

An Evaluation of Swedish Monetary Policy between 1995 and 2005

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Foreword

The Riksbank (Swedish central bank) has had an independent status in relation to the Riksdag and the Government since January 1999. This independent status is set out in Swedish law. Decisions regarding changes in interest rates are taken by an Executive Board consisting of six members who, according to the Riksbank Act (1988:1385), may not seek or take instructions on matters relating to monetary policy. According to the Instrument of Government, no public authority can determine how the Riksbank decides in matters relating to monetary policy.

The main task of the Riksbank is to maintain price stability. It should also promote a safe and efficient system of payments. According to the preparatory materials to the Riksbank Act, the Riksbank's monetary policy should first and foremost strive to achieve a low and stable rate of inflation. In addition, the Riksbank should, without neglecting the objective of price stability, support the aims of general economic policy with the purpose of attaining sustainable economic growth and high levels of employment. Since 1 January 1995 the Riksbank has formally based Sweden's operative monetary policy on an inflation target. The aim is that inflation, defined in terms of the consumer price index, is to be limited to 2 % per year, with a tolerance interval of ± 1 percentage unit.

As part of the parliamentary Committee on Finance's follow-up and evaluation tasks, the Committee unanimously decided in April 2005 to carry out an independent evaluation of Sweden's monetary policy in the period 1995-2005. Reasons included that the inflation target had been in force for ten years and that no independent evaluation of Sweden's monetary policy had been conducted since changes to the monetary policy framework were introduced in the 1990s. At the end of May 2005, the Committee prepared the terms of reference for the evaluation. In brief, these stated that the evaluation should focus on the following questions (the terms of reference are presented in greater detail in an annex to the report):

- Are the Riksbank's overall objectives correctly formulated?
- Is the inflation target correctly formulated?
- Has the monetary policy pursued by the Riksbank achieved the inflation target during the period 1995-2005?
- What methods of forecasting and analysis does the Riksbank use, and how is the Riksbank's decision-making process designed?
- Is the Riksbank's external communication effective and expedient?
- Does the Riksbank have the right instruments to achieve the inflation target?
- How does Sweden fare in comparison with other countries with inflation targets?

In November 2005 the Committee on Finance decided to assign the evaluation jointly to Professor Frederic Mishkin at Columbia University and Professor Francesco Giavazzi at Bocconi University. They started their evaluation in January 2006. During the spring of 2006, Mishkin and Giavazzi visited Sweden on several occasions in order to collect information and discuss Swedish monetary policy with various stakeholders in Swedish society. Among others, they met representatives of the Riksbank, the social partners, academic life, the financial market, the Government and the Riksdag. Between April and June 2006, the public also had the opportunity to submit their views on Sweden's monetary policy to the evaluators, via the Riksdag website. In addition, some 20 referral bodies were invited to submit statements on Sweden's monetary policy directly to the evaluators.

Mishkin's and Giavazzi's findings from their survey of Swedish monetary policy in the past ten years are presented in this Report from the Riksdag. The Committee has high hopes that the evaluation will further stimulate the important and already lively debate on Swedish monetary policy. The authors take full responsibility for the contents of the report.

Stockholm 28 November 2006

Stefan Attefall
Chair of the
Committee on Finance

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1 Introduction

On November 10, 2005 the Riksdag Committee on Finance appointed Professor Francesco Giavazzi and Professor Frederic S. Mishkin to evaluate Swedish monetary policy between 1995 and 2005. The Committee expected the evaluation to follow the directives approved by the Committee on Finance on 31 May 2005 and which state (the complete text of the Guidelines appears in Appendix 1):

“The following issues shall be addressed:

- **The Riksbank’s objective.** The evaluator shall analyse whether there is any conflict of goals between the Riksbank Act’s price stability objective and the task of promoting stability in the financial system.
- **The formulation of the inflation target.** The evaluator shall analyse whether the inflation target is correctly formulated so as to ensure price stability. The evaluator shall analyse whether the inflation target also serves to support existing objectives of general economic development with the aim of achieving sustainable economic growth and high levels of employment. The evaluator shall highlight the consequences of the current system according to which the Riksbank independently formulates the operative objectives of monetary policy. The evaluator shall examine the target level, tolerance range, target variable and the clarifications that have been developed.
- **Fulfilment of the inflation target and the shaping of monetary policy.** The evaluator shall analyse to what extent current monetary policy has contributed to achieving the inflation target during the period 1995-2005. The analysis shall be carried out on an annual basis. The evaluator shall highlight whether the current monetary policy has also served to support the goals of sustainable economic growth and high levels of employment. The evaluator shall highlight whether the Riksbank has observed its basic rule for monetary policy and whether it has sought to ensure symmetry in its approach to the inflation target.
- **Data and procedures for monetary policy decisions.** The evaluator shall analyse the Riksbank’s forecasting and analysis methods, as well as the quality of the economic/statistical data on the basis of which decisions are made. The evaluator shall also highlight and analyse the Riksbank’s internal preparation and decision-making processes.
- **The Riksbank’s external communication.** The evaluator shall analyse the Riksbank’s external communication with regard to the inflation target, current economic developments, changes in interest rates and the reasons for any deviations from the inflation target. The evaluator shall examine whether the Riksbank’s presentation of its decisions and the data on which its decisions are based (inflation reports, press releases, minutes, speeches, working reports) are such that monetary policy can be predicted and evaluated.

- **The instruments of monetary policy.** The evaluator shall analyse whether the instruments of monetary policy that the Riksbank has at its disposal are sufficient for the Riksbank to achieve its goals.
- **Comparison with other countries with inflation targets.** The evaluator shall compare the shaping and results of monetary policy in Sweden with a few other countries with inflation targets.”

The following describes how we worked:

We started working on this evaluation in January 2006. For the first couple of months we studied documents that had been made available to us by the Secretariat of the Riksdag Committee on Finance and by the Riksbank, as well as similar evaluations that had been conducted concerning other central banks, and material we collected directly.

- We made the following visits to Stockholm:
- Professor Mishkin in the week of March 5-10, 2006
- Professor Giavazzi in the week of April 2-7, 2006
- Together in the week of May 7-12, 2006
- Professor Giavazzi was also at the Riksbank for a conference on “Central Bank Governance” on August 31-September 1, 2006. During these days he met with the Secretariat of the Riksdag Finance Committee and of the Riksbank (including the Governor) to check some facts and gather additional information.

During these trips we met a variety of interested parties, in the Riksbank, in financial institutions, in labour unions, in the universities, in the ministry of Finance and in other Swedish organizations: a list of the people we met is in Appendix 2. We also had meetings with members of the Committee on Finance of the Riksdag, of political parties represented in the Riksdag, and of the General Council of the Riksbank. On May 9 we met for two hours with the Swedish Prime Minister, Mr. Goran Persson.

We invited the public to submit their views in two ways, unsolicited and solicited:

- We advertised our evaluation on the website of the Riksdag (with an additional link on the Riksbank website). Through this channel we received some 50 e-mails;
- We sent approximately 20 letters to various Swedish organizations inviting more extended submissions. Through this channel we received 6 submissions. A list of the organizations which sent submissions is in Appendix 3.

We jointly wrote a first draft of the report in Italy May, soon after returning from Stockholm. During June and July we made further progress collecting additional information from the Riksdag Committee on Finance and from the Riksbank, and read the various e-mails and submissions we received. We

finalized the report during the month of August and completed it during the month of September, except for some facts that still needed to be checked. A final version was ready in early October when it was sent to the translators.

We would like to thank Par Elfvingsson at the Riksdag Committee on Finance, and Mikael Apel at the Riksbank for their assistance in organizing this work. Johanna Stenkula von Rosen at the Riksbank helped us produce some of the Figures in the Report. Our research assistant at Columbia Business School, Emilia Simeonova, did an excellent work.

We thank the Riksbank staff for their openness and frankness.

2 The Science of Monetary Policy

There have been major advances in economic research on monetary policy over the last thirty years and what we have learned has helped countries improve their economic performance substantially in recent years. In the 1990s and 2000s, inflation has dropped sharply in most countries, while employment fluctuations have if anything decreased. This research can help us evaluate Swedish monetary policy on a scientific basis. Here we examine what economic science tell us about how monetary policy should be conducted in nine key areas: 1) the importance of price stability and a nominal anchor to successful monetary policy, 2) fiscal and financial preconditions for achieving price stability, 3) central bank independence as an additional precondition, 4) central bank accountability as a necessary complement of independence, 5) the rationale for inflation targeting, 6) flexibility of inflation targeting, 7) central bank transparency and communications, 8) the optimal inflation target and 9) the role of asset prices in monetary policy.

2.1 The importance of price stability and a nominal anchor to successful monetary policy

The realization that price stability and a nominal anchor are important to the successful conduct of monetary policy has stemmed from three intellectual developments in economics: 1) the recognition that expansionary monetary policy cannot raise output and employment except in the short run, 2) the realization that inflation is costly, and 3) the time-inconsistency problem. These developments in economic science then have led to the recognition first, that price-stability should be the overriding long-run goal of monetary policy, and second, that an explicit nominal anchor should be adopted.

2.1.1 Expansionary monetary policy cannot raise output and employment except in the short run

Up until the 1970s, many economists thought that there was a long-run trade-off between inflation and employment so that expansionary monetary policy to achieve higher inflation could deliver lower unemployment in the long-run. Research in the late 1960s and 1970s proved that this reasoning was incorrect. Famous papers by Edmund Phelps and Milton Friedman demonstrated that in the long-run, the economy would gravitate to some natural rate of unemployment no matter what the inflation rate was.¹

Attempts to lower unemployment below the natural rate would then only result in higher inflation. The so-called rational expectations revolution in the 1970s, driven by path-breaking papers by Robert Lucas, Thomas Sargent and

Neil Wallace made it clear that the public and the markets' expectations about monetary policy have important effects on almost every sector of the economy.² This research demonstrated that not only is there no long-run tradeoff between employment and inflation, but attempting to lower unemployment below the natural rate through expansionary monetary policy would probably not work, except in the very short run (e.g. over a few quarters) to lower unemployment because inflation expectations would adjust rapidly upwards and would quickly lead to higher inflation with little improvement in unemployment.

2.1.2 The high cost of inflation

Over the past three decades, economists and policymakers have become increasingly aware of the economic and social costs of inflation. The high inflation environment of the 1970s and 80s made the costs of inflation more apparent and led to a growing consensus that price stability – a low and stable inflation rate – provides substantial benefits to the economy. Price stability prevents overinvestment in the financial sector: in a high inflation environment the financial sector expands to profitably act as a middleman to help individuals and businesses escape some of the costs of inflation. Price stability lowers the uncertainty about relative prices and the future price level, making it easier for firms and individuals to make appropriate decisions, thereby increasing economic efficiency. Price stability also lowers the distortions that arise from the interaction of the tax system and inflation. Finally, price stability reduces strains on a country's social fabric because it lessens conflict between different groups in the society each trying to make sure that its income keeps up with the rising level of prices at the expense of others. Inflation also increases poverty because it hurts the poorest members of society most: differently from the rich, the poor do not have access to financial instruments which would enable them to protect themselves against inflation.

All of these benefits of price stability suggest that low and stable inflation can increase the level of resources productively employed in the economy, and can even help increase the rate of economic growth. Over time, the consensus has grown that inflation is detrimental to economic growth, particularly when inflation is at high levels.

2.1.3 The Time-Inconsistency Problem

Another important development in the science of monetary policy which emanated from the rational expectations revolution was the discovery of the importance of the *time-inconsistency problem* in papers by Finn Kydland and Edward Prescott, Guillermo Calvo and Robert Barro and David Gordon.³ The time-inconsistency problem is something that we deal with continually in everyday life. We often have a plan that we know will produce a good outcome in the long run, but when tomorrow comes, we just can't help ourselves

and we renege on the plan because doing so has short-run gains. This occurs when we make a New Year's resolution to go on a diet, but soon thereafter we can't resist having one more bite of that piece of cake – and then another bite, and then another bite – and the weight begins to pile back on. In other words, we find ourselves unable to *consistently* follow a good plan over *time*; the good plan is said to be *time-inconsistent* and will soon be abandoned.

Monetary policymakers also face the time-inconsistency problem. They are always tempted to pursue a discretionary monetary policy to boost economic output and employment in the short-run – above the level that is consistent with stable inflation – which is more expansionary than firms or people had initially expected. The best policy, however, is *not* to pursue a discretionary, expansionary policy because decisions about wages and prices reflect workers and firms expectations about policy: when they see a central bank pursuing expansionary policy, workers and firms will raise their expectations about inflation, and push wages and prices up. The rise in wages and prices will lead to higher inflation, but will not result in higher output on average.

A central bank will have better inflation performance in the long run if it understands (and makes clear to the public) that it should not have an objective of raising output or employment above what is consistent with stable inflation and will not try to surprise people with an unexpected discretionary, expansionary policy. Instead, it should commit to keeping inflation under control.

However, even if a central bank recognizes that discretionary policy will lead to a poor outcome – high inflation with no gains in output – and so renounces it, the time-inconsistency problem is likely to arise nonetheless from political pressure. In the view of many observers, politicians in a democratic society tend to be shortsighted because they are driven by the need to win their next election. With this as their primary goal, they are unlikely to focus on long-run objectives, such as promoting a stable price level. Instead they will seek short-run solutions to problems like high unemployment by calling on the central bank to lower interest rates.

2.1.4 Price stability should be the overriding, long-run goal of monetary policy

The inability of monetary policy to boost employment (except in the very short run), the high costs of inflation and the time-inconsistency problem lead to the conclusion that the overriding, long-run goal of monetary policy should be price stability.

A goal of price stability immediately follows from the benefits of low and stable inflation which promote a higher level of economic output. Furthermore, an institutional commitment to price stability is one way to make time-inconsistency of monetary policy less likely and does not lead to lower employment in the long run. An institutional commitment to the price stability goal provides a counter to time-inconsistency because it makes it clear that the central bank must focus on

the long-run and thus resist the temptation to pursue short-run expansionary policies that are inconsistent with the long-run, price stability goal. An institutional commitment to price stability can also encourage the government to be more fiscally responsible and thus promote one of the preconditions discussed below for good monetary policy. When a government has committed to price stability it becomes harder for it to run large budget deficits. Politicians now are more likely to recognize that eventually they will have to pay for current deficit spending by raising taxes or by cutting public expenditures and will not be able to resort to the so-called inflation tax – the issuing of money to pay for goods and services – because this leads to inflation and is thus inconsistent with the price stability goal.

But does accepting a price stability goal mean that the central bank should ignore concerns about output and employment fluctuations? Clearly, monetary policy should be directed at lowering both inflation *and* output/employment fluctuations around their optimal/natural levels. Indeed, defining the objectives of monetary policy in this way is standard in the academic literature. (Note that because output and employment usually move together, we use the terms output and employment interchangeably. However, there are cases in which output and employment do not move together, especially when there are productivity shocks as have recently occurred in Sweden where positive productivity shocks have resulted in high output growth while employment has been stagnant.)

The additional objective of lowering employment fluctuations explains why central banks should not try to attain price stability *in the short-run* because this would mean that monetary policy would solely be directed at minimizing inflation fluctuations and this could lead to excessive employment fluctuations. However, because price stability helps to promote economic growth and because in the long run expansionary monetary policy that produces inflation cannot increase employment and can only hurt workers, price stability should be the overriding goal of monetary policy *in the long run*, but not in the short run.

In some countries, the United States for example, legislation asks the central bank to achieve two objectives: price stability and maximum employment – and is thus known as *dual mandate*. Other countries, Sweden, the United Kingdom and the Euro area, for example, have a *hierarchical mandate*, in which the goal of price stability is placed first, but then say that as long as price stability is achieved, other goals such as high employment can be pursued.

The distinction between a dual and a hierarchical mandate is however largely academic. As long as price stability is a long-run goal, but not a short-run goal, monetary policy can reduce employment fluctuations by allowing inflation to deviate temporarily from the long-run goal: thus the central bank effectively operates under a dual mandate.

Taken at face value, a dual mandate could be dangerous: if a dual mandate leads a central bank to pursue short-run expansionary policies that increase output and employment without worrying about the long-run consequences for inflation, the time inconsistency problem may recur. Concerns that a dual

mandate might lead to overly expansionary policy is a key reason why many countries have favored hierarchical mandates in which the pursuit of price stability takes precedence. Hierarchical mandates can also be a problem if they lead to the central bank focusing solely on inflation control, even in the short-run, and so it undertakes policies that lead to large employment fluctuations. The bottom line is that either type of mandate is appropriate as long as it operates to make price stability the primary goal *in the long run*, but not in the short run.

Article 2 of the Sveriges Riksbank Act states: “*The objective of the Riksbank’s operations shall be to maintain price stability. The Riksbank shall also promote a safe and efficient payment system.*” There is no explicit reference to a dual mandate in the Act itself. However, in the Bill (1997/98:40) where the Act was proposed the Government states that (section 7.3): “*The objective of monetary policy shall be to maintain price stability. As an agency under Parliament, the Riksbank shall additionally without setting aside the objective of price stability, support the objectives for general economic policy with the intention of achieving sustainable growth and high employment.*”

Thus the Riksbank de facto operates under a hierarchical mandate similar to those that have been written for the Bank of England and the European Central Bank.

2.1.5 A well-defined nominal anchor should be adopted

Although an institutional commitment to price stability helps solve time-inconsistency and fiscal policy problems, it does not go far enough because price stability is not a clearly defined concept. Typical definitions of price stability are often of the type, you know it when you see it. Constraints on fiscal policy and discretionary monetary policy to avoid inflation might thus end up being quite weak because not everyone will agree on what price stability means in practice, providing both monetary policymakers and politicians a loophole to avoid making tough decisions to keep inflation under control. A solution to this problem is to adopt a nominal anchor that ties down exactly what the commitment to price stability means.

A nominal anchor is like a behavior rule which can help to prevent the time-inconsistency problem. By providing an expected constraint on discretionary policy a nominal anchor helps the monetary authorities to resist giving in and pursuing overly expansionary discretionary policy.

2.2 Fiscal and Financial Preconditions for achieving price stability

Monetary policy is not done in a vacuum. There are two basic preconditions for monetary policy to be able to promote price stability and for adopting a credible nominal anchor: 1) responsible fiscal policy, 2) financial policies that

promote the safety and soundness of the financial system. We shall see that if a government has unsound fiscal and financial policies, monetary policy will be unable to keep inflation under control and this is why responsible fiscal policies and sound financial policies are preconditions for successful monetary policy. Happily, as we will see, Sweden currently meets these two preconditions. Nevertheless, we discuss them here because Sweden has not always met these preconditions in the past and they must never be taken for granted: without them monetary policy, no matter how well conducted, will eventually fail.

2.2.1 Responsible fiscal policy

Because the government has to pay its bills, just as we, private individuals, do, it has a budget constraint. When we spend more than we earn, we have to finance the excess spending by borrowing. If we cannot borrow, then our only option is to cut back our spending. When a government spends more than its revenues, that is, when it runs a budget deficit, it can similarly finance the deficit by borrowing, that is by issuing government debt. Unlike us, however, if the government cannot borrow, it has another option to finance a deficit: it can print money and use it to pay for its excess spending. When budget deficits get large, a government may not be able to borrow sufficient funds to cover the deficit. It may then resort to printing money directly or pressure the central bank to purchase government bonds (called *monetizing the debt*) which results in the same thing, an expansion of the money supply. The result is that when budget deficits get too large, pressure can arise that leads to expansionary monetary policy and high inflation will occur, making it difficult for the monetary authorities to be able to pursue price stability. In Sweden, there is less likelihood that expansionary fiscal policy can lead to expansionary monetary policy because the Maastricht Treaty, which Sweden has adopted, rules out printing money to finance budget deficits, and even during the Swedish banking crisis of the early 1990s, deliberate decisions were made not to finance the cost of the government bailouts of the banking system by monetizing the debt: the government had to issue bonds to pay for these bailouts. Nonetheless, even in an environment like Sweden's, responsible fiscal policy promotes confidence that the central bank will never be put in a position where it has to expand the money supply to help the government finance its deficits.

2.2.2 Sound financial policies that promote the safety and soundness of the financial system

Similarly, poor regulation and supervision of the financial system can result in large losses in bank balance sheets that make it impossible for the monetary authorities to raise interest rates to control inflation because doing so might lead to further losses and thus to a collapse of the financial system.

Also, significant losses in banks' balance sheets can lead to large payments by the government to get the banks back on a sound footing, as indeed occurred in Sweden in the early 1990s, and this will lead to larger budget deficits. Larger deficits, as we have seen, can then also lead to an expansion of the money supply which produces high inflation. Sound financial policies are thus also essential for the attainment of price stability.

2.3 Central Bank Independence as an Additional Precondition

Achieving price stability through the adoption of a credible nominal anchor, however, requires another precondition: in setting its policy instruments the central bank should be independent. There is always some discomfort in democratic societies in giving to non-elected officials control over policies that are important to almost every citizen. Here we discuss central bank independence; in the following sub-section we address the issue of accountability.

2.3.1 Goal Independence

Although there is a strong rationale for the price stability goal and for the adoption of a nominal anchor, who should set the goals for monetary policy? Should the central bank independently announce its commitment to the goal of price stability and what nominal anchor it chooses, or would it be better to have this commitment be mandated by the government?

Here the distinction between goal independence and instrument independence is useful. *Goal independence* is the ability of the central bank to set its own goals for monetary policy – say the goal of an inflation rate of 2% two years in the future. *Instrument independence* is the ability of the central bank to independently set the instruments of monetary policy, e.g. the level of the interest rate, to achieve its goals.

The principle, so basic to democracy, that the public must be able to exercise control over government actions strongly suggests that the goals of monetary policy should be set by the elected government. In other words, a central bank should not be goal independent. The corollary of this view is that the institutional commitment to price stability should come from the government in the form of an explicit, legislated mandate for the central bank to pursue price stability as its overriding, long-run goal.

Not only is a legislated mandate and goal dependence of the central bank consistent with basic principles of democracy, but it has the further advantage that it makes time-inconsistency less likely, while making sound fiscal policy that promotes good monetary policy more likely. As we discussed above, the source of the time-inconsistency problem is more likely to be embedded in the political process than it is in the central bank. Once politicians commit to the price stability goal by passing central bank legislation with a price stabil-

ity mandate, it becomes harder for them to put pressure on the central bank to pursue short-run expansionary policies that are inconsistent with the price stability goal. Furthermore, a government commitment to price stability is also a commitment not to pursue irresponsible fiscal policy that would lead to higher inflation.

The reasoning above suggests that the central bank should be goal dependent in a parliamentary system as in Sweden: in other words the government should set the long-run goal for monetary policy, say a 2% level for the inflation rate. (However, it is far less clear that the government should set the long-run goals for monetary policy in a congressional system, as in the United States, because there is a distinct separation between the executive branch and the legislative branch. In a congressional system it is far from clear who in the government should set monetary policy goals, and so it might be harder to establish strict goal dependence for the central bank.⁴ Even in a parliamentary system, where there is less of a distinction between the executive branch and the legislative branch, there is still an issue of whether it should be government ministers or the legislature who should set the long-run goal.) Even when the central bank is goal dependent, however, the central bank should not be cut out of the decision making process through which the goals of monetary policy are set. Because the central bank has both prestige and expertise in the conduct of monetary policy, governments will almost always be better served by setting the objectives for monetary policy in consultation with the central bank.

Although there is a stronger case for the government setting the goal for monetary policy in the long-run, it is more controversial whether it should set inflation targets in the short-run or intermediate-run. First, there is the concern that having the government set the short or medium-term inflation target could lead to it being changed every month or every quarter, and this could easily lead to a serious time-inconsistency problem in which short-run objectives would dominate. In practice, however, this problem does not appear to be severe, because in many countries in which the government sets the annual inflation target, the target is rarely changed once price stability is achieved. Even though in theory governments could manipulate an annual inflation target to pursue short-run objectives, the transparency of the goal setting decision tends to lead to a long-run approach in setting the inflation target even when it is done on an annual basis.

If inflation is currently far from the long-run target, who sets the medium-term target is more complicated. The length of the lags from monetary policy to inflation is a technical issue that the central bank is far more qualified to determine than politicians. Thus how long it should take for inflation to return to the long-run target necessarily requires judgment about these lags which should be insulated from short-term political pressure if time-inconsistent policies are to be avoided. This argues for having the central bank set the medium-term inflation target because how quickly it approaches the long-run target reflects the lags of monetary policy effects on inflation. On the other

hand, there is an argument for the government having a role in setting the medium-term target in this situation because, as Lars Svensson has shown, preferences on the weight given to minimizing output fluctuations relative to inflation fluctuations affect the speed at which inflation should be adjusted toward the long-run goal.⁵ Therefore, in order for the government's preferences to be reflected in monetary policy, the government would need to have some role in setting the medium-term target.

Whether the central bank or the government should set medium-term inflation targets is therefore an open question. This may not be that much of a dilemma most of the time because medium-term targets and long-run targets are likely to be quite close. But this will not always be the case.

2.3.2 Instrument independence

Although the arguments above suggest that central banks should be *goal dependent*, there is a strong case that central banks should be *instrument independent*, that is should be allowed to set the policy interest rate that they deem appropriate to pursue the long run goal of price stability without interference from the government. We have seen that the time-inconsistency problem almost surely emanates from the political process. Making central banks independent means that the central bank is better able to avoid the time-inconsistency problem.

The fact that monetary policy needs to be forward looking in order to take account of the long lags in the effects of changes in interest rates on inflation provides another reason for instrument independence. Instrument independence insulates the central bank from the myopia that is frequently a feature of the political process arising from politicians' concerns about getting elected in the near future. Instrument independence thus makes it more likely that the central bank will be forward looking and adequately allow for the long lags from monetary policy actions to inflation in setting their policy instruments.

Recent evidence seems to support the conjecture that macroeconomic performance is improved when central banks are more independent. When central banks in industrialized countries are ranked from least legally independent to most legally independent the inflation performance is found to be the best for countries with the most independent central banks.⁶

Both economic theory and the better outcomes for countries that have more independent central banks has lead to a remarkable trend toward increasing central bank independence throughout the world. Before the 1990s very few central banks were highly independent, most notably the Bundesbank, the Swiss National Bank and to a somewhat lesser extent the Federal Reserve. Now almost all central banks in industrialized countries and many in emerging market countries have a level of independence on par with the pre-2000 Bundesbank and the Swiss National Bank. In the 1990s, greater independence was granted to central banks in such diverse countries as the New

Zealand, the United Kingdom, South Korea and those in the Euro area, as well as in Sweden.

2.4 Central Bank Accountability

A basic principle of democracy is that the public should have the right to control the actions of the government. The public in a democracy must have the capability to punish incompetent policymakers in order to control their actions. If policymakers cannot be removed from office or sanctioned in some other way, this basic principle of democracy is violated. In a democracy, government officials need to be held accountable to the public.

A second reason why accountability of policymakers is important is that it helps to promote efficiency in government. Making policymakers subject to sanctions makes it more likely that incompetent policymakers will be replaced by competent policymakers and creates better incentives for policymakers to do their jobs well. Knowing that they are held accountable for poor performance, policymakers will strive to get policy right. If policymakers are able to avoid accountability, then their incentives to do a good job drop appreciably, making poor policy outcomes more likely.

2.4.1 Where should the political debate about monetary policy take place?

The need for central bank accountability suggests that monetary policy should be subjected to active public debate. But where should this debate take place? Should it take place in a country's legislative branch, its parliament or congress? Should the executive branch, that is, government ministers, get actively involved in the monetary policy debate?

Before answering these questions we shall make two observations. First is the importance of a free and competent press where informed debates about monetary policy can take place. This requires high quality professional journalists, but also the active participation of a country's best and better known economists. Such discussions are important because they can help increase the accountability of the central bank with the public.

Second, in discussing the role of public debates about monetary policy, one should never forget that if the credibility of the central bank to pursue price stability is weakened, inflation expectations will rise, leading to increased inflationary pressure as a result of demands by workers and businesses to raise their wages and prices. In that case, the central bank may be confronted with a difficult situation: if it does nothing, the nominal anchor will be weakened and inflation will rise; if it tightens monetary policy to restore the nominal anchor's credibility, it may end up tightening too much and cause damage to the economy. A situation like this is exactly what the Riksbank confronted in the early years of its inflation targeting regime from

1993 to 1996, as we shall discuss in Section 3.2.1. As we shall see, the Riksbank's concerns that inflation expectations were too high at that time led to a tightening of monetary policy, which ended up being too much, leading to an economic contraction and a decline of inflation below the Riksbank's stated target. A loss of central bank credibility can thus lead to worse performance of monetary policy.

The analysis of the effects of a loss of central bank credibility indicates that there can be a cost from politicians' criticisms of the central bank's conduct of monetary policy. Political debate that takes the form of only criticizing policy actions, particularly when the central bank raises interest rates, but does not criticize the central bank for lowering rates when it might produce too much inflation, can be counterproductive because it will weaken the nominal anchor and produce worse economic outcomes. Political debate which focuses on whether a central bank is taking or has taken the appropriate measures to achieve price stability is, in contrast, likely to strengthen the nominal anchor.

Although there can be costs from political debate about the central bank, there are also major benefits. Political debate is central to the workings of a democracy and the central bank should not be excluded from this debate. Criticisms of the central bank both by politicians and participants in the markets are what make a central bank accountable and give the central bank the incentives to do its job well. Open monitoring and debate about the central bank also can enhance the central bank's ability to learn from its mistakes. Whatever the form of the political debate, the gains from having political accountability for a central bank indicate that active political debate about monetary policy is vital.

The above reasoning argues strongly for having active political debate and scrutiny of monetary policy in a country's legislative branch. It also suggests that debate about the performance of the central bank, particularly after outcomes are known, has great value in enhancing central bank accountability.

Debate and criticism of the central bank from the executive branch or government ministers is far more problematic, however, particularly if it is meant to influence the central bank's current decisions. Because government ministers have greater influence over legislation that affects the powers and resources of the central bank, government ministers, particularly the prime minister or minister of finance, have substantial power to punish or reward the central bank. When a government minister criticizes central bank actions, and in particular criticizes the central bank when it raises interest rates, central bank credibility is likely to be weakened. The result could actually be the opposite of what the government minister wants, because in order to restore credibility to the nominal anchor and keep inflation expectations from rising, the central bank is even more likely to raise interest rates further, which could lead to a contraction in economic output and employment.

Recognition of the danger of having government ministers criticize monetary policy has led some governments to renounce criticizing central bank

decisions, with positive outcomes. The recent relationship between the executive branch and the Federal Reserve in the United States is quite illustrative of the benefits of not having the political debate about monetary policy occur through comments by government officials. Early in Bill Clinton's first presidential term, Robert Rubin, who later became the U.S. Treasury Secretary, but who worked in the White House heading the National Economic Council, convinced President Clinton that it would be a mistake for the President (or Rubin himself for that matter) to criticize the Federal Reserve's raising of interest rates in early 1994. Doing so would only lead to a weakening of the credibility of the Fed, an upward surge in inflation expectations, a resulting rise in long-term interest rates, and thus a sharp fall in long-term bond prices. (See Bob Woodward's, *Maestro*, for a lively discussion of this episode.⁷) The result was that the Clinton Administration did not comment on Federal Reserve policy actions throughout its term in office. Not criticizing the Fed for raising rates enabled the Fed to obtain credibility as a serious inflation fighter, promoting more stable inflation expectations. This enhanced credibility enabled the Fed to refrain from tightening monetary policy in the later part of the 1990s without worrying about a blow out of inflation expectations, something which helped sustain strong economic growth. Furthermore, the high credibility of the Fed enabled it to aggressively lower interest rates preemptively in the face of negative shocks even before the 2001-2002 recession began without worrying that this would lower its inflation-fighting credibility. Given the Fed's quick reaction, the 2001-2002 recession ended up being quite mild. The Clinton Administration's policy, which has been continued by the Bush Administration, is viewed as a tremendous success and not only helped the Fed produce both low and less volatile inflation, but also helped produce low volatility of output and employment fluctuations.

2.5 The rationale for inflation targeting

Economists and policymakers may have come to the conclusion that it makes sense to adopt a nominal anchor. But which anchor should be chosen? There are three basic types of nominal anchors for countries that have an independent monetary policy: monetary targets, inflation targets and implicit but not explicit nominal anchors. (An alternative nominal anchor is an exchange rate target (peg), which, with open capital markets, as in Sweden, implies that a country no longer has an independent monetary policy that can focus on domestic considerations. We discuss exchange rate targets in the context of the role of asset prices in monetary policy in a later section.) What are the relative merits of these alternative anchors?

2.5.1 Monetary targeting

Monetary targets were once the nominal anchor of choice, but a monetary target will have trouble serving as a strong nominal anchor when the relation-

ship between monetary aggregates and inflation is unstable. This relationship is likely to become even more unstable after a financial liberalization or technological innovations which make it more difficult to define what money actually is. Indeed, this is exactly what happened in the countries that adopted monetary targeting. Gerald Bouey, the governor of the Bank of Canada, colorfully described his central bank's experience with monetary targeting by saying, "We didn't abandon monetary aggregates; they abandoned us."

Note that Germany (and to a lesser extent Switzerland) had substantial success with monetary targeting. Still, it is important to recognize that these successes often occurred (certainly up to the late 1980's) in an environment characterized by rather strict financial regulation, where the relationship between monetary aggregates and inflation was relatively stable. Moreover, the Bundesbank and the Swiss National Bank were not bound by the monetarist orthodoxy advocated by Milton Friedman, who suggested that a monetary aggregate should be the primary focus of monetary policy and that such an aggregate should be kept on a constant-growth-rate path. Instead, monetary targeting in Germany and Switzerland were much closer to inflation targeting than they were to a monetarist conception of monetary targeting.

2.5.2 Inflation targeting

The disappointments with monetary targeting led to a search for a better nominal anchor and resulted in the development of inflation targeting in the 1990s. Inflation targeting evolved from monetary targeting by adopting its most successful elements: an institutional commitment to price stability as the primary long-run goal of monetary policy, and to achievement of the inflation goal; increased transparency through communication with the public about the objectives of monetary policy and the plans for policy actions to achieve these objectives; and increased accountability for the central bank to achieve its inflation objectives. Inflation targeting, however, differs from monetary targeting in two key dimensions: First, rather than announce a target for a monetary aggregate, the central bank publicly announces a medium-term numerical target for future inflation; and in deciding how to set its policy instruments it makes use of an information-inclusive strategy, with a reduced role for intermediate targets such as money growth, to forecast future inflation and output.

Inflation targeting superseded monetary targeting for several reasons. First, inflation targeting does not rely on a stable money-inflation relationship and so shocks to velocity (the ratio of nominal income to the money supply) which distort this relationship are largely irrelevant to monetary policy performance. Second, it is inherently forward-looking and uses more information, and not primarily one variable, to determine the best settings for policy, thereby giving it the potential to produce better policy settings. For example, in the case of an energy supply shock, like a sharp rise in the price of oil, strict monetary targeting would overlook the consequences that the oil price

change will have on inflation and future output, while inflation targeting would not. Third, an inflation target is readily understood by the public because changes in prices are of immediate and direct concern, while monetary aggregates are farther removed from peoples' experience. (What percentage of a population would know the difference between M0, M1, M2 or M3?) Inflation targets are therefore better at increasing transparency of monetary policy because they make the objectives of the monetary authorities clearer. Fourth, inflation targets increase central bank accountability because the performance of the central bank can now be measured against a clearly defined target. Monetary targets work less well in this regard because of the unstable money-inflation relationship which makes it harder to exercise accountability because the central bank will inevitably miss its monetary targets frequently, as occurred for the Bundesbank which missed its target ranges over half of the time.

Because an explicit numerical inflation target increases the accountability of the central bank in its task of controlling inflation, inflation targeting also has the potential to reduce the likelihood that a central bank will suffer from the time-inconsistency problem in which it reneges on the optimal plan and instead tries to expand output and employment by pursuing overly expansionary monetary policy. But since time-inconsistency is more likely to come from political pressures on the central bank to engage in overly expansionary monetary policy, a key advantage of inflation targeting is that it is better able to focus the political debate on what a central bank can do in the long-run – that is, control inflation – rather than what it cannot do – permanently raise economic growth and the number of jobs through expansionary monetary policy. Thus inflation targeting appears to reduce political pressures on the central bank to pursue inflationary monetary policy and thereby reduces the likelihood of time-inconsistent policymaking.

2.5.3 Monetary policy with an implicit but not explicit nominal anchor

A third approach to conducting monetary policy is the one used by the Federal Reserve under Alan Greenspan. The Greenspan Fed had a nominal anchor that was implicit but not explicit and involved an overriding concern by the Federal Reserve to control inflation in the long-run with forward-looking, pre-emptive strikes against inflation or deflation. The Greenspan Fed's strategy has been enormously successful. Under Greenspan (with the help of the previous chairman, Paul Volcker, who helped break the back of inflation in the early 1980s), the Fed has been able to reduce inflation in the United States to around the 2% level which is similar to what inflation targeting central banks have achieved. Pre-emptive strikes against inflation – particularly the 1994-95 increase in the Fed Funds rate from 3% to 6% from February 1994 until early 1995 – helped keep inflation stable and helped sustain the longest business cycle expansion in U.S. history, from 1991 to 2001. The Fed then

engaged in a preemptive strike against a weakening economy and deflation starting in January 2001, with the result that the recession in 2001-2002 was quite mild and inflation remained stable. These preemptive strikes against both inflation and weakness in the economy enabled the United States to have steady growth with continuing low inflation.

There are several disadvantages of an implicit anchor based on the reputation of a single individual as in the United States. One disadvantage is its lack of transparency: it leads to constant guessing game about the central bank's goals which creates unnecessary volatility in financial markets and arouses uncertainty among producers and the general public. This was illustrated not only by the repeated inflation scares in the 1990's, but also by the sharp swings in long-term interest rates in the United States during the late spring and summer of 2003. Because the market was confused about the Fed's mixed signals on the risk of deflation and what it might do, the ten-year bond rate first dropped from a level near 4% at the beginning of May to 3.2% in the middle of June, and then rose over 100 basis points to 4.5% by the end of July. If the markets had a clearer picture of the Fed's longer-run objectives, particularly on inflation, then they might have focused less on what the Fed's next policy move would be, making it less likely that Fed statements or policy moves would lead to whipsawing of the market.

Furthermore, the opacity of a central bank without an explicit nominal anchor makes it hard to hold a central bank accountable to the public: its leadership can't be held accountable if there are no predetermined criteria for judging its performance. Low accountability, as we already noted, may also make the central bank more susceptible to the time-inconsistency problem, whereby political pressure might induce it to pursue short-term objectives at the expense of long-term ones.

An additional problem with a central bank not having an explicit nominal anchor is that it – and particularly its leader – is more likely to find its credibility being challenged, leading to what Marvin Goodfriend has called an “inflation scare” – a spontaneous increase in inflation fears that is reflected in a sharp rise in long-term interest rates.⁸ When Greenspan first took over as Fed Chairman, for example, an inflation scare ensued with a sharp upward spike in long bond rates because the markets had doubts that Greenspan, who had strong ties with the Republican leadership, would be able to resist political pressures and be as serious about controlling inflation as his predecessor, Paul Volcker had been. It was only after continual emphasis and success in controlling inflation that the Greenspan Fed was able to avoid inflation scares.

The most serious problem with the use of an implicit but not explicit nominal anchor is its strong dependence on the preferences, skills, and trustworthiness of the individuals in charge of the central bank. Under Alan Greenspan, the Fed has emphasized forward-looking policies and inflation control with great success, and this strategy is continuing under Ben Bernanke. The Fed's leadership will, however, periodically change, and there is no guarantee to get chairmen with the quality of Alan Greenspan or Ben

Bernanke and who will also be strongly committed to inflation control. In the past, after a successful period of low inflation, the Federal Reserve has reverted to inflationary monetary policy – the 1970s are one example. Without an explicit nominal anchor like an inflation target, this could happen again.

Another disadvantage of using an implicit but not explicit nominal anchor is inconsistency with democratic principles. As we have seen, central bank independence is critical to producing low inflation outcomes, yet the practical economic arguments for central bank independence coexist uneasily with the presumption that government policies should be made democratically, rather than by an elite group. In contrast, use of an inflation target as a nominal anchor makes the institutional framework of monetary policy more consistent with democratic principles and avoids some of the above problems. Use of an inflation target involves delegation of policy with a specific mandate, rather than open-ended delegation to an individual (group of individuals). This promotes the accountability of the central bank to elected officials.

2.5.4 Economic performance under inflation targeting

Given its advantages, it is not surprising that the performance of inflation targeting has been quite good in controlling inflation. Inflation targeting countries seem to have significantly reduced both the rate of inflation (Figure 1) and inflation expectations beyond what would likely have occurred in the absence of inflation targets. Furthermore, once down, inflation in these countries has stayed down and inflation volatility has declined (Figure 2): following disinflations, the inflation rate in targeting countries has not bounced back up during cyclical expansions of the economy as used to occur in the past.

One concern about inflation targeting is that a sole focus on inflation may lead to monetary policy that is too tight when inflation is above target and thus may lead to larger output and employment fluctuations. Indeed, the opposite is what happened (Figure 3). (However, a drop in output volatility has also occurred in many countries that have not adopted inflation targeting, and it is thus not absolutely clear that it is due to better performance of monetary policy. It could simply be the result of smaller shocks to the economy in recent years. This is currently a very active area of research). To see how inflation targeting could lead to lower, rather than higher, output volatility, we need to understand that there are two factors that are the key drivers of inflation: inflation expectations and the amount of slack in the economy, described by the so-called *output gap*, the difference between actual output and potential output (the natural rate of output that the economy would achieve with flexible wages and prices). (Two other important factors are import prices, which are determined by world market prices and exchange rates, and supply shocks such as the price of oil. However, the central bank has no control over world market prices and oil prices in particular—and experience shows that inflation targeting stabilizes the exchange rate, thus contributing to the stability of import prices.). An inflation target helps stabilize inflation expectations

around the target: deviations of inflation from the target will therefore be highly correlated with the output gap. Thus stabilizing inflation also helps to stabilize output gaps, in other words it can help stabilize fluctuations of output around potential output.

To see how this would work, consider a negative demand shock, such as a sudden decline in consumer confidence which causes consumers to cut back on their spending which then leads to a decline in output relative to potential. The result is that inflation will fall below the inflation target in the future and the central bank will pursue an expansionary policy in order to prevent an undershooting of the target. The expansionary policy raises demand and output back up to potential, thus keeping inflation close to the target. Indeed, because an inflation target helps anchor expectations, the central bank will be willing to be more aggressive in pursuing expansionary policy because it does not have to worry that this expansionary policy will lead an inflation scare with a blow out of inflation expectations.

Summarizing: inflation targeting has not only produced good inflation outcomes, but has also been associated with declines in output fluctuations. The better performance on output fluctuations from inflation targeting regimes has surprised many initial skeptics, because an increased focus on controlling inflation, everything else equal, should lead to larger, not smaller output fluctuations. However, if inflation targeting produces a stronger nominal anchor, which is a key to successful economic performance, then inflation targeting can lead not only to a decline in inflation but also output volatility.

2.6 The Flexibility of Inflation Targeting

Although inflation targeting has many advantages, it has to be designed well to produce the best possible outcomes. What is best practice for inflation targeting regimes? First we look at what degree of flexibility needs to be built into the inflation targeting regime.

Price stability is a means to an end, a healthy economy, and should not be treated as an end in itself. Thus, central bankers should not be obsessed with inflation control, and become what Bank of England Governor, Mervyn King, has characterized as "inflation nutters". Clearly the public cares about output as well as inflation fluctuations, and so the objectives for a central bank in the context of a long-run strategy should thus include not only minimizing fluctuations of inflation around its target, but also minimizing output fluctuations around potential output.

Although, as we have seen, in the face of demand shocks, reducing inflation fluctuations also helps reduce fluctuations of output around potential output, for one type of shock too much focus on hitting an inflation target exactly could magnify output fluctuations. If the economy is hit by a negative shock to supply, say a large increase in energy prices, inflation can rise at the same time that output falls below potential (a negative output gap).⁹ In this

situation, if a central bank tightens to bring inflation immediately back to the target level, output would fall further and this could lead to increased output gap fluctuations. Because central banks should care about output gap fluctuations, the presence of supply shocks indicates that inflation targeting should not try to always bring inflation quickly down to the target. Rather, inflation targeting needs to be quite flexible and in the face of supply shocks should shoot for having inflation come back down to the inflation target only gradually. Lars Svensson has characterized this approach to conducting monetary policy as “flexible inflation targeting”.¹⁰ Indeed, his research and that of others, particularly Michael Woodford, shows that the horizon over which inflation should be brought back down to the long-run inflation goal should vary over time depending on how far inflation is currently away from the long-run goal and what kind of shocks have hit the economy.¹¹

The reasoning above suggests that inflation targeting should not involve a sole focus on inflation or a simple rule that indicates that policy rates should be moved in a particular direction depending on the state of the economy or forecasts of inflation. Instead, an inflation targeting regime should display substantial concern about output fluctuations and thus pursue flexible inflation targeting with varying horizons for bringing inflation back to its target. Central bankers in inflation targeting countries do indeed express concerns about fluctuations in output and employment when discussing how they are conducting monetary policy and have been willing to minimize output declines by gradually lowering medium-term inflation targets toward the long-run goal when they are hit by negative supply shocks. In addition, because financial instability can have such a large negative impact on output fluctuations, concerns about financial instability also provide a justification for changing the horizon over which inflation is brought back down to its target. Building flexibility in inflation targeting has been critical to its success in not only lowering inflation volatility, but also reducing output fluctuations. Indeed, flexible inflation targeting is consistent with the highly successful policy actions taken by the Greenspan Fed, and only differs from the Greenspan approach in its greater commitment to transparency.

Flexible inflation targeting should be seen as a way of pursuing an objective of minimizing inflation and output gap fluctuations, but with an emphasis on couching policy in terms of the *path* of inflation because, as we will see, measures of output gaps are notoriously unreliable.

2.7 Central bank transparency and communication

Inflation targeting regimes put great stress on making policy transparent and on regular communication with the public. Inflation-targeting central banks have frequent communications with the legislative branch of the government, some mandated by law and some in response to formal inquiries, and central bank officials tend to take every opportunity to make public speeches on their

monetary policy strategy. While these techniques are also commonly used in countries that have not adopted inflation targeting, inflation-targeting central banks have taken public outreach a step further: Not only do they engage in extended public information campaigns, including the distribution of glossy brochures, but they also publish documents known as *Inflation Reports*. The publication of these documents is particularly noteworthy, because they depart from the usual dull-looking, formal reports of central banks and use fancy graphics, boxes, and other eye-catching design elements to engage the public's interest and to improve communication.

The above channels of communication, especially the *Inflation Reports*, are used by central banks in inflation-targeting countries to explain the following concepts to the general public, financial market participants, and politicians: 1) the goals and limitations of monetary policy, including the rationale for inflation targets; 2) the numerical values of the inflation targets and how they were determined; 3) how the inflation targets are to be achieved; and 4) reasons for any deviations from targets. Another important purpose of *Inflation Reports* is to make public the central bank's forecasts of future inflation. These communications have improved private sector planning by reducing uncertainty about monetary policy, interest rates, and inflation; they have promoted public debate of monetary policy, in part by educating the public about what a central bank can and cannot achieve; and they have helped clarify the responsibilities of the central bank and of politicians in the conduct of monetary policy.

The higher transparency and improved communication of central banks who have adopted inflation targeting is one of the major strengths of this monetary policy framework. Not only does it help decrease uncertainty, with the benefits described earlier, but transparency also goes hand in hand with increased accountability.

2.7.1 How should the central bank discuss its objectives for monetary policy?

As we have seen, central bank objectives should include both lowering inflation *and* employment/output fluctuations. However, many central banks are extremely reluctant to discuss concerns about output fluctuations even though their actions show that they do care about them. This lack of transparency is what one of the authors' of this evaluation has called the "the dirty little secret of central banking".

Some central bankers fear that if they are explicit about the need to minimize output fluctuations as well as inflation fluctuations, politicians will use this to pressure them to pursue a short-run strategy of overly expansionary policy that will lead to poor long-run outcomes. Furthermore, a focus on output gaps could lead to policy mistakes similar to those that occurred in the United States in the 1970s (discussed below). The response to these problems is that central bankers engage in a "don't ask, don't tell" strategy.

However, the unwillingness of central banks to discuss their concerns about reducing output fluctuations creates two very serious problems. First, a don't-ask-don't tell strategy is dishonest. Doing one thing but saying another is the height of non-transparency, and central banks not admitting that they care about output fluctuations can erode confidence in other elements of their transparency that are clearly beneficial. Second, if central bankers do not discuss their concerns about output fluctuations, they may end up being characterized as "inflation nutters", and this can cause an erosion of support for a central bank's policies and independence because this set of preferences is clearly inconsistent with the public's.

The case for central bank transparency with regard to its concerns about output fluctuations is quite strong. But how can central banks do this? One answer is that the central bank can make it absolutely clear that it takes output fluctuations into account when it targets inflation. This is exactly what the Norges Bank has done with the following statement that appears at the beginning of its *Inflation Report*: "*Norges Bank operates a flexible inflation targeting regime, so that weight is given to both variability in inflation and variability in output and employment.*" The Norges Bank thus makes it absolutely clear that its objectives include not only reducing inflation fluctuations but also output (employment) fluctuations and that flexible inflation targeting is a way of doing this.

The second way of making it clear that the central bank also has an objective of reducing output fluctuations is that the central bank can announce that it will not try to hit its inflation target over too short a horizon because this would result in unacceptably high output losses, especially when the economy gets hit by shocks that knock it substantially away from its long-run inflation goal. Furthermore, it can clarify that the horizon for the inflation target will vary depending on the nature of the shocks to the economy. Again, the Norges Bank does exactly this with the following statement that appears after the statement mentioned above: "*Monetary policy influences the economy with long and variable lags. Norges Bank sets the interest rate with a view of stabilising inflation at the target within a reasonable time horizon, normally 1-3 years. The relevant horizon will depend on disturbances to which the economy is exposed and how they will affect the path for inflation and the real economy in the period ahead.*" The Riksbank's objectives are explained very clearly not in the *Inflation Report* itself, but in the document *Monetary Policy in Sweden*, released on May 19, 2006.

Monetary authorities can further the public's understanding that they care about reducing output fluctuations in the long run by emphasizing that monetary policy needs to be just as vigilant in preventing inflation from falling too low as it is from preventing it from being too high. They can do this (and some central banks have) by explaining that an explicit inflation target may help the monetary authorities stabilize the economy because it allows them to be more aggressive in easing monetary policy in the face of negative demand shocks to the economy without being concerned that this will cause a blowout

in inflation expectations. (However, in order to keep the communication strategy clear, the explanation of a monetary policy easing in the face of negative demand shocks needs to indicate that it is consistent with the preservation of price stability.)

In addition, central banks can also clarify that they care about reducing output fluctuations by explaining that when the economy is clearly below any reasonable measure of potential output – i.e., the output gap is sure to be negative – they will take expansionary actions to stimulate economic recovery. In this case, measurement errors in the estimate of potential output – a serious concern, as we discuss in the next paragraph – are likely to be swamped by the size of the output gap, so there will be little doubt that expansionary policy is appropriate and that inflation is unlikely to rise from such action, so that the credibility of the central bank in its pursuit of price stability will not be threatened.

2.7.2 Should central banks announce an output (employment) target?

Given that we have argued that central banks should make clear that they do have an objective of reducing output fluctuations, why shouldn't they announce an output (or employment) target as well as an inflation target? After all, announcing an output or employment target seems like a natural way to express concerns about output or employment fluctuations. This obvious answer is not the right one, however, because potential output and the associated natural rate of employment (or unemployment) are so hard to measure. This is why, the section above advocates that central banks should express their concerns about output/employment fluctuations by describing how the targeted path of inflation is modified to help minimize these fluctuations. (We shall return to the difference between output and employment, that we already discussed in sub-section 2.1.4, in a few paragraphs.)

One measurement problem for potential output occurs because the monetary policy authorities have to estimate it with real-time data, i.e., data that is available at the time they set the policy instrument. GDP data is frequently revised substantially and this is one reason why output gaps are mis-measured in real time. Even more important: it is notoriously hard to know what potential GDP and its growth rate actually are without hindsight. For example, in the United States it was not until the 1980s that policymakers recognized that potential GDP growth had slowed markedly after 1973 (and the natural unemployment rate had correspondingly increased) and errors in measures of output gaps have been very large in the postwar period.

An even more severe measurement problem occurs because 'conceptually' economists are not even sure theoretically what potential output means. Some economists argue that conventionally measured potential GDP based on a trend, the most common method, differ substantially from more theoretically

grounded measures based on the output level that would prevail in the absence of nominal price stickiness.

The fact that it is so hard to measure potential output or even know theoretically how to define it, indicates that announcing an output or employment target would lead to worse policy outcomes. This is illustrated by the experience of the United States in the 1970s when the Federal Reserve had a hard time measuring potential output. Under Federal Reserve chairman Arthur Burns, the Fed put a lot of weight on hitting an output target. Unfortunately, the Fed had such inaccurate estimates of potential output that it thought that there was a lot of slack in the economy when there wasn't. The result was that it did not tighten monetary policy sufficiently during that period even when inflation was rising to double digit levels, producing what has been referred to as the "Great Stagflation" in which inflation rose to very high levels and yet employment fluctuations continued to be very high. Research has shown that the reason for the Federal Reserve's poor performance during the 1970s was *not* that it was unconcerned with inflation, but rather that it focused too much on targeting output.

It is true that there are measurement problems with inflation as well as output gaps, but both the conceptual and real-time measurement problems for inflation are of a far smaller magnitude. Also, although there is some question about what should be the optimal level of the inflation target in the long run, the choice of a number anywhere between 1% and 3% does not seem to matter very much. However, a 0.5 percentage point difference in potential output makes a huge difference to the welfare of individuals in the society. This is why it is better to embed concerns about employment fluctuations in an inflation targeting framework, rather than pursuing an output target. Indeed, as we have argued earlier, a focus on inflation control using a flexible inflation targeting framework is likely to produce better outcomes not only for inflation but also for output fluctuations.

Announcing an employment target may be even more problematic than announcing an output target because unforeseen shocks to productivity can alter the relationship between the natural rates of output and employment. In many countries, not only in Sweden, we have seen unexpected increases in productivity in recent years so that very rapid output growth has not been accompanied by employment growth. Because predicting productivity shocks has been very difficult in recent years, forecasting the natural rate of unemployment may be even harder than forecasting the natural rate of output. For this reason, central banks are often even more reluctant to discuss employment targets than output targets.

Announcement of an output or employment target might also increase the tendency for politicians to pressure the central bank to pursue expansionary policies that could exacerbate the time-inconsistency problem and weaken the nominal anchor. The result would be not only higher levels and volatility of inflation, but also greater output fluctuations.¹²

2.7.3 Should central banks publish inflation forecasts?

Almost all inflation-targeting central banks publish their forecasts of economic variables such as output, unemployment and inflation. Since the medium-term target is inflation in the future, so the medium-term target is actually the inflation forecast. (This is why inflation targeting is sometimes referred to as “inflation forecast targeting”.) Since inflation forecasts are key to the conduct of monetary policy in an inflation targeting regime, transparency requires that the inflation forecast of the central bank be revealed to the public. There are a number of advantages from publication of such forecasts. First, publication of forecasts can help the public and the markets understand central bank actions, thus making it easier for them to assess whether the central bank is serious about achieving its inflation goal and is setting the policy instruments appropriately. Publishing forecasts is thus crucial to making the central bank accountable. Second, forecasts enable the markets to understand how the central bank is setting its policy instruments and so it helps to reduce uncertainty. Third, publication of forecasts enables the public to evaluate the quality of central bank forecasts which will enhance central bank credibility if these forecasts are viewed as constructed using best practice. Fourth, publication of forecasts increases the incentives for the central bank to produce good forecasts because a poor forecasting record would be embarrassing.

The publication of inflation forecasts might require several steps. First, the monetary policy committee (in the Swedish case the members of the Executive Board of the Riksbank) might have to learn how to agree on a forecast (and on the path of policy interest rates on which such a forecast is based, an issue to which we turn to later.) and the degree of uncertainty in such a forecast. Once it has accomplished this, it can then publish this information using a so-called *fan chart* (because the resulting graph looks like a fan) in which shaded areas indicate the probability of the forecasted variable being within a particular shaded area and so provide information about the most likely forecast and the uncertainty around that forecast.

There is one argument against a central bank publishing its forecasts which has been made by Stephen Morris and Hyun Song Shin.¹³ Market participants may have information that the central bank does not have, or have useful and different ways to interpret some of the same information. But if market participants put a high value on central bank forecasts, they may modify their own forecasts to bring them closer to those of the central bank. The result is that their forecasts would not reflect the full amount of information that they have. There is thus a possibility that the private sector will end up with less information about the economy and so their decisions will then be worse. The Morris-Shin argument, however, depends on market participants having sources of information that are quite accurate relative to the information in central bank forecasts. This unlikely to be true, particularly for inflation forecasts which depend on projections of central bank policies that are clearly

better known by the central bank, and so there is still a very strong case for central banks to publish their forecasts.¹⁴

2.7.4 On what interest rate path should the central bank condition its forecasts?

Given that publishing forecasts is highly beneficial, there is still the question of what path of the policy interest rate the forecast should be conditioned on. There are three choices: 1) a constant interest rate path, 2) market forecasts of the future policy rates, or 3) a central bank projection of the path for policy interest rates.

A constant interest path would almost surely never be optimal because future projected changes in interest rates will be necessary to keep inflation on the appropriate target path. The second choice is also problematic for several reasons. Using market forecasts for the interest rate path may give the impression that the central bank's decisions are driven by the analysts in the financial sector. This may weaken confidence in the central bank's capabilities for making independent decisions and could create concerns that the central bank is a captive to participants in the financial market. In addition, if the central bank just does what the market expects it to do there is a circularity when the central bank sets its policy rate on the basis of market forecasts because the markets forecasts are just guesses of what the central bank will be doing. In this case, there is nothing that pins down the system and inflation outcomes could be indeterminate. Of course, the central bank may not intend to follow the market's expectations, but if this is the case, the central bank is clearly not being very transparent when it bases its forecasts of the economy on market expectations of its actions. An additional, but more minor, problem of conditioning on market forecasts of policy rates is that these forecasts require making assessments of the risk (term) premiums embedded in interest rates. There is not complete agreement on the best way to do this and this is currently an active area of economic research. Market participants may not be completely happy with the way the central bank chooses to extract market forecasts of the policy path from interest rates and this could create some doubts about the quality of the central bank forecasts.

Theory thus favors the third one, the central bank projection of the policy path used to build the inflation forecasts published by the bank. Clearly, an inflation forecast is meaningless without specifying what policy it is conditioned on, and this is why Lars Svensson has made a strong case for a central bank to publish its projection of the policy-rate path used in producing its forecast, which will almost surely be time-varying.¹⁵ In addition, information about the central bank's view on the future path of the policy rate would help the market understand and better assess the central bank's approach to monetary policy.

Some central banks, including the ECB and Bank of England, base their inflation forecasts not on the interest path that they deem appropriate to de-

liver price stability, but rather on the path implicit in the market yield curve—the second approach discussed above. These central banks argue that whenever such a path implies an inflation forecast that deviates from the bank's target, the monetary policy committee will follow a different path. If this happens, transparency would require that the central bank reveal some information about its different view on the future path of policy rates: but when it does so its forecast would necessarily differ from what was previously published. Not surprisingly, this can create confusion in the public and in the financial markets.

Although the argument for announcing the projection of the policy path is theoretically sound, it does create some problems. One objection to a central bank announcing its policy projection, raised by Charles Goodhart, a former member of the Monetary Policy Committee of the Bank of England, is that it would complicate the decision making process of the committee that makes monetary policy decisions. The current procedure of most central banks is to make decisions only about the current setting of the policy rate. Goodhart argues that “a great advantage of restricting the choice of what to do now, this month, is that it makes the decision relatively simple, even stark.”¹⁶ If a policy projection with time-varying rates is announced, this clearly requires that the monetary policy committee come to an agreement on this policy path. Although Lars Svensson argues that this could be done by a “simple” voting procedure, this procedure is far from simple and is unlikely to work.¹⁷ Forcing committee members to make a decision about the future path of policy rates and not just the rate today may complicate matters so much that the decision-making process could be impaired. Although committee members might have some idea of a future direction for policy rates, they are likely to have trouble thinking about a precise path. Furthermore, getting committee members to agree on such a path might be very difficult and could end up being very contentious.

The second problem with announcing a projection of the policy rate path is that it might complicate communication with the public. Although economists understand that any policy path projected by the central bank is inherently conditional because changes in the state of the economy will require a change in the policy path, the public is far less likely to understand this distinction. Indeed, there is a danger that the public and the markets will come to expect that decisions about policy rates will have already been made before the next monetary policy committee meeting. When new information comes in and the central bank moves the policy-rate differently from its projected path, the public may see this as a reneging on its announced policy or an indication that the central bank's previous announcements were a mistake. Thus even when the central bank is conducting its policy in an optimal manner, deviations from its projected policy path may be viewed as a central bank failure and could hurt the central bank's credibility. In addition, the deviations of the policy-rate from its projected path might be seen as flip flops on the part of the central bank. As we often see in political campaigns, when a candidate

changes his position – even if this reflects changes in circumstances and thus reveals sound judgment – such a shift is vulnerable to attacks by his or her opponents that he or she does not have leadership qualities. Wouldn't central banks be subject to the same criticism when changing circumstances would force them to change the policy-rate from its previously projected path? The result might be a weakening of support for the central bank and its independence, although this has not as yet been a problem in New Zealand where the central bank does announce its projected policy rate path.

Summarizing, although there are strong arguments for a central bank to publish its projections of the policy path, the problems with doing so suggest that how this should best be done is very controversial. There are three possible choices: 1) the most likely (or the mean) policy path could just be published,¹⁸ 2) the most likely policy path could be published along with shaded areas showing how much uncertainty there is about such a path, using a fan chart; and 3) a fan chart of the policy path could be published without the most likely path. Currently very few central banks publish their projections of the policy path. The Reserve Bank of New Zealand, however, uses the first procedure in which only the most likely policy path is published, while the Norges Bank uses the second procedure and publishes a fan chart which also includes the most likely policy path.

We have serious doubts about the first procedure, particularly for central banks in which the decision about setting policy rates is done by a committee rather than an individual. Decisions about setting policy rates at the Reserve Bank of New Zealand are made solely by the Governor, and so the complications with having a committee decide the policy projection are not present. Thus the fact that the Reserve Bank of New Zealand has been able to publish only the most likely policy path does not tell us whether this would work well in other central banks which have committees decide on policy. Just publishing the most likely policy path also leaves the central bank vulnerable to criticisms that it is not doing what it said it would do when it deviates from the projected path.

The second procedure used by the Norges Bank has more to recommend it. It does indicate that the policy projection is highly uncertain. The fan chart will make it clear to market participants that when a central bank deviates from the most likely projection, this does not mean that it has flip flopped. Rather it makes it easier for the central bank to explain that the economy did not evolve quite as the central bank thought was most likely. The one problem with this procedure is that the public and the media may focus too much on the most likely path in the fan chart, and this could lead to some of the problems we have mentioned above.

We are most comfortable with the third procedure of just publishing the fan chart but not publishing the most likely path. The fan chart is consistent with full transparency of the central bank because it would show the direction the central bank expects for the policy path but would also indicate the degree of uncertainty the central bank has about the future evolution of the economy

and the policy path. Also publication of the fan chart (and of the data needed to construct it) would enable market participants to derive the most likely policy path, so this information would not be hidden. However, by not publishing the most likely policy path, the central bank could emphasize and make it much clearer to the public that it has not made a commitment to achieving the most likely policy path, and that the most likely policy path is not that special. Therefore, not publishing the most likely policy path is actually more transparent, as long as the data for construction of the fan chart is made publicly available.

An additional advantage of not publishing the most likely policy path is that members of the policy committee at the central bank who disagreed with the implied most likely path might be more comfortable about agreeing to the fan chart without the most likely path because they could state that their view of the most likely path is still well within the range of paths indicated by the fan chart. There is a precedent for publishing only fan charts without the most likely policy path: the Bank of England in its *Inflation Report* does not publish the most likely path of the variables for which it provides forecasts, but instead only publishes fan charts. Our suspicion is that the Bank of England does not publish the most likely paths of variables it forecasts because it wants to emphasize to the markets that its forecasts are uncertain. (The Bank of England, however, does not publish information on its projection of the policy path, but rather conditions its forecasts on the market forecasts of policy rates.)

2.7.5 Should central banks announce their objective function for monetary policy?

In order for the public and the markets to fully understand what a central bank is doing they need to understand the central bank's objectives. Because inflation-targeting central banks should and do care about output fluctuations as well as inflation fluctuations, Lars Svensson has argued that announcing an inflation target is not enough: full transparency requires that the central bank reveal its objective function, i.e., what is the relative weight that they put on reducing output fluctuations relative to reducing inflation fluctuations.¹⁹

We think that there are problems with the suggestion that a central bank should announce its "objective function". The first problem with announcing an objective function is that it might be quite hard for members of a monetary policy committee to specify an objective function. Members of monetary policy boards don't think in terms of objective functions and would have a very hard time in describing what theirs is. Monetary policy committee members could be confronted with hypothetical choices about acceptable paths of inflation and output gaps and such choices would reveal how much they care about output versus inflation fluctuations. Although committee members would be able to do this when confronted with a real world situation, our

experience with seeing how policy boards work suggest that members would find this difficult to do when the choices are only hypothetical.

A second problem, raised by Charles Goodhart, is that it would be difficult for a committee to agree on its objective function. Not only individual committee members might have trouble defining their own objective function, but the composition of the committee changes frequently and the views of existing members may also change. Deciding on the committee's objective function would thus substantially increase the complexity of the decision process and might also be quite contentious. As a result it could weaken the quality of monetary policy decisions by distracting the attention of committee members away from the analysis of developments in the economy.

A third problem is that it is far from clear who should decide on the objective function. If the members of the monetary policy board do so, isn't this a violation of the democratic principle that the objectives of bureaucracies should be set by the political process? An alternative would be for the government to do so. But if we think that it would be hard enough for a monetary policy committee to do this, it would clearly be even more difficult for politicians to decide on the objective function.

Even if it were easy for the monetary policy committee or the government to come to a decision on the objective function, would it be easy to communicate it to the public? If economists and members of a monetary policy committee have trouble quantifying their objective function, is it likely that the public would understand what the central bank was talking about when it announced its objective function? Announcement of the objective function would be likely only to complicate the communication process with the public.

The announcement of the central bank's objective function can add a further complication to the communication process that might have even more severe consequences for the ability of the central bank to do its job well. The beauty of inflation target regimes is that by focusing on one target – inflation – communication is fairly straightforward. On the other hand, with the announcement of the objective function, the central bank may lead the public to believe that it will target on output as well as inflation. As we have already mentioned, discussion of output as well as inflation objectives can confuse the public and make it more likely that the public will see the mission of the central bank as elimination of short-run output fluctuations, thus worsening the time-inconsistency problem.

Given the objections raised here, it is not surprising that no central bank has revealed its objective function to the public.

2.7.6 Should central banks publish their minutes?

The benefits of transparency suggest that central banks should provide a substantial amount of information about how decisions about monetary policy are made. Central bank minutes, the summary of the deliberations about monetary policy by the members of the policy board, provide an important

vehicle for doing exactly that and there is thus a strong argument for them to be released in a timely manner. Most central banks do indeed publish minutes within a couple of weeks of their policy decisions, and the Riksbank is no exception.

However, could transparency be pushed even further by having the arguments expressed in policy board meetings attributed to the individual board members who make them? Our view is that the answer is no. A counterexample to pushing transparency further in this direction is provided by the experience of the Federal Reserve which publishes transcripts of its FOMC (the policy board) meetings five years after the meeting. (The publication of these transcripts is unique to the Fed and it occurred because Arthur Burns, the chairman of the Federal Reserve decided to install a taping system without the knowledge of his fellow board members. When this was publicly revealed during Alan Greenspan's tenure as Fed chairman, the U.S. Congress insisted that the transcripts be published and the Fed did not feel it could resist the congressional request.) Participants in the FOMC who saw how the FOMC operated both before and after it was announced that the transcripts would be released have indicated that policy discussions became much more formal and less interactive once FOMC members became aware that their statements would be attributed to them. This experience suggests that attributing arguments to particular members would lead to less effective policy board meetings because it would reduce free discussion and make monetary policy committee meetings less lively.

Although we do not believe that the arguments of individual members in policy board meetings should be published because it would inhibit frank discussion, we do believe that individual board members should have some accountability for their actions: this suggests that their votes on policy decisions should be recorded as is done in Sweden and in the United Kingdom.

2.8 The Optimal Inflation Target

We have already seen that good economic performance requires that an inflation targeting regime be designed to be flexible. In addition, there are questions about how the target itself should be chosen to generate the best economic performance. There are three issues that must be dealt with in designing the optimal inflation target: 1) what price measure should be used in the inflation target?, 2) what is the optimal level of the inflation target? and in particular 3) should the target be in terms of price level or in terms of inflation?

2.8.1 What price measure should be used in the inflation target?

Economic theory shows that an inflation target that uses a measure of inflation which puts more weight on prices that move sluggishly (referred to as *sticky prices*) will do better at reducing employment and output fluctuations.²⁰

If there is a high weight put on more flexible prices, monetary policy is likely to overreact to short-term fluctuations in these prices, leading to excessive fluctuations in employment and output.

One important element of the consumer price index (CPI) in many countries is mortgage interest payments which are calculated as the price of owner-occupied housing multiplied by the mortgage rate. Including mortgage interest payments in the CPI means that a flexible and volatile asset price, that of residential housing, has a major effect on CPI inflation measures. Using an inflation target based on such a CPI measure therefore leads to targeting on an inflation measure that does not put enough weight on sticky prices and this can result in excessive output fluctuations. In the case of Sweden this problem is in part alleviated by the fact that the calculation of housing cost is based on an index of the price of the total housing stock, which is rather stable. Changes in the price of houses only have an impact on the CPI if there is a change in ownership. For example, if 5% of the housing stock change owners, the index will increase only by the price change concerning that 5%.

In addition, since the mortgage rate in most countries is an interest rate that is not adjusted for inflation (a *nominal* rate rather than a *real* rate), a CPI that includes mortgage interest payments will overstate inflation when nominal rates are rising because expectations of inflation are rising. This can mean that when the central bank is raising interest rates to contain inflation, the inflation measure will be biased upward, which could induce even tighter monetary policy. The resulting over tightening would then lead to an unnecessary output decline.

Targeting on an inflation measure that includes mortgage interest payments is thus problematic and this is an important reason why inflation indices used to guide monetary policy in the United States, the United Kingdom and the Euro area exclude mortgage interest payments. Indeed, the view that the measure of inflation used for the target should put more weight on sticky prices suggests that monetary policy should target on a measure of core inflation that removes volatile prices, like food and energy, from the price index—although no specific core measure will always be appropriate because what are sticky price items change over time. This is why many central banks use “core inflation” measures to guide monetary policy.

2.8.2 What is the optimal level of the inflation target?

A key question for any central bank using an inflation targeting strategy is what the long-run target for inflation should be. In order to decide on the appropriate long-run inflation target, we need to answer the deeper question of what does price stability mean? Alan Greenspan has provided a widely-cited definition of price stability as a rate of inflation that is sufficiently low that households and businesses do not have to take it into account in making everyday decisions. This definition of price stability is a reasonable one and operationally any inflation number between 0 and 3% seems to meet this

criterion. Some economists, Martin Feldstein being a prominent example, have argued for a long-run inflation goal of 0%, which has the psychological appeal of the "magic number" of zero.

One argument against setting the long-run inflation target at zero has been raised in a prominent paper by George Akerlof, William Dickens and George Perry and discussed in the context of Sweden by Lundborg and Sacklén.²¹ They argue that setting inflation at too low a level produces inefficiency and will result in an increase in the natural rate of unemployment. They reason that downward rigidity of nominal wages, which they argue is consistent with the evidence, indicates that reductions of real wages can occur only through inflation. The implication is that a very low rate of inflation might prevent real wages from adjusting downward in response to declining labor demand in certain industries or regions, thereby leading to increased unemployment and hindering the re-allocation of labor from declining sectors to expanding sectors.

The argument by Akerlof-Dickens-Perry misses an important part of the story. Inflation not only can put "grease" in the labor markets and allow downward shifts in real wages in response to a decline in demand: it can also put in "sand" by increasing the noise in relative real wages. This noise reduces the information content of nominal wages and hence the efficiency of the process by which workers are allocated across occupations and industries. Thus, we do not find the Akerlof, Dickens, Perry argument to be a persuasive one for setting the long-run goal for inflation above zero—and, by the way, the evidence for the Akerlof-Dickens-Perry mechanism is not at all clear cut.

A more persuasive argument against an inflation goal of zero is that such a goal makes it more likely that the economy will experience episodes of deflation: with a mean of zero, half the time inflation would have to be negative (deflation). Deflation can be highly dangerous because debt contracts in industrialized countries frequently have long maturities, so that a deflation, even if anticipated in the short-run, leads to an increase in the real indebtedness of firms and households.²² Deflation can thus lead to what economist Irving Fisher already in the 1930's called debt-deflation, in which deflation leads to a deterioration of firms and households' balance sheets which in turn leads to financial instability. Indeed, debt-deflation is one reason why the Japanese economy has performed so poorly up until very recently (although the unwillingness of the government to fix problems in the banking sector was a more important factor). Deflation, even if fully anticipated, also causes a problem for monetary policy because it can lead to a situation in which interest rates hit a floor of zero (the so-called *zero lower bound*) and cannot be lowered any further to stimulate the economy. The conventional tool of monetary policy to stimulate the economy, lowering interest rates, is no longer an option, making it much more difficult for the monetary authorities to extricate an economy from a deflationary trap.

The dangers of deflation imply that undershooting a zero inflation target (i.e., a deflation) is potentially more costly than overshooting a zero target by

the same amount. The logic of this argument suggests that setting an inflation target a little above zero is worthwhile because it provides some insurance against episodes of deflation.

The arguments here suggest that too low an inflation target, below 1%, may worsen economic outcomes, while an inflation target above 3% is inconsistent with what most people would consider to be price stability. This is why we see that countries have chosen inflation targets between 1% and 3%. Empirical research does not find that it matters very much to economic performance whether the inflation target is 1.5%, 2% or 2.5%. Any number between 1% and 3% seems to lead to similar outcomes.

2.8.3 Point target or range?

Once the optimal level of inflation to target is chosen, there is still a question as to whether the target would be better described as a point target, say 2%, or a range (band), say 1 to 3%? The advantages of a range is that it provides more explicit flexibility to the targeting regime and also conveys to the public the important message that there is uncertainty in the inflation process and so the central bank's ability to control inflation will necessarily be imperfect.

However, the use of a range can have a major drawback: it can take on a life of its own. With target ranges in place, politicians, financial markets and the public might focus on whether inflation is just outside or inside the edge of a range, rather than on the magnitude of the deviation from the midpoint. This is what happened in the United Kingdom in 1995 when inflation exceeded the target midpoint by over one percentage point, but without breaching the upper band. The fact that inflation was still within the target range gave the Chancellor of the Exchequer cover to resist demands for tightening of monetary policy by the Bank of England—at the time the bank was not yet independent and interest rates were set by the Chancellor. The problem with too much focus on the edges of the range is that it can lead the central bank to concentrate too much on keeping the inflation rate just within the bands rather than trying to hit the midpoint of the range, and this can result in inappropriate policies.

The above drawback is easily dealt with if the central bank emphasizes the midpoint of its inflation target in its communication, while providing a tolerance range as the Riksbank and the Bank of England do. In this formulation it is clear that the central bank is not focusing on the edges of the band. Indeed recent research by one of the authors of this report demonstrates that having an inflation target specified as a point with a tolerance range around it is an excellent way to mitigate the time-inconsistency problem and provide the appropriate incentives for monetary policy.

2.8.4 Should the target be defined in terms of price level or in terms of inflation?

Currently, all countries who have adopted inflation targeting have chosen to target inflation rather than the price level. With an inflation target, misses of the inflation target are not reversed by the central bank so that bygones are bygones. A price level target does not imply that inflation should necessarily be zero. A price level target can allow for positive inflation by specifying that the target is along a steadily rising path of the price level. However, in contrast to an inflation target, if inflation ends up being above the specified growth rate of the price level target, inflation will need to be temporarily below this growth rate in order to return the price level to the target path (as illustrated in Figure 4). Which of these two targets would result in better economic performance is still an open question. Indeed, it is the subject of active research in the economics profession.

There are two key advantages of a price-level target relative to an inflation target. The first is that a price-level target can reduce the uncertainty about where the price level will be over long horizons. With an inflation target, misses of the inflation target are not reversed by the central bank so that the uncertainty of where the price level will be in the future grows as we go further out into the future. This uncertainty can make long-run planning difficult and may therefore lead to a decrease in economic efficiency.

The second advantage of a price-level target arises in the event of a negative shock to the economy which lowers output and also lowers inflation below the targeted growth rate of the price level. A price level target implies that inflation will have to be above that growth rate for some period of time. The higher expected inflation rate that results then implies that the real interest rate (the interest rate adjusted for expected inflation) will decline even without central bank actions and so monetary policy automatically becomes more expansionary, which counters the negative shock to output. This desirable feature of a price level target, which has been labeled *history dependence* by Michael Woodford, can therefore produce less output variance than an inflation target.²³

A price level target can thus be particularly stabilizing for the economy when deflation sets in, as it did in Japan in the late 1990s and early 2000s, leading to the *zero-lower-bound problem* in which nominal interest rates cannot go below zero and so the conventional tool of lowering nominal interest rates to stimulate the economy is no longer an option for the central bank. As pointed out by Gauti Eggertson and Michael Woodford, an inflation target can still leave the economy in a *deflationary trap*, in which a large deflationary shock that leads to persistent deflation results in high real interest rates because nominal interest rates encounter the zero-lower-bound and cannot fall below zero.²⁴ The history dependence of a price level target helps undo this problem, because the deflation which sends the price level below its target leads to expectations of even higher inflation, which lowers real interest rates,

thereby stimulating the economy and helping the economy escape from the deflationary trap.

The history dependence of a price level target also can reduce inflation variability over an inflation target, though at first, this may seem surprising. For example, when there is a cost-push shock, such as an increase in oil prices, the amount of the inflation increase that the central bank must accept in order not to have a large decline in output is lower because businesses expect the general increase in the price level to be undone and so will raise prices by less than they otherwise would, thereby helping to contain inflation. Also when the central bank makes a mistake in estimating the level of potential output, fluctuations in inflation are likely to be lower. Say the central bank overestimates productivity growth and potential output, as the Federal Reserve did in the 1970s, and this leads to overly expansionary monetary policy and inflation. With a price level target, businesses will again not raise prices by as much as they otherwise would because they expect the increase in the price level to be undone.²⁵

There are however disadvantages of a price level target. The traditional view, forcefully articulated by Stanley Fischer, argues that in models which are not forward looking, a price-level target could produce more output variability because overshoots or undershoots of the target must be reversed and this could impart significantly more volatility to monetary policy and, with sticky prices, to the real economy in the short run.²⁶ A second problem is that a price-level target may lead to more frequent episodes of deflation because an overshoot of the target would require that inflation be unusually low for a period of time. If the price level target did lead to episodes of deflation, then the problems of financial instability and having the interest rate hit the zero lower bound could be harmful to the economy.²⁷ A price level target might also be more difficult to communicate than an inflation target because the fact that the optimal inflation rate is almost surely positive requires that the price level target rise over time. Thus the central bank would have to explain that the price level target is a moving target, which is somewhat more complicated than explaining that the central bank has a constant inflation target, say at 2%.

However, the arguments for preferring an inflation target over a price-level target, do not rule out hybrid policies, which combine features of an inflation and a price-level target. A hybrid policy would involve an inflation target, but in which target misses will be offset to some extent in the future. Research at the Bank of England and the Bank of Canada shows that an inflation target with a small amount of offsetting of target misses can substantially reduce the uncertainty about the price level in the long run, but still generate very few episodes of deflation. A hybrid policy would thus in effect state that when inflation has been below the target for a substantial period of time, the monetary authorities would have a bias for inflation to be slightly higher than the target for a brief period of time. Similarly, if inflation has been persistently above the target, the central bank would have a bias for inflation to be slightly lower than the target. One way to implement a hybrid policy would be to have

an inflation target defined as an average over several years (rather than year by year, as is typical in most inflation targeting regimes) which would allow some offset of annual misses of the target. However, communicating such a hybrid policy to the public will not be easy and might reduce the transparency of the inflation targeting regime. Adoption of a hybrid policy should therefore be considered with prudence.

2.9 The role of asset prices in monetary policy

Changes in the price of assets like common stocks, housing, long-term bonds or foreign currencies, have important effects on output and inflation and are important transmission mechanisms for monetary policy. Asset price movements affect households' and firms' balance sheets and thus affect spending which feeds into changes in both output and inflation. Thus setting monetary policy instruments to achieve inflation targets requires factoring in asset price movements. For example, a substantial rise in housing prices, which adds to household wealth, would lead to increased spending, higher output and thus eventually a rise in inflation. An inflation-targeting central bank would therefore need to respond to the rise in housing prices by raising interest rates in order to keep the economy from overheating and inflation from rising above the inflation target.

The issue about how central banks should respond to asset price movements is not whether they should respond at all, but rather whether they should respond over and above the response called for by the flexible inflation targeting framework described above. Specifically there is an issue of whether the monetary authorities should try to prick or at least slow down asset price bubbles, because subsequent collapses of these asset prices might be highly damaging to the economy, as they were in Japan in the 1990s. Some economists argue that central banks should at times react to asset prices in order to stop bubbles from getting too far out of hand. For example, research by Stephen Cecchetti, Hans Genberg, Jonathan Lipski and Sushil Wadhvani finds that outcomes are better when the central bank conducts policy to prick asset price bubbles. However, they assume that the central bank knows the bubble is in progress. This assumption is highly dubious because it is hard to believe that the central bank has this kind of informational advantage over private markets. Indeed, the view that government officials know better than the markets has been proved wrong over and over again. If the central bank has no informational advantage, then if it knows that a bubble has developed that will eventually crash, then the market would know this too, and the bubble would unravel: thus bubbles would be unlikely ever to develop.

A separate focus on asset prices over and above their impact on what inflation targeting central banks should care about – that is the impact on employment and inflation – can lead to worse policy outcomes. First, the optimal response to a change in asset prices very much depends on the source of the

shock to these prices and the duration of the shock. An excellent example of this pitfall of too much focus on an asset price was the tightening of monetary policy in Chile and New Zealand in response to the downward pressure on the exchange rate of their currencies in the aftermath of the East Asian and Russian crises in 1997 and 1998. Given that the shock to the exchange rate was a negative terms of trade shock which would cause the economy to slow down, it would have better been met by an easing of policy rather than a tightening. Indeed, the Reserve Bank of Australia responded in the opposite direction to the central banks of New Zealand and Chile, and eased monetary policy after the collapse of the Thai baht in July 1997 because it was focused on inflation control and not the exchange rate.²⁸ The excellent performance of the Australian economy relative to New Zealand and Chile's during this period illustrates the benefit of focusing on the main objective of the central bank rather than on an asset price.

A second problem with the central bank focusing too much on asset prices is that it raises the possibility that the central bank will be made to look foolish. The linkage between monetary policy and stock prices, for example, although an important part of the transmission mechanism, is nevertheless still a weak one. Most fluctuations in stock prices occur for reasons unrelated to monetary policy, either reflecting real fundamentals or animal spirits. The loose link between monetary policy and stock prices therefore means that the ability of the central bank to control stock prices is very limited. Thus, if the central bank indicates that it wants stock prices to change in a particular direction, it is likely to find that stock prices may move in the opposite direction, thus making the central bank look inept. Recall that when Alan Greenspan made his speech in 1996 suggesting that the stock market might be exhibiting "irrational exuberance", the Dow Jones average was around 6500. This didn't stop the market from rising, with the Dow subsequently climbing to above 11000.

A third problem with focusing on asset prices is that it may weaken support for a central bank because it looks like it is trying to control too many elements of the economy. Part of the recent successes of central banks throughout the world has been that they have narrowed their focus and have more actively communicated what they can and cannot do. Specifically, central banks have argued that they are less capable of managing short-run business cycle fluctuations and should therefore focus more on price stability as their primary goal. By narrowing their focus, central banks in recent years have been able to increase public support for their independence. Extending their focus to asset prices has the potential to weaken public support for central banks and may even cause the public to worry that the central bank is too powerful, having undue influence over all aspects of the economy.

A fourth problem with too much focus on asset prices is that it may create a form of moral hazard. Knowing that the central bank is likely to prop up asset prices if they crash, the markets are then more likely to bid up prices. This might help facilitate excessive valuation of the asset and help encourage

a bubble that might crash later, something that the central bank would rather avoid.

A fifth problem is that a focus on asset prices might lead the public to think that the central bank has additional objectives over its concerns about inflation and output fluctuations. Indeed, it may lead market participants to suspect that the central bank has an additional target of asset prices. This can substantially complicate the central bank's communication about what its inflation targeting regime means and why it is setting policy instruments the way it is. Indeed, as we shall see, this has become a serious problem in Sweden.

The arguments against too much focus on asset prices do not deal with one particular concern about asset price movements. Asset price crashes can sometimes lead to severe episodes of financial instability with the most recent notable example being once again that of Japan. If this happens, monetary policy might become less effective in bringing the economy back to health. There are several responses to this concern about the impact of asset prices on financial instability.

First, the bursting of asset price bubbles often does not lead to financial instability. The recent bursting of the stock market bubble in the United States is one example. The stock market crash in 2001-2002 did not do substantial damage to the balance sheets of financial institutions, which were quite healthy before the crash. As a result the stock market crash was followed by a very mild recession, despite some very negative shocks to the U.S. economy: the September 11, 2001 terrorist attack on the World Trade Center which harmed both consumer and business confidence and the corporate accounting scandals in Enron and other U.S. companies which caused doubts about the quality of information in financial markets and thus had a very negative impact on credit spreads.

Second, many have learned the wrong lesson from the Japanese experience. The problem in Japan was not so much the bursting of the bubble, but was rather the policies that followed. The bubble burst in 1989, but the economy did not substantially weaken until several years afterwards. The problem in Japan was that the government was unwilling to fix the problems in the banking sector, so that they continued to get worse well after the bubble had burst. In addition, the Bank of Japan did not ease monetary policy sufficiently in the aftermath of the crisis, as many critics of Japanese monetary policy have pointed out. Indeed, it was not until 1998 that the Japanese economy entered its deflationary period. There are two lessons from the Japanese experience.

The first lesson from Japan is that the serious mistake that a central bank makes is not failing to stop a bubble, but is rather not responding fast enough after a bubble bursts. If the Bank of Japan had responded rapidly after the asset price crash and recognized that monetary policy had to be much easier because the decline in asset prices was substantially weakening demand in the economy, then deflation would never have set in. If deflation had not gotten

started, Japan would not have experienced the debt-deflation that further weakened the balance sheets of the financial sector along the lines outlined earlier.

The second lesson from Japan is that after a bubble bursts, if it harms the balance sheets of the financial sector, the government needs to take immediate steps to restore the health of the financial system. The procrastination on the part of the Japanese government in dealing with the problems in the banking sector is a key reason why the Japanese economy did so poorly for ten years.

These two lessons suggest how a central bank should deal with possible bubbles in asset markets. Instead of having to preemptively deal with the bubble – which as argued above is almost impossible to do – a central bank can make sure that financial instability is not a serious problem by being ready to react quickly to an asset collapse if it occurs. One way a central bank can make sure that it is ready to react quickly is to conduct simulations to assess how it should respond to an asset price collapse. Indeed, these central bank simulations can be thought of as stress tests similar to the ones that commercial financial institutions and banking supervisors conduct all the time. They see how financial institutions will be affected by particular scenarios and then propose plans for how to make sure that the banks can withstand the negative impacts. By conducting similar exercises, the central bank can minimize the negative impacts of a collapse of an asset price bubble without having to predict that a bubble is taking place or that it will burst in the near future.

Another way that a central bank can respond to possible bubbles is through its *Financial Stability Reports* if it has them. These reports are where the central bank can evaluate whether rises in asset prices might be leading to excessive risk taking on the part of financial institutions. If this is what appears to be happening, the central bank can put pressure on the prudential regulators and supervisors of these institutions to rein in excessive risk taking by financial institutions.

3 How Well Has Swedish Monetary Policy Been Run?

Sweden started the transition to a new monetary regime in January 1993. Two months before (November 19, 1992) the fixed exchange rate regime had been abandoned and the krona –following a very costly but failed attempt to defend the parity – had been allowed to float. Soon thereafter (January 15, 1993) the Riksbank announced that monetary policy would be run based on an inflation targeting regime, and the first prototype *Inflation Report* was published in June of that year. The inflation target was set at 2 per cent and formally began to apply on 1 January 1995.

The Riksbank Act of 1999 greatly increased the independence of the central bank along several dimensions, in particular by creating an independent Executive Board with long-term appointments that are protected from severance from employment and that can neither “seek nor take instructions when fulfilling their monetary policy duties.”

This section analyses how Swedish monetary policy has been run. The institutional setup is the subject of the following section. In evaluating Swedish monetary policy over the past decade, we examine several questions: 1) whether it produced good economic performance in the long run, 2) were policy rates set appropriately, and 3) what has been the relationship between monetary policy and the exchange rate?

3.1 Taking stock of a decade: monetary policy and overall economic performance

As we explained in the previous section, monetary policy is unable to affect a country’s level of potential output. What it can and should do is try to minimize fluctuations of actual around potential output, but as we argued above, the best way to do this is not by focusing on output or employment targets, but rather on the path of inflation. One way to evaluate whether the Swedish monetary policy regime during the past 10 years has been successful thus consists in looking at the volatility of output along with the behaviour of inflation and inflation expectations.

Output gaps, as we argued, are difficult to measure and not surprisingly one is presented with a rich variety of different techniques for measuring such a gap. Based on our experience we decided to choose the output gap constructed using a statistical technique (the Hodrick-Prescott filter) that defines such a gap as the difference between actual output and an estimate of the underlying trend in output. This leaves open the choice of which macroeconomic variable should be used to define the gap. Three possibilities are: GDP, employment or hours worked. When we applied the HP filter to these three

series we obtained very similar results (Figure 5): the state of the business cycle appears almost identical whether one looks at it from the point of view of one or the other of the three series. Having established that which series we consider makes little difference, we decided to analyse fluctuations in the output gap constructed using GDP data.

Figure 6 computes the volatility of the output gap over four sub-periods: 1980-89, the years preceding the banking crisis; 1990-94, the period characterized by the banking and subsequently the exchange rate crises; 1995-98, the early years of the new monetary policy regime, before the Riksbank had gained full independence, and finally 1999-2005. The volatility of the output gap is lower since 1999, compared with its level in the 1980's: the standard deviation is 1,1 in the more recent period, compared with 1,6 in the 1980's. This means a 30 per cent reduction in output volatility.

Figure 7 shows inflation expectations at various horizons. For each year the grey lines show inflation expectations at 1, 2, 3, 4 and 5-years horizons. The message from Figures 6 and 7 is very clear: the new monetary policy regime has allowed Sweden to stabilize inflation expectations with no loss in terms of higher output volatility: on the contrary, output volatility has also been reduced (although, as mentioned in connection with the data shown in Figure 3, such a reduction cannot be solely attributed to the shift in the monetary policy regime).

The shift in inflation expectations is consistent with the observation that the transition to inflation targeting has produced a dramatic change in the process driving Swedish inflation. This is clear from Figure 8 which shows the path of Swedish inflation. Inflation has come down sharply, but in addition its process has changed. Statistical tests of the inflation time-series show that up to 1993 (more precisely, for the decade 1984-1993) it is not possible to reject the hypothesis that inflation drifted without a firm anchor, i.e. that the inflation time series was non stationary. The statistical test indicates that there is a 43 percent chance that over the decade there was *no* anchor.²⁹ On the contrary, for the inflation targeting period over the years 1994-2003 the corresponding probability is just 0,27 per cent, which means that inflation was stationary. Inflation targeting has succeeded in establishing a solid nominal anchor.

What have been the effects on unemployment? Unemployment in Sweden has been higher in the past 15 years than it had been before the crisis of the early 1990's (Figure 9): it was fluctuating between 1.5 and 3.5 percent, and has now shifted to a range about 3 percentage points higher. As we have argued in section 2, however, because there is no long-run trade-off between inflation and employment, there was little that monetary policy could do to shift unemployment back to the old range. There are a large number of studies of the reasons for the rise in Swedish unemployment, a phenomenon shared by other European countries (for instance Ljungqvist and Sargent).³⁰ This is not the place to get into this discussion. Our point is simply that such a rise cannot be attributed to the shift in monetary policy.

Still, monetary policy can affect fluctuations of employment within the new range. We have just seen that over the past decade fluctuations in output and employment have not been wider than they had been in the past, but it would not be fair to stop here. For instance, a comparison of Figures 8 and 9 shows that unemployment has moved towards the top of the new range at a time, 2002 to 2005, when inflation has constantly undershot the 2% target. In the next section we thus move away from the longer run view and look more closely at the relationship between monetary policy decisions and the fluctuations of output and employment inside the new range.

3.2 Were interest rates set appropriately?

In this paragraph we focus on two separate periods: (1) The early years of the inflation targeting regime, that is between 1993 and 1997. Why was the speed of interest rate reductions so slow? Did the Riksbank keep real rates unnecessarily high in the first years of the inflation targeting regime? (2) The years since about 2004, characterized by an inflation rate below the target and an unemployment rate that has shifted towards the top of the new range.

3.2.1 The transition to the IT regime and the pace of the initial reduction in interest rates.

The Riksbank announced that monetary policy would be run based on an inflation targeting regime on January 15, 1993. The inflation target was set at 2 per cent, but while inflation fell rapidly – from close to 9 per cent in 1993 to 3 per cent in 1995 – two-year-ahead inflation expectations remained above 4 per cent for another three years, that is until 1996 (see Figure 7). As a result the new monetary regime remained quite tight: in early 1996, with current inflation falling below 2%, the policy rate was still 9%.

It was only during 1996 that the policy rate was reduced, along with the fall in inflation expectations: within a year, the policy rate was cut to from 9% to 4% and two-year ahead inflation expectations had stabilized at 2 per cent, the Riksbank's announced target.

How were inflation expectations stabilized, and why did it take so long? At the beginning the exchange rate was still an important factor in determining the level of policy rate, and it is possible that one of the reasons why rates were kept relatively high was the concern for the effect that a cut might have had on the krona. The emphasis on the exchange rate faded away during 1996-97 when the bank started publishing more formal inflation forecasts and probability distributions for future inflation. The shift away from giving any weight to the exchange rate is consistent with best practice in inflation targeting: as we have argued in section 2.9 direct concern for asset prices should not be a factor in interest rate decisions.

The diminished role of the exchange rate was probably one factor explaining why interest rates started to fall at a faster pace, but in our view it is not

the main explanation. The main development in 1996-97 was the fall in inflation expectations. The shift to a more formal inflation targeting regime, based on inflation forecasts, most likely helped increase the bank's credibility and this was reflected in a fall in inflation expectations. But something else was happening around that time, which was probably the main reason for the shift in expectations.

There is a remarkable coincidence between the stabilization of inflation expectations and the developments in fiscal policy. Between 1993 and 1995 the Swedish budget deficit averaged 9 per cent of GDP: in 1995 the overall deficit was 7 per cent of GDP and the primary balance – that is the budget balance net of interest – was also in deficit. The turn around in fiscal policy occurred during 1996-97 when the primary balance jumped from a deficit to a *surplus* of 4 per cent of GDP and the overall budget was balanced (it has since then been in surplus year after year.)

So why was the speed of initial interest rate reductions so slow? Our view is that in Sweden, up until 1996-97, one of the preconditions of long run price stability – sound fiscal policy – was not met. Fear of future monetization – which at the time could not be ruled out, since the Riksbank was not yet independent – kept inflation expectations above the central bank's inflation target. Only when fiscal policy turned around and the financial framework was tightened did expectations stabilize allowing policy rates to be reduced. This episode is almost a textbook example of the importance of meeting the preconditions for price stability.

3.2.2 Rates over the past couple of years

The rapid interest rate reductions which occurred around 1996-97 – after inflation expectations stabilized around the Riksbank target – documented in Figure 10 were accompanied by a sharp fall in unemployment: from 9 per cent in 1997 to 4 by 2001 (Figure 9). As of 2002 however, unemployment started rising again: within two years it moved from 4 to 6 per cent and has since remained around that higher level—the top of what appears to be the new range for the unemployment rate, that is 4 to 6 per cent. Has monetary policy, starting sometime in 2002, been too tight? Was there a policy mistake? The possibility of a policy mistake is suggested by the path of inflation. Since early 2004, inflation (measured by the UNDI_X index) has constantly turned out below the 2 per cent target (see again Figure 8).

During 2002 policy rates were increased twice: 25 basis points in March and another 25 basis points in June. Then, at the end of the 2002, the Riksbank started a sequence of cuts which reduced the policy rate by 150 basis points over a period of six months. From April 2004 to June 2005, policy rates were kept constant. Were the two hikes decided in the Spring of 2002 a mistake? Was the subsequent accommodation too late and too timid?

Two things might have happened. One possibility is that at some point the Riksbank became more hawkish, changing the way it responded to the uncer-

tainty in the data. In other words: would the Riksbank of, say, 1999-2001 have been more accommodative if faced with the data that became available in the following 4-5 years? Such a shift could happen because the Board starts putting different weights on the risks implicit in its forecasts: faced with the same probability distributions for future inflation two different Boards might make different decisions if the weight they assign to the various scenarios are different. But the Board might have also started to consider data that it previously used to overlook, in particular house prices.

An alternative is that the Board kept behaving as it had done in the past, but the mistake was made in interpreting the data. In other words, the mistake was in the bank's inflation forecasts.

A simple way to examine the first hypothesis – that the Riksbank changed the way it responds to the data – is to fit a monetary policy rule that describes as accurately as possible the behavior of the central bank over an interval of time and then use it to forecast the bank's interest rate decisions “out of sample”, that is outside the interval over which the rule has been estimated. Such simple rules are just simple approximations to the way monetary policy is conducted in practice: thus it should not be surprising that they might fail to accurately describe central bank behavior, especially at turning points of the business cycle. Significant deviations of actual policy decisions from those predicted by such simple rules are thus just a hint that the central bank might have changed its behavior. Similarly, finding that actual and predicted policy decisions coincide is just an indication – but not a proof – that the central bank's behavior has not shifted. With this caveats these exercises remain interesting and suggestive.

The way such out-of-sample forecasts are constructed allow the central bank to respond to the economic data that become available over time, but assume that the bank responds using the same parameters that have been estimated over the estimation interval. (Technically, because the estimated rules always included the lagged policy rate, there are two ways to construct such forecasts: “dynamic forecasts” use, as lagged interest rate, the value that had been forecasted for the previous period; “one-step ahead forecasts” instead use the actual policy rates realized over the forecasting interval.)

Such an exercise has been conducted by Marcela Meirelles Aurelio, an economist at the Federal Reserve Bank of Kansas City for seven central banks, including the Riksbank and trying a variety of rules to describe their behavior.³¹ In that analysis, which estimates the monetary policy rule using data up to 2000 Q4 and starts the simulation in 2001 Q1, the Riksbank and the Reserve Bank of Australia appear to have been the most predictable central banks, meaning that the interest rate paths predicted using either one-step-ahead forecasts or dynamic forecasts are remarkably close to the paths actually followed by the two central banks.

We have run a similar experiment using a rolling sample. The first simulation – as in the paper by Aurelio – estimates the monetary policy rule using data from 1993 Q4 and up to 2000 Q4, and starts the simulation in 2001 Q1³²;

the second uses data up to 2001 Q4, the third uses data up to 2002 Q4 and the last simulation uses data up to 2003 Q4. Figure 11 shows the four simulations. In each case we report both the one-step ahead simulation and a dynamic simulation. All simulations extend to 2006 Q1. One step ahead simulations are the most appropriate for the issue at hand, since they answer the question: What would the Riksbank have done if, confronted with the new data, it had responded using the estimated rule. In general, as already noted by Aurelio, interest rate paths predicted using one step ahead forecasts track the actual path of policy rates quite closely. A small divergence is observed in 2001-02 when the rule estimated up to 2000 Q4 would have predicted a somewhat lower path of the policy rate. Although small, this difference suggests that at some point around 2002 the Riksbank reacted to the data by tightening monetary policy more (although only slightly more) than it would have done had it used the rule followed so far.

A further hint that at some point the Executive Board might have started to look at the data differently – or to look at different data – comes from appearance, around late 2003, of a new concern in the Board discussions: house prices. As we mentioned, after the two rate hikes decided during the Spring of 2002, at the end of that year the Riksbank started a sequence of cuts which reduced the policy rate by 150 basis points over a period of six months. Then, from August 2003 and for a period of two years, policy rates were kept constant. Was the monetary policy accommodation too timid? Why was the sequence of policy rates cuts interrupted? Reading the minutes of the Executive Board meetings one notices that the sequence of rate cuts came to an end about at a time when a new argument turns up in Board's the monetary policy discussions: house prices. For instance, in the meeting of December 4, 2003 (the third meeting after the sequence of rate cuts had been interrupted) one member argues that *"high house prices could be one reason to exercise caution in cutting interest rates. An interest rate cut could aggravate house price developments, resulting in a further increase in mortgages and household indebtedness."* Since then house prices have gained increasing importance in monetary policy discussion; it is thus possible that in recent years the concern for house prices led to monetary policy being too tight. We have discussed the role of asset prices in Section 2.9 and we do have some concerns that the Riksbank may put too much emphasis on housing prices.

An alternative explanation for the recent undershooting is, as we have mentioned, the possibility that the Riksbank for a couple of years missed what was happening in the economy and thus made erroneous inflation forecasts.

In a public hearing at the Riksdag Committee on Finance on April 1, 2004, the Riksbank Governor said that based on the information that had since become available, the policy rate increases decided in the Spring of 2002 had been unnecessary: *"With hindsight, it could perhaps be claimed that raising the interest rate in spring 2001 and 2002 was unnecessary. However, this would not lead to a fruitful discussion. It is always easy to know how one should have acted afterwards, when the result is a fact. The interesting part of*

an assessment is whether our decisions are understandable in the light of the picture available at the time the decision was made. When we analyze this question, we can conclude that we have acted consistently on the basis of the inflation forecasts we made, much as we usually do." The 2004/1 *Inflation Report* contains a thorough analysis of whether those decisions – both the two rate increases and the subsequent pace of rate cuts – were consistent with the way the bank viewed the economy at the time and why such views might have been incorrect.

We first wish to emphasize that both the Governor's frank recognition and the bank's post-mortem of that episode are an example of transparency that one does not frequently find among central banks. As to the substance of the decisions, the 2003 post-mortem identifies in the combination of high productivity growth and relatively low wage increases one of the factors for inflation having turned out lower than the bank had forecasted.

The March 2002 *Inflation Report* – which was the basis for the two rate hikes – expressed concern for "weak productivity growth" and added that "wage increases, for example, have been somewhat higher than expected". The Report recognizes that part of the productivity slowdown was related to the 2001 recession and that productivity would recover as the economy started growing again, but it clearly underestimated the pace of the recovery: in 2004 total factor productivity in the economy at large increased by 4 per cent and labor productivity by 3.5 per cent. Nominal wages also increased less than expected: the Report had assumed a rate of increase of nominal wages just above 4 per cent per year, while in the event between 2002 and 2005 nominal wages grew by only 3 per cent per year. Evidence that the Riksbank underestimated the strength of the economy also comes from its forecasts for output growth. The economy grew 3 per cent per year between 2002 and 2005, well above what the bank has anticipated (the mistake was particularly large in 2004, when the outcome was close to 4 per cent with a 2.6 per cent forecast). The fact that the bank overestimated inflation while underestimating growth is a signal that it missed something important that was happening on the supply side, that is on productivity and on the effects of greater competition.

This being said, everybody else in the business of making forecasts missed it as well. In February 2002 two-year-ahead inflation expectations computed outside the bank (by money market agents, employer's and employees' organizations, purchasing managers) averaged 2.6 per cent, slightly above the bank's central forecast. We shall further discuss how the Riksbank forecasting track record compares with that of other institutions in section 4.2.4.

So, are the recent undershooting of inflation and the accompanying rise in unemployment at least in part to be attributed to policy mistakes by the Riksbank? The errors in forecasting inflation were probably hard to avoid – in particular since, as we just said, nobody else in the forecasting business did better. These forecasting errors suggest however that the Bank might consider devoting more resources to the analysis of developments in the real economy,

particularly in the area of productivity growth and the labour market: we shall return to this in our evaluation of the technical expertise of the Riksbank in section 4.2. The excessive emphasis on house prices is certainly not in line with state-of-the-art inflation targeting. This is an issue to which we shall return in our evaluation of the Swedish monetary policy regime in Section 4.6.4

3.3 The apparent puzzle of the krona-euro exchange rate

Figure 12 documents the stability of the krona-euro exchange rate over the past five years. Since 2002 the rate has remained inside a very small band: $\pm 2,25$ per cent around a parity of 9,25 kronor for 1 Euro. The stability of the Euro exchange rate is not unique to Sweden: Figure 12 also shows the path of the sterling-euro rate, which also has been remarkably stable over the past three years.

Has the Riksbank given special attention to the Euro exchange rate in setting its interest rate? One argument for giving special attention to the Euro is that trade with the Euro area countries represents a very significant fraction of total Swedish trade: 45,6% for imports and 37,2% for exports in 2003 (the data refer to trade with the EU-12 countries).

The Riksbank last intervened in the foreign exchange market in the Spring of 2001, when an increase in inflation expectations weakened the Krona. The discussions that took place among the Board members on the appropriateness of such intervention prompted the Bank to issue the “*Principles for Intervention*” a document that spells out under what conditions foreign exchange intervention is justified. Since then the exchange rate appears to have played no role in interest rate decisions. Surprisingly, such a shift away from giving any role to the euro exchange rate corresponds, as we have seen in Figure 12, with the beginning of a period of high exchange rate stability.

The fact that the Euro exchange rate has played no role in interest rate decisions is confirmed not only by the minutes of the board’s meetings – that never mention the exchange rate in connection with an interest rate decision – but also by a test conducted in the study by Federal Reserve Bank of San Francisco mentioned in sub-section 3.2.2. If we add the krona-euro exchange rate to the variables that explain the board’s interest rate decisions, such a variable is never statistically significant.³³ Figure 13 suggests that the reason why the krona-euro exchange rate might have been so stable is the increased synchronization between of the Swedish and Euro area business cycles since the start of the European monetary union (1999). Faced with very similar data the Riksbank and the ECB tend to synchronize their interest rate decisions (Figure 14): this helps explaining why the exchange rate has been so stable.

4 An Evaluation of the Swedish Inflation Targeting Regime

There are seven key issues that we address in our evaluation of the Swedish inflation targeting regime: 1) Is the institutional framework of the inflation targeting regime appropriate? 2) Is the technical expertise in the Riksbank of sufficiently high quality? 3) Is the level of the inflation target appropriate? 4) Is the inflation targeting regime sufficiently flexible? 5) Does it make sense to base forecasts on implicit market interest rates? 6) How well is the Riksbank communicating? 7) Is the Executive Board set up properly?

4.1 Is the Institutional Framework of the Inflation Regime Appropriate

Section 2 on the science of monetary policy outlines several desirable criteria for the institutional framework underpinning the conduct of monetary policy: (i) a commitment to sound fiscal and financial system policies, (ii) a mandate to pursue price stability, (iii) government ownership of the inflation target, (iv) independence of the central bank so it is insulated from the political process, (v) accountability of the central bank for meeting its price stability goals. We look at each of these in turn.

4.1.1 Is there a strong commitment to sound fiscal and financial system policies?

As discussed in Section 2, unsound fiscal and financial system policies that either lead to pressure on the central bank to print money or to a blow up of the financial system, can make it impossible for a central bank to pursue non-inflationary monetary policy. Sound fiscal and financial system policies are therefore preconditions for successful inflation targeting. Here the record of the past ten years in Sweden is excellent. In the aftermath of the financial crisis in the late 1980s and early 1990s, Sweden put in place a prudential regulatory and supervisory system that has promoted the safety and soundness of the financial system. In addition, fiscal policy, supported by a new budget law (Law SFS 1996:1059) has resulted in an average annual budget surplus from 1995 to the present of 1% of GDP, a far better performance than is seen for the average country in the Euro area, where in those years budgets have on average recorded deficits of 3.8 per cent of GDP. As citizens of the United States and Italy, we can only admire the fiscal performance of Sweden.

4.1.2 Is there a sufficiently strong mandate to pursue price stability?

Article 2 of the Sveriges Riksbank Act, which was substantially revised in January of 1999, states: “*The objective of the Riksbank’s operations shall be to maintain price stability. The Riksbank shall also promote a safe and efficient payment system.*” Because maintaining a safe and efficient payments system is completely consistent with a price stability objective, the Riksbank mandate provides an appropriately strong commitment to price stability. Moreover, as we discussed in Section 2.1.4, the Government states in the Bill (1997/98:40) where the Act was proposed that (section 7.3): “*The objective of monetary policy shall be to maintain price stability. As an agency under Parliament, the Riksbank shall additionally without setting aside the objective of price stability, support the objectives for general economic policy with the intention of achieving sustainable growth and high employment.*” Thus the Riksbank de facto operates under a hierarchical mandate similar to those that have been written for the Bank of England and the European Central Bank. Thus we consider the mandate of the Riksbank as entirely appropriate.

4.1.3 Does the government take sufficient ownership of the inflation target?

Because sound fiscal policy is necessary for a central bank to be able to pursue non-inflationary monetary policy, having the government buy into the inflation targeting regime by indicating support for the inflation target announced by the central bank is highly desirable. Government ownership of the inflation target increases the likelihood that it will pursue fiscal policies that facilitates achievement of the inflation target by the central bank. In many countries, government ownership of the inflation target has occurred because the government sets the target, although usually in consultation with the central bank. This is a feature of the inflation targeting regimes in New Zealand, Canada and the United Kingdom, for example. In Sweden, the decision to adopt inflation targeting at its inception in 1993, and the decision about the level of the inflation target, were taken by the Riksbank, not by the government. Since 1996, however, the government in its annual budget statement supports the direction of monetary policy set by the Riksbank. For instance, in the autumn 1996 they wrote as follows:

“The over all aim of the monetary policy is price stability. The Riksbank independently conducts monetary policy and the general council of the Riksbank have defined price stability such that the increase in consumer price index should be limited to 2 percent with a tolerance of 1 percentage point up and down. The Government supports the aim of the monetary policy.”

From autumn 1997 until to today the relevant paragraph has read something like:

“Low inflation is a precondition for good growth and full employment. Parliament has decided that the over all task for monetary policy is price stability. On this foundation the Riksbank independently conducts monetary policy. The Riksbank defines price stability such that the annual increase in consumer price index should be limited to 2 percent with a tolerance of 1 percentage point up and down. The Government supports the aim of the monetary policy as well as the inflation target.”

In addition the new Riksbank Act of 1999, which gives the Riksbank a strong mandate to pursue the price stability objective, has led to further government ownership of the inflation targeting regime. Although if we were designing the institutional framework for inflation targeting from scratch, having the government take a more active role in setting the target would have been desirable, in practice the government now takes sufficient ownership of the inflation targeting regime and we see no reason to recommend a change.

4.1.4 Is the Riksbank sufficiently independent?

Research has shown that having an independent central bank that is able to resist political pressure to pursue inflationary policies is associated with substantial improvements in economic performance. The Riksbank Act of 1999 greatly increased the independence of the Riksbank along several dimensions. It created an independent Executive Board with long-term appointments that are protected from severance from employment and that can neither “seek nor take instructions when fulfilling their monetary policy duties.” The Riksbank Act is in line with best practice in the degree of independence that it accords the central bank.

4.1.5 Is the Riksbank’s degree of accountability adequate?

In a democratic society, the independence of the central bank can only be protected if it is supported by the public and their political representatives. This support will only be forthcoming if the central bank is considered to be sufficiently accountable. In addition, accountability provides the proper incentives for a central bank to achieve its mandate. Accountability requires an open dialogue between the bank, the public and its elected representatives. The best place for this to occur is in a country’s parliament or congress. A somewhat unusual feature of the institutional setting for monetary policy in Sweden (but which is also a feature of the institutional framework in Finland) is that the Riksbank is a public authority under the Riksdag, the Swedish parliament. This feature of the Swedish constitutional system gives the Riksbank a different relationship with the government than most other Swedish agencies, which instead are agencies of the government, not of parliament. It also differs from central banks in other countries which are typically governmental agencies. This special feature of the Riksbank makes it even more natural for the public debate about monetary policy to take place in the parliament.

Since 1999 the Finance Committee of the Swedish parliament conducts annually a formal, written evaluation of monetary policy. Such formal evaluations are not common in other countries and may stem from the unique relationship of the Riksbank and the Swedish parliament. Conducting an evaluation of this type increases the Riksbank's accountability and is highly desirable. On reading these evaluations, however, we were somewhat disappointed that they did not go as much into depth in the analysis of Riksbank performance as we had expected, given the central role that such documents could play in the process of making the bank accountable to the public. When, in 2002 the Finance Committee commissioned a study from the National Institute of Economic Research (NIER: "Monetary Policy 1999-2001") to evaluate the Riksbank's performance, the evaluation was deeper and substantially more useful — although we do not necessarily subscribe to all the points raised, in particular their conclusions about the Riksbank's forecasting record, an issue to which we shall return. This experiment suggests however that having the Finance Committee seek outside expertise to evaluate monetary performance is highly desirable; using a variety of outside expertise would further improve the evaluation process.

Another important element of the Riksbank's accountability are the hearings that occur in the Finance Committee on monetary policy twice a year (normally February/March and October) immediately after the publication of the *Inflation Report*. Unfortunately, the way these hearings are conducted makes them very ineffective. The basic problem is that the hearings are scheduled just one hour after the *Inflation Report* is released. As a result members of the committee do not have any time to carefully scrutinize the report and this is reflected in the quality of the debate at the hearing. The Finance Committee has asked the Riksbank to release the *Inflation Report* to them before it is released to the public. The Riksbank correctly has refused this request: the risk that information leaks to financial markets and gives some market participants an unfair advantage is too high.

A solution to this problem is evident from the experience of other countries, the United Kingdom, the United States and the Euro area. In these countries, documents similar to *Inflation Reports* are discussed in the congress or parliament several weeks (typically 2 to 3 weeks) after they are released to the public.

The quality of the debates on such occasions is much higher than in Sweden and as a result they receive significant media attention, raising the accountability of the central bank. Furthermore, because there is sufficient time to scrutinize the report, parliaments often hire outside experts to assist them in preparing the hearings. We believe that the accountability of the Riksbank and the quality of the public debate about monetary policy in Sweden would be raised substantially if *Inflation Reports* were released at least one week and possibly two weeks before the Finance Committee hearings are held, and if the Committee hired outside experts to assist them.

Other Parliaments use outside experts to help Finance Committee members prepare the discussion with the central bank. The House of Lords Economic Affairs Committee in the UK Parliament, for instance, has recently used professor Mike Wickens of York University to prepare the meetings with members of the Monetary Policy Committee of the Bank of England. The experience of the European Parliament is particularly interesting. At the start, when the ECB came into being, there was obviously no tradition of meetings between Parliament and the President of the bank. Ms. Christa Randzio Plath, chair of the Committee on Economic and Monetary Affairs, was concerned about the quality of the debate, particularly since – as in Sweden – this Committee is the only body, within the EU institutions, which can hold the ECB accountable. Thus the chair retained—for a relatively modest fee – a group of outside experts, mostly academic economists, whose purpose was to “train” the Committee members—in a few occasions one expert would play the role of the ECB president and answer questions, while other experts would play the role of the Committee members: the debates were lively and the Committee members who attended such ‘mock meetings’ rapidly learned how to conduct a tough hearing. Eventually, after this transition period, outside experts were just retained with the task of preparing questions and background papers, similarly to the role that outside experts play in the UK Parliament.

Another venue for public discussions of a central bank’s performance is through statements by government ministers. Although government ministers certainly have a right to speak out on any issue that concerns them, there are higher potential costs if government ministers, rather than ordinary members of parliament, comment on monetary policy. Because government ministers have greater power to influence legislation that affects the central bank, their comments, more than those of other elected officials, could raise concerns that the central bank will accede to political pressure and thus lead to substantial costs. The resulting weakening of central bank independence can lead to a substantial deterioration of economic performance. Indeed, if the credibility of the central bank for resisting pressure to pursue overly expansionary policies is weakened, the central bank may need to tighten monetary policy more than it would otherwise to keep inflation expectations from rising above the inflation target. Economic outcomes can therefore be improved if government ministers refrain from commenting on monetary policy. As we have seen in section 2, the strong economic performance of the United States in recent years provides a powerful example of the benefits of following this principle.

Over the last several years, the Swedish prime minister has made critical comments on the policy actions of the Riksbank. These comments have not been instructions to the Riksbank and so are not in violation of the Riksbank Act. However, they have been perceived by the public and the media as an attempt to pressure the central bank to either cut interest rates or desist from raising them. Given the strong performance of the Swedish economy in recent years, we do not believe that these comments have substantially weakened the credibility or independence of the Riksbank. Nonetheless, these comments are

a precedent that could become a serious problem at some future date if the economy were to weaken and the Riksbank's performance were under attack. In this situation, critical comments about monetary policy actions by government ministers could weaken the credibility and independence of the Riksbank, with negative consequences for how monetary policy might be conducted.

4.2 Is the technical expertise of the Riksbank of sufficiently high quality?

Our opinion is that the Riksbank is a high quality organization. Its staff comprises very good economists who use state-of-the-art economic and statistical methods. The analysis carried out by the economists is entered into the monetary policy process and used by the Board in making its decisions in a professional and effective manner. This Section substantiates these statements starting from the quality of the economists who work at the bank.

4.2.1 The quality of the staff and of its output

In the Riksbank, analysis of monetary policy is carried out in the Monetary Policy Department. As of today (May 2006) in the divisions of that department that are directly involved in monetary policy issues (that is excluding the Statistics Division), 31 out of a total 59 employees are economics PhDs. This is a relatively high number compared with other central banks. In 2003 for instance an analysis of the quantity and quality of central bank research conducted by the Bank of Canada found the following number of PhD's: Bank of England 74, Banca d'Italia 51, Riksbank 40, Bank of Finland 23, Bank of Spain 17 (the number of the Riksbank includes a few PhD's who are not in the divisions responsible for monetary policy).³⁴ During the last three years, the Research Division of the Monetary Policy Department (the more "research oriented" division in the department) has recruited in the International Job Market for recent PhD economists. The rest of the department recruits through more conventional channels – mainly advertisements in Swedish newspapers and on the Riksbank's web site.

The quality of the bank's research output has increased in recent years: up to 2002 the number of articles produced by the bank's staff (sometimes in collaboration with outside researchers) and accepted for publication in international journals was about 5 per year. They were 14 in 2003, 15 in 2004. The study by the Bank of Canada referred to earlier also computes the average quality of the articles published by central bank staff over the period 1999-2003. The best are the researchers at the Federal Reserve Bank of Minneapolis (with a score of 0.64), a Reserve Bank which is very unusual also within the Federal Reserve System. The score for the New York Fed and the Bank of England is 0.43, the Bank of Portugal 0,41, the Bank of Canada and the Re-

serve Bank of Australia 0.30, the central banks of Spain and Italy 0,23, the Bank of Finland 0,22, the Danish and Belgian central banks 0,21. The score for the Riksbank is 0.34, the third best in Europe. The average Riksbank researcher publishes each year 0,22 journal articles (the number, also computed in the Bank of Canada study corrects the number of publication with co-authors and then weights them by quality of the journal). This puts the Riksbank in 8th position worldwide: the first 5 are U.S. Federal Reserve Banks and the Board of Governors, number 6 and 7 are the Bank of Greece and the ECB. Overall the Riksbank compares extremely well with its peers both in terms of the volume and the quality of its research output.

We went into so much detail because the importance of a central bank's research quality should not be underestimated. As discussed in section 2 of this report, economic research played an important role in the change in thinking at central banks that has led to improved monetary policy. Running a state-of the art inflation targeting regime presents a central bank with challenging analytical issues: developing and running the models used in preparing the forecasts, choosing the appropriate assumption about the path of interest rates to be used in constructing the inflation forecasts, etc. Only a central bank that has a group of economists on top of the monetary policy research agenda and that is able to integrate their knowledge in the decision-making process will be able to run a state of the art inflation targeting regime

An additional reason why a high research quality is important has to do with reputation. The central bank must win the respect of the country's economists, in academia, in the financial sector, in employers' and employees' organizations. Only a bank which attracts high quality researchers will be able to achieve such a reputation.

An analysis of the distribution by main topics of the Working Papers published by the bank over the period 1997-2006 (160 papers which include both papers produced by the bank's economist, but also some papers presented by outside visitors) reveals an institution mostly concerned the setting up, running and fine-tuning of the inflation targeting regime: 40% of the papers deal directly with monetary policy issues, 15% with technical issues related to econometric estimation, calibration or forecasting, 15% with issues related to the estimation of the output gap or to the analysis of unemployment, 30% with other economic issues including financial stability and the exchange rate. This distribution – considered in conjunction with the discussion, in Section 3.2.2, of the possible reasons for the undershooting of inflation in recent years – suggests that the bank should put a bit more emphasis on economic analysis of the real sector and of the state of the labour market in particular.

Since 1998 the Riksbank has arranged 1-2 conferences a year, often in collaboration with an academic institution, and often with a number of prominent international academics attending. Topics have ranged from 'Monetary Policy Rules', 'Credit Risk Modeling', 'Inflation targeting: implementation, communication and effectiveness'. The Research Division regularly receives guests from both central banks and universities. These guests present their

research at a seminar and participate in meetings with Riksbank employees from various fields, not just within the Research Division. Guest researchers usually spend around a week at the Riksbank, although there are occasionally longer visits of six months or a year. Riksbank staff regularly participates in outside conferences and such participation is considered a natural part of the bank's every-day activities. All of this has had the effect of integrating the Riksbank in the international research community, a process cherished by the best central banks in the world.

The bank also has a number of high caliber Scientific Advisors. These currently include a few of the best known U.S.-based and Swedish macroeconomists. The bank uses their advice both on policy issues and on more technical problems. One of them regularly reviews the Inflation Report – after it has been published – and offers suggestions for improvement.

4.2.2 The Riksbank's inflation forecasts

In constructing its inflation forecasts the Riksbank uses a variety of models. This is a practice to be commended since no single model can claim to offer the “best” description of the way an economy works: checking the forecasts produced by different models thus reduces the probability of errors that cannot be attributed to information that was not available at the time the forecasts were prepared, but rather to the model missing some important aspect of the economy.

The *Inflation Report* includes forecasts for more than 50 variables. These forecasts are produced combining analyses of structural models, forecasts from a number of time-series and indicator models and expert assessments. The structural model currently used is a so-called RAMSES model (Riksbank Aggregate Macro model for Studies of the Economy of Sweden), a dynamic stochastic general equilibrium model that the bank began developing in 2003. While the first phase of the work – formulating and estimating a DSGE model for a small open economy – is near completion, the bank is in the midst of the second phase, integrating the model into the policy environment. Time-series and indicator models are also used in the forecasting process: these models work well with regard to short-term forecasts – one to two quarters ahead – while a Bayesian VAR model appears to work fairly well also on somewhat longer horizons. In addition, the bank has a number of “sector experts” who use partial equilibrium models (that is models limited to a specific sector of the economy) as a support in their assessments.

The steps the bank is undertaking to integrate general equilibrium models in the policy process should be praised. Beyond the information they directly provide, such models force discipline unto the policy making process avoiding the risk that decisions may be driven by anecdotal evidence.

4.2.3 The process of monetary policy decisions

The Executive Board usually has seven scheduled monetary policy meetings over the course of a year to make decisions regarding the repo rate. In conjunction with three of these meetings (four before 2006) an *Inflation Report* is published which contains the Board's analysis of the economy and the forecasts for several variables.

The analysis and forecasting work that results in an *Inflation Report* lasts 6 weeks and begins with a meeting at the Monetary Policy Department. Figure 15 below illustrates the timeline of this process. The discussion starts with an analysis of inflation and economic activity abroad and on developments in financial markets. At the subsequent meetings the inflation situation and economic developments in Sweden are discussed. At a fairly early stage of the process, the staff presents their analysis of the current economic situation and their forecasts to the Executive Board at a meeting in the so-called "Large" Monetary Policy Group. A first draft of the Inflation Report is then presented and discussed at a Board meeting 2 weeks ahead of the final publication; at this meeting Board members make more definite decisions about the forecasts and the content of the Inflation Report. The drafting of the Inflation Report continues and the final text is discussed on yet another Board meeting, 1 week ahead of the final monetary policy meeting.

For the monetary policy meetings that do not coincide with the publication of an *Inflation Report*, the analysis and forecasting work is performed in a similar way but on a somewhat smaller scale – essentially assessing how new data has affected the most recent forecast. This results in an internal report that is presented in the "Large" MPG and forms the basis of the Executive Board's monetary policy meeting.

4.2.4 How does all this add up? Do the Riksbank's economists do a good job at analysis and forecasting?

The Riksbank's record at forecasting inflation compares well with other Swedish forecasters. Consider Figure 16 which shows a 95 percent confidence interval around NIER's absolute mean forecast error during the period 1997-2005.³⁵ Measured in this way, only one forecaster has made a *significantly* larger forecast error than the NIER (SN, Svenskt Näringsliv, the Confederation of Swedish Enterprises). The rest of the forecasters, including the Riksbank (RB), are well inside the interval. The NIER's evaluation of monetary policy 1999-2001 (the only independent evaluation of the Riksbank's monetary policy so far) concludes (chapter 2.3) that other forecasters have neither been better nor worse than the Riksbank at forecasting inflation.

Figure 17 compares the forecasts for inflation in 2005 made at various points in time by the Riksbank and a number of outside institutions.³⁶ In this particular case the Riksbank's forecast (and its error) has consistently been below the average.³⁷

4.2.5 Integrating financial stability in the monetary policy process

We argued in Section 2.9 that *Financial Stability Reports* are the tool through which the central bank can evaluate whether rises in asset prices might be leading to excessive risk taking on the part of financial institutions – and, were this to happen, allow the central bank to put pressure on the prudential regulators and supervisors of these institutions to rein in excessive risk taking by financial institutions.

The Bank of England has recently reviewed the way its *Financial Stability Report* is produced, trying to sharpen the analysis of systemic stress testing. One way it does this is by focusing the attention on a list of “top five” risks to systemic stability. The new Bank of England Report is also written in a way that looks much more like the bank’s *Inflation Reports*. We suggest that the Financial Stability Department of the Riksbank investigates what its Bank of England colleagues have done, starting from the presentation of the stress testing exercises in chapter 3, Box 6 of the *Financial Stability Report* issued on July 12, 2006.

4.3 Is the level and formulation of the inflation target appropriate?

The analysis in Section 2 suggests that the optimal level of the inflation target should be above zero, but not much above 3% because then it would be considered inconsistent with price stability. Research does not find much difference in the performance of inflation targeting regimes when the inflation target is between 1% and 3%. Although the level of the inflation target was chosen without much scientific study, the 2% number that the Riksbank has chosen ended up being right in the middle of the 1-3% range that seems appropriate.

The recent undershooting of the inflation target has led some Swedish private sector analysts to propose that the inflation target should be lowered. We find their arguments unconvincing and believe that lowering the inflation target would be a mistake. Changes in productivity growth could indeed affect the optimal level of inflation that a central bank should target. However, research on how productivity increases would affect the optimal level of inflation is not well developed.

Even more importantly, changing the level of the inflation target to lower it when actual inflation has been below the target, or to raise it when actual inflation is above the target would weaken the credibility of the inflation target as a nominal anchor. As we have seen, weakening the nominal anchor could have very negative consequences for economic performance. In addition, lowering an inflation target when inflation falls below the target will create perverse expectations in the future. The expectation that the central bank will lower the target when inflation falls below it means that an under-

shoot of the target will cause a downward revision of inflation expectations, which will make it more likely that businesses will lower prices, and will thus increase the decline in inflation. The result is that inflation volatility will increase. Indeed, the argument against changing the inflation target when there are undershoots or overshoots is the same as that made in section 2.8.4 why history dependence of monetary policy has substantial benefits.

We also find unconvincing research based on the Akerlof-Perry-Dickens analysis that argues that the natural rate of unemployment in Sweden would fall substantially if the inflation target was raised above the 2% target. As we discussed in Section 2, the Akerlof-Perry-Dickens analysis only looks at half of the picture: inflation also puts “sand” into the labor markets by increasing the noise in relative wages and this suggests that higher inflation will not lower the natural rate of unemployment.

The level of the inflation target in Sweden seems to be about right and we can find no compelling reason to change it. This does not mean that further scientific study won’t shed more light on what the optimal level of the inflation target should be in general and specifically in Sweden.

The Riksbank’s formulation of the inflation target states that “Monetary policy is targeted on keeping inflation at 2%, with a tolerance of +/- 1 percentage point for deviations from this level.” This formulation is consistent with best practice because it makes clear that the Riksbank is not focusing too much on the edges of the range, which could lead to inappropriate policy decisions.

4.4 Is the Swedish Inflation Targeting Regime Sufficiently Flexible?

From 1999 to 2005, the Riksbank in general operated according to the following simple rule which was described in the October 1999 *Inflation Report* as follows: “if the overall picture of inflation prospects (based on an unchanged repo rate) indicates that in twelve to twenty-four months’ time inflation will deviate from the target, then the repo rate should normally be adjusted accordingly.” Starting with this rule was a reasonable approach for three separate reasons. First, it was extremely simple, aiding communication and enabling the public to understand the basis for the Riksbank’s monetary policy decisions. Second, after a period during which the exchange rate had been important in determining monetary policy decisions, the rule signaled that the Riksbank was focused on the control of inflation and that the inflation target was the nominal anchor, not the exchange rate. Third, it educated the public to understand that monetary policy has long lags and thus had to be forward looking via an inflation forecast.

Despite its advantages, this behavioral rule had a number of drawbacks. Above all, as we discussed in the section on the science of monetary policy, such a simple rule does not allow monetary policy to be sufficiently flexible.

Monetary policy must not only focus on reducing inflation but also output fluctuations. Depending on the nature of the shocks to the economy, the horizon over which the inflation target should be reached varies. For example, if a shock drives inflation very far from its target, trying to get back to the target within a two year horizon might entail very high costs because the slow adjustment of wages and price would lead to a large fall in output and employment. A more flexible horizon enables a central bank to focus on reducing output fluctuations, without having to specify an output target, which we have shown is highly problematic.

Over time, the Riksbank began to move away from the simple rule in order to obtain sufficient flexibility in the inflation targeting regime. Even in 1999, the Riksbank argued that sometimes the horizon for the inflation target might have to extend beyond two years. Starting in the *Inflation Report* of March 2005, the Riksbank presented forecasts for a three year horizon which were based on the assumption of an interest rate path given by market expectations. Then in the *Inflation Report* of October 2005, the forecasts based on market expectations with a three-year horizon became the main scenario discussed in the report. The new more flexible approach was described by the Riksbank as follows:

“In certain cases, we may need an even greater flexibility than the two year perspective allows. If the economy were to suffer very large supply shocks, for instance, in the form of structural changes that have a major effect on inflation the process of bringing inflation back to the target may need to take even longer to avoid excessive strain on the economy.”

It further explained:

“Thus the objective of monetary policy is to maintain price stability. However, it is possible to give consideration to the development of the real economy. This does not mean having a target for growth or employment. Instead, this type of consideration is made possible by the way in which we have chosen to formulate the principles for attaining the inflation target.” Irma Rosenberg, March 30, 2006

Increased flexibility of an inflation targeting framework and abandonment of simple rules to describe the monetary policy process is in line with the latest thinking on how monetary policy should be conducted. Indeed one drawback of inflation targeting as practiced by some central banks is that the use of a fixed horizon for the target has the potential to make the monetary policy framework too rigid.³⁸ Although we strongly endorse the Riksbank's move to more flexibility, we do have some concerns expressed in the next two sections about how this move to flexibility has been executed: in particular, with regard to the interest rate assumption embedded in the inflation forecast and in their communication strategy.

4.5 Does it Make Sense to Base Forecasts on Implicit Market Interest Rates?

The need for longer horizons for the inflation target obviously requires that forecasts of inflation and the economy also have a horizon that extends beyond two years. Longer horizons for forecasts make an assumption of a constant policy (repo) rate untenable because the forecasts become unstable. Starting with the *Inflation Report* of February 23, 2006, the Riksbank not only lengthened the forecast beyond two years, but generated its forecasts with an assumption that the repo rate will move in line with the market's expectations as represented by forward rates.

As was discussed in Section 2, basing forecasts on market expectations raises several problems that have manifested themselves in Sweden. There are concerns outside the central bank that the use of market-based projections of the repo rate may suggest that the Riksbank decisions about setting the repo rate are being driven by market participants. This of course is not the way monetary policy should be conducted because it can lead to instability in inflation and output (Section 2.7.4), but also creates the danger that one segment of the society is having too much influence over monetary policy. The Riksbank must have its own view about where policy rates should go in the future. Furthermore, the Riksbank will not always agree with market expectations because their forecasts might suggest that a different policy path is required to achieve the monetary policy objectives. If this happens, transparency would require that the bank reveal some information about its different view on the future path of policy rates, which the Riksbank has done: but when it does so its forecast would necessarily differ from what they have previously published. Not surprisingly, this can create confusion in the public and in the financial markets.

Additional confusion arises from the timing of the data used by the Riksbank to construct the implied future path of the repo rate. The forward-rate data used to compute the repo path is an average of daily interest rates over the first two weeks of the thirty-day period preceding the publication of *Inflation Report*. By the time the *Inflation Report* is published, the market's assessment of the future repo rates may have changed because of new information. When the Riksbank indicates that its view of the path of policy rates differs from the market-based path in its *Inflation Report*, market participants have indicated to us that they are unsure whether this is because the Riksbank actually has a different view than the markets on the future policy path, or because the information going into the policy path has become outdated.

There is also a minor technical issue – as we already noted in Section 2.7.4 – about the way that the Riksbank generates the policy path implied by market expectations. Forward rates reflect not only expectations about the future repo rates but also risk premiums. Deriving the policy path implied by market expectations requires that the Riksbank estimate these risk premiums, but it is not clear what the best way to do this is, and it remains an open subject for

research. The additional uncertainty this introduces into the forecast process has raised concerns among market participants.

The Riksbank is aware of many of these problems. Indeed, the Governor of the Riksbank in a speech on April 4, 2006, has suggested that the “*time is right to go one step further and publish our own interest rate path.*”

4.6 How Well is the Riksbank Communicating?

In providing our assessment of how effectively the Riksbank is communicating with the public, we first provide an overall assessment and then discuss a few specific problems with the communication strategy.

4.6.1 Overall Assessment

Our reading of *Inflation Reports*, speeches, parliamentary testimony, press releases, minutes, and the frequency with which these are produced suggests that the Riksbank is highly transparent. Indeed, in a study of central bank transparency, the Riksbank ranks first for transparency among the countries included in the study, along with New Zealand.³⁹

The presence of six different members of the Executive Board, who are individually accountable, necessarily results in different assessments from the Board on the state of the economy, what is the appropriate policy stance, and how best to implement monetary policy. As a result the Riksbank cannot speak entirely with one voice. Although this engenders some costs in terms of the clarity of the Riksbank’s communication with the public, having decisions made by a committee rather than an individual has several benefits. Research suggests that monetary policy decisions are improved when made by a committee composed of several individuals rather than by one person, and having a variety of views influence monetary policy makes the central bank more compatible with democratic institutions.⁴⁰

Our generally favorable assessment of the Riksbank’s communication strategy does not mean that it is without problems. Indeed, our discussion with many elements of Swedish society indicates that recently the Swedish public and markets have found it increasingly difficult to understand how the Riksbank is conducting monetary policy. Why has this occurred?

4.6.2 Problems with moving away from a (too) simple rule

Part of the problem is the difficulties mentioned above of explaining monetary policy decisions based on policy paths derived from market forecasts. In addition, the move toward greater flexibility, which required moving away from a simple rule, even if justified, does create an increased burden on the central bank’s communication process because many market participants would like to see how increased flexibility translates into a new rule for monetary policy. However, having the right degree of flexibility of an infla-

tion targeting regime means that *there can be no precise rule for setting policy rates*. The more difficult communication environment when the Riksbank began pursuing a more flexible inflation targeting regime requires even greater care in how it communicates with the public and the markets. One problem that the Riksbank has faced is that any transition to a new approach to describing monetary policy takes time for the public and market participants to understand. However, there are some dimensions upon which the Riksbank's communication strategy could be substantially improved.

4.6.3 Which inflation measure does the Riksbank target?

A second problem arises from some confusion as to which inflation measure the Riksbank targets. The official inflation target is defined in terms of the consumer price index (CPI) which is substantially impacted by changes in the costs of housing. This is because an important component of the CPI measure is mortgage interest payments which are calculated as the product of the interest rate on mortgages times an index of the price of the total housing stock-, although, as we already discussed, such an index is rather stable since changes in the price of houses only have an impact on the CPI if there is a change in ownership. As we discussed in Section 2, a central bank that is using an inflation targeting regime to help stabilize employment (output) fluctuations, as it should do, should not target on an inflation measure that reflects volatile movements in asset prices and interest rates.

The Riksbank is well aware of the problems associated with an inflation target based on the CPI and does focus more on an inflation measure that excludes mortgage interest payments, UND1X, in *Inflation Reports* and its discussions of monetary policy. The Riksbank is also aware that, as pointed out in Section 2, monetary policy should target inflation measures that are dominated by sticky prices and so core measures that exclude other volatile prices are often a better guide to monetary policy. It also correctly points out that no single core inflation is always appropriate as a guide to monetary policy because the appropriate core measure will change depending on how permanent or temporary are shocks to different prices. Despite the appropriateness of this reasoning, the fact that the official inflation target remains defined in terms of the CPI and that forecasts of the CPI are still discussed in *Inflation Reports* may lead to the suspicion that at times the Riksbank may put too much weight on a clearly inappropriate inflation measure when making monetary policy decisions.

The resulting confusion about what inflation measure the Riksbank targets can easily be eliminated by the Riksbank officially defining the inflation target in terms of the UND1X measure which excludes mortgage interest payments. (This index would benefit from a more user-friendly name.) This was what was done by the Bank of England which initially set its inflation target in terms of the RPIX which excluded mortgage interest payments, rather than in terms of the British CPI which like the Swedish CPI included

mortgage interest payments. Defining the inflation target in terms of UNDI_X does have the disadvantage of having the Riksbank target a different inflation measure than headline CPI measure reported in the media which is therefore better known by the public. Thus a better solution to this problem is that the central statistical agency, Statistics Sweden, modifies its measure of the CPI, to exclude mortgage interest payments. Indeed, it is well known that having housing costs measured by the mortgage rate (a nominal rate not adjusted for inflation) multiplied by housing prices bias measured inflation.

This problem has existed in other countries. For example in the United States, whose CPI treated housing costs in a similar way to Sweden's CPI – and inflation was substantially overestimated in the 1970s – this led to a revision of the U.S. CPI in 1983, which afterwards excluded mortgage interest payments, but instead measured costs of owner-occupied housing through a rental equivalence measure. The inflation measure used in the Euro area is based on the harmonized index of consumer prices (HICP) published by Eurostat which excludes not only mortgage interest payments but owner – occupied housing costs in general. (Note that HICP does not necessarily reflect the best way of measuring the consumer price index and a decision was made to exclude owner-occupied housing costs because there was no widespread agreement as to how to measure owner-occupied housing costs in Europe.) Indeed, recently the Office of National Statistics in the United Kingdom changed its measure of the consumer price index to HICP in order to be in line with the consumer price index used in the Euro area. Sweden could also move in this direction as a first step in removing mortgage interest payments from the CPI, which would be desirable. However, further research in the Euro area and Sweden, may provide better measures of the CPI in the future.

4.6.4 The discussion of asset prices in the conduct of monetary policy

We do believe, however, that the Riksbank has recently made one serious mistake in its communication strategy, namely its discussion of the role of asset prices in the conduct of monetary policy. Indeed, the Riksbank's statements recently about one particular asset price, residential housing, has led to a weakening of the confidence that the public and markets hold for the bank. The Riksbank's discussion of the impact of asset prices on their policy decisions has led to confusion about what flexibility of the inflation targeting regime actually means.

To illustrate why the confusion has occurred, we quote the press release of February 23, 2006 after the Executive Board's decision to raise the repo rate by 25 basis points (0.25 percentage points).

Despite the high growth in production and demand, inflation has remained low for a long period of time. This is due to both falling import prices and good domestic productivity growth. Behind these factors is increased competition, both international and domestic. These factors are

expected to continue contributing to holding down inflation, although inflation will gradually rise and approach the inflation target a couple of years ahead. *The inflation forecast has been revised down slightly in comparison with the December forecast.* [our italics] The low outcome for January has effects on inflation in the short term, but the main factor holding back inflation in the longer term is productivity growth.

All in all, UNIDX inflation is expected to rise gradually and to be close to the 2 per cent target a couple of years from now. This forecast is based on, for instance, the assumption of strong growth in Sweden and abroad and of gradual increases in the repo rate. *As before, there is also reason to observe that household indebtedness and house prices are continuing to rise rapidly.* Given this, [our italics] the Executive Board decided to raise the repo rate by 0.25 percentage points at yesterday's meeting.

This statement has two striking elements, which we have italicized. In the first paragraph, the Board acknowledges that the inflation forecast was revised downward. In fact the *Inflation Report* published on the same day shows UNIDX forecasts that are below the 2% target at every horizon and also at every horizon are lower than the forecasts published in the previous *Inflation Report*. In the second paragraph they mention that the rise in house prices and household indebtedness is a reason why they decided to raise the repo rate. A similar reference to housing prices right before announcing the decision to raise rates was made in the press release of January 20, 2006.

A reader of this statement could easily conclude that the Riksbank is setting the policy instrument not only to control inflation, but to restrain housing prices. This naturally could lead to public suspicions (which we have heard) that the increased flexibility of the inflation targeting regime that the Riksbank has recently emphasized means that an additional target has been added for monetary policy over and above its inflation target. It is true that in recent speeches Executive Board members have stated that "the reference to household indebtedness and house prices is not, as some have understood it, an expression for our having introduced new targets alongside the inflation target". (Irma Rosenberg, April 19, 2006) Nonetheless, given the repo rate increases in February and January and the accompanying press releases, this has led to substantial confusion as to what the goals of the Riksbank are. Indeed, our discussions with Riksbank officials left us somewhat confused about what were their views on the role of housing prices in the conduct of monetary policy.

Our discussion in Section 2 indicates that asset prices, such as house prices, should factor into monetary policy because they affect households' wealth and thus consumer spending, which in turn has an impact on future inflation and employment. Higher asset prices which stimulate the economy and inflation could provide a justification for tightening policy if they lead to an overshoot of the inflation target. Moreover, asset price movements can affect financial stability. Fluctuations in some asset prices, however, pose a more serious threat to financial stability than others. Booms and busts in commercial real estate, for example, have direct impacts on bank balance

sheets because they often lead to the accumulation of bad loans which destroy bank balance sheets, as occurred in Sweden during the 1980s and early 1990s.

The discussion in Section 2, however, does not justify the Riksbank focusing independently on housing prices in setting the repo rate as it seems to have done in its recent statements. Furthermore, housing prices have rarely led to financial instability because it is easier for financial institutions to assess the credit risk in residential mortgages, and households are very reluctant to default on these mortgages. Indeed, the Riksbank's recent *Financial Stability Reports* have correctly emphasized that recent housing price movements have not raised financial stability concerns. Thus currently, the Riksbank has not faced a tradeoff between the goals of reducing employment and inflation fluctuations and financial stability concerns from housing prices. Financial instability concerns currently also do not justify the Riksbank's independent focus on housing prices.

As we outlined in Section 2, raising policy rates to burst a bubble in asset prices can only be justified if a central bank knows better than the markets what the "correct level" of asset prices should be. It is, however, unlikely that central banks have better information than the markets, and acting as if they do could result in serious policy mistakes. Even though asset prices should not be an independent factor in monetary policy decisions (and the Riksbank has recently acknowledged this point in the document *Monetary Policy in Sweden*, released on May 19, 2006), run-ups in the prices of an asset like housing require that the Riksbank be ready to cope with a possible housing price collapse. Just as private financial institutions and their supervisors need to conduct stress tests prepare them to deal with the impact of sharp declines in asset prices on balance sheets, central banks need to conduct stress tests on how monetary policy should be adjusted in the face of asset price meltdowns. Statements in *Inflation Reports* indicate that the Riksbank is indeed aware that it would need to respond vigorously to stimulate the economy if there were a sharp decline in housing prices. Formal exercises in which the Riksbank conduct simulations to assess how they should respond if housing or any other important asset prices collapse would help them prepare for this possible eventuality. This emphasis on stress testing is the correct response to concerns about the recent rises in housing prices.

4.7 Is the Executive Board Set Up Properly?

4.7.1 Length of appointments of Board members

The process of appointing the members of the Board of the Riksbank has not always been easy. Over the period 1999-2005 there were 8 different members of the Executive Board—though there were more than 8 appointments since the terms of some members have been renewed. After having been re-appointed, 3 members left before their second term expired.

This has created two problems, one can easily be solved, the other merits further attention. The first problem is that new members who have been appointed to replace members who had resigned before the end of their term have not been appointed for the remainder of the term (this is for instance the practice on the Board of Governors of the Federal Reserve). The result is that the staggering of appointments (the process by which the term of no more than one member comes to an end in every year) has been disrupted; if the current members were to serve their entire terms this would imply that 1 member would have to be reappointed in the spring of 2007, two members in the fall of 2008 and 3 members (including the Governor) in the fall of 2011. This is not a good system because whatever political party happened to command a parliamentary majority in that year could have a disproportionate influence on the composition of the Board. Over time the terms of Board members should be brought back to the original staggering (the suggestion that in case of resignations Board members should be appointed only for the remainder of the term left open should not apply to the Governor).

4.7.2 Defining board members responsibilities

The second problem that the apparent difficulty at retaining Board members has created is the attempt to entice them into the job by upgrading their job descriptions adding managerial responsibilities. This system has problems. Currently – and most likely for the reason just mentioned – all Board members are deputy governors and have some responsibility in running the bank – though the extent of such responsibilities varies amongst Board members. The risk is that Board members are selected not only looking at their experience in running monetary policy, promoting financial stability, and managing foreign exchange rate reserves, but also considering their managerial experience, which is irrelevant for the tasks they are supposed to carry out, that is decide on policies to promote macroeconomic and financial stability and efficient management of foreign exchange reserves.

The internal organization of the bank should be reconsidered, clearly separating the role of Board members from the tasks of running the Riksbank. This is the case, for instance, at the Bank of England, where the external members of the Monetary Policy Committee have no involvement with the day-to-day running of the bank. This problem very clearly noted by Governor Heikensten who noted. *“[Responsibilities inside the Bank] are unclear. When a problem came up it was unclear who was responsible, a member of the executive board or a head of department. The essential thing if you want to run an efficient organization is to have clear responsibilities. ... You cannot run an efficient organization with six people acting at times as if they were CEO’s. You don’t see it in other places so why would it work in a central bank. ... We are all primarily chosen to contribute on strategic or policy matters. But we are using too much of our time to discuss internal matters. At the same time we don’t have enough time to talk to people outside the central*

bank, travel in the country, participate in public discussions or to formulate policy and think about policies in the future.” (Interview: Lars Heikensten, *Central Banking*, vol. 16, no. 2, November 2005).

Following these observations the bank has reviewed its internal organization delegating more responsibilities to the heads of department (See the “Instructions for Sveriges Riksbank” which entered into force on 1 January, 2005)

We believe the bank should push the process one step further, by reducing the number of deputy governors to one – or two at most – and clearly specifying that the remaining Board members have no other responsibility than contributing to policy discussions and policy decisions, and communicating such decisions to the public. One never exaggerates emphasizing that setting a country’s monetary policy and promoting financial stability is a difficult and critical task. Managerial responsibilities are simply distractions that often, as Governor Heikensten correctly noted, reduce the effectiveness of Board members in the task for which they have been selected.

A move in this direction would significantly improve the policy process by focusing Board members on their main task. We are afraid, however, that this would not eliminate the difficulties at identifying suitable, interested candidates. Some have suggested that central banks should solve the problem by promoting internal candidates to the Board. While in principle there is no reason to prevent bank staff from moving up to a Board seat, Board members should always reflect a broad spectrum of views, something which requires external appointments. Sweden is a relatively small country. If the difficulties of identifying good candidates who can commit to sit on the Board for an entire term were to persist, one might consider reducing the size of the Board. “Six” is not a magic number: the Board could very well run with 5 or even 4 members, for instance the governor, a deputy governor and two externals, with the Governor casting the decisive vote whenever that were necessary.

In conclusion, having all members of the Executive Board jointly responsible for managing the Riksbank can weaken individual responsibility. Assigning management responsibilities to the Governor and Deputy Governor would enhance the effectiveness of management of the Riksbank. It would also improve the monetary policy process by emphasizing that the main task of the other members of the Executive Board is to make monetary policy decisions, to set the overall strategy of the Riksbank in promoting both economic and financial stability, to manage foreign exchange reserves well and to communicate to the public. These tasks are a full time job and need to be protected from managerial tasks that would decrease their focus on their primary responsibilities.

4.7.3 Can the appointment process be improved?

The Riksbank is unique in being an agent of Parliament, not of the Government. This uniqueness might allow considering, in the case of appointments

to the Executive Board of the Riksbank, a slightly different process relative to other agencies which would have important benefits.

The law states that Board members, including the Governor, are appointed by the bank's General Council. The Riksdag has no direct role in such a process except, of course, for appointing the Bank's General Council. Delegating the selection process to an independent body, such as the General Council, is a good idea since it reduces the risk of political interference in the appointment process. However, the job is too important for the Riksdag to learn about the views of new Board members just by reading their resumes. Individuals nominated to the Board should be invited to stand in a formal hearing at the Finance Committee of the Riksdag. Such hearings should end – as is common in other countries, for instance for appointments to the Board of the Federal Reserve – with a vote of confidence. This would strengthen Board members in the performance of their monetary policy tasks.

A corollary to such a change is that the Finance Committee of the Riksdag should be free to invite all Board members, not only the Governor, to explain their views and their decisions while in office.

4.7.4 Can conflicts of interest for Executive Board members arise?

The law protects the independence of Executive Board members by specifying a “cooling off period” after they leave the Board and during which they are prevented from taking other jobs unless given permission by the Governing Council of the Riksbank. Government appointments, however, are not subject to the cooling off period. Such an exception risks affecting the independence of Board members vis-à-vis the Government, that is precisely vis-à-vis the agent which might have the strongest incentive to influence monetary policy decisions. We believe that the rules should be amended to include government appointments among those subject to the cooling off period.

5 Conclusions and Recommendations

Our evaluation of monetary policy in Sweden indicates that the Riksbank compares favourably with the best central banks in the world and that monetary performance has greatly improved from what occurred prior to the adoption of inflation targeting under an independent central bank. This has been supported by a country that has good governance and government policies that have promoted fiscal responsibility, financial stability and growth in productivity.

However, in recent years the Riksbank has persistently undershot its inflation target; this has been associated with a loss in output and higher unemployment. The Riksbank also has been somewhat less effective in clearly communicating its strategy for the conduct of monetary policy. There is thus room for improvement in the Riksbank's performance and in this section we make *nine* recommendations that – along with a few other suggestions discussed in Section 4, in particular the staggering of Board appointments and the responsibilities of Board members – we hope can help put monetary policy on an even sounder footing. We divide our recommendations into those that deal with the conduct of monetary policy and those that involve the governance of monetary policy.

5.1 The Conduct of Monetary Policy

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.

Recommendation 2: The Riksbank should clarify that asset prices (housing prices, stock prices and exchange rates) are not independent targets for monetary policy. A flexible inflation targeting regime which focuses on reducing employment and inflation fluctuations should not target on asset prices or respond to them over and above their affect on employment and inflation. Some response to asset price fluctuations is called for because asset price fluctuations can affect inflation and employment in the future by affecting the wealth of households or the stability of financial institutions. For example, higher asset prices stimulate spending, suggesting the need for tighter monetary policy to restrain inflation.

Although monetary authorities do not have better information than the market about the “correct level” of asset prices, the possibility of a sharp correction in the future, on the other hand, means that the Riksbank should be prepared to rapidly loosen monetary policy to stimulate the economy when and if a collapse in asset prices were to occur. Housing prices in Sweden today do not appear to pose a threat to the stability of financial institutions and the Riksbank should avoid focusing excessively on housing prices in setting its monetary policy instruments. However, banking supervisors should monitor the health of financial institutions and take appropriate steps if asset price movements were to expose these institutions to excessive risk.

Recommendation 3: Persistent undershooting of the inflation target suggests that monetary policy should lean towards more expansionary policy (while persistent overshooting should bias monetary policy to be relatively more contractionary). There are two rationales for a bias toward expansionary policy. First, persistent undershooting of the inflation target signals that the economic analysis (including estimates of output gaps) and the forecasting models may not be fully capturing why inflation consistently turns out lower than had been anticipated and may thus lead to further undershooting of the inflation target in the future. Second, as our earlier discussion of the benefits of a price level target suggests – which automatically delivers history dependence – having an element in the inflation targeting regime that allows the price level to recover to what it otherwise would have been if the target had not been undershot can help further stabilize employment. Similar logic would of course apply in the case of overshooting the inflation target, suggesting that persistent overshoots should lead to a contractionary bias to monetary policy. The benefits – in terms of output stabilization – of having a bias to monetary policy when there are persistent undershoots or overshoots of the inflation target are stronger when the public expects such a bias. The Riksbank should therefore make it clear *in advance* that it will be conducting monetary policy with a tendency to let the price level recover to what it would have been in the absence of undershoots or overshoots of the target. It should also make clear that putting in this bias is only a slight modification of its monetary policy strategy.

Recommendation 4: The Riksbank should provide more information on the future path of policy rates that are used in producing its forecasts of inflation and the economy, but should make clear the uncertainty surrounding such a path. The recent move to basing forecasts on a non-constant path for policy rates is a step in the right direction. The Riksbank, as it has already indicated, should move one step further and base its forecasts on its own assessment of the policy path. In its *Inflation Report* it should provide information about such a path using graphs (fan charts) that show the general direction of the future path but also its uncertainty, thereby not committing the Riksbank to a specific level of policy rates in the future. In addition, the Riksbank should make clear that the uncertainty reflected in its fan

charts about future policy rates means that its executive board has not committed to future decisions about policy rates.

Recommendation 5: The inflation target should be defined in terms of a price index that is not directly affected by the costs of housing. The current CPI measure includes an important component that is essentially mortgage interest rates multiplied by an index of housing prices. This measure is not the right one for the Riksbank to target on in order to stabilize the economy. The first best solution to this problem would be for Statistics Sweden to change the definition of the CPI as has been done in other countries such as the Euro area to remove the influence of housing prices and interest rates in the CPI measure. Alternatively, the Riksbank should make clear that its inflation target uses a measure that excludes interest rates and housing prices (such as UND1X).

Recommendation 6: There is no compelling reason to change the level of the inflation target from the 2% number. But further study of the appropriate level of the inflation target could be beneficial if it is conducted by technical experts. The 2% level of the inflation target is in the middle of what other inflation targeting countries have chosen and is not inconsistent with what economic analysis suggests is a reasonable inflation goal. The appropriate level of an inflation goal is, however, specific to the institutions and characteristics of each country's economy and may also change over time. Serious study of the appropriate goal for inflation in Sweden would certainly be valuable, but if there were to be a change to the inflation goal, it should be exclusively based on technical considerations.

5.2 Governance of Monetary Policy

Recommendation 7: The dialogue between the Sveriges Riksdag and the Riksbank needs to be enhanced by separating the release of the *Inflation Report* from its discussion in the Finance Committee. The *Inflation Report* should be released to all parties, including the Riksdag's Committee on Finance, at the same time, but at least one to two weeks prior to the Committee's hearing on the report. This would give the committee and the public sufficient time to study and evaluate the *Inflation Report*. In its evaluation process the Committee should consider using the contribution of outside experts. Such a process would significantly enhance the quality of the political debate about monetary policy and increase the accountability of the Riksbank.

Recommendation 8: A main venue for public debates on monetary policy is in the parliament. An improved debate on monetary policy by the public and particular the parliament makes it less necessary for government officials to express their own views on monetary policy. While government officials

have the right to speak on any issue they choose, the experience in many countries suggests that monetary policy and economic performance is enhanced when the government refrains from commenting on the stance of monetary policy.

Recommendation 9: Individuals who are nominated to the Executive Board of the Riksbank should be asked to appear in parliamentary hearings before they are appointed. Because central banks are among the most independent of government agencies, its officials need to be thoroughly publicly scrutinized before they are appointed. Because, contrary to other Swedish agencies, the Riksbank is unique in being an agent of the Riksdag rather than the government, the Riksdag's Committee on Finance is the appropriate venue for such scrutiny.

APPENDIX 1

Terms of reference for the evaluation of Swedish monetary policy, 1995–2005, provided by the Riksdag Committee on Finance

Background

Since 1 January 1999, following a broadly supported parliamentary agreement, the Riksbank (Swedish central bank) has had an independent status in relation to the Riksdag and the Government. This independent status is set out in Swedish law. Decisions regarding changes in interest rates are taken by an Executive Board consisting of six members. According to the Riksbank Act (1988:1385), members of the Executive Board may not seek or take instructions on matters relating to monetary policy. The Instrument of Government, which is one of the laws making up the Swedish Constitution, also states that no public authority can determine how the Riksbank decides in matters relating to monetary policy.

The Riksbank Act states that the objective of the Riksbank's activities is to maintain price stability. It should also promote a safe and efficient system of payments. According to the preparatory materials to the Act, the primary aim of the Riksbank's monetary policy should be to achieve a low and stable rate of inflation. In addition the Riksbank should, without neglecting the objective of price stability, support the aims of general economic policy with the purpose of attaining sustainable economic growth and high levels of employment. Unlike its counterparts in countries such as the UK and New Zealand, it is the Riksbank itself rather than its principal – the Riksdag – that draws up the operational goals of monetary policy. In this respect, the Riksbank has a similar position in Sweden to the ECB in the Economic and Monetary Union.

In January 1993, shortly after Sweden abandoned the fixed exchange rate and let the krona float freely on the foreign exchange market, the General Council of the Riksbank decided that Sweden's operative monetary policy would be based on an inflation target. The objective, which formally began to apply on 1 January 1995, was formulated as follows:

- Inflation was to be limited to 2 per cent per year, with a tolerance range of ± 1 per cent.
- The target was to be defined in terms of the consumer price index (CPI).
- The target was to be symmetrical, in the sense that the Riksbank would view excessively low inflation as seriously as it would excessively high inflation.

Over time, the Riksbank has drawn up a basic rule for monetary policy. According to this rule the repo rate should normally be raised if there is a risk of inflation exceeding the inflation target in the course of one or two years, and vice-versa if the inflation forecast is below the target.

The new Executive Board chose to maintain the inflation target when it assumed office on 1 January 1999. At the same time, it issued a clarification of Sweden's monetary policy, in which it stated the following two reasons for why it may in certain cases be warranted to allow more than one to two years to meet the inflation target:

- If the consumer price index is likely to be influenced over the coming one to two years by one or more factors that are not considered to affect inflation and inflation expectations more permanently. Examples of such factors include changes in household interest costs or changes in indirect taxes and subsidies.
- If inflation has deviated so sizeably from the target that a quick return caused by changed interest rates would have significant unwanted effects on production and employment. In such a situation, the target should be met more gradually.

The inflation target has been the official anchor of monetary policy for the past ten years. This is sufficiently long to warrant an in-depth evaluation of Swedish monetary policy, in addition to the evaluations carried out by the parliamentary Committee on Finance in connection with its annual examination of the Riksbank's activities.

Purpose

The purpose of this evaluation is to examine the shaping of Sweden's monetary policy and the results of this policy for the period 1995-2005, in accordance with the guidelines presented below. If necessary, the evaluator shall propose changes as part of this evaluation. Should established methods of evaluation prove to be insufficient, the evaluator shall also develop and test new methods for the evaluation of monetary policy. The evaluator shall also propose ways in which annual evaluations of monetary policy can be broadened, deepened and organised in the future. The evaluation will be broadly disseminated.

Guidelines

The following issues shall be addressed:

- **The Riksbank's objective.** The evaluator shall analyse whether there is any conflict of goals between the Riksbank Act's price stability objective and the task of promoting stability in the financial system.

- **The formulation of the inflation target.** The evaluator shall analyse whether the inflation target is correctly formulated so as to ensure price stability. The evaluator shall analyse whether the inflation target also serves to support existing objectives of general economic development with the aim of achieving sustainable economic growth and high levels of employment. The evaluator shall highlight the consequences of the current system according to which the Riksbank independently formulates the operative objectives of monetary policy. The evaluator shall examine the target level, tolerance range, target variable and the clarifications that have been developed.
- **Fulfilment of the inflation target and the shaping of monetary policy.** The evaluator shall analyse to what extent current monetary policy has contributed to achieving the inflation target during the period 1995-2005. The analysis shall be carried out on an annual basis. The evaluator shall highlight whether the current monetary policy has also served to support the goals of sustainable economic growth and high levels of employment. The evaluator shall highlight whether the Riksbank has observed its basic rule for monetary policy and whether it has sought to ensure symmetry in its approach to the inflation target.
- **Data and procedures for monetary policy decisions.** The evaluator shall analyse the Riksbank's forecasting and analysis methods, as well as the quality of the economic/statistical data on the basis of which decisions are made. The evaluator shall also highlight and analyse the Riksbank's internal preparation and decision-making processes.
- **The Riksbank's external communication.** The evaluator shall analyse the Riksbank's external communication with regard to the inflation target, current economic developments, changes in interest rates and the reasons for any deviations from the inflation target. The evaluator shall examine whether the Riksbank's presentation of its decisions and the data on which its decisions are based (inflation reports, press releases, minutes, speeches, working reports) are such that monetary policy can be predicted and evaluated.
- **The instruments of monetary policy.** The evaluator shall analyse whether the instruments of monetary policy that the Riksbank has at its disposal are sufficient for the Riksbank to achieve its goals.
- **Comparison with other countries with inflation targets.** The evaluator shall compare the shaping and results of monetary policy in Sweden with a few other countries with inflation targets.

Working method and report

- The evaluator shall compile necessary data in the relevant areas set out in the guidelines above. The Riksbank will be able to assist the evaluator in this task. The Riksbank will establish within its organisation a secretariat that will assist the evaluator with any translations, information and background material that the evaluator considers necessary for the purpose of the evaluation. In order to guarantee independence, the evaluator shall also have independent secretariat resources to collect and process any necessary data.
- The evaluator shall invite various stakeholders to submit their opinions on the considerations presented in the guidelines above. If necessary, the evaluator shall appoint other relevant expertise.
- The evaluator shall submit his or her findings in writing to the Riksdag Committee on Finance by no later than 15 november 2006. The findings will then be published as a report for general dissemination.
- After submitting the findings to the Riksdag Committee on Finance, the evaluator must be prepared to participate in public seminars on the organisation and findings of the evaluation.

APPENDIX 2

Schedule of the meetings we had with various parties

Frederic Mishkin's meeting schedule, March 7-10, 2006

Tuesday, March 7

- 10.00-11.00 Stefan Ingves, Governor, the Riksbank.
- 11.30-13.00 Lunch at the Riksbank with Irma Rosenberg, Vice Governor, the Riksbank, and others.
- 13.00-14.00 Irma Rosenberg.
- 14.30-15.30 The Committee on Finance: Bo Bernhardsson (Social Democrats), Gunnar Axén (Moderat Party), Gunnar Nordmark (Liberal Party); the Committee Secretariat: Ove Nilsson (Head) and Pär Elfvingsson.
- 17.00- Dinner with Anders Vredin, Head of Monetary Policy Department, the Riksbank, Pär Elfvingsson and Mikael Apel, Advisor, the Riksbank.

Wednesday, March 8

- 9.00-11.00 Dan Andersson, Chief Economist, Swedish Trade Union Confederation (LO).
- 11.30-13.30 Urban Bäckström, Director General, Confederation of Swedish Enterprise (Svenskt Näringsliv).
- 14.00-15.00 Klas Eklund, Chief Economist, and Henrik Mitelman, Chief Bond Analyst, SEB.

Thursday, March 9

- 9.00-10.30 Anders Vredin, Head of Monetary Policy Department, the Riksbank.
- 10.30-11.30 Per Jansson, Deputy Head of Monetary Policy Department, the Riksbank
Lunch at the Riksbank with Tor Jacobson, Deputy Head of Monetary Policy Department (in charge of research) and Kasper Roszbach, Head of Research Division.
- 14.30-15.30 Jörgen Eklund, Chief Press Officer and Staffan Viotti, Advisor to the Governor, the Riksbank.
- 15.30-16.30 Claes Berg, Advisor, General Secretariat, the Riksbank.

Friday, March 10

- 10.00-12.30 Ingemar Hansson, Director General, National Institute of Economic Research (Konjunkturinstitutet).
- 13.00-14.00 Kerstin Hallsten, Deputy Head of Monetary Policy Department, the Riksbank.
- 14.30-16.30 Summarizing discussion at the Riksbank (Irma Rosenberg, Anders Vredin, Per Jansson, Kerstin Hallsten).
- 16.30-17.30 Planning of the visit in May with Pär Elfvingsson and Mikael Apel.

Francesco Giavazzi's meeting schedule, April 3-7, 2006Monday, April 3

- 10.00-11.30 Irma Rosenberg, Vice Governor, the Riksbank.
- 11.30-13.00 Lunch at the Riksbank with Irma Rosenberg and others.
- 14.00-15.00 Johan Schück, Columnist, Dagens Nyheter.
- 15.30-16.30 Peter Norman, President of the Seventh AP Fund.

Tuesday, April 4

- 9.30-11.00 Per Lundborg, Professor, Swedish Institute for Social Research (SOFI).
- 11.30- Torsten Persson, Director, Institute for International Economic Studies. Afternoon spent at the IIES. Meetings with Torsten Persson and others.

Wednesday, April 5

- 10.30-11.30 Lena Hagman, Chief Economist, and Roland Spånt, former Chief Economist, Swedish Confederation of Professional Employees (TCO).
- 12.00-13.30 Hubert Fromlet, Chief Economist, Swedbank (Förenings-sparbanken).
- 14.00-15.00 Jörgen Appelgren, Chief Economist, Nordea.
- 18.00- Klas Eklund, Chief Economist, SEB.

Thursday, April 6

- 10.00-11.00 Anders Vredin, Head of Monetary Policy Department, the Riksbank.
- 11.30-13.00 Jan Häggström, Chief Economist, Handelsbanken, Erik Thedéen, Strategist, Nektar Asset Management, Brummer & Partners and Jan-Åke Sand, Senior Portfolio Manager, SEB Hedge Fixed Income.
- 14.15-15.15 Jens Henriksson, State Secretary, Ministry of Finance.
- 15.30-16.30 The Committee on Finance: Bo Bernhardsson, Agneta Gille, Sonia Karlsson and Carin Lundberg (Social Democrats), Tomas Höggström (Moderate Party), Karin Pilsäter (Liberal Party), Roger Tiefensee (Centre Party); the Committee Secretariat: Ove Nilsson (head), Pär Elfvingsson, Niklas Frank and Joanna Gervin.
- 16.45-17.45 Anders Borg, Chief Economist, Moderate Party.

Friday, April 7

- 9.30-11.00 Johan Gernandt, Vice Chairman, General Council of the Riksbank and Susanne Eberstein, member of General Council.
- 11.30-13.30 Lunch and summarizing discussion at the Riksbank.
- 13.30-14.30 Lars Heikensten, former Governor, the Riksbank.

Francesco Giavazzi's and Frederic Mishkin's meeting schedule, May 9-11, 2006Tuesday, May 9

- 10.00-11.00 Göran Persson, Prime Minister.
- 12.00-13.30 Jan Häggström, Chief Economist, Handelsbanken, Erik Thedéen, Strategist, Nektar Asset Management, Brummer & Partners and Jan-Åke Sand, Senior Portfolio Manager, SEB Hedge Fixed Income.
- 14.30-15.30 Martin Andersson, Head of the Financial Stability Department, the Riksbank.
- 17.00-18.00 Anders Borg, Chief Economist, Moderate Party.

Wednesday, May 10

- 9.00-10.00 Jens Henriksson, State Secretary, Ministry of Finance.
- 10.30-11.30 Stefan Ingves, Governor, the Riksbank.
- 11.30-12.45 Lunch at the Riksbank with Anders Vredin, Head of Monetary Dept and Staffan Viotti, Advisor to the Governor.
- 13.00-13.30 Green Party: Peter Eriksson.
- 13.45-14.45 Non-Socialist Alliance. Moderate Party: Gunnar Axén, Hans Lindblad (the party secretariat); Liberal Party: Gunnar Nordmark, Christer Nylander, Karin Pilsäter, Sune Davidsson (the party secretariat); Centre Party: Åsa Torstensson.
- 15.00-15.45 Social Democrats: Bo Bernhardsson, Agneta Gille, Sonia Karlsson, Arne Kjörnsberg, Carin Lundberg.
- 16.45-17.15 Left party: Lars Bäckström, Siv Holma, Camilla Sköld Jansson.
- 17.30-18.30 The Riksbank's General Council; Jan Bergqvist (Chairman) and Johan Gernandt (Vice Chairman).

Francesco Giavazzi's meetings, August 31-September 1, 2006Thursday, August 31

- 11.00-12.00 Stefan Ingves, Irma Rosenberg, and Anders Vredin

Friday, September 1

- 14.00-14.30 Pär Elfvingsson, Ove Nilsson and Ingvar Mattsson from the Committee on Finance
- 17.30-18.30 Johan Gernandt, Vice Chairman, the Riksbank's General Council

APPENDIX 3

List of the institutions which responded to our invitation by sending written submissions

The Swedish Trade Union Confederation (LO)

The Swedish Confederation of Professional Employees

The Economic Council of Sweden at the National Institute of Economic Research

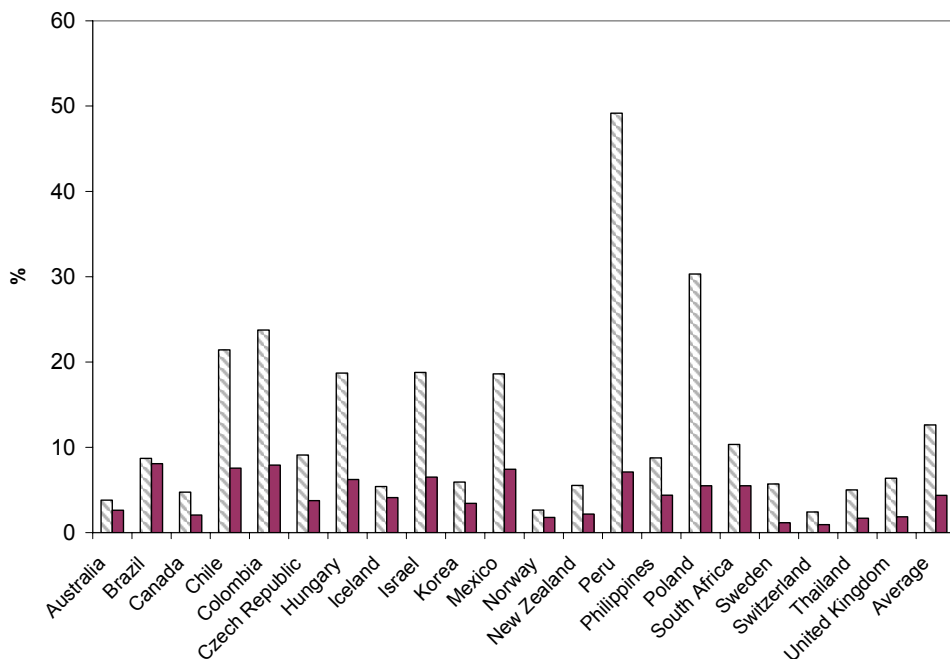
The Department of Economics of Lund University

The Department of Economics of Uppsala University

The School of Business, Economics, and Law at Göteborg University

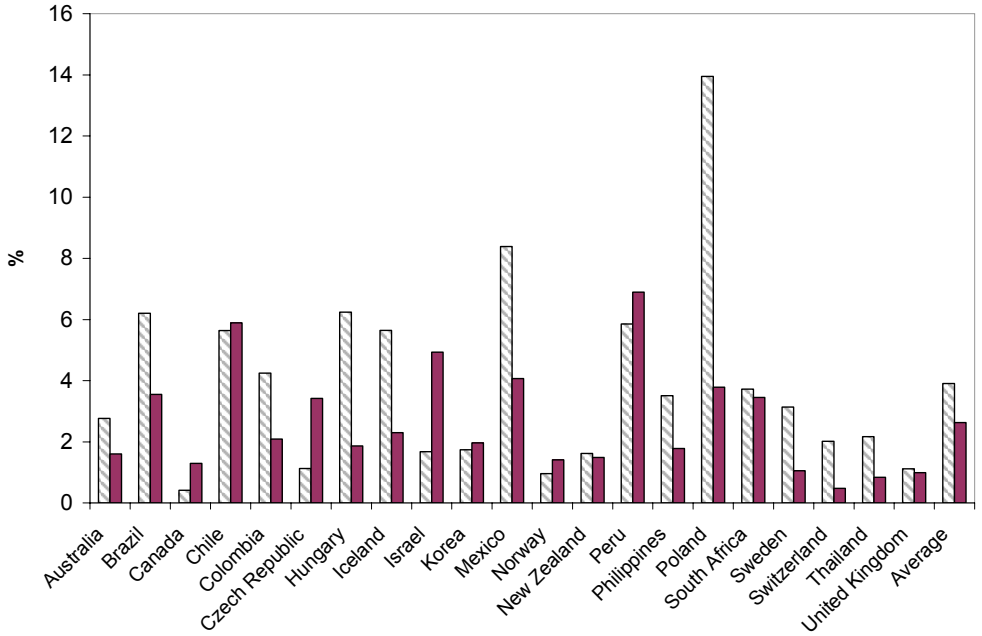
APPENDIX 4

Figure 1: Average level of inflation, before and after adoption of inflation targeting



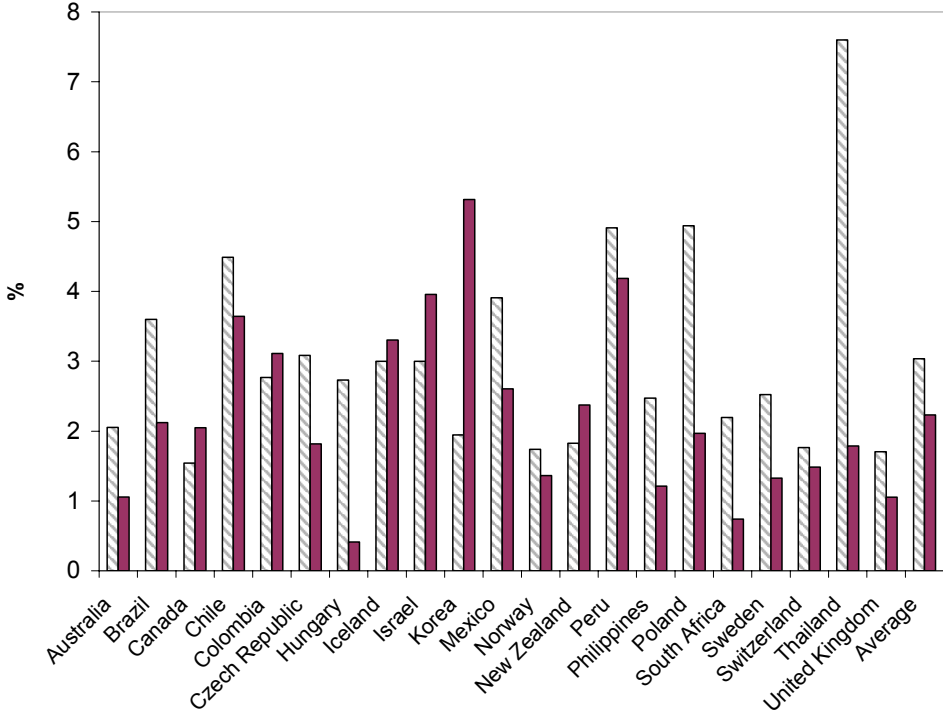
Source: Data are from 1989, Q1 to 2004, Q4 from IMF *International Financial Statistics*. Adoption dates of inflation targeting are from Mishkin, Frederic S. and Klaus Schmidt-Hebbel, "One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?" in Norman Loayza and Raimundo Soto, eds., *Inflation Targeting: Design, Performance, Challenges* (Central Bank of Chile: Santiago 2002): 171-219

Figure 2: Volatility of inflation (standard deviation) before and after adoption of inflation targeting



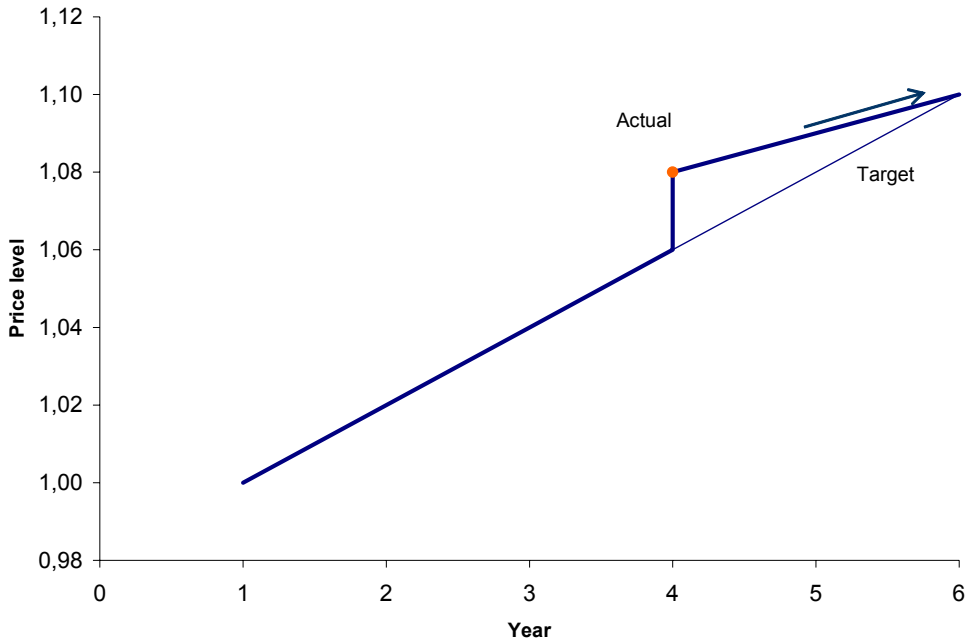
Source: Data are from 1989, Q1 to 2004, Q4 from IMF International Financial Statistics. Adoption dates of inflation targeting are from Mishkin, Frederic S. and Klaus Schmidt-Hebbel, "One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?" in Norman Loayza and Raimundo Soto, eds., *Inflation Targeting: Design, Performance, Challenges* (Central Bank of Chile: Santiago 2002): 171-219.

Figure 3: Volatility of output (standard deviation) before and after adoption of inflation targeting



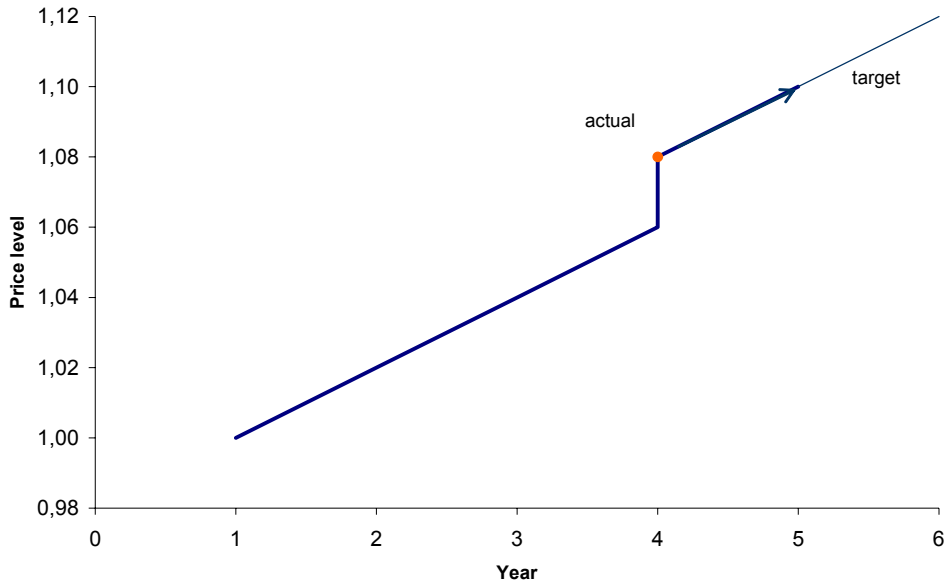
Source: Data are from 1989, Q1 to 2004, Q4 from IMF International Financial Statistics. Adoption dates of inflation targeting are from Mishkin, Frederic S. and Klaus Schmidt-Hebbel, "One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?" in Norman Loayza and Raimundo Soto, eds., *Inflation Targeting: Design, Performance, Challenges* (Central Bank of Chile: Santiago 2002): 171-219.

Figure 4: Price Level versus Inflation Targeting



Panel (a) Price Level Targeting

Suppose the desired inflation rate is 2% so the price level target is rising at 2% every year and inflation has also been rising at 2% from year 1 to year 3. Then the inflation rate jumps to 4% in year 4. With a price level target the overshoot of inflation requires the central bank to move the price level back to the target path, which means that for a period of time the central bank will shoot for an inflation rate will be below 2%

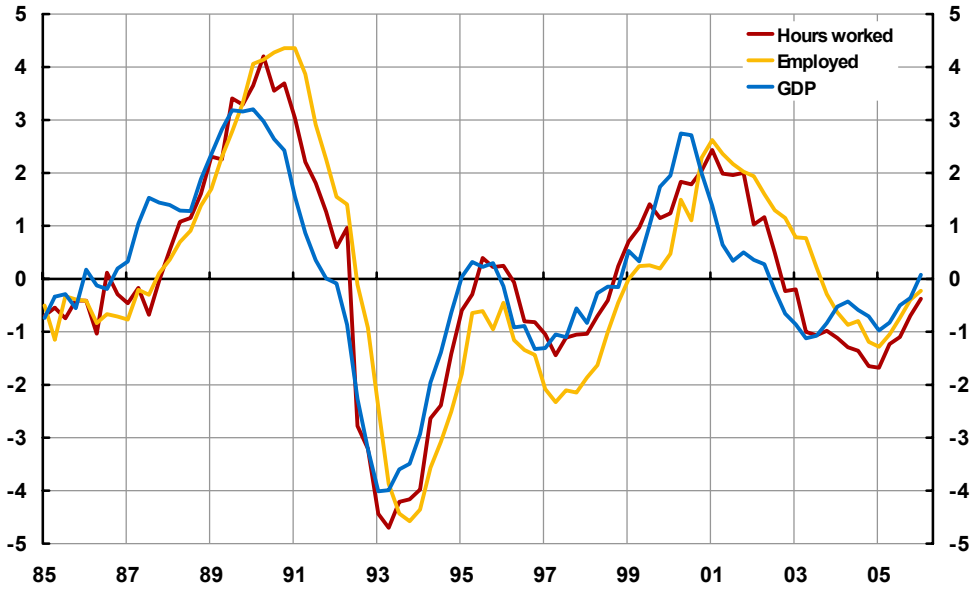


Panel (b) Inflation Level Targeting

Suppose the inflation target is 2% so the price level target is rising at 2% every year and inflation has also been rising at 2% from year 1 to year 3. Then the inflation rate jumps to 4% in year 4. With an inflation target, the price level path that is targeted is raised to accommodate the increased price level (bygones are bygones), so the central bank still tries to achieve an inflation rate of 2%.

Figure 5: Outputgaps, Hodrick-Prescott filtered

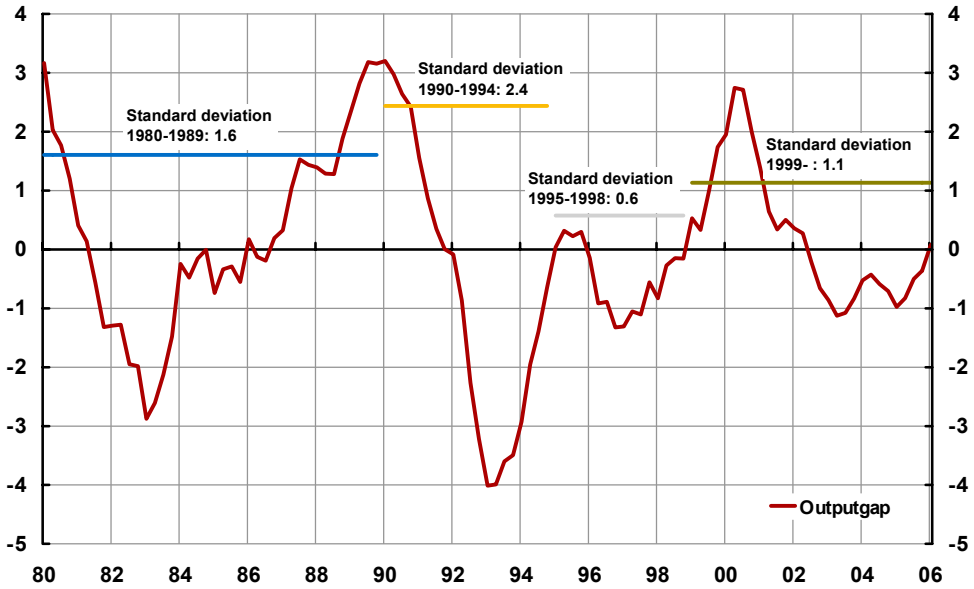
Percentage deviation from trend.



Sources: Statistics Sweden and the Riksbank.

Figure 6: Output gap (GDP), Hodrick-Prescott filtered

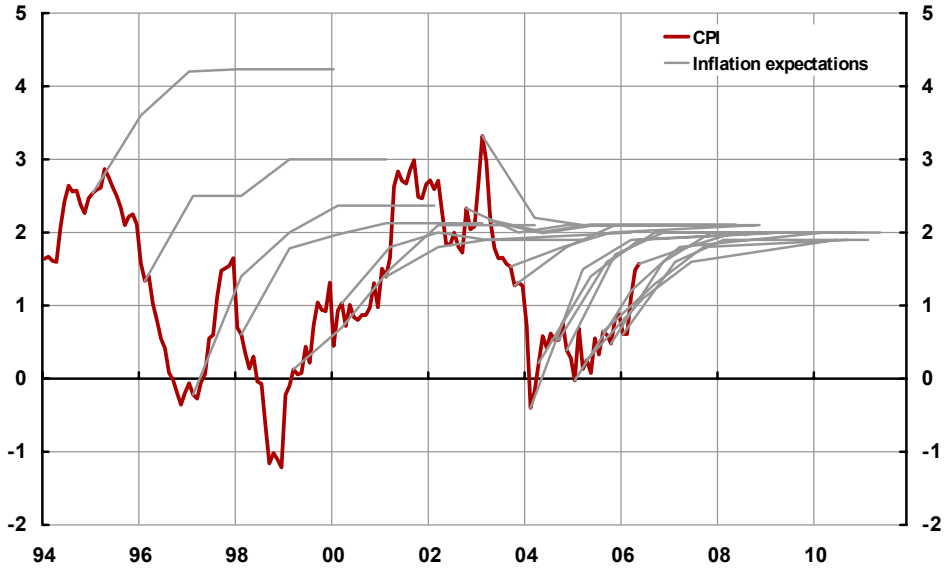
Percentage deviation from trend.



Source: The Riksbank.

Figure 7: CPI and money market players' inflation expectations

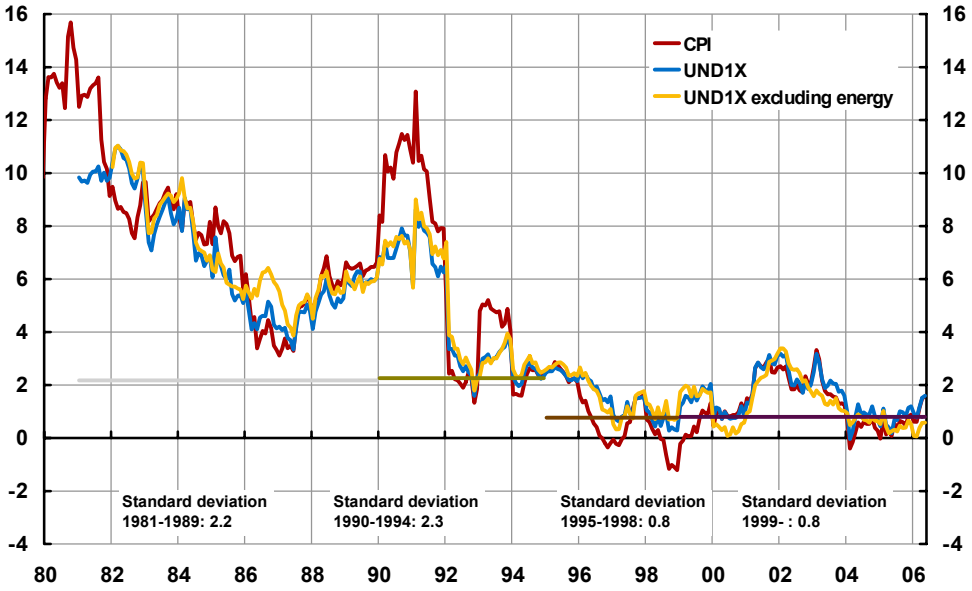
Annual percentage change.



Sources: Prospera Research AB and Statistics Sweden.

Figure 8: Different inflation measures

Annual percentage change



Sources: Statistics Sweden and the Riksbank

Figure 9: Open unemployment

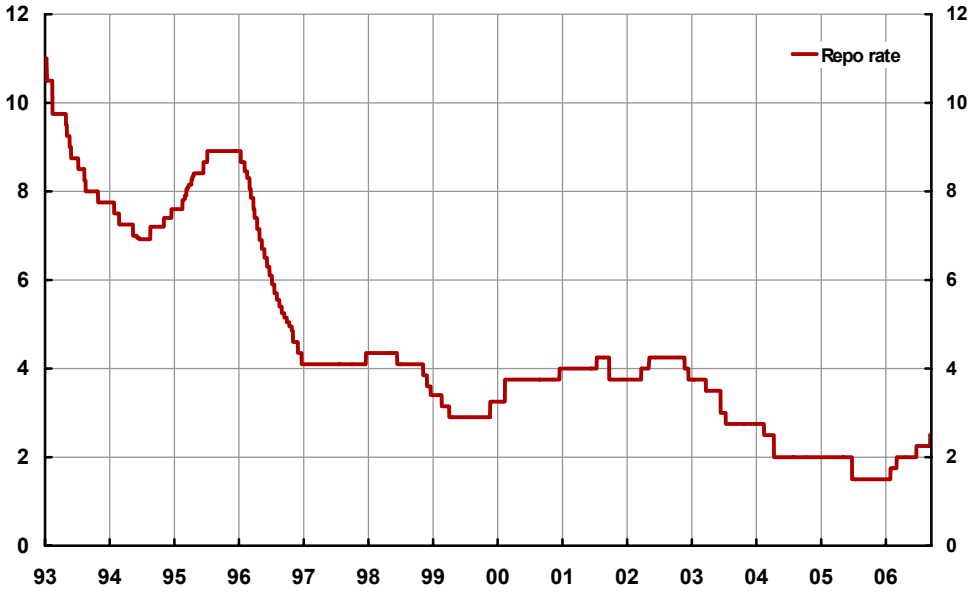
Per cent of the labour force, seasonally adjusted



Sources: NIER, Statistics Sweden and the Riksbank.

Figure 10: Swedish policy rate: Repo rate

Per cent



Source: The Riksbank.

Figure 11: Out-of sample (static and dynamic) forecasts from a simple monetary policy rule

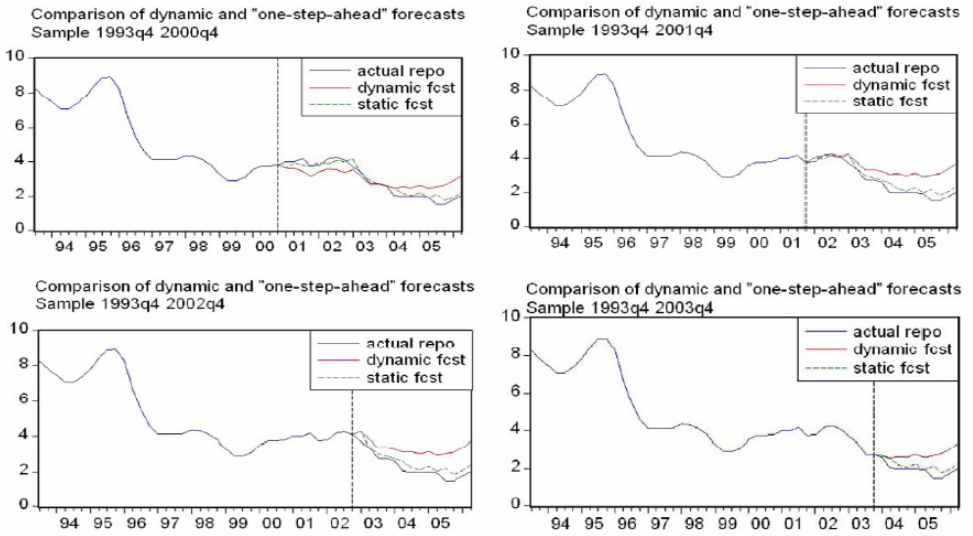
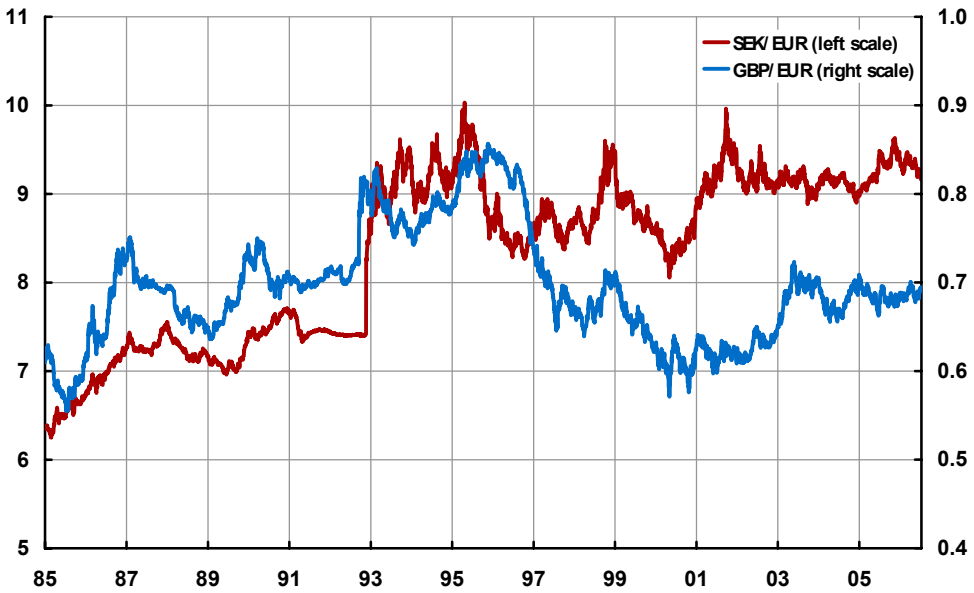


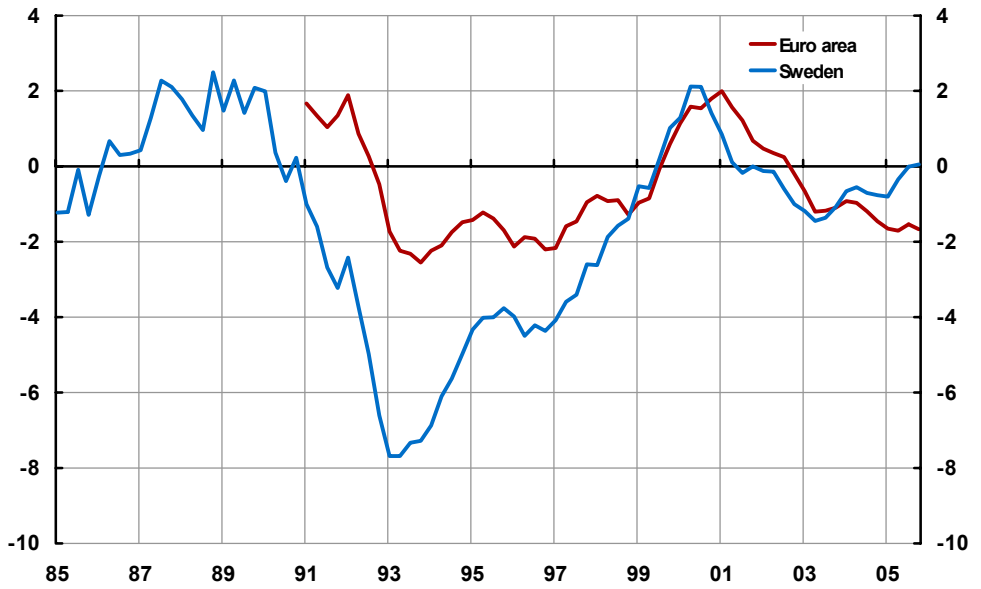
Figure 12: Exchange rates, SEK/EUR and GBP/EUR



Source: The Riksbank.

Figure 13: Output gap: Sweden and the Euro area

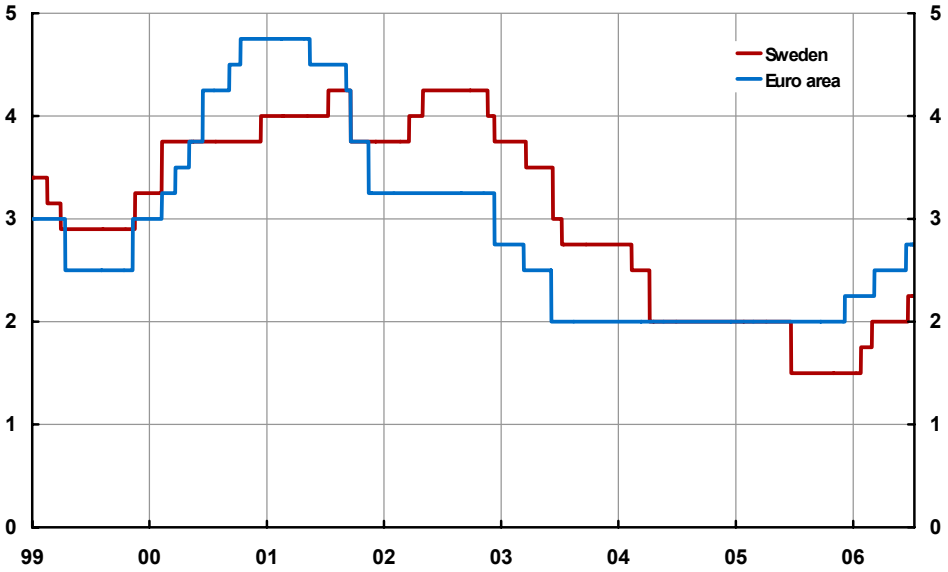
Per cent of potential GDP



Source: OECD.

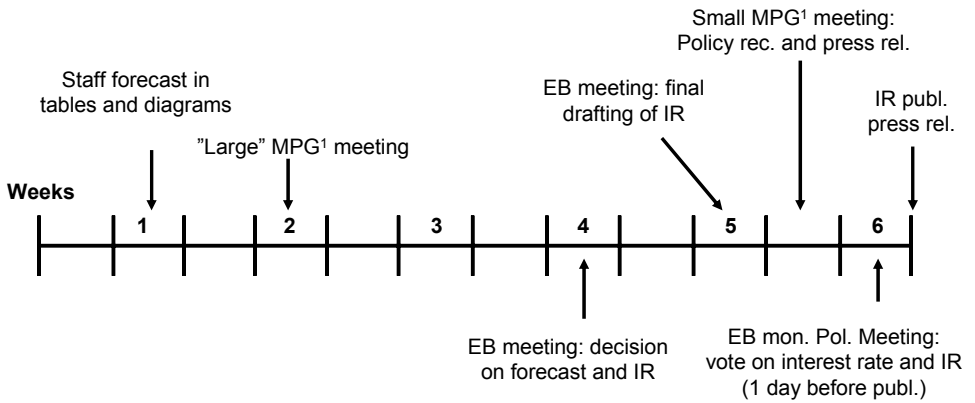
Figure 14: Policy rates: Sweden and the Euro area

Per cent



Source: The Riksbank.

Figure 15: The Swedish monetary policy process



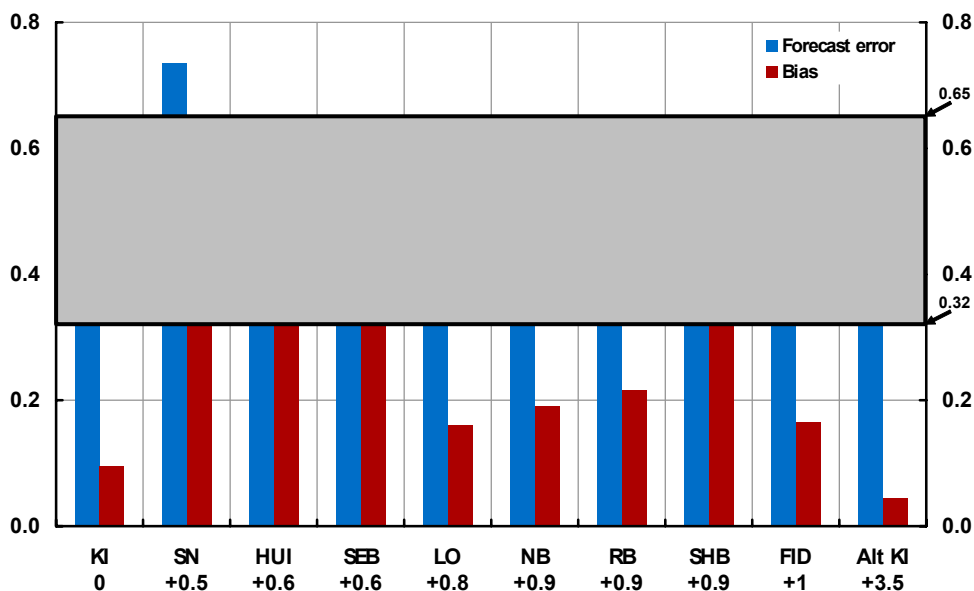
¹ Monetary Policy Group.

EB Executive Board

IR Inflationary Report

Figure 16: A comparison of forecast errors

Forecast error CPI 1997–2005

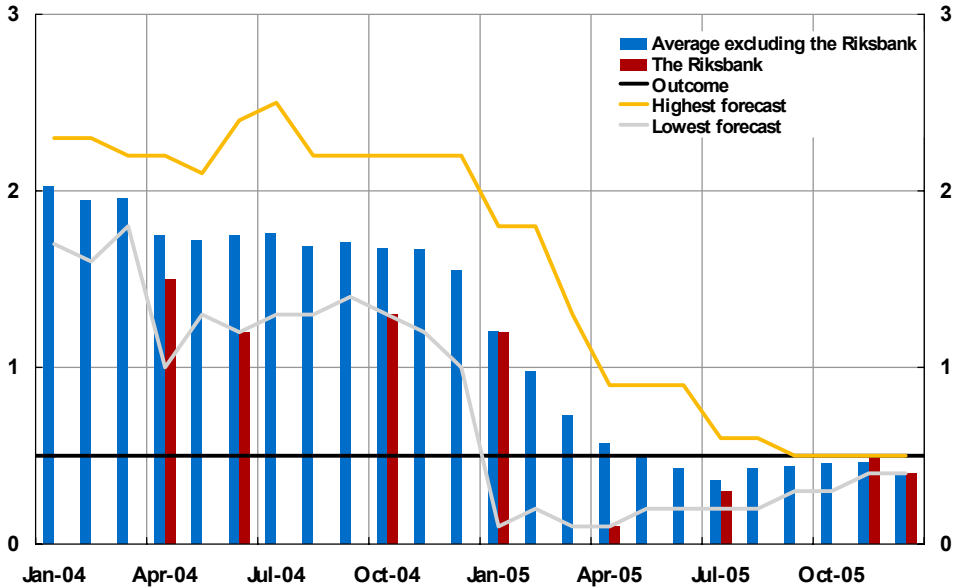


Note: Forecast error refers to the absolute mean forecast error, in forecasts made in 1997-2005, i.e. those in the spring and autumn of the current year and in the spring and autumn of the previous year. Bias refers to the average overestimation (mean forecast error). The figures, below the figure, show when the forecasts of the respective forecasting institute were published in relation to the NIER's forecasts: the difference is expressed in average number of months. The 95-% confidence interval, which is indicated in the figure, is calculated from the data set 1999-2005 and is centered around NIER's forecast at the time 0.

Sources: NIER (The Swedish Economy March 2006), Statistics Sweden and the Riksbank.

Figure 17: Forecasts of inflation (CPI) in 2005 at various times:
the Riksbank and an average of other forecasters

Annual averages.



Sources: Consensus Inc., Ministry of Finance, LO, Statistics Sweden and the Riksbank.

Endnotes

¹ Friedman, Milton (1968) "The Role of Monetary Policy," *American Economic Review*, 58, (March): 1-17; and Phelps, Edmund (1967), "Phillips Curves, Expectations and Optimal Unemployment Over Time," *Economica*, 34 (August): 254-281.

² Lucas, Robert E., Jr (1972) Expectations and the Neutrality of Money. *Journal of Economic Theory* 4: 103-124; Lucas, Robert E., Jr (1973) Some International Evidence on Output-Inflation Tradeoffs. *American Economic Review* 63: 326-334; Lucas, Robert E., Jr (1976) Econometric Policy Evaluation: A Critique. in *The Phillips Curve and Labor Markets*, Brunner K and Meltzer A eds. Carnegie-Rochester Conference Series on Public Policy 1: 19-46; and Sargent, Thomas J. and Neil Wallace (1975) "Rational Expectations, the Optimal Monetary Instrument and the Optimal Money Supply Rule," *Journal of Political Economy* 83: 241-254.

³ Kydland, Finn, and Prescott, Edward (1977). "Rules Rather than Discretion: The Inconsistency of Optimal Plans." *Journal of Political Economy* 85, no. 3 (June): 473-492; Calvo, Guillermo (1978). "On the Time Consistency of Optimal Policy in the Monetary Economy." *Econometrica* 46, no. 6 (November): 1411-1428; and Barro, Robert J., and Gordon, David (1983). "A Positive Theory of Monetary Policy in a Natural Rate Model." *Journal of Political Economy* 91, no. 4 (August): 589-610.

⁴ See Bernanke, Ben S., Laubach, Thomas, Mishkin, Frederic S., and Posen, Adam S. (1999) *Inflation Targeting: Lessons from the International Experience* (Princeton University Press: Princeton).

⁵ Svensson, Lars.E.O. (1997) "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," *European Economic Review*, 41: 1111-1146.

⁶ See the recent surveys in Forder, James (2000). "Central Bank Independence and Credibility: Is There a Shred of Evidence?: Review" *International Finance*, vol. 3, no. 1, April: 167-185 and Cukierman, Alex (2006), "Central Bank Independence and Monetary Policymaking Institutions: Past Present and Future," Central Bank of Chile Working Papers No. 360 (April).

⁷ Woodward, Bob (2000) *Maestro: Greenspan's Fed and the American Dream* (Simon and Schuster: New York).

⁸ Goodfriend, Marvin (1993) "Interest Rate Policy and the Inflation Scare Problem: 1979-1992." *Federal Reserve Bank of Richmond Economic Quarterly* 79, no. 1 (Winter): 1-24.

⁹ Note that not all supply shocks lead to a tradeoff between inflation and output fluctuations. A negative supply shock could lead to a decline in potential output along with higher inflation and then lowering inflation and allowing actual output to decline is the right thing for the central bank to do.

¹⁰ Svensson, Lars.E.O. (1997) "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," *European Economic Review*, 41: 1111-1146.

¹¹ Woodford, Michael. (2003) *Interest and Prices: Foundations of a Theory of Monetary Policy* (Princeton University Press: Princeton).

¹² Because estimates of output gap measures are one important input into central bank forecasts of inflation, there is an argument to provide some information about them to the public, but which emphasizes how uncertain these measures are. We do not believe that fan charts are a good way to do this because we do not believe that they describe sufficiently that we are not even sure conceptually how to measure potential output and output gaps. On the other hand, publication of several different conceptual ways of measuring output gaps might provide more information about them and might indicate how uncertain these measures are. This is a subject for further research.

¹³ Morris, Stephen and Shin, Hyung Song (2005). "Central Bank Transparency and the Signal Value of Prices," *Brookings Papers on Economic Activity* 2: 1-66.

¹⁴ E.g., see Svensson, Lars E. O. (2005) "Social Value of Public Information: Morris and Shin (2002) is Actually Pro Transparency Not Con," NBER Working Paper No. 11537 (August), Woodford, Michael (2005). "Central Bank Communication and Policy Effectiveness," NBER Working Paper No. 11898 (December) and Wyplosz, Charles et al. (2006), "How Much Information Should Interest Rate-Setting Central Banks Reveal?," mimeo, University of Geneva, Graduate Institute of International Studies.

¹⁵ Svensson, Lars E.O., 2002, "Monetary Policy and Real Stabilization," in Federal Reserve Bank of Kansas City, *Rethinking Stabilization Policy*: 261-312.

¹⁶ Goodhart, Charles A.E. (2001) "Monetary Transmission Lags and the Formulation of the Policy Decision on Interest Rates," Federal Reserve Bank of St. Louis, *Review* (July/August): 165-181, page 173.

¹⁷ Since the interest rate path is multi-dimensional it would be impossible to have an open ended voting procedure, because the votes would become too scattered. This could be avoided by restricting the preferences of committee members - for instance by choosing a particular voting sequence. However that would make it easy for whoever sets the agenda to manipulate the vote on the interest rate path. This is an illustration of the problems of collective decision-making identified by Condorcet and Arrow and discussed in the vast literature on social choice. For an introduction to these issues see Torsten Persson and Guido Tabellini *Political Economics: Explaining Economic Policy*, MIT Press (2000). For a more extended discussion see David Austen Smith and Jeff Banks, *Positive Political Theory II*, University of Michigan Press. (2005).

¹⁸ Most central banks talk about the most likely path (mode) of their forecasts, but there are strong theoretical arguments for central banks to talk more about the mean path because it takes into account that the risks to the forecast may be biased more in one direction than another. In most cases, however, the mean and the mode will be quite close to each other.

¹⁹ Svensson, Lars E.O., 2002, "Monetary Policy and Real Stabilization," in Federal Reserve Bank of Kansas City, *Rethinking Stabilization Policy*: 261-312.

²⁰ See for instance Goodfriend, Marvin, and King, Robert G. (1997): "The New Neoclassical Synthesis and the Role of Monetary Policy" *NBER Macroeconomics Annual* 1997, 231-283.

²¹ Akerlof, George, Dickens, William, and George Perry, 1996. "The Macroeconomics of Low Inflation," *Brookings Papers on Economic Activity* 1: 1-59. Lundborg, Per and Hans Sacklén (2001), "Is There a Long-Run Unemployment-Inflation Tradeoff in Sweden?", Working Paper Series 2001, No. 173, Trade Union Institute for Economic Research (FIEF). Akerlof, Dickens and Perry make a related point in "Near Rational Wage and Price Setting and the Long Run Phillips Curve" in *Brookings Papers on Economic Activity*, (2000) No.1, 1-4. What appears to give rise to the non-vertical segment of the long-run Phillips curve in this paper is the assumption that economic agents at low levels of inflation are "near rational" in the sense that they respond less than proportionally to expected inflation, in their price and wage setting decisions. This "money illusion" is assumed to gradually fade away as inflation increases. This gives rise to a "hump" in the long-run Phillips curve.

²² If a deflation is anticipated, it would have less negative consequences for debtors versus creditors and so the debt-deflation problem described by Irving Fisher (1933) "The Debt-Deflation Theory of Great Depressions", *Econometrica*, Vol. 1: 337-357 would have less negative consequences. The fact that the deflation is anticipated does not completely rule out some negative impacts on balance sheets because if the debt is sufficiently long-lived, there still is some redistribution from debtors to creditors.

²³ Woodford, Michael (2003). *Interest and Prices: Foundations of a Theory of Monetary Policy* (Princeton University Press: Princeton).

²⁴ Eggertsson, Gauti B. and Woodford, Michael (2003) "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity* 1: 139-211.

²⁵ Gorodnichenko, Yuriy and Shapiro, Matthew D. (2006) "Monetary Policy When Potential Output is Uncertain: Understanding the Growth Gamble of the 1990s," *NBER Working Paper* No. 12268 (June), make this argument and show how it also works to stabilize inflation when the central bank underestimates productivity growth.

²⁶ Fischer, Stanley. 1994. "Modern Central Banking," in Forest Capie, Charles Goodhart, Stanley Fischer and Norbert Schnadt, *The Future of Central Banking*, Cambridge University Press, Cambridge, U.K.: 262-308.

²⁷ See footnote 22.

²⁸ For a discussion of Australian monetary policy in this period see "Six years of inflation targeting" address by Mr G.R. Stevens, Assistant Governor of the Reserve Bank of Australia, to the Economic Society of Australia, Sydney, 20 April 1999, available at: "http://www.rba.gov.au/PublicationsAndResearch/Bulletin/bu_may99/bu_059_9_2.pdf, in particular p. 53.

²⁹ Kai Leitemo, "Successful inflation targeting in Sweden 1993-2003? Seven simple tests", unpublished, Department of Economics, Norwegian School of Management, December 2005.

³⁰ Lars Ljungqvist and Thomas J. Sargent, "The Swedish Unemployment Experience," *European Economic Review*, vol 39, 1995, pp 1043-1070.

³¹ Marcela Meirelles Aurelio, "Do we really know how inflation targeters set interest rates?", Working Paper RWP 05-02, Federal Reserve Bank of Kansas City, July 2005.

³² The estimated monetary policy rule assumes that the policy rate is a function of its lag, the one-year ahead inflation forecast and the one-year ahead forecast for output growth.

³³ However, because the exchange rate has so little movement, the statistical test may have very low power.

³⁴ Pierre St-Amant, Greg Tkacz, Annie Guérard-Langlois, and Louis Morel (2005), "Quantity, Quality, and Relevance: Central Bank Research, 1990–2003" Bank of Canada, *Working paper* No. 37/2005

³⁵ "Bias" refers here to mean forecast error.

³⁶ The outcome and all forecasts shown in Figure 16 (including Riksbank's) are for CPI. The dating of the forecast follows Consensus Inc's presentation, which may differ from the actual date of publication by a month or two. The institutions used in this figure are the ones that are included in Consensus Economics Inc's publication.

³⁷ Blix, Friberg and Åkerlind (2002) make a comparison that includes more variables and covers the period 1993-2001. In this study the Riksbank comes out fairly well. This is somewhat less obvious in the most recent study by Bergvall (2005), "Utvärdering av Konjunkturinstitutets prognoser" ("An Evaluation of NIER's Forecasts"), covering the period 1997-2004. One issue that is emphasized both in Blix et al (2002) and Bergvall (2005) is that the differences between forecasters tend to be rather small, perhaps because of

“herd behaviour”. This means that different rankings between forecasters should be interpreted with caution and that it is hard to conclude that one forecaster is systematically and significantly better than another.

³⁸ Donald L.Kohn (2004) “Inflation Targeting,” Federal Reserve Bank of St. Louis *Review* Vol. 86, #4 (July/August): 179-183.

³⁹ Carin van der Crujisen and Maria Demertzis, “The impact of central bank transparency on inflation expectations”, *Working Paper* No. 031/2005, De Nederlandsche Bank (March 2005).

⁴⁰ Blinder, Alan and Morgan, John (2005) “Are Two Heads Better Than One? Monetary Policy by Committee,” *Journal of Money, Credit and Banking* (October): 789-812.