

Speech

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WEDNESDAY, 17 APRIL, 2002

Perspective on the inflation target

Swedish Economics Association

First I want to express my thanks for the invitation to attend your Association and discuss various aspects of the Riksbank's assignment. I truly look forward, in keeping with recent years, to a dialogue on economic policy issues both with my two opponents and with other scholars and students in this Association.

The theme for today's discussion, "Perspective on the Inflation Target", has led me to take the past year's increase in the rate of inflation as my starting point. To many forecasters, including those of us at the Riksbank, the increase has come as a surprise. This may raise questions about the intellectual framework, which rests on forecasts, for monetary policy's formation. Although I believe most people would agree that in the period of almost a decade in which it has been implemented, the inflation target has on the whole functioned quite well, it is still important that monetary policy's analytical framework is continuously discussed. The economy is constantly exposed to complex shocks, with repercussions which are so difficult to predict that we need to develop our thinking all the time.

In the work on this paper I have been greatly assisted by Claes Berg, Anders Borg, Jörgen Eklund, Staffan Viotti and Anders Vredin. I am also grateful for valuable comments from members of the Executive Board and other colleagues at the Riksbank. At the same time, I am solely responsible for any remaining errors and shortcomings, as well as for the opinions expressed here

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The question I shall be considering initially is whether there are alternatives to the way in which the Riksbank has chosen to conduct monetary policy. Simplifying somewhat, the Riksbank's approach can be described with a rule of thumb: if the forecast rate of inflation 1–2 years ahead is above the 2 per cent target, then the repo rate should normally be raised and vice versa.¹ The work accordingly focuses on a forecast of future inflation. But as forecasts are liable to be wrong, they carry an element of uncertainty. It can therefore be reasonable to discuss and compare alternative strategies in order to see whether the uncertainty can be reduced.

It might be argued that economic science is not sufficiently developed or that the interactions of economic agents and markets are far too complex to be forecast. Since monetary policy is not capable of influencing price developments directly, instead of taking its cue from inflation forecasts, the central bank could choose to set the interest rate in the light of some variable that is currently known. Examples of such intermediate variables could be current price tendencies, the money supply or resource utilisation. I intend to discuss such possibilities and then conclude by harking back to the Riksbank's current monetary policy strategy.

Alternatives to basing monetary policy on forecasts

Actual price movements

One alternative to the present rule of thumb could be to set the interest rate in the light of the prevailing rate of inflation. The Riksbank would then adjust the instrumental rate every time Statistics Sweden publishes a CPI outcome that is above or below the 2 per cent target.

The primary argument against such an arrangement is perhaps that, compared with the present rule of thumb, it would lead to larger fluctuations in real economic activity. This is because the repo rate and inflation are not *directly* linked. The Riksbank's possibility of influencing price movements is more indirect and works, in simple terms, via market interest rates, credit flows and asset prices before impinging on demand in the real economy and such variables as employment, profits, investment, consumption and net exports. Demand's impact on prices depends in turn on potential output and resource utilisation. We still do not know exactly how this complex transmission mechanism functions, how quickly it works or how it varies both over time and in its effects on the economy.

Concerning the time lag, the view adopted by most central banks is that most of the effect materialises after an interval of one to two years. It is conceivable that for various reasons monetary policy's impact via market interest rates may have become quicker in recent years. Financial markets have become more responsive to expectations, many households have flexible mortgage rates and so on. There are, however, other factors at work in the opposite direction. One is that the exchange rate, which in a small open economy is a central component of the transmission mechanism, does not always respond to instrumental rate adjustments in the same way as before. Moreover, on account of the associated menu costs, in a low inflation regime it seems that firms adjust prices less frequently. Still, until further notice most things speak in favour of the established view that the greater part of monetary policy's impact on inflation shows up after one to two years. That

naturally does not rule out the possibility that a part of the effect materialises either sooner or later than this.

From this it follows that basing monetary policy on current inflation can lead to problems because the economic situation that may have changed completely by the time the repo rate adjustment elicits its full effect. A rather abrupt change of course may then be needed to deal with the situation that then prevails.

Perhaps a parallel can be drawn with piloting a car ferry among the islands en route from Stockholm to Finland. If those in command concentrated on what lies just ahead of the ship's stern, their course would have to be rather erratic in order to avoid the numerous islands, skerries and shallows that suddenly come into view; and considering the time it takes to alter such a large ship's course, she may inevitably run aground and in any event the journey would hardly be pleasant for the passengers. Matters will be different if those on the bridge look further ahead and alter the course gradually so as to follow the smoothest line. What lies several nautical miles ahead may not be all that clear but it is possible to arrive at a reasonable view of the optimum course and make gradual changes as the picture becomes more distinct. In this way, not only will the ship reach its destination but the voyage will be fairly comfortable for its passengers.

One of the questions a central bank faces in the construction of a strategy for monetary policy is the choice between variations in real economic activity and in the rate of inflation. If the bank acts so that the real economy fluctuates sharply, sooner or later the political system and people in general will probably want to change the basic premises for the central bank's independence and primary assignment. Conversely, if real economic stability always has priority and the central bank accepts large deviations from the inflation target, confidence in the low inflation regime will soon be eroded. Against this background, most central banks aim for a reasonable compromise between these two extremes. They strive to fulfil the inflation target in the medium run by being forward-looking and accept the occurrence of limited deviations (downwards as well as upwards) in the short term. A monetary policy that acts on current inflation is by definition not forward-looking.

Similar arguments apply to a strategy whereby the central bank is guided by nominal GDP outcomes, a question that was discussed last year in this Association. Besides the disadvantages I just mentioned from not looking ahead, a nominal GDP strategy has the drawback that the national accounts frequently have to be revised. Whereas the CPI figures are mostly definitive when they are first published, the GDP outcome data are often changed substantially, sometimes after an interval of several years.²

The relatively long time lag before monetary policy affects the economy makes it necessary to accept that inflation will sometimes deviate from the target. The alternative would be marked fluctuations in employment and output. This is clear from what happens when one of the Riksbank's models is run with a monetary policy for correcting inflation quickly. We assume that the rate of inflation suddenly rises from 2 to 3 per cent and the Riksbank immediately tries to counter this by raising the repo rate in a single step of between 4 and 5 percentage points. Inflation would then admittedly fall back from 3 to around 2 per cent in the course

of twelve months but that would be achieved at the expense of very weak growth and employment. GDP growth drops a couple of percentage points in the first year and between 30,000 and 40,000 jobs are lost. So when the year is over a dramatic interest rate cut is needed to restabilise the economy.

This example shows that while an increase in inflation could be countered quickly and resolutely, doing so would lead to an appreciable destabilisation of the real economy. In that the Riksbank looks ahead instead and, in the event of deviations from the inflation target, directs monetary policy for a smoother adjustment, such abrupt shifts in the repo rate do not normally occur and real economic development can be more stable.

The money supply

It is a well-established fact that in the long run inflation is a monetary phenomenon. Sizeable, permanent changes in the rate of price increases can be explained by growth of the money supply having been excessively high or low. An alternative to basing policy on forecasts might therefore be to use the money supply as an intermediate target. This presupposes an acceptable correlation between the money supply and inflation in the medium run.

Using the money supply as the guide has the advantage that monetary policy can be conducted systematically and predictably. The intermediate variable – the money supply – is known when decisions are made and provided it is closely correlated with the path of inflation one to two years ahead, monetary policy will be very transparent.

However, basing monetary policy on a money supply target is not a simple matter. It is questionable whether a straightforward and stable relationship between the money supply and inflation also exists in the short and medium term.³ This is because the relationship has been disturbed by various factors. Financial innovations have contributed, for example, to changes in the pattern of household payments and investment. Moreover, a number of major factors still have to be forecast in order to arrive at what may be an appropriate target for the money supply. So in practice even a money supply strategy has to be based on forecasts of a number of variables and an assessment of, for example, the output gap. Moreover, when the strategy was used in a number of countries in the 1970s and '80s, it was not particularly successful.

In the absence of a straightforward, stable relationship between the intermediate variable (the money supply) and the ultimate objective (price stability), a conflict may arise between them because the central bank has only one instrument, its interest rate. If the central bank chooses to minimise fluctuations in the money supply, a probable consequence – given that the relationship is not exact or stable – will be increased fluctuations in inflation and output. It is intuitively hard to see why a central bank would prefer to stabilise the money supply, which does not directly affect public prosperity, rather than stabilising price movements and output more directly.⁴

If the relationship between the money supply and inflation is not exact and stable over time, the significance of the money supply should be demoted to that of one of several indicators in an inflation targeting strategy based on forecasts. While the

money supply is an important indicator of inflationary pressure, it is not the only one. There may be grounds, on the other hand, for highlighting the significance of the money supply (or rather perhaps its mirror image of the loan stocks in bank balance-sheets) as a source of information about the financial system's future stability. In the past, the build-up of a sizeable financial bubble has nearly always coincided with a major expansion of credit in the financial system. Sweden's bank crisis about a decade ago is a case in point. Against this background, the money supply and credit flows should belong to the arsenal of indicators of both monetary and financial stability that a central bank ought to follow closely.⁵

Inflation and the output gap

Yet another alternative way of conducting monetary policy is to set the interest rate as a function of the rate of price increases and some measure of the difference between actual and potential growth. Professor John Taylor, currently a Treasury under-secretary in the Bush Administration, has formulated a simple rule for interest setting that has come to be named after him and been widely recognised.⁶

With the Taylor rule, the instrumental rate varies around an equilibrium rate with a correction for actual inflation's relationship to targeted inflation and resource utilisation (GDP growth's divergence from an estimated trend). Given that the economy is in equilibrium, inflation is 2 per cent and the output gap is zero, in Taylor's version of the rule for the United States the nominal instrumental rate is 4 per cent. Divergences in resource utilisation or inflation prompt the central bank to raise or lower the instrumental rate, depending on the size and direction of the deviations.⁷

The Taylor rule is popular for several reasons; besides being relatively simple, it seems to give a relatively good account of monetary policy in many different countries. In that way it has contributed to a better understanding of how monetary policy is conducted. To date, however, no central bank has explicitly stated that it has chosen to base its monetary policy on the type of rule John Taylor advocates.

One result that a money supply target and the Taylor rule have in common is that monetary policy's responses to the various shocks to which an economy is constantly being exposed are systematic and predictable. The fact that the variables to which monetary policy responds are assumed to be known at the time of decisions contributes to this.

The conceivable objections to basing monetary policy on simple rules of this type concern their very simplicity. An economy is constantly being hit by shocks of different types. Neither firms nor households behave mechanically. It is therefore not to be expected that economic policy can be boiled down to some kind of autopilot. Allow me to illustrate this with a couple of examples.⁸

A first objection to basing monetary policy on a simple Taylor rule is that the rule assigns too much weight to a particular indicator of the output gap. The output gap is a central concept in macro theory and economic policy but that does not lessen its complexity.

Potential output tends to vary over time. Changes in such factors as demography, technology, tax and transfer systems or other important components temporarily or permanently affect productivity growth and labour supply, with an impact in

turn on potential output. Although considerable progress has been made in real business cycle theory when it comes to the importance of supply shocks, we unfortunately do not have a clear intellectual framework for the forces behind potential output's variations in the short and medium term. Changes in the output gap are therefore difficult to pin down exactly in stable measurements. The methods used to estimate potential growth and the output gap from econometric models tend to yield conflicting results that are also unstable over time. This familiar fact, demonstrated in numerous studies, can be exemplified with the Riksbank's alternative estimations of the output gap as presented continuously in the Inflation Report.⁹

A Taylor rule relies on a single measurement of resource utilisation. This contrasts with the Riksbank's conception of the output gap or resource utilisation. We try to combine a number of different measurements and indicators into a weighted overall assessment. Alternative estimations of the output gap are presented in connection with the Inflation Report's discussion of resource utilisation. Studies of different industries' assessments of resource utilisation are considered in detail. Other indicators that can add to the picture of resource utilisation and its relationship with inflation are obtained by analysing current wage trends (both negotiated wage increases and wage drift) and data on the labour market situation. We usually also emphasise the need for a flexible approach to and a continuous reassessment of different indicators of resource utilisation. In recent years our views about the level of resource utilisation, the interval within which potential growth lies and the relationship between growth and inflation have been revised continuously. The point I want to make is thus that the analysis stands to gain from decision-makers using a perception of resource utilisation that is broader than a mechanical application of the Taylor rule provides.

In addition to these objections to the simple Taylor rule it can be noted that there is a lot of evidence to the effect that instead of being stable, the equilibrium interest rate in the equation varies with the potential growth rate. This is a view that can be traced back to the Swedish political economist Kurt Wicksell's notion of a "natural interest rate".

A monetary policy based on forecasts

I should now like to present some reflections on the forecast-based monetary policy we undertake at the Riksbank.

First of all, an inflation targeting policy based on forecasts has several basic characteristics in common with the other alternatives I have been discussing. (This, however, does not apply to the alternative of basing policy solely on CPI outcomes.) One common denominator is the fundamental philosophy and aim of safeguarding the value of money. Monetary policy strives for price stability as a way of providing a nominal anchor for the economy. Another similarity is the medium-term perspective rather than short-term activism. This in turn calls for a forward-looking perspective when the instrumental rate is set. A further resemblance is that in the Riksbank's strategy, monetary policy reacts systematically, though neither automatically nor mechanically; this helps households and firms to base their

expectations of inflation on a monetary policy that is predictable. We have followed our rule of action relatively closely, as is evident from *Diagram 1*.

Diagram 1, published in our latest Inflation Report, shows the actual path of the repo rate and estimations obtained with a simple forecast-based rule. It seems that on the whole, our actions can be explained fairly well by applying an equation based on the Riksbank's own series of forecasts of inflation one to two years ahead plus a term for the repo rate's "inertia". Considering the rule's simplicity, the deviations from it must be said to be small. The diagram accordingly shows that the Riksbank's actions have been reasonably systematic and based on the Bank's inflation forecasts.

It is, of course, too early for a more thorough evaluation of explicit inflation targeting regimes compared with other monetary policy strategies.¹⁰ It is also the case that Taylor rules, albeit in a somewhat modified form, likewise give comparatively good explanations for a number of central banks that have not explicitly adopted an inflation target, for example Deutsche Bundesbank and the U.S. Federal Reserve. Thus, there are similarities between the strategies of these central banks and inflation targeting regimes. If the differences are greater rhetorically than in practice, it is therefore difficult to establish that one of the arrangements has performed better or worse than the others.

Diagram 2 presents the variations in growth and inflation for a number of industrialised countries in two periods. One is the years from 1970 to 1990, when central bank policy – except in Germany and Switzerland – tended to concentrate excessively on stabilising employment and demand instead of aiming to maintain price stability in the medium term. In a majority of these countries the transition to a stability-oriented monetary policy had at least not been completed. By the time of the other period, 1995–2000, in a number of countries the transition to price stability had been successfully completed. The choice of periods and countries as well as methods is, of course, debatable but in all the countries it looks as though the situation had become considerably more stable in the more recent period compared with the earlier.

That conclusion applies to Sweden, where much hard work has been devoted to making the new regime credible. What I have in mind is, course, the ambitious consolidation of the government finances and the Riksbank's own efforts to generate confidence in the new and initially fragile regime with an explicit inflation target. The Swedish economy appears to have become more stable with the new regime. From 1995 onwards the average rate of inflation, measured with UNDEX, has been fairly close to the 2 per cent target. This has been accompanied by higher GDP growth than before. A part of the higher growth is of course explained by there being plenty of unutilised resources after the crisis in the early 1990s.

It cannot be argued that inflation targeting countries would have done worse if they had followed the same strategy as Germany and Switzerland, or that those two countries would have done equally well if they had targeted inflation. It is also conceivable that similar results would have been achieved with other monetary strategies, such as the pragmatic procedure at the U.S. Federal Reserve or the fixed exchange rate regimes – amounting in practice to a delegation of monetary policy

to the Deutsche Bundesbank – that were used at times in, for example, France, Italy and Denmark. Other changes, for example a clearer long-term orientation of fiscal policy, with an appreciable reduction of budget deficits as a major component, can also explain the more stable picture.

But it does seem reasonable to conclude that the stronger focus on price stability in a number of countries, accompanied by a delegation of monetary policy to independent central banks, has helped to reduce inflation in many industrialised countries. In Sweden the average rate of inflation (UNDIX) dropped from around 8 per cent in the period 1970–90 to about 1.8 per cent in 1995–2000.

It is also reasonable to believe that the transition to targeting inflation contributed to the reduction of fluctuations in growth and inflation in countries such as Sweden, the United Kingdom, Canada, Finland, Australia and New Zealand. Neither can it be denied that these regime shifts may have played a part in the somewhat higher growth that was achieved in the 1990s compared with the two preceding decades.

Flexible rule of action

I like to think that our inflation targeting policy and rule of action are flexible, by which I mean that monetary policy is characterised by a rule of action that is simple and clear, making our actions reasonably easy to follow and foresee, at the same time as we are sufficiently flexible to alter our behaviour if this is called for by unexpected economic shocks. The important thing then is to be explicit about the motives behind our actions. As I just said, the basic considerations in monetary policy are inflation in a medium-term perspective and a reasonable degree of stability in the real economy.

In recent years a common topic in the discussion of inflation and monetary policy has been the concept of transitory effects. A sudden and unforeseen increase (or decrease) in the general price level on account of some type of shock leads to inflation being temporarily higher (or lower) in the following twelve months. That shocks of this type should influence monetary policy is not self-evident.¹¹ On the one hand, reacting to transitory shocks that do not mirror changes in resource utilisation or inflation expectations would be liable to result in demand being affected by instrumental rate adjustments in ways that contribute to future, more permanent deviations from the inflation target. On the other hand, future deviations from the inflation target can also occur if one disregards the fact that supply shocks may mirror more or less transitory changes in productivity or that temporary price effects may have consequences for other prices and influence inflation expectations. Determining whether or not monetary policy ought to respond to a change in the rate of price increases calls for detailed analyses of the underlying causes.

This is another circumstance that illustrates the disadvantages of a strategy that only considers current price tendencies and is likely to lead to appreciable fluctuations in the development of prices as well as demand. Neither, for that matter, is there any price index that is so constructed that it only measures factors of central importance for monetary policy and works in any situation. The

discussion also brings out the drawback of working with rigid rules of action for monetary policy, for example a money supply target or a Taylor rule. Here is another instance.

At this Association's monetary policy meeting last spring I discussed how the Riksbank ought to react if the economy is exposed to various types of structural change. I concluded that the "flexible inflation targeting policy" as defined by the Riksbank does provide for temporary departures from our simple rule of action. It should be underscored that in the event of such departures from the rule of action, it is important to be particularly explicit about what is guiding monetary policy. I also pointed out last year that it is not difficult to envisage a situation, for example rapidly rising asset prices, where the rule of action and the inflation target must defer to a tighter monetary stance. This view is, of course, connected with my time as under-secretary at the Finance Ministry during the banking crisis in the early 1990s. If rising asset prices are a symptom of a wider build-up of imbalances, such as a rapid expansion of credit, then monetary policy must endeavour to limit the risks that expanding financial sector bubbles may affect the real economy. That does not mean that determining when such a situation is on the way is particularly easy. The point I want to make is that our monetary policy strategy provides for such a contingency.¹²

Forecasting is difficult

So far I have been discussing advantages of the Riksbank's current monetary policy arrangements and the drawbacks alternative strategies may have. In doing so I hope I have indicated that the alternatives also have some advantages, too. But I still consider that the advantages with the Riksbank's way of conducting monetary policy outweigh the disadvantages. But something should also be said about what is perhaps the current regime's greatest drawback, namely the difficulty in forecasting future inflation, not least in such a comparatively distant perspective as one to two years ahead.

Completely reliable forecasts of future inflation presuppose success in two respects. *One* is managing to predict how shocks in the current situation will spread successively through the economy and affect the future rate of inflation. The *other* is managing to predict the shocks that subsequently occur in the forecast period and generate a future increase or decrease in the rate of inflation. While the first task is certainly difficult but maybe not completely out of the question, given that the course of events stays reasonably close to historical patterns, the second is virtually impossible.

In other words, forecasts can err and we must bear that in mind. So I want to make it particularly clear that even though forecasting errors occur, I still consider that most things indicate that our present forecast-based inflation targeting regime functions satisfactorily.

An important issue is, of course, the size of the forecasting errors it is reasonable to expect. Some colleagues at the Riksbank studied this about a year ago by evaluating 52,000 forecasts which 250 institutions around the world had presented over a period of almost a decade. They concluded that the errors in forecasting

inflation were somewhere between a half and one percentage point, depending slightly on the country in question.¹³

The historical errors in the Riksbank's forecasts have been of approximately this magnitude except in three periods. The *first* was 1996–97, when large interest rate cuts, for example, lowered CPI inflation via house mortgage expenditure. The *second* was in the late 1990s, when the deregulation of electricity and telecom markets, for example, led to a relatively large one-off downward shift in the price level and temporarily lowered inflation. The *third* is the past year, when the greater part of the increase in inflation has had to do with various supply shocks, for instance on prices for electricity, meat, fruit and vegetables last spring. The background to these price disturbances is a poor water supply for hydroelectric power on account of low precipitation, livestock diseases and poor harvests on account of unusually cold weather in Europe. As I mentioned, shocks of this type are liable to raise the price level and lead to a transitory increase in the rate of inflation.

Perhaps the most pertinent question, however, is whether these historical “forecasting errors” would have had any decisive consequences for monetary policy if they had been anticipated well in advance. The answer in my opinion is: probably not. Even if we had allowed for the interest expenditure item's downward effect on CPI inflation in 1996–97, we would still have lowered the repo rate. Neither would it be realistic to suppose that the Riksbank would have, as it were, chased its own tail and lowered the interest rate appreciably more on the grounds that CPI inflation was below the target. In the period in the late 1990s, resource utilisation was already rising rapidly and an even more expansionary monetary policy would hardly have been justified. The instrumental rate in Sweden was a good bit lower than in the United States in these years and also lower at times than in the euro area, at the same time as the Swedish krona was comparatively weak.

Concerning the past year's increase in inflation, it was not the supply shocks that prompted the decision in March to raise the repo rate but the picture that was beginning to emerge of the Swedish economy being rather close to or even somewhat above full resource utilisation. This may be a major problem, not for current inflation but rather for future inflation as activity continues to strengthen.

Conclusion

I began by considering whether the problems associated with making forecasts for the Riksbank's current policy of targeting inflation could be avoided by changing to a different strategy. What I have said hopefully shows that this does not seem to be the case, at least with the knowledge that is available today.

- A less forward-looking policy, based for example on outcome data or forecasts that only illuminate the near future, would be liable to have destabilising effects on the real economy.
- Even a policy based on the money supply is dependent on forecasts of resource utilisation; it, too, can have destabilising consequences if the correlation between the intermediate variable and the ultimate objective breaks down.

- Neither would it be realistic or even appropriate to have a strategy whereby monetary policy is determined by automatic and mechanical rules; in the worst case, the simplicity of such a strategy can lead to unduly large fluctuations in both inflation and GDP.

I therefore conclude that the problems connected with forecasting inflation cannot be avoided by choosing a different monetary strategy, at least with the present state of knowledge. As I see it, the problems with forecasts are manageable and relatively slight compared with the regime's advantages in other respects. As the discussion has also shown, most monetary strategies have drawbacks as well as advantages.

Most people will no doubt agree when I say that on the whole, Sweden's experience of targeting inflation is favourable but of course that does not mean that we can rest content or smug. We do not claim to have found the *ultimate* monetary strategy. But by being transparent about the information on which our monetary policy is based and by being prepared to discuss the policy's formation, the Riksbank can offer a guided tour of the complex world in which we live and are constantly learning new things. So when we wake up each morning, let us ponder a while on the mistakes we may have made and do not yet understand.

However, since the world and its inhabitants do not behave in a mechanical and rigid fashion, one cannot expect monetary policy to be perfect. Monetary policy is not an exact science, perhaps not even a science. Still, by acting systematically and predictably in accordance with a clear intellectual framework, while we may not entirely avoid the risk of making mistakes, it does seem – and that is maybe what matters – that we can avoid making mistakes that are serious.

¹ For descriptions of how the Riksbank works on monetary policy, see e.g. Berg, C. (1999), Inflation forecast targeting, *Sveriges Riksbank Quarterly Review* 3, Berg, C. & Lindberg, H. (2000) Conducting monetary policy with a collegial board: the new Swedish legislation one year on, *Sveriges Riksbank Economic Review* 2, Bäckström, U. (1998), Five years with the price stability target, *Sveriges Riksbank Quarterly Review* 1, id. (2001), What shall guide monetary policy? Discussion paper for the Swedish Economics Association, published in Swedish in *Ekonomisk Debatt* 6, Heikensten, L. & Vredin, A. (1998), Inflationsmålet och den svenska penningpolitiken: erfarenheter och problem (The inflation target and Swedish monetary policy: experiences and problems, Transactions of the Economics Association), *Ekonomisk Debatt* 6, Heikensten, L. (1999) The Riksbank's inflation target – clarification and evaluation, *Sveriges Riksbank Quarterly Review* 1, Riksbank memorandum (1999), The Riksbank's inflation target – clarification and evaluation.

² For an argument in favour of the Riksbank changing to a nominal GDP strategy, see e.g. Kinnwall, M. (2001), Kommentar till Urban Bäckström (Comment to Urban Bäckström, Transactions of the Economics Association), *Ekonomisk Debatt* 6.

³ See e.g. Friedman, B. (1996), The rise and fall of money growth targets as guidelines for US monetary policy, *NBER Working Paper* 5465, or Estrella, A. & Mishkin, F.S. (1996), Is there a role for monetary aggregates in the conduct of monetary policy, *NBER Working Paper* 5845. As regards the euro area, a number of studies have shown that a stable money demand function may exist, see e.g. McMorrow, K. (1998), Is there a stable money demand function at the community level – evidence using a cointegration analysis approach, for the Euro-zone countries and for the community as a whole, *EU DGII Economic papers* 131 and Coenen, G. & Vega J-L (1999), The demand for M3 in the Euro-area, *ECB Working Paper* 6.

⁴ Svensson, L.E.O. (2001), Monetary policy issues for the euro system, *Working Paper*.

⁵ A prominent advocate of the importance of the money supply and credit stocks for financial stability is Otmar Issing, member of the ECB's Executive Board and formerly senior economist at

Deutsche Bundesbank; see e.g. Issing, O. (2002) The role of monetary policy in managing economic risks, remarks given at the 18th Annual Conference of The National Association for Business Economics, 26 March, Washington. Recent studies, for example Gerlach, S. & Svensson, L.E.O. (2001), Money and inflation in the euro area: a case for monetary indicators, *BIS Working Paper* 98, indicate that a monetary gap can explain future inflation more satisfactorily than the output gap; Söderström, U. (2001), Targeting inflation with a prominent role for money, *Sveriges Riksbank Working paper* 123 points in the same direction.

⁶ Taylor, J. (1993), Discretion versus policy rules in practice, *Carnegie-Rochester Conference Series on Public Policy* 39.

⁷ The Taylor rule prescribes the following way of determining the instrumental rate:

$$i_t = \pi_t + 0,5(\pi_t - 2) + 0,5(y_t - y^*) + 2$$

where i stands for the instrumental rate, π inflation, y actual GDP and y^* potential GDP. The constant 2 represents the real equilibrium interest rate. Rewriting gives:

$$i_t = 4 + 1,5(\pi_t - 2) + 0,5(y_t - y^*)$$

⁸ Some publications that relate to the rather extensive discussion of the Taylor rule are: Woodford, M. (2001), The Taylor Rule and Optimal Monetary Policy, Princeton University (January), and Svensson, L.E.O. (forthcoming), What is wrong with Taylor rules? Using judgement in monetary policy through targeting rules, *J. of Economic Literature*. See also *Sveriges Riksbank Inflation Report* 2002:1, box on pp. 60–64, Berg, C., Jansson, P. & och Vredin, A. (forthcoming), Simple rules for monetary policy: some Swedish experiences, *Sveriges Riksbank Working Paper Series*, Taylor, J. (1999), *Monetary Policy Rules*, University of Chicago Press, or Clarida, R., Gali, J & Gertler, M. (1999), The science of monetary policy, *NBER Working Paper* 7147.

⁹ De Brouwer, G. (1998), Estimating output gaps, *Research Discussion Paper* 9809, Reserve Bank of Australia, Cerra, V. & Saxena, S.C. (2000) Alternative methods of estimating potential output and the output gap: an application to Sweden, *IMF Working Paper* WP/00/59, Guay, A. & St-Amant, P. (1996), Do mechanical filters provide a good approximation of business cycles?, *Technical Report* 78, Bank of Canada, St-Amant, P. & van Norden, S. (1997), Measurement of the output gap: a discussion of recent research at the Bank of Canada, *Technical Report* 79, Bank of Canada, Orhanides, A. & van Norden, S. (1999), The reliability of output gap estimates in real time, *Finance and Economics Discussion Series* No. 1999-38.

¹⁰ See e.g. Bernanke, B.S., Laubach, T., Mishkin, F. & Posen, A. (1999), *Inflation Targeting: Lessons from the International Experience*, Princeton University Press, Bofinger, P. (2001), *Monetary Policy: Goals, Institutions, Strategies and Instruments*, Oxford University Press, Leiderman, L. & Svensson, L.E.O. (eds.), *Inflation Targets*, CEPR, Mishkin, F.S. (1998) International experiences with different monetary policy regimes”, *Sveriges Riksbank Working Paper*, 57, Svensson, L.E.O. (1999), Inflation targeting as a monetary policy rule, *J. of Monetary Economics*, or id. (2000), Monetary policy issues for the eurosystem”, *Working Paper*.

¹¹ Ways of analysing different price shocks are discussed in Nessén, M. & Söderström, U. (2000) Core inflation and monetary policy, *Sveriges Riksbank Working Paper* 110.

¹² Borio, C. & Lowe, P (2002), Asset prices, financial and monetary stability: exploring the nexus, at the BIS conference, *Changes in risk through time: measurement and policy responses*.

¹³ See Blix, M., Wadefjord, J., Wienecke, U. & Ådahl, M. (2001), How good is the forecasting performance of major institutions?, *Sveriges Riksbank Economic Review* 3.