shows meetings held during a normal process and approximately when these meetings are scheduled. The process usually takes about six weeks. As can be seen in the figure, the work normally

[9] See, for example, Villiani (2005).

begins with a discussion of various risks and conceivable alternatives for the development of the economy. The Board members participate already at this first meeting together with employees of the Monetary Policy Department, some employees from other departments and a number of advisers to the Executive Board. The aim of the meeting is to discuss at an early stage, what the Executive Board and the employees at the Riksbank see as the possible course of the future development of the economy in Sweden and abroad.

It is at this meeting that the alternative scenarios described in the second chapter of each Monetary Policy Report begin to take shape. The scenarios illustrate the possible course of development if particular events occur in the economy. For example this process may involve alternative scenarios for productivity, the oil price or economic growth abroad. These scenarios can then be used in the production of the main scenario. They can also be used to reflect a scenario that an individual Executive Board member prefers as the main scenario.

The scenarios also act as a guide for external analysts as to how monetary policy may be adapted if economic development does not follow the course predicted by the Riksbank. For example, the Monetary Policy Report published in February 2007 contained an analysis of an alternative scenario in which wages developed at a faster rate than stated in the main scenario. This contributed to an upward adjustment of market expectations regarding the repo rate during the spring when it appeared that the collective bargaining process would lead to higher wage increases than predicted by the Riksbank. The Riksbank also adjusted the repo rate upwards in subsequent reports. In the first and second Monetary Policy Reports of 2008, the alternative scenarios for oil and commodity prices functioned in the same way.

Experience indicates that that the work on the alternative scenarios increases the stringency of the discussions conducted during the forecast process and facilitates the effort to draw up a main scenario that a majority of the Executive Board can support.

The discussions at this meeting are relatively unbiased and take a broad perspective. The meeting usually begins with a review of the scenarios that were described in the previous Monetary Policy Report or that have been presented internally. At the end of the meeting, the Monetary Policy Department attempts to summarise the discussion by formulating a number of possible alternative scenarios. Several more in-depth analyses may also be ordered if it is believed that these are of importance to the approaching interest rate decision. If, for example, it is decided at the meeting that it would be interesting to draw up an alternative scenario

in which productivity is lower than in the previous main scenario, then it becomes necessary to investigate questions such as:

- What could lead to lower productivity?
- How long will productivity be lower?
- When can productivity be expected to be lower?
- Is productivity lower just in Sweden or in other countries too?
- How will the Riksbank react?
- Is it possible to produce scenarios in the Riksbank's general equilibrium model for the Swedish economy (Ramses) or should some other model be used?

Figure 2. The process when a Monetary Policy Report is published.

The international forecast and the current situation in Sweden are determined

After the initial risk meeting, a number of meetings are held at which new statistics and new events that have occurred in the economy since the previous monetary policy meeting are presented and analysed – has development been in line with the previous assessments and what is the current status of the economy? The exogenous conditions for the forecast reviewed those factors that are independent of the monetary policy conducted in Sweden. A small, open economy like Sweden is highly affected by events in the outside world, while the opposite is not the case. As there is of a time lag before monetary policy has an effect, development in the very short term is also relatively unaffected by the interest rate

decision that the Executive Board takes at the next monetary policy meeting. The discussions at the meeting are often at a detailed and technical level. The forecasts in the main scenario begin to take shape.

Initially, an *international outlook meeting* is held at which the aim is to arrive at a preliminary international forecast. The meeting begins with a review of any important new information on international events or developments that has become available since the previous monetary policy meeting and of any important information that is expected to become available before the forecast is adopted. There is a discussion of the deviations from the main scenario that have occurred since the previous assessment and of the revisions that the new information indicates may be required. The results of several indicator models and model runs are presented. Forecasts from bodies such as the OECD and the IMF are also presented.

After this a *financial market meeting* is held. One of the purpose of this meeting is to determine a preliminary repo rate path which will be used at the beginning of the forecasting work. This is often the same path as in the previous forecast, but revisions are of course made if required in light of new information. Proposals for alternative interest rate paths are also presented. Events on the financial markets since the previous monetary policy meeting are discussed and analysed. This includes analysing the changes that have taken place in the implied forward rate path, which is assumed to reflect the markets expectations regarding the repo rate path. Developments regarding of house prices, credits, share prices, the money supply, exchange rates and international interest rates is also presented at the meeting.

Next, a *current status* meeting is held. The purpose of the current status meeting is to as certain the state of the Swedish economy as the present time. The definition of current status is relatively broad. The National Accounts, which are the most important source of statistics on the real economy, are published with a time lag. The outcomes for the preceding quarter are therefore not usually known when the forecasting work starts. Assessing the current status of the economy thus often entails making a forecast for the preceding quarter as well as for the present quarter. An important aspect in this context is the assessment of the current level of resource utilisation. As in the case of the international outlook meeting, the current status meeting begins with a review of any important new information on Sweden that has become available since the previous monetary policy meeting and of any important information that is expected to become available before the forecast is adopted. Apart from new information on the current economic situation, there are also

discussions of other new information that may be important for the forecasts in the slightly longer term.

At this meeting, the results from a number of indicator models and model runs are also presented.[10] In the case of the model runs the main focus is on the current situation. For example, the actual outcomes compared to what Ramses expected are studied and analysed.

The Executive Board members are invited to intend these meetings, but they are mainly intended to be working meetings, for the personnel of the Monetary Policy Department. Members of the Executive Board who are unable to attend these meetings, or who prefer to receive a summary of the new information, may choose to attend only the first large monetary policy group meeting, which is described below.

The Monetary Policy Department establishes its forecast

Following these three introductory meetings, the Monetary Policy Department establishes its view of macroeconomic developments. The initial focus is on a number of key variables such as inflation, interest rates, GDP, number of hours worked, exchange rates and resource utilisation. The idea initially is to adopt a "top-down" approach to the forecast. This means that the first thing to do is to form a general picture of the macroeconomic situation. The forecasts are produced on the basis of the exogenous conditions; that is on the basis of the view of the current status of the economy and the forecast for developments abroad. The forecast is produced with the help of Ramses and so-called Bayesian VAR models. As pointed out above, some areas are not particularly well developed in Ramses as yet, so partial models that focus on certain specific variables are also used in the forecasting work. Finally, a wide range of assessments are made in order to arrive at the final macro forecast.

The different parts of the forecast are then chiselled out in more detail. For instance, a complete forecast is produced for the demand components in the balance of resources and in the labour market. This is more of a "bottom-up" approach and thus acts as a means of checking the macro picture. The aim is to ensure that all the parts of the forecast hold together and add up correctly. Normally, this leads to only minor revisions of the macro forecast.

[10] For a review of these see Andersson and Löf (2007).

THE MONETARY POLICY DEPARTMENT'S INTEREST RATE PATH IS NOT A RECOMMENDATION

The interest rate paths presented in the Riksbank's Monetary Policy Reports and Updates represent the view of monetary policy that the majority of the Executive Board supports on each occasion. They are, however, the final result of the entire forecasting process. When the Monetary Policy Department begins work on the forecast, it normally uses the interest rate path adopted at the previous monetary policy meeting as a starting point. The forecast for the repo rate is then gradually adjusted as the forecasting work progresses. The path produced at this stage should reflect the Executive Board's normal, historical behaviour.

An alternative to producing an interest rate path that reflects the historical behaviour of the Executive Board would be to produce an interest rate path that the management believes is an appropriate path. However, it is not obvious which type of path should be chosen here. It is of course valuable for the Executive Board to hear the management's views on monetary policy. The fact that the Riksbank conducts flexible inflation targeting means that alongside the inflation target the Riksbank also has to take into account the development of production and employment. If inflation deviates significantly from the target it is not self-evident how quickly inflation should be brought back to two per cent. To determine whether, and if so how, the repo rate needs to be changed, an analysis must be made of the causes of the deviation of inflation from the target and also of how the interest rate, inflation and the real economy interact. What may be considered to be a well-balanced monetary policy at the time is thus not immediately self-evident. It is rather a question of judgement, and the point of having an Executive Board consisting of several members is that this provides a range of perspectives and expertise. Presenting a forecast – including a path for the repo rate – that has been produced entirely by civil servants may thus be problematic. What point of view should it represent? There may also be differences of opinion among the management; if so, whose interest rate path should be presented? That of the Head of the Monetary Policy Department or an average of the views of the entire Department?

However, although there are good reasons why the management should not give the Executive Board a recommendation, it has to be admitted that ultimately it is difficult to prevent the interest rate path and other forecasts from being at least partly affected by the management's own assessments. Furthermore, it is not entirely unusual for members of the Executive Board to explicitly ask members of the Department at various meetings what they believe would be a well balanced monetary

policy. The important thing, however, is not that the Executive Board finds out what various people in the Monetary Policy Department think about the interest rate forecast, but that it is made clear that it is made clear how they arrived at the different forecasts. The results that the different models have provided and the various assessments that have been made alongside the models should, for example, be made as clear as possible.

The first large monetary policy group meeting summarises new information and the forecast

When the work on the forecast has been completed at the Monetary Policy Department, the first large monetary policy group meeting is held. In the first part of the meeting, the Executive Board is updated on any new information that has become available and the international forecast is presented. In the second part, various in-depth studies and the forecast for Sweden are presented. The aim of this meeting is to provide the Executive Board with the information and data it needs to be able to begin to form a joint view of the future development of the economy and the monetary policy that should be conducted in the period ahead.

The meeting may vary in length depending on what has happened since the last meeting and how many in-depth studies have been ordered. Table 1 below shows the schedule for such a meeting, wich is approximately five hours long. These meetings are open to most of the Monetary Policy Department and to the Executive Board. Personnel from the Financial Stability Department and from the Communications Secretariat, as well as certain advisers to the Executive Board, usually also take part.

Table 1. Example of an agenda for the first large monetary policy group meeting.

Agenda	Time (minutes)	Presenters
Part 1		
Introduction and summary	5	Head of FD
Market report	30	DMAO
Housing prices etc.	30	FSD
International outlook	60	DEPA
Current status in Sweden	55	FD
Part 2		
In-depth studies	40	
The forecast	80	MD

Note. DMAO = The Division for Market Analysis and Operations, FSD = Financial Stability Department, DEPA = The Division for Economic Policy Analysis, FD = The Forecast Division and MD = The Modelling Division.

The first part of the meeting begins with the presentation of the new information that has become available since the last monetary policy

meeting. This is followed by a presentation of the forecasts and how they were obtained. Initially, the forecasts produced using Ramses and the BVAR models are presented. These forcasts are based on the assessments made for the international outlook and on the new information for the present quarter. The model revisions are then presented to explain how the model forecasts have been revised between this forecasting process and the previous forecasting process. Sometimes the model revisions are also co-weighted.

If other models have been used to produce the main scenario, the results from these models are also presented, as was the case in the autumn of 2007 during early stages of the financial crisis. It was not possible to capture the consequences of the financial turbulence in Ramses. A forecast was therefore produced in another model in an attempt to capture these developments. A great deal of analysis was also required.

The next step is produce a summary in which the previous forecast, the model forecasts and the forecast in the main scenario are presented. Finally, various consistency checks are presented. For example, the entire real forecast (GDP, employment etc.) is entered into Ramses to see what inflation and interest rate forecasts then emerge from the model.

The aim of the first large monetary policy group meeting is to attempt to clarify for the Executive Board what forecasts different models generate, how the models react to the new information that has become available and, not least, what assessments the management of the Monetary Policy Department made to arrive at the final forecast. At this meeting, the members of the Executive Board also have the opportunity to ask the expert about details in the forecast.

The second large monetary policy group meeting provides more scope for discussion

The second large monetary policy group meeting is held the next day. This meeting is also divided into two parts. The first part of the meeting takes around one hour and the second part approximately two hours. Table 2 shows the agenda for such a meeting. In the first part, the scenarios that were ordered at the introductory risk meeting are presented. Scope is provided to discuss the effect of different factors on economic development. For example, how will GDP and inflation in Sweden be affected if development abroad is weaker than assumed in the main scenario? And in what way may monetary policy in Sweden need to be adapted to this scenario? We also check with the Executive Board whether the alternative scenarios cover the risks the Board sees in the period

ahead and whether the Board believes that the monetary policy response seems reasonable.

All of the people who participated in the first large monetary policy group meeting are invited to attend the first part of the second meeting. However, the second part of the meeting is attended only by the Executive Board and a small number of people from the management of the Monetary Policy Department, a couple of advisers and representatives from the Communications Secretariat. The reason for limiting participation in the second part of the meeting is to allow the members of the Executive Board to discuss the issues between themselves as thoroughly and as openly as possible. The members of the Executive Board may now discuss and express opinions on the main scenario basis of their own assessments.

Table 2. Example of an agenda for the second large monetary policy group meeting.

Agenda	Time (minutes)	Presenters
Part 1		
Alternative scenarios	60	MD
Part 2		
Discussion of the forecast – different weightings	60	MD
Different repo rate paths	60	MD

Note. MD=The Modelling Division.

The Executive Board confers

In part 2 of the second large monetary policy group meeting the Executive Board plays a more active role. The various Board members present their views on the forecast. A member may, for example, express concern that the forecast for productivity is too high. If an alternative scenario for productivity has been drawn up the main scenario can be adjusted directly at the meeting by weighting the two scenarios for the growth of productivity together. The Board can then immediately see what impact this has on the forecasts for the repo rate path, inflation and, for example, the growth of GDP. Various repo rate paths that reflect different balances between inflation and the development of the real economy are also presented.

On the basis of this material, the Executive Board attempts to arrive at a repo rate path that it seems likely that the majority of the Board members can support. At this point that the Board members decide that they want to see additional alternative scenarios, or another repo rate path than the one that the one that has served as the main scenario until this time. If so, these are produced by the next day when a follow-up

meeting is held with the Executive Board and some of the personnel of the Monetary Policy Department.

On the basis of this new material, the Board members can usually decide which interest rate path they prefer. It is still possible, however, for the Executive Board to amend the forecasts if it believes this is necessary. All forecasts can be changed at the Executive Board's monetary policy meeting that is held a week or so later.

Executive Board meetings on the forecasts and the texts

After the second large monetary policy group meeting the Monetary Policy Department continues its work and compiles a first draft of the Monetary Policy Report. This is done in close co-operation with the Executive Board. A formal Executive Board Meeting is held a few days after the second large monetary policy group meeting at which the forecasts are presented.

The Executive Board receives a first draft of the Monetary Policy Report as a basis for this meeting. The forecasts are those that the Board adopted at the meeting on the day after the second large monetary policy group meeting. The Board continues to discuss the forecasts and how they should be presented in the Monetary Policy Report. The editorial work on the Monetary Policy Report continues and the text is regularly checked with the members of the Executive Board.

The Executive Board then holds another formal meeting a few days later. The primary focus of this meeting is on the wording of the report, which is reviewed in detail. After this it is finally time for the monetary policy meeting.

The monetary policy meeting

The Executive Board normally holds six monetary policy meetings a year. If necessary the Board can meet more often. The number of meetings is not stipulated by law, but is determined by the Executive Board members. In addition to the Executive Board members, a number of employees from the Monetary Policy Department, the Financial Stability Department and the Communications Secretariat take part in the meeting, as well as some advisers and lawyers. The Chairman and Vice Chairman of the General Council also regularly participate in the meetings of the Executive Board and thus have a direct insight into the work of the Board. They both have the right to express opinions, but not to put forward proposals or take

part in any decisions. In total, around 20 people are usually present at the meeting.

The meeting usually begins with a brief update on how the financial markets have developed, including markets expectations regarding monetary policy ahead of the meeting, and other new, important information received since the editorial meeting a few days earlier. This is followed by a summary of the main elements in the Monetary Policy Report or the Monetary Policy Update.

The Executive Board then discusses economic developments in the years ahead. First they deal with economic activity and inflation abroad and then developments in Sweden. Each member of the Executive Board now presents his or her view of the current status of the economy and of the monetary policy stance that should be adopted. There is no predetermined order as to who will begin the discussion. Although the members of the Board may have formed an opinion during the process, the final decision on the repo rate is made at this time and a majority view is formed regarding the future repo rate and economic development at this time.

The process is designed so that the forecasts and the Monetary Policy Report can be changed following the meeting. The alternative scenarios and the model results allow consistent revision of the forcasts in connection with the monetary policy meeting at the request of majority of the Executive Board. The Chairman of the Executive Board usually concludes by summarising the discussions held and the proposals that have been put forward regarding the interest rate level. The Executive Board then moves on to the decision and votes.

After the formal meeting, the Monetary Policy Report and the press release are finalised. The wording should reflect the discussions at the meeting. The repo rate decision is normally announced the day after the meeting when the press release is published. At the same time, the Monetary Policy Report is published on the Riksbank's website. The printed version of the report is published slightly later. Approximately two weeks after the monetary policy meeting, minutes are published which relate in detail how the different Board members have reasoned and voted. The Monetary Policy Department draws up draft minutes that the Executive Board may then amend.

To sum up, this article has highlighted and discussed the changes that have taken place in recent years in the way that the background data and material for the interest rate decisions are produced. Some of these changes stem from the fact that forecasting methods have developed. Other changes relate to the specific conditions that apply in Sweden where the independent position of the Riksbank raises high demands for

openness and transparency. The Riksbank's decision to begin publishing its own forecast for the repo rate is part of the effort to increase transparency and to further improve the analyses. This also means that the members of the Executive Board have become more involved in the forecasting process. The Riksbank continually evaluates its forecasts to determine how well they have managed to predict actual developments as part of its efforts to constantly improve its working methods.

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Hedge funds and financial crises

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A discussion of the impact of hedge funds on the crisis is a recurring feature of every financial crisis. Even though the course of events in previous crises may have been very different, the criticism of hedge funds tends to be the same. This article discusses the impact of hedge funds on financial crises first from a historical perspective and then in relation to the current crisis. The claim that hedge funds in general have a greater impact on financial crises than other investors is not, however, supported by the analysis here.

Many differences between hedge funds and mutual funds

"Hedge fund" is a collective term for different types of investment fund. Generally speaking, a hedge fund is a fund with absolute return targets for financially sophisticated investors. Although many hedge funds protect their investments against losses (so-called hedging) this does not apply to all the funds. Hedge funds in fact use many different investment strategies.

Hedge funds do, however, have a number of common characteristics that distinguish them from mutual funds. In general, hedge funds employ more flexible investment strategies. A more liberal regulatory framework[2] than for mutual funds enables more dynamic investment strategies with both long and short positions and the use of derivatives. Hedge funds can also choose to have a high level of leverage. Mutual funds have relative return targets where the results of the fund are compared with an index. Hedge funds have absolute return targets irrespective of the development of the market as a whole.

[1] E-mail: maria.stromqvist@riksbank.se. The views expressed here are those of the author and should not be regarded as the Riksbank's views on these issues. I am grateful for the comments made by the editors of the Economic Review, which have helped to improve the article.

[2] In Sweden, hedge funds are regulated by the Investment Funds Act (2004:46) and Finansinspektionen's regulations regarding investment funds (FFFS 2004:2). See Finansinspektionen (2007).

The fee structure in hedge funds also differs from that in mutual funds. In a mutual fund, the management fee is a few per cent of the managed capital. In hedge funds, it normally consists of a fixed fee of two per cent of the managed capital and then a variable fee of 20 per cent of any earnings over and above the return target. Some hedge funds also apply a "high water mark" which sets a limit for when the variable fee may be levied. A high water mark means that the variable fee is only charged if the value of the fund exceeds its highest previous value, irrespective of the earnings achieved in the period concerned.

With a high minimum limit for investments, hedge funds are primarily intended for institutional investors or financially strong individuals. A typical feature of hedge funds is also that investors can only withdraw their money from the fund on a monthly or quarterly basis, in contrast to mutual funds, which provide liquidity on a daily basis. This approach facilitates investments in less liquid assets.

The hedge fund market has grown dramatically

Over the last ten years, the hedge fund market has grown exponentially. In 1996, hedge funds managed approximately USD 135 billion dollars and there were around 2 000 funds. By the end of 2007, 10 000 hedge funds managed USD 2 000 billion (see Figure 1). This means that there has been a fifteenfold increase in the capital managed by hedge funds during the period, which can be compared to the sixfold increase for mutual funds in the same period. In addition to the fact that the hedge funds have grown in size, the range of strategies adopted has also changed during the period. Almost a third of the total capital invested in hedge funds in 1996 was to be found in global macro funds[3] (Strömqvist (2008). The most common strategies today are share-based (e.g. long/short equity[4]) and arbitrage strategies that exploit indentified cases of mispricing on the market. Global macro funds now account for only a few per cent of the market.

The Swedish hedge fund market is still developing. The first Swedish hedge fund started in 1996. The market has grown since then and at the end of 2007 there were approximately 70 hedge funds which managed almost 5 per cent of the total capital managed by funds in Sweden.[5] Long/short equity funds predominate on the Swedish market.

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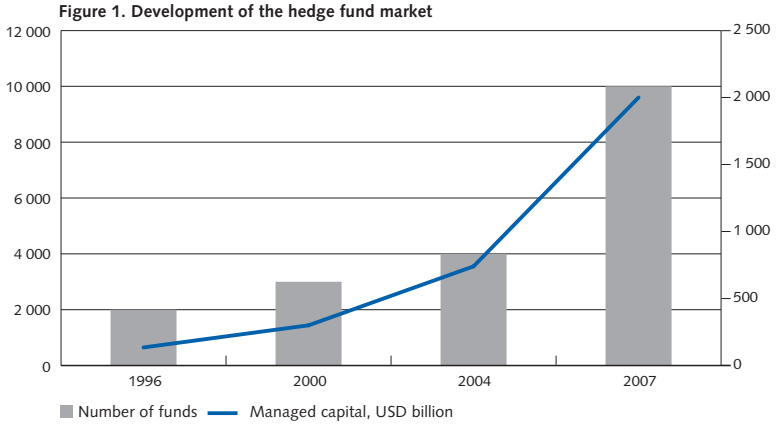
[3] Global macro funds are based on an analysis of changes in macroeconomic variables and invest in all types of assets and markets.

[4] Long/short equity is a strategy in which the managers buy shares they believe will increase in value and sell shares they believe will fall in value.

[5] www.fondbolagen.se

Figure 1. Development of the hedge fund market



Sources: Strömqvist (2008) and ECB (2007).

How can hedge funds affect financial markets?

The more liberal investment rules that govern hedge funds can have both positive and negative effects on financial markets. First and foremost, the more liberal investment rules mean that hedge funds can perform two functions on the financial markets.

The first is to play the role of arbitrager. A common hedge fund strategy these days is for the manager to exploit mispricing. This may, for example, concern a derivative that is mispriced in relation to the underlying asset or a share that is mispriced in relation to the fundamental value of the company. Whether an asset is mispriced or not is usually evaluated using statistical and economic models. When investors buy undervalued assets and sell overvalued assets, prices are pushed back towards their more fundamental values. This helps to improve pricing, which makes the market more effective.

The second role is to help to improve liquidity in the financial system. Higher liquidity is generally believed to lead to more effective pricing. Hedge funds tend to be more active than other investors, which means that more assets are bought and sold. Hedge funds are more able than mutual funds to invest in less liquid markets and instruments. They are also often important participants in new markets. All of these properties provide increased liquidity.

But the flexibility that hedge funds have also entails risks. The most tangible risk is a high degree of leverage. Although this may make it possible for a fund to make large profits, it also increases the risk that a fund will collapse if it makes the wrong investments. The high degree of leverage entails risks for the counterparties of the hedge funds (for example the lenders) and the failure of a fund may therefore have contagion

effects in the financial system. The hedge funds' use of derivatives also entails certain risks. Derivatives make it possible to adopt large positions on the market for a small capital contribution, which gives the manager additional leverage. Derivatives can, however, be used for two purposes: for speculation or for risk protection. Hedge funds use derivatives for both these purposes. The use of borrowing and of derivatives can contribute to greater fluctuations in share prices as it leads to the adoption of larger positions. The more liberal investment rules for hedge funds can also be used to reinforce market movements for speculative purposes, so-called positive feedback trading.

The positive and negative effects of the more liberal investment rules of the hedge funds will be discussed below.

Previous financial crises

In the financial crises of the 1990s and 2000s, a discussion arose about the role of hedge funds. Even though the course of events in these crises differed widely, the criticism of hedge funds has tended to be the same. The criticism directed at hedge funds in connection with financial crises is that hedge funds or groups of hedge funds with a high degree of leverage could have a strong impact on prices by making speculative attacks on, for example, certain companies, sectors or currencies. This impact on prices can be strengthened when herd behaviour is generated among investors. Hedge funds are also accused of manipulating asset prices and of contributing to the build-up of financial bubbles. A financial bubble is a situation in which the price that players pay for financial assets, such as shares or properties, significantly exceeds the value that the asset has in terms of the income that it can realistically be expected to generate.

In this section, four different financial crises and the effects of hedge funds on these crises will be discussed in relation to the above criticism. The first crisis concerned European currencies and occurred at the start of the 1990s. The second crisis is the Asian crisis that began in the autumn of 1997. One year later we saw the collapse of the Long-Term Capital Management hedge fund, which was partly a result of the financial failure in Russia earlier that year. Finally, the IT bubble and its resolution in and around year 2000 is discussed. In the following section, the current crisis will then be analysed.

GEORGE SOROS AND THE EUROPEAN CURRENCIES

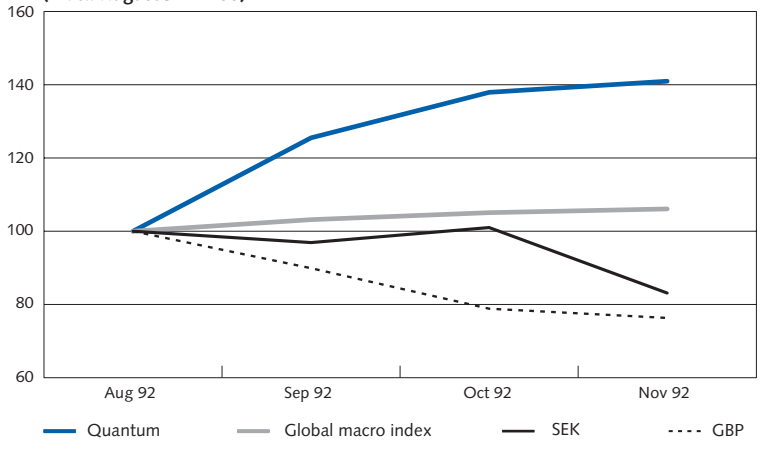
A clear example of when an individual hedge fund influenced prices relates to the well-known currency speculation by George Soros and his

Quantum Fund in the early 1990s. The Quantum Fund was a global macro fund and Soros speculated in this case against fixed European exchange rates. The reason that the exchange rates were challenged was that they did not correspond with the macroeconomic conditions in the countries concerned. In the autumn of 1992, the Quantum Fund sold large volumes of the British pound and the Swedish krona, among other currencies, against the US dollar forward rate (short positions). The attempts of the respective central banks to defend their fixed exchange rates became too costly and they were forced to abandon them. As a result, there was a rapid decline in the value of the currencies and the Quantum Fund was able to make billions. According to Fung and Hsieh (2000), the Quantum Fund made a profit of one billion pounds on its short positions in the British pound alone. Soros came under heavy criticism for his actions but responded that since the currencies were obviously incorrectly valued a price adjustment would in any case have been necessary sooner or later.[6]

Figure 2 shows the relative development of the two European currencies and hedge funds in the period August to November 1992. The two graphs at the bottom of the figure show the cumulative development of the British pound and the Swedish krona relative to the US dollar. The upper two graphs show the cumulative earnings for an index of hedge funds with a global macro strategy and for Soros' hedge fund Quantum.

The Bank of England was forced to abandon its defence of the pound on 16 September. In this month, the Quantum Fund had a return of 25 per cent. The fund's return continued to be positive over the follow-

Figure 2. The crisis in 1992 and global macro funds (Index August 92 = 100)



Sources: Fung and Hsieh (2000) and Strömqvist (2008).

[6] See Rouzbehani (2007).

ing months. The Riksbank took the decision to allow the krona to float on 19 November and as a result the krona lost 20 per cent against the dollar.

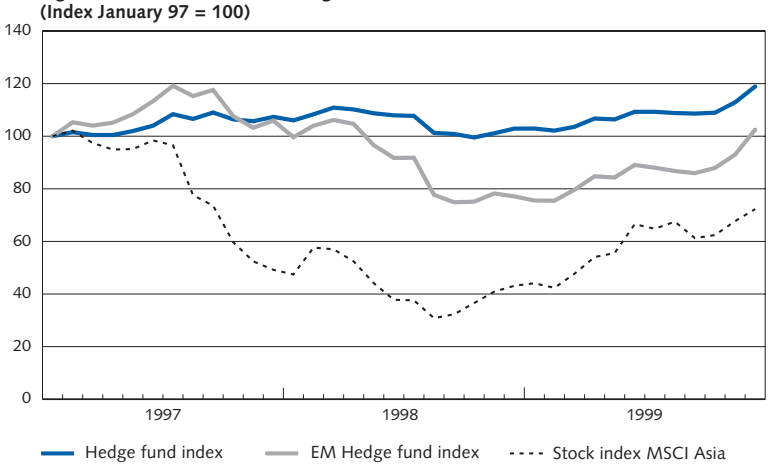
In this case, it is undoubtedly so that the speculative attacks of an individual hedge fund on the currencies significantly affected prices. On the other hand, the Quantum Fund can not be accused of having manipulated prices or of contributing to the development of the financial bubble. This bubble was the result of an erroneous economic policy and a price adjustment was therefore unavoidable. The criticism that can be made, however, is that this price adjustment occurred more rapidly and more dramatically due to the speculation of the Quantum Fund than, in all likelihood, would otherwise have been the case. A more well-ordered price adjustment could have been conducted at a lower economic cost but, on the other hand, may have delayed the necessary structural transformation enforced by the crisis. The fact that the macro fund index in Figure 2 is fairly stable during the period indicates that the currency speculations were relatively limited to the Quantum Fund and possibly a few other funds. In other words, there is little evidence of herd behaviour among the hedge funds.

THE ASIAN CRISIS

Issues relating to hedge fund speculation against fixed exchange rates became current again in connection with the crisis in Asia. In the mid-1990s, a number of countries in South-East Asia, for example Thailand, had large deficits in their current accounts. Their fixed exchange rates against the US dollar contributed to domestic borrowing in foreign currencies and this in turn led to exposure to currency risk. The development of a financial bubble was also driven by an inflow of international capital. When this inflow reversed and became an outflow, the fixed exchange rates became untenable. In July 1997, Thailand devalued its currency and was soon followed by Malaysia and South Korea. The bursting of the financial bubble led to major adjustments in asset prices, such as share prices. It was discussed whether hedge funds held extensive short positions in the Asian currencies and had thus pressured the countries to devalue so that they would then be able to make large profits from the weakening of the currencies and the falling share prices. The issue was taken so seriously that it was investigated by the IMF (Eichengreen et al. (1998)), which interviewed a number of market operators.

Figure 3 shows the cumulative return on the Asian stock market, an index for hedge funds that focus on emerging markets, and a general hedge fund index. If hedge funds had collectively speculated against the economies of the Asian countries we should see a high positive return for

Figure 3. Cumulative return during the Asian crisis 1997–1999
(Index January 97 = 100)



Sources: MSCI Barra and Strömqvist (2008).

hedge funds during the period. However, this is not the case. The general hedge fund index shows a weak positive return during the period.

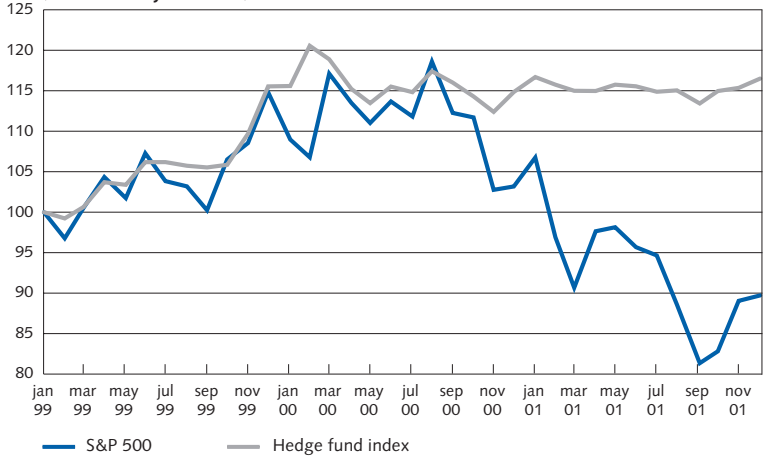
A more interesting point is that hedge funds that focus on emerging markets lost 20 per cent of their value up to the middle of 1998. The Asian crisis thus had a negative impact on these hedge funds (although they still had a higher return than the share index). I have shown (Strömqvist (2008)) that hedge funds that invest in emerging markets mainly use long positions in shares. Their return is thus positively correlated to the stock market. An article by Bris, Goetzmann and Zhu (2007) points out that the possibility to take short positions in emerging markets is limited. This reduces the opportunities of the hedge funds to exploit a negative market trend to generate increased profits.

As in the case of the crisis in 1992, this financial bubble was the result of fundamental and structural imbalances in the financial system. Hedge funds therefore played no prominent role in the development of the bubble. The factor that distinguishes the Asian crisis from the crisis of 1992 is that in the Asian crisis it was not possible to indentify individual investors or groups of investors who contributed more to the development of the crisis than others. What happened instead was that international investors in general panicked and quickly withdrew the capital they had invested in the region (Lindgren et al. (1999)). Eichengreen et al. (1998) found no evidence that hedge funds in particular had helped to undermine the economies of the Asian countries through speculation, herd behaviour or positive feedback trading. Nor could Fung and Hsieh (2000), by means of regression analysis, find a generally applicable negative correlation between hedge fund returns and changes in the value of the Asian currencies.

In 1999, the value of IT-related shares increased dramatically, which resulted in record market values in relation to the companies' reported values or profits. These values proved to be untenable and in March 2000 the trend reversed and the prices of IT-related shares fell heavily. If hedge funds had played the role of arbitragers, they should have counteracted the exaggerated price increases by taking short positions in IT shares. However, in a study of hedge fund holdings in American IT shares, Brunnermeier and Nagel (2004) found that the opposite was in fact the case. According to the results of this study, hedge funds held extensive long positions in IT shares during the bubble and then reduced these holdings before the crash occurred. This conclusion is confirmed in Figure 4 which shows the cumulative return for hedge funds in relation to the US stock market. The index for hedge funds increases at approximately the same rate as the share index in 1999 and the early part of 2000. Subsequently, the two graphs separate; the share index falls dramatically, while the hedge fund index remains relatively unchanged throughout the rest of 2000. Brunnermeier's and Nagel's (2004) explanation was that the hedge funds were aware that there was a bubble and the optimal strategy was to ride the wave rather than to correct prices.

So, what criticism can be levelled at the hedge funds in the case of this crisis? It is possible that by buying IT-related shares, the hedge funds helped to drive up prices and thus increase the financial bubble. We may also ask whether they started the dramatic fall in prices by selling their IT shares. The stock market is, however, a relatively liquid market and large volumes must be traded in order to affect the general trend. The hedge

Figure 4. Cumulative return, IT bubble (Index January 99 = 100)



Sources: Ecowin and Strömqvist (2008).

funds' impact on the bubble should therefore correspond to their influence on the financial market at the time. If we assume that the hedge funds realised that there was a bubble, the fact that they chose to ride the wave indicates that they believed they did not have sufficient influence on the financial markets to be able to burst the bubble themselves. Brunnermeier and Nagel (2004) found that although the hedge funds reduced their holdings in IT shares before the crash, they did not sell their entire holdings. It is reasonable to assume that they did not at the same time adopt short positions in these shares in order to drive prices downwards.

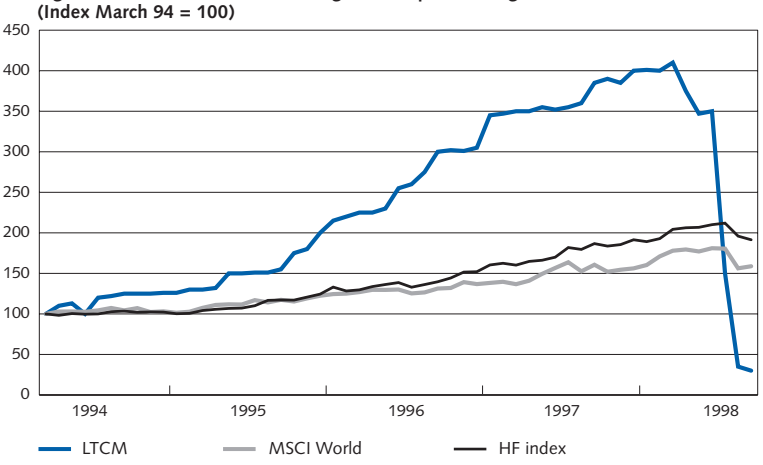
LTCM

The three crises presented above represent episodes in which hedge funds, for various reasons, succeeded in getting a better return than the market as a whole. This section discusses the leverage of the hedge funds and the effects on financial stability when the strategies fail by looking at the example of Long-Term Capital Management.

The well-known hedge fund Long-Term Capital Management collapsed in August 1998. According to Edwards (1999), the fund had at that time equity of approximately USD 5 billion but had borrowed up to USD 125 billion, which entails an extremely high degree of leverage of 25 times equity. The fund's strategy was to exploit mispricing, particularly on the bond market. For example, the fund had invested large sums in the assumption that the interest rates of bonds issued at different times but with the same maturity would converge. Following the financial collapse in Russia, the market situation suddenly changed and the interest rates diverged instead. The fund suffered major losses and, given its high leverage and its positions in derivatives, the Federal Reserve was of the opinion that a collapse could have a negative impact on the entire financial system. Together with a number of investment banks, the Federal Reserve therefore arranged a rescue involving the take over of positions in the fund.

The LTCM episode demonstrates partly that there are risks associated with funds with a high degree of leverage, and partly that hedge funds can be regarded as being systemically important. It is namely not only the fund's investors and their counterparties that are affected if the fund goes bankrupt. When the assets have to be sold off, the values of assets of the same type also fall, which in turn may force other leveraged investors to sell off assets if the value of their collateral falls below the borrowed sum. This creates a vicious circle that affects financial stability. Good risk management is therefore important, not only for the hedge funds themselves, but also for the counterparties that make the high leverage possible. The

Figure 5. Cumulative return for Long-Term Capital Management (Index March 94 = 100)



Sources: Lowenstein (2000), MSCI Barra and Credit-Suisse Tremont.

LTCM case also illustrates that the risks are particularly great in market situations with a high degree of uncertainty and a high level of risk aversion.

According to Edwards (1999), however, it is, unusual for hedge funds to have a degree of leverage of more than 10 times their equity. In their study, Eichengreen and Park (2002) found that 74 per cent of the hedge funds had a degree of leverage less than two times their equity in 1998. The corresponding figure one year later was 89 per cent. The US President's Working Group on Financial Markets (1999) discussed the risks associated with a high degree of leverage. The Group found that other institutional investors had the same degree of leverage as the hedge funds in 1998 but that they also managed much greater assets.

How does the present financial crisis differ from previous crises?

The discussion concerning hedge funds and financial crises has arisen once again in connection with the current turmoil. One example is from the beginning of 2007 when Bear Sterns' hedge funds collapsed. These funds had highly leveraged portfolios with credit instruments related to the US market for housing bonds (subprime). Another example is when Iceland accused hedge funds of speculating against the Icelandic currency and, consequently, the Icelandic economy (Affärsvärlden, 31 March 2008). In Sweden, there were also claims that London-based hedge funds were spreading malicious rumours about Swedbank with the aim of getting the share price to fall as these hedge funds had been shortselling (selling borrowed shares) the share (Dagens Nyheter, 19 September 2008 and Dagens Industri, 26 September 2008). In September 2008, shortsell-

ing was prohibited on many markets as it was believed that the practice had been used to accelerate falls in share prices, especially in financial companies.

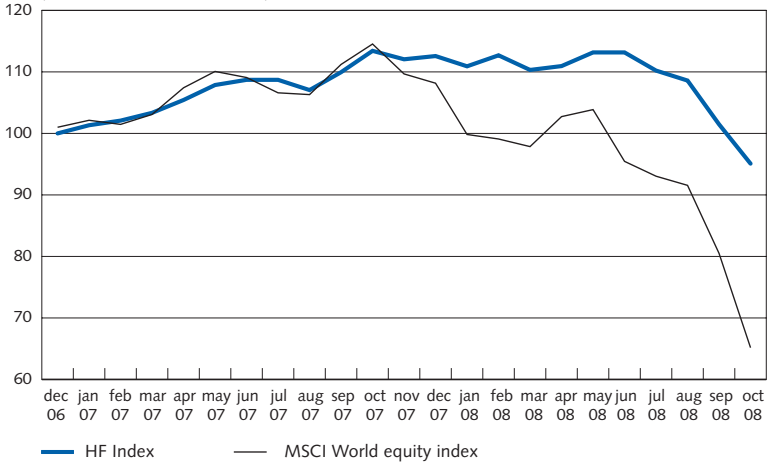
The question is: What has the role of the hedge funds been in the current crisis? A general answer is that the crisis has affected them more than they have affected the crisis. The main argument for this is that the hedge funds have experienced more problems in handling this crisis than previous crises.

BROAD DECLINE FOR HEDGE FUNDS

Figure 6 shows the cumulative returns on the hedge fund market and stock market during the present crisis. Hedge funds had a stable and thus better development than shares between October 2007 and June 2008. Thereafter, both the hedge fund index and the share index declined, although the fall was greater for the share index.

Unlike the situation in the Asian crisis, when it was mainly funds with a focus on emerging markets that were affected, the negative development of the hedge funds in this crisis can not be related to a particular strategy. According to Barclay's database on hedge funds, as many as 89 per cent of the hedge funds in the database had a negative return in September 2008. Figure 7 shows the market return over a period of six months, May to October 2008, for six different strategies. In May 2008, all of the strategies had a positive return. Thereafter a negative trend began, which subsequently accelerated in September and October. The

Figure 6. Cumulative return during the current crisis (Index December 06 = 100)



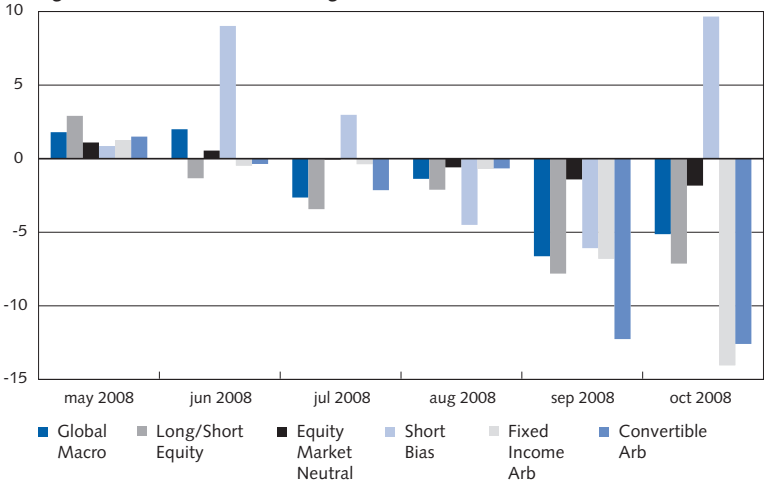
Sources: Credit Suisse Tremont and MSCI Barra.

strategies that performed best were the equity market neutral strategy[7] and the short bias strategy.[8] The strategies that performed worst during the period were the convertible arbitrage and fixed income arbitrage strategies.[9] The poor return of the long/short equity strategy indicates that the funds employing this strategy have had a predominance of long positions in the falling stock market. A number of factors that distinguish the current crisis from previous crises and that have contributed to the poorer return for hedge funds are discussed in the sections below.

CHANGES IN REGULATIONS

A unique feature of the current crisis is the decision taken in the autumn of 2008, which suddenly changed the regulations governing the market. The decision to ban shortselling (primarily the shortselling of shares in financial companies) affected different strategies to different degrees. There was a major negative impact on some strategies, mainly those in which shortselling is a natural element or in which there is a high degree of exposure to the financial sector. The ban affected hedge funds more than mutual funds because hedge funds use shortselling to a greater extent. A ban on shortselling in a falling market makes it more difficult to use strategies that reinforce negative market movements. This was also

Figure 7. Return for selected strategies



Sources: Credit Suisse Tremont.

[7] An equity market neutral strategy aims to avoid market risks by adopting long and short positions. The fund's total position then becomes neutral in the sense that the general market movements do not tangibly affect the fund's result. The removal of the systemic risk does not mean that the fund is entirely risk-free. The non-systemic risk remains.

[8] This strategy is defined in the next section.

[9] These strategies exploit the mispricing of convertible debt instruments and interest rate instruments respectively.

the aim of the ban. However, the ban on shortselling also made it more difficult to protect long positions through short positions and to use certain arbitrage strategies.

Short bias is a strategy that provides increasing returns in the case of falling asset prices and the effect of the ban on shortselling can be clearly seen in Figure 7. The short bias strategy worked well during the summer of 2008, but not in September, when the ban on shortselling was introduced. The strategy then provided a high positive return in October. The strategy is not particularly opportunistic, however, as it means that the fund always has a predominance of short positions in its portfolio, irrespective of market conditions.

An example of a market neutral arbitrage strategy that includes shortselling is convertible arbitrage. In this strategy, a long position is usually taken in the convertible debt instrument and a short position in the share concerned. The profits arise from the mispricing of the convertible debt instrument in relation to the share; for example it may be undervalued due to poor liquidity. As convertible arbitrage is a market neutral strategy, i.e. the return should not be dependent on market movements, it has nothing to gain from strong negative market movements and does not therefore normally use shortselling for this purpose.

BROAD DECLINE IN ASSET VALUES

Previous crises have been limited to particular markets or asset types. In the current crisis, many different asset types have been affected at the same time, and globally. Normally, hedge funds receive premiums for assuming credit risk, duration risk and liquidity risk. These risk premiums usually constitute a large part of the hedge funds' profits. In the latest crisis, however, a higher degree of risk taking has not led to higher profits, on the contrary. The fact that the downturn has affected many different asset types and markets at the same time has also wiped out all of the profits previously gained from these premiums. The increased risk premiums have simply not compensated for the losses made.

In the period 2001 to 2003, many hedge funds generated large profits by diversifying their portfolios to include property or commodities. As investors have become more unwilling to take risks during the crisis, they reduced borrowing in their portfolios by selling assets. This has driven the prices of almost all asset types downwards, including commodities and property, which has weakened the positive effects of diversification.

The hedge funds were better able to predict the downturn that occurred in connection with the IT bubble than the current downturn because the valuations of the companies during the IT bubble were at

historically high levels. It was therefore not difficult to see that a price adjustment would take place. This was not the case in the current crisis and many funds were therefore taken by surprise by the dramatic fall in share prices.

There has been extreme volatility in both share and commodity prices in the current crisis. This has made it more difficult to forecast future movements in asset values. For example, many hedge funds that had invested in a negative stock market trend and high commodity prices experienced problems in July 2008 when the trend suddenly reversed with a considerable increase in share prices and a considerable fall in commodity prices (ECB (2008)).

A final difference between the current crisis and previous crises is that the current turmoil originated in a bank crisis. The banks' problems have had a direct impact on the hedge funds in the form of more restrictive lending, higher borrowing costs and assets tied up in connection with bankruptcies (e.g. Lehman Brothers). The funds have been forced to sell off assets in a falling market and this has had a negative effect on their returns.

Do hedge funds today constitute a greater threat to financial stability than other investors?

This section discusses the relationship between hedge funds and other types of investor. The possibility for an investor to influence the financial markets is greater the greater the proportion of total capital this investor manages. The question is, how large a proportion of total risk capital is currently invested in hedge funds, given that these have grown dramatically in numbers and size over the last 10 years? Another interesting question is whether hedge funds are the only type of investment fund on today's financial markets that can pose a threat to financial stability?

DISTRIBUTION OF MANAGED CAPITAL

Figure 8 shows the capital managed by institutional investor groups in December 2007. Despite the dramatic growth of the hedge fund market, hedge funds still account for only a small part of total managed capital. Both pension companies and fund companies manage approximately ten times as much capital as hedge funds. This counters the argument that hedge funds as a group could influence entire markets. In the case of major market movements it is therefore probable that several types of institutional investor follow the same trends.

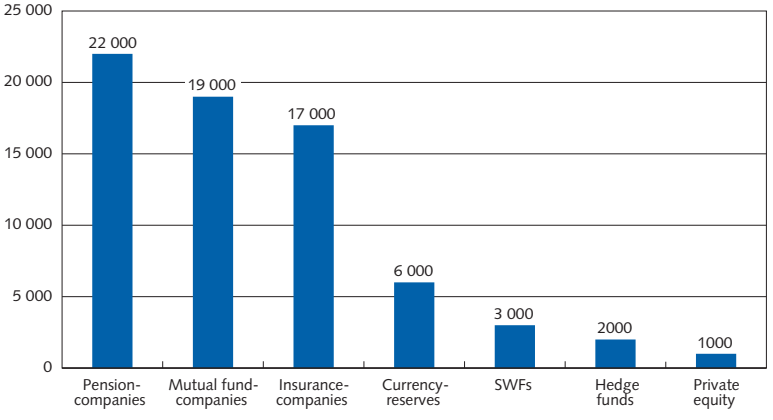
How great is the influence of individual hedge funds? Figure 8 shows the total quantity of managed capital, but says nothing about how the capital is distributed between the funds. That question is instead answered by Figure 9. According to the journal Alpha Magazine, the largest hedge fund in the world is JP Morgan Asset Management, which had a managed capital of USD 45 billion at the end of 2007. This is only a few per cent of the capital managed by the world's largest fund companies and pension companies. It is therefore reasonable to assume that the influence of individual hedge funds on entire markets is limited.

SOVEREIGN WEALTH FUNDS

It is interesting to note the amount of capital now managed by Sovereign Wealth Funds (government investment funds). At the end of 2007, their total managed capital was approximately USD 3 000 billion dollars, 50 per cent more than the hedge funds. It is worth considering a comparison between the Sovereign Wealth Funds (SWFs) and the hedge funds. Both these types of investment fund are fairly unregulated and do not need to publish information about their holdings and transactions. They can both contribute liquidity to financial markets and increase the efficiency of these markets. Even though the SWFs often have a long-term investment horizon there are examples of speculative transactions on the part of such funds. On one occasion, the Norwegian SWF shortsold bonds issued by Icelandic banks, a move that was severely criticised by the Prime Minister of Iceland (The Economist, 17 January 2008).

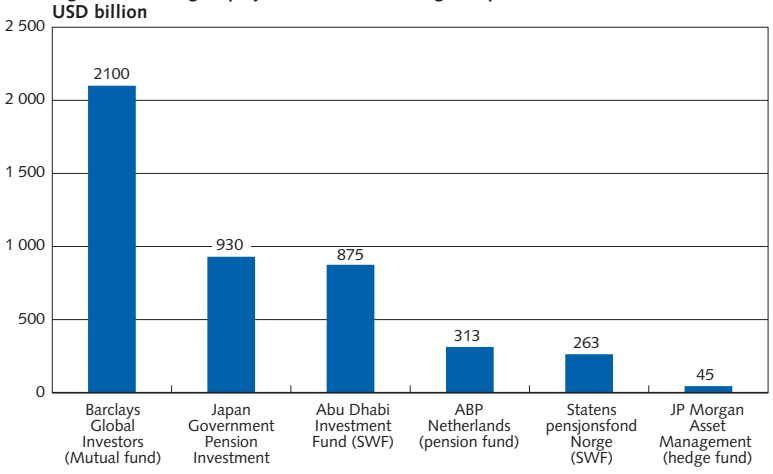
There are, however, significant differences between hedge funds and SWFs. In the first place, the market for SWFs is highly concentrated

Figure 8. Capital managed by institutional investor groups (December 2007)
USD billion



Sources: The Economist (17 January 2008).

Figure 9. The largest players in terms of managed capital (December 2007)
USD billion



Sources: Pionline.com, Alpha Magazine's Hedge Fund 100 Rankings 2007 och The Economist (17 January 2008).

in that it consists of a handful of very large funds. The largest individual SWF, the Abu Dhabi Investment Fund, manages almost a third of the total managed capital (USD 900 billion). This is followed by the Norwegian SWF, which has almost USD 400 billion. The hedge funds' total managed capital of around USD 2 000 billion is distributed among 10 000 funds.[10] The SWFs should therefore be more able to influence the market than the hedge funds. In the second place, there is a clear risk that the investments of SWFs will be governed by political decisions and not by the expected return relative to risk, which is not the case with the hedge funds. Such investments may have a detrimental effect on the effectiveness of the financial markets.

No support for the claim that hedge funds affect financial crises more than other investors

Although hedge funds have undoubtedly influenced the financial markets in certain crises, the analysis in this article shows that this is not something that happens as a rule. The behaviour of the hedge funds, like that of other investors, has differed widely in the previous crises.

The criticism of the hedge funds often stems from the fact that in crises they have invested money in the price adjustment of incorrectly valued assets. Under normal conditions, this has a positive impact on the effectiveness of the market. In financial crises, on the other hand, it is regarded as a factor that will make the market more unstable. It is,

[10] According to Strömqvist (2008), the average hedge fund managed USD 100 million.

however, unreasonable to expect that investors who normally employ arbitrage strategies should refrain from doing so during financial crises and that mispricing should be allowed to prevail. From the policy point of view, it is thus difficult to assess when these strategies are desirable and when they are not.

Another common criticism is that hedge funds manipulate asset prices and contribute to the development of financial bubbles. However, the only crisis discussed in this article where hedge funds can be suspected of contributing to the development of the bubble is the IT crisis. In two of the other crises, the funds exploited untenable situations caused by erroneous economic policies. Generally speaking, the use of arbitrage strategies actually counteracts the development of financial bubbles. However, given their profit-maximising targets, hedge funds do not accept any responsibility for preventing the creation of bubbles. One may, however, discuss whether the hedge funds' speculative attacks against bubbles can accelerate and deepen the process when the bubbles burst.

The arguments for the claim that hedge funds do not have a greater impact on financial markets than other investors have already been presented by Eichengreen et al. (1998) and are still valid today. Hedge funds alone are not large enough to be able to influence prices on liquid markets, as their capital is small in relation to that of other investors, such as banks and insurance companies. It is therefore more probable that large market movements are due to several types of institutional investor following the same trends. The fact that the hedge funds rode the wave in the IT bubble can be seen as a sign that they did not regard themselves as being large enough to influence the direction of the market on the liquid stock market.

There is no clear evidence that hedge funds generate herd behaviour. It can rather be argued that hedge funds are less prone to generate herd behaviour than other investors because they want to keep their strategies secret (see Eichengreen et al. (1998)). The IT bubble exemplifies the fact that hedge funds may be those that follow other investors, rather than the other way around. Neither Fung and Hsieh (2000) nor Eichengreen et al. (1998) were able to find proof that hedge funds reinforce market movements, or that they are more interested in manipulating a market than other investors.

It is often claimed that the hedge funds' lack of transparency constitutes a risk. It is therefore interesting in this context to compare hedge funds to the SWFs that have emerged. The SWFs manage more capital than the hedge funds and the market is highly concentrated, i.e. there are only a few, large SWF's. SWFs are not obliged to report their holdings or transactions and there is also a risk that their investments will be governed

by political decisions. There is therefore no reason to believe that hedge funds are able to exert greater influence on financial markets or to generate more instability than SWFs.

The strongest argument for the claim that hedge funds have not driven the current financial crisis is that they have been negatively affected on a broad front. In contrast to previous crises, the downturn has affected most asset types and markets, which has reduced the effect of diversification. In addition, the shortselling of shares was prohibited on many markets in September 2008 with the aim of preventing an acceleration of the fall in share prices. The cost of this ban was, however, that strategies that normally employ shortselling, irrespective of market conditions, were affected. This was unfortunate because, in the long run, restricting the possibility to conduct arbitrage reduces the effectiveness of the financial markets. The fact that hedge funds have been hit by the latest crisis does not, however, rule out that they have played a role in the development of the crisis together with banks and other institutional investors. Bear Sterns' funds were two of the funds that provided liquidity for the complex new credit instruments which then shook the market when they collapsed.

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IMF Financial Sector Surveillance

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The strong common interest in preventing and managing economic crises was one reason behind the creation of the IMF directly after the Second World War, where the Bretton-Woods system for fixed exchange rates was one central element. Since then, the system has changed considerably and over the last 25 years this change has been rapid. The most prominent changes concern the increased financial openness and the large financial flows that nowadays dwarf the trade-related flows. However, the IMF's mandate is more related to preventing and managing current account crises than capital account crises and is thus not perfectly fitted to a world where monetary and financial issues are increasingly intertwined and an economic crisis is more likely to originate in the financial sector than in the real sector. The key issue is then how can the IMF adapt its surveillance of the global economy to better capture the new economic picture. This is one of the major issues for debate and reform in the IMF. In this article we describe the IMF's financial sector surveillance, discuss various proposals and give our view on the road forward.

The recent discussion on financial sector surveillance is largely motivated by the rapid development of the financial system. The discussion falls into two broad categories – the longer-term policy issues arising from the IMF's role and strategy regarding financial sector surveillance, and the policy issues arising from the recent global financial sector turmoil. Among the members of the IMF there is broad consensus that the IMF should focus on areas where it has comparative advantages, where surveillance is seen as a central element. However, wiews have been more divergent on the capacity and mandate of the Fund to involve itself more heavily in the surveillance of the financial sector.

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The IMF's core task is to promote international monetary cooperation with a focus on exchange stability and the promotion of a balanced growth of international trade[2]. In its conventional connotation, the mandate is not perfectly fitted to a world where monetary and financial issues are increasingly intertwined and international financial crises can originate in the capital accounts more probably than in the current accounts. Over the last 12 years, for example, the major crises have been financial rather than the current account crises more common in the earlier years of the IMF's operations.[3] In short, a financial sector crisis in one country with its immediate direct or indirect effect on financial markets worldwide constitutes today a much higher risk to international monetary stability than a more traditional current account crisis stemming from the loss of export competitiveness.

The IMF's work on financial sector issues should take into account the 2007 Surveillance Decision (see Box 1) which narrowed the scope of Fund bilateral (country-specific) surveillance to external stability and exchange rate issues. The decision, however, also promised an increased

Box 1: The 2007 Decision on Bilateral Surveillance over Members' Policies

On 15 June 2007, the IMF Executive Board adopted a new decision on bilateral surveillance over member countries' economic policies, which puts exchange rate policies at the centre of the surveillance process.[4] The primary reason for the update was to make bilateral surveillance more effective and transparent and to strengthen the Fund's exchange rate oversight mandate. The 2007 Decision, which replaces the 1977 Decision on Surveillance over Exchange Rate Policies, provides an up-to-date and comprehensive framework for the Fund's bilateral surveillance. While the old decision covered only surveillance of exchange rate policies, the new framework is much broader in scope, including domestic economic and financial policies. In particular, the new framework adds a new principle (principle D) recommending that countries avoid exchange rate policies that cause external instability – regardless of the reason for undertaking them. The new decision elaborates on what is meant by the pre-existing principle of exchange rate manipulation and it introduces the concept of

[2] IMF (1990), Article I Purposes: http://www.imf.org/external/pubs/ft/aa/aa01.htm
[3] IMF (2007a). See also Melander (2002) on different types of crises.

fundamental exchange rate misalignment. The new framework identifies certain developments, which, in the IMF's assessment of a member's observance of the principles, would require thorough review and might indicate the need for the Fund to initiate discussion with the member. Most notably, the indicators have been updated to reflect the increased importance of international capital flows.

It is no secret that the US administration, which has accused the IMF of being "asleep at the wheel" when it comes to exchange rate surveillance, has been pushing this decision in order to pressure China on its exchange rate policy.

focus on financial sector surveillance. The financial sector has a direct bearing on external stability in open economies through its central role in facilitating cross-border capital flows. The ensuing loosening of intertemporal constraints will have a direct impact on the savings and investment decisions of economic agents and, consequently, on the external position of the country concerned. Nevertheless, how the increased surveillance of the financial sector should fit into the 2007 decision is a challenge for the Fund.

As a related issue, it should be remembered that the prerogatives and responsibilities of the IMF in the field of capital movements and their surveillance lack a clear definition. The discussions in the late 1990s on giving the IMF jurisdiction in this area did not result in a legal mandate for capital account issues.

IMF expertise and "toolbox" – is there room for improvement?

This section aims to briefly describe the IMF's surveillance activities and to discuss possibilities. In short, the IMF has the combined role of watchdog and advisor, which is most evident within the policy discussions of the Article IVs and the Financial Sector Assessment Programs (FSAP). The World Economic Outlook (WEO) and the Global Financial Stability Report (GFSR) are the main vehicles for public communication of the Fund's analyses. The Financial Sector Indicators (FSI) comprise a set of indicators that could be used for both purposes. The FSI is compiled to monitor the soundness of financial institutions and markets, and of their corporate and household counterparts. They are a subset of the broader class of macro

[4] For more information on the decision, see http://www.imf.org/external/np/sec/pn/2007/pn0769.htm#decision

prudential indicators that IMF staff use in surveillance of the financial system.

BILATERAL SURVEILLANCE

Article IV consultations are the principal tool of bilateral surveillance. Their primary focus is on the macro analysis of developments, external sustainability and related vulnerabilities, outlooks and recommendations. The overarching focus and methodology of Article IV is determined by the 2007 Surveillance Decision. Article IVs are mandatory and every member is subject to an Article IV every 12-24 months.

The FSAP is the main vehicle for financial surveillance. It assesses legal and regulatory frameworks, financial infrastructure, financial institutions, and markets. A key element is a comprehensive assessment of a country's compliance with key international standards and codes. Stress tests are usually carried out to analyse the financial system's strength and viability against a variety of shocks. A main worry in financial crises is contagion and the FSAP also provides an assessment of the "connections" in the financial system by monitoring the system characteristics and by comparing stress tests with standards in order to identify weaknesses. FSAPs are voluntary and carried out or updated on an approximately five-year cycle.

The Asian financial crisis in the late 1990's prompted the international community to work on structural measures to help avoid such crises in the future. Codes of good conduct concerning the regulation and supervision of the financial sector, as well as the transparency of policies and data, were agreed as a means of making the financial system more robust. Reports on the Observance of Standards and Codes (ROSC) summarize the extent to which countries observe certain internationally recognized standards and codes.[5] This work is usually prepared and carried out in the context of the FSAPs. The ROSC is used to help sharpen the financial institutions' policy discussions with national authorities, and in the private sector (including by rating agencies) for risk assessment. Short updates are produced regularly and new reports are produced every few years.

As indicated earlier, the financial sector plays a key role in shaping a country's external position by having a direct impact on the savings and

[5] The 12 standards and codes have been developed by the Fund or other standard-setting bodies such as the World Bank, the Basel Committee on Banking Supervision or the Financial Action Task Force (FATF). The standards and codes include accounting; auditing, anti-money laundering and countering the financing of terrorism (AML/CFT), banking supervision, corporate governance, data dissemination, fiscal transparency, insolvency and creditor rights, insurance supervision, monetary and financial policy transparency, payments systems, and securities regulation.

investment decisions of economic agents, and in supporting sustained output expansion by intermediating savings to their most efficient uses. Therefore, financial sector analyses should employ an important part of bilateral Article IV consultations. Macroeconomic analyses and sustainability assessments should explicitly take into account the robustness or vulnerabilities of the financial system and regulatory framework.

Integrating the Article IV discussions and FSAPs

Possible ways to step up financial sector analysis in the Article IV consultations include to improvement of financial sector expertise and better integration of the findings from FSAPs into the Article IV consultations. In this context, it should be noted that the progress in integrating financial sector surveillance in Article IV consultations and a better understanding of macro-financial linkages requires the improvement of financial expertise in the IMF departments that carry out the Article IV consultations.

Essentially, there are two potential ways to integrate the findings from FSAPs into the assessment of the general macro frameworks within the Article IVs:

i) FSAP => Article IV; look for financial sector risks and regulatory frameworks and evaluate their impact on the macroeconomic situation.
ii) Article IV => FSAP; look for macroeconomic risks and evaluate their potential impact on the financial system to identify weaknesses in its structure and regulation.

Both alternatives would require intense cooperation between the macroeconomists (area departments, Fiscal Affairs Department, etc.) and the financial sector economists in the Monetary and Capital Markets Department (MCM), by increasing the participation of staff from the MCM in the Article IV missions and through an increased use of interdepartmental forums. It may also be worth examin the form of FSAPs to see if there is scope for improvements, keeping in mind the different fields of application.[6] Moreover, FSAP updates could become more focused and tailored to country specific circumstances in order to maintain their current frequency within the limits of the current resource envelope.

The taskforce on integrating finance and financial sector analyses into Article IV concludes in its report that an overly-detailed or prescrip-

[6] On 30 May 2008, the Executive Board decided to integrate the offshore financial centre assessment programme with the FSAP (see IMF(2008c)). This can be seen as part of the attempt to simplify, standardise and streamline parts of the Fund's financial surveillance.

tive framework within the IMF was not recommended, given the variety in the IMF membership and the lack of widely-accepted methodology for assessing financial sector stability. There were, however, some general conclusions to be drawn for the Article IV mission chiefs, including more systematic cooperation with the MCM, increased use of existing interdepartmental forums (e.g. the preparatory processes for the WEO and the GFSR) and continued experiments with a wider range of analytical tools and data sources.

REGIONAL SURVEILLANCE

A potential problem with FSAPs is that they involve little analysis of financial cross-border issues. One of the conclusions from the IEO evaluation of FSAPs was that in countries with extensive cross-border financial sector participation, they generally made little inroad into the broader global and regional dimensions, with limited contribution to identifying and highlighting potential spill-over channels and effects.[7] In a world of increasing financial integration, this would suggest a need for more regional FSAPs.

From the perspective of the Nordic-Baltic region, where financial sector integration is at a very high level, and in the context of ongoing EU discussions on regulatory and crisis management frameworks, the focus of the regional FSAPs could be twofold. First, a regional FSAP could look closely at financial sector integration and its implications and try to identify possible risks. Second, considering the increasing need for policy cooperation as a result of ever closer financial sector integration across borders, the FSAP could assess the cross-border functioning of supervisory frameworks, including crisis prevention and resolution mechanisms.

MULTILATERAL SURVEILLANCE AND GFSR

When it comes to multilateral financial surveillance, the GFSR is the main instrument for global financial market surveillance. Its key objectives are to identify potential vulnerabilities in the international financial system from a multilateral perspective and to analyze linkages between developments in mature financial centres and capital flows to emerging markets. The GFSR takes a macroeconomic and aggregate stance and does not currently involve deeper analysis of the situation in different key financial institutions. However, the two most recent GFSRs, in April and October 2008, have already sought to draw policy lessons from the turmoil and

[7] IMF (2006)

have placed a particular emphasis on asset valuation, central bank liquidity frameworks and risk management.

The need for further modifications of the GFSR remains to be discussed. A possible idea for the Fund is an increased dialogue with a few key financial institutions in order to improve early awareness of new financial instruments that could cause risks to financial stability. The link between the GFSR and the FSAP could also be strengthened. For example, a country with weak financial supervision and an unclear division of responsibilities will experience more difficulties in preventing and managing a crisis than a country or region with more powerful supervision. This is also true for regions with significant financial cross-border integration. Today, the GFSR does not account for institutional weakness of this type. The knowledge stemming from FSAPs could thus be used to further strengthen and broaden the analysis in the GFSR.

The state of the debate

There have been a number of initiatives on how to adjust the Fund's work to the challenge of increasing financial sector surveillance. The most central ones are briefly described below.

IMF'S OWN ANALYSIS

In the reports IMF (2008a) and IMF (2008d), staff suggest that the Fund can increase financial sector surveillance through its Article IV consultations and FSAP Assessments.[8] In particular this would sharpen surveillance and policy advice in a number of areas. The most prominent strands of work are:

Risk monitoring and risk management: Staff propose to monitor macro-economic related risk profiles in individual financial institutions and the adequacy of risk management practices in financial institutions, including stress testing and capital adequacy with extra vigilance on liquidity issues. This includes aspects of eventual procyclicality in regulation, accounting frameworks and risk management practices. Monitoring the transition to Basel II is also important.[9]

Crisis management and resolution: This work will focus on legal frameworks and institutional set-ups for regulation, supervision, and crisis

[8] IMF (2008a).

[9] In most countries the law requires banks to hold a certain amount of capital to provide a cushion against losses and discipline bank owners. The Basel II framework is a consistent and internationally adopted framework for determining the capital requirement for individual banks. The basic idea is that the capital buffer should increase with the size and the level of risk in the bank's asset portfolio. Basel II has been implemented in EU law since January 1, 2008. For more on Basel II, see Lind (2005).

management and resolution. It includes issues such as central bank liquidity facilities, the powers and authority of supervisory authorities, deposit insurance schemes etc.

It is clear that the delegations from the Fund need to have the right knowledge of these issues in order to be able to provide real added value for the member country.

COOPERATION WITH THE FSF

Many members have proposed closer cooperation with the Financial Stability Forum (FSF, see Box 2), whose main mandate is to coordinate work on financial supervision and surveillance. The main argument is the natural complementarity between the IMF's broad surveillance activities and the FSF's gathering of senior national policy makers representing key regulatory and supervisory authorities. On the other hand, the FSF has a much narrower membership than the IMF since the FSF comprises the G7, a few other countries with financial centres and international organisations including the IMF, while 185 countries are members of the IMF. The cooperation between the IMF and the FSF has so far mainly involved Fund participation in FSF working groups and the exchange of information.

Providing an "early warning system"

The UK has been very active in the discussion on "early warning systems" (EWS) and has proposed a joint FSF/IMF biannual report listing the main risks to financial stability and the probability that they will occur. The IMF would rank the main global risks to financial stability and the FSF would set out a working plan for the relevant international bodies and committees to address these risks, recognising that most policy actions will ultimately be up to the individual countries. The report would be discussed at the IMFC meetings and then published.[10]

There are several potential problems with this suggestion. First, assessing the probability of occurrence and the magnitude of different sources of risk is not straightforward. Most likely it will be as much a computation exercise as a matter of judgement and gut feeling. In the end it may be difficult to distinguish one from the other. There are also data and modelling difficulties. Secondly, it would also require substantial

[10] The International Monetary and Financial Committee (IMFC) is an advisory body to the IMF. It consists of the Ministers of Finance of the 24 countries and constituencies represented on the Executive Board of the IMF. In practice, even though the communiqués of the IMFC are not formally binding policy documents for the IMF, the statements of the IMFC guide the work of the IMF. For more information on the governance of the IMF, see http://www.imf.org/external/about.htm.

resources, not least regarding the collection and evaluation of financial data. The need for extensive and trustworthy financial data might also limit the possible coverage to advanced economies where such data is available. Thirdly, the signalling effect might be severe if markets take a formal EWS very seriously with possibly unwanted consequences. Finally, the proposed division of labour between the IMF and the FSF will move policy decisions away from the IMF with its broad membership to a much more limited circle of countries. This may undermine the legitimacy and usefulness of the IMF.

Box 2: FSF – The Financial Stability Forum

The FSF was created in April 1999. Its aim is to promote international financial stability through information exchange and international co-operation in financial supervision and surveillance. The FSF does not have permanent working groups but ad hoc working groups have worked on particular issues in greater detail, for example the operation of highly leveraged institutions, capital flows, implementation of standards, offshore financial centres, large and complex financial institutions and deposit insurance. The FSF Chair briefs the G7 Finance Ministers and Central Bank Governors and the International Monetary and Financial Committee of the IMF.

The FSF meets biannually or more frequently as needed. It also holds regional meetings in Latin America, the Asia-Pacific region, Africa and Central and Eastern Europe. In these meetings, Forum members and regional non-members exchange views on issues relevant to the stability of the global financial system and of regional systems. Such a meeting was hosted by the Riksbank in January 2007.

The FSF is managed by a small secretariat at BIS (Bank for International Settlement) in Basel. Analytical resources are contributed by members by forming ad hoc working groups.

Members of the FSF

Central banks, as well as regulatory and supervisory authorities from Australia, Canada, France, Germany, Hong Kong, Italy, Japan, the Netherlands, Singapore, Switzerland, United Kingdom and the United States.

International organisations: BIS, European Central Bank (ECB), IMF, Organisation for Economic Cooperation and Development (OECD), and the World Bank.

Standard-setting bodies: Bases Committee on Banking Supervision (BCBS), Committee on Global Financial Systems (CGFS), Committee on Payment and Settlement Systems (CPSS), International Association of Insurance Supervisors (IAIS), International Accounting Standards Board (IASB), and International Organisation of Securities Commissions (IOSCO).

For more on the FSF, see http://www.fsforum.org/

A difficult trade-off – macro or micro approach to financial sector surveillance?

This section attempts to discuss the crucial trade offs regarding the approach adopted in the IMF's financial surveillance. The first trade off to decide on is the proper balance between the micro and macro approach. The IMF's surveillance is today centred on the macro dimensions, which stems naturally from its role as a "global overseer" and the fact that the macro economic environment also affects the financial sector, for example through asset prices, credit losses and demand for financial services. The Fund has the role of "supervising the supervisors", where more long-term and macro-oriented issues such as legal and regulatory frameworks and market structures are assessed in the FSAPs and the macroeconomic policies are overseen in the Article IV consultations. Its comparative advantage with respect to surveillance is therefore not within a micro approach (assessing different financial institutions' balance sheets). On the other hand, meaningful financial sector surveillance might require deeper insight into the micro data of individual financial institutions and the IMF's broad knowledge of surveillance and its established contacts in all the member countries should make it possible for the Fund to adapt to new challenges. This would not be without resource implications and the need to prioritise scarce resources is evident. A thorough analysis of the financial sector in all member countries, in combination with the demands stemming from the 2007 surveillance decision, seems hard to manage within the limited budget envelope. Furthermore, the Article IV consultations are limited to a maximum of one visit per year and would not grasp all the continuous movements on the financial markets. Introducing a system of "Article IV updates", where the member states provide the IMF with data updates in the areas identified as vulnerable during the mission, could be a potential solution to the continuity problem, but this would also require resources. Another potential problem, with such a solution is that it may only work for a limited set of IMF's members who already have well-developed data-gathering routines in place.

Since FSAPs are voluntary, not all members with important financial markets are reviewed, for example systemically important countries such as the US and China have not been assessed yet[11]. In total, initial FSAP reviews have covered 2/3 of IMF members so far, and about the same in terms of world GDP. Consequently, prioritization of countries of systemic importance, where there are risks of contagion across borders, seems unavoidable if the IMF is to be able to perform the deepened analysis needed to properly evaluate the financial sector. Many countries would claim that such a prioritization would break the obligations the IMF has towards all its members. The middle way would be to integrate findings from the different instruments to a greater extent but without the intention of taking on new responsibilities for financial sector surveilance, which are currently handled on the national level. Today, the IMF assesses the macro aspects of the financial sector by looking at aggregates, potential bubbles and risk pricing. The macro assessment sometimes leads to a deeper micro assessment on the institutional level if deemed necessary – but how often and to what extent this is done is unclear. If this is to be performed on a more regular basis then access to micro financial data is crucial.

Today the IMF is represented in the FSF, but the potential for working with other international committees, such as CEBS and IAIS, could be further explored, especially to share the data sets needed for these micro assessments.

Conclusion

For the IMF to remain relevant for its members it is important to increase the IMF's surveillance of the financial sector. The IMF is well placed to integrate its findings and make policy recommendations in this area. It is, however, important that the changes evolve within the institution's comparative advantages, where an overly micro-orientated, resource-intensive approach should be avoided. Such an approach would make it more necessary to prioritize than can be justified by its mandate and principles of equal treatment of members; that is if the IMF has to concentrate its surveillance on a few systemically-important countries while more or less abandoning a large majority of its members. Both sides could argue that this is unfair and it would decrease the usefulness of the IMF in the latter group of countries and thus undermine the legitimacy of the Fund, further eroding its main comparative advantage – its universal membership. However, this should not rule out the use of micro data on an ad-

[11] The US has, however, promised to undergo a FSAP during 2009 (see speech by US Under Secretary McCormick, 25 February 2008)

hoc basis when deemed necessary; for example, if aggregated indicators signal significant weaknesses, there may be a need to study the balance sheets of one or a few systemically-important financial institutions to evaluate the probability of a default with profound contagion effects. Given these restrictions, the road forward as outlined by the IMF staff seems well advised.

It seems possible to increase the awareness of financial risks and to generate dialogue on proper policy responses by modifying already existing instruments. One way to improve surveillance is by more consistently linking the identification of financial weaknesses, including authorities' crisis management capacities, to the assessment of the macroeconomic developments, and vice versa. We would welcome an attempt to step up financial sector analysis into the Article IV consultations, including work to improve the financial sector competence and a better integration of the findings from FSAPs.

The regional and global perspective could be emphasized even further. One of the reasons for the magnitude of the recent turbulence was that it spread more rapidly across borders and markets than earlier crises. The IMF's surveillance must therefore increasingly aim at a more cross-border perspective, by taking a regional stance in regions or markets that are closely interdependent. One way is to expand the bilateral FSAPs to also cover regions with important cross-border flows, which was tried in a Nordic-Baltic Regional FSAP exercise in 2006-2007. In the context of increasing financial sector integration and policy coordination, the regional FSAPs should focus on financial system stability and crisis prevention and resolution frameworks.

The IMF has much to gain by cooperating with other international organisations and committees, such as the FSF. In any such cooperation it is important that the IMF continues to be a central actor when it comes to policy advice. The suitability of the more radical suggestions (e.g. EWS) is not as evident and there are several potential problems with these suggestions. First, assessing the probability of occurrence and the magnitude of different sources of risk is not straightforward. Most likely it will be as much a computation exercise as a matter of judgement and gut feeling. In the end it may be difficult to distinguish one from the other. There are also data and modelling difficulties. Secondly, it would also require substantial resources, not least regarding the collection and evaluation of financial data. The need for extensive and trustworthy financial data might also limit the possible coverage to advanced economies where such data are available. Thirdly, the signalling effect might be severe if markets take a formal EWS very seriously with possibly unwanted consequences. Finally, the proposed division of labour between the IMF and the FSF will

move policy decisions away from the IMF with its broad membership to a much more limited circle of countries. This may reduce the influence and transparency of non-FSF members and thereby undermine the legitimacy and usefulness of the IMF as a central forum for analysis and dialogue.

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