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PUBLISHER: URBAN BÄCKSTRÖM
GOVERNOR OF SVERIGES RIKSBANK

EDITOR: STAFFAN VIOTTI

Information Sekretariat, Sveriges Riksbank, S-103 37 Stockholm, Sweden
Telephone Int. +46 8 787 00 00

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The current situation for monetary policy

BY URBAN BÄCKSTRÖM

Urban Bäckström is Governor of Sveriges Riksbank. This speech was held at the hearing of the Standing Committee on Finance on 6 October 1999.

First a word of thanks to the Committee for the invitation to discuss the situation for monetary policy. Today, as required by Chapter 6, Article 4 of the Sveriges Riksbank Act (1988:1385 with amendments), the Riksbank has presented this Committee with the year's second written account of monetary policy. The account is in the form of the third Inflation Report during 1999. In my opening remarks I shall briefly summarise the content of the Report and present the Executive Board's appraisal of the present conditions for monetary policy.

Impressive economic performance

New statistics during the summer gave a picture of stronger activity than most observers had counted on as recently as in the spring. GDP growth in the first half-year is calculated to have been 3.4 per cent. At the same time, inflationary pressure is currently low.

The Swedish economy is developing impressively. It is in fact some decades since various key statistics for the macro economy

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have been as strong as this. Growth is good, inflation low, and both the current account and public finances are showing a surplus. Last but not least, the economy is generating more jobs than what we have been accustomed to previously. Unemployment is therefore decreasing, though it is still above the levels that were customary in earlier decades.

So the situation before us today is completely different from what we experienced last autumn. During the past year, Sweden's economic prospects have changed considerably in the eyes of various observers, and the Riksbank has been no exception in that respect.

Monetary policy in the past twelve months

Last autumn the financial markets became increasingly turbulent in connection with, for example, problems arising from the hedge fund Long Term Capital Management and the suspension of Russian debt payments. The financial crisis was expected to add to the negative real economic effects of the Asian crisis. International observers, including the IMF and the OECD, therefore revised their global growth and inflation forecasts downwards. The Riksbank did the same. Although growth in Sweden's domestic sectors was relatively good and the exchange rate tendency remained weak, the overall picture did point to slacker growth and lower inflation in the forecast period. In November and December, the Riksbank therefore reduced the repo rate from 4.10 to 3.40 per cent.

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The early months of this year were marked by continued repercussions of the Asian crisis in the world economy, with weaker international demand. In order to prevent this from leading to a dampening of economic development in Sweden and an even lower rate of

inflation, in February and March the Riksbank reduced the repo rate in two more steps to 2.90 per cent.

Since then the situation has stabilised. An easing of monetary policy in many parts of the world as well as in Sweden has been an important factor behind the better tendencies in recent months and the more positive forecasts. Even though the statistics show a stronger economic trend, inflation has been in line with the Riksbank's forecasts. For this reason the repo rate has been kept unchanged since March.

In August the 12-month rate of CPI inflation was 0.6 per cent, and inflation's underlying rate, measured by UND1X, was 1.5 per cent. It is changes in indirect taxes and subsidies, together with house mortgage interest expenditure, that are continuing to result in an underlying rate of inflation that is higher than CPI inflation.

Economic prospects from 1999 to 2001

We are now moving into a period of strong growth, externally as well as in Sweden.

As regards the international picture, the Riksbank judges that annual growth in the OECD area up to the end of 2001 will amount to not quite 2.5 per cent. It looks as though effects of the Asian crisis are now dying away and that emerging market growth will become stronger in the next two years, above all in the crisis-hit countries in Southeast Asia but to some extent also in Latin America and Eastern

Europe. In Japan, too, the earlier risk of negative growth has turned into cautious optimism about an upturn. Prospects for the euro area have likewise improved, with a recovery in manufacturing and stronger consumer confidence. In the United States there seems to have been a further extension of the upward phase this year, and a slowdown may be softer and more cautious than anticipated earlier.

Even with stronger international growth, external price pressure is likely to be weak. For one thing, after the Asian crisis there is still some unutilised capacity on the whole in the global economy. Other factors are increased price competition and an expected appreciation of the krona.

Even with stronger international growth, external price pressure is likely to be weak.

Economic prospects in Sweden also look brighter. Besides the positive cyclical signals from abroad and their expected effects on the Swedish economy, there is the stronger growth of domestic demand. Firms as well as households are optimistic about the future. There are a number of reasons for this. Real wages and employment are rising rapidly, and public sector finances are becoming stronger. Fiscal policy in 2000 and 2001 is now assumed to be somewhat more expansionary. All in all, GDP growth is judged to be 3.6 per cent in 1999, 3.8 per cent in 2000 and 3.0 per cent in 2001. These assessments are based on the technical assumption that the repo rate is kept unchanged.

The strong growth trend means that in the coming years the economy's unutilised resources at present will be utilised more quickly than the Riksbank envisaged earlier.

Inflation is judged to move up somewhat faster than the Riksbank assumed earlier.

Inflation is accordingly judged to move up somewhat faster than the Riksbank assumed earlier. In the main scenario the underlying rate of inflation, measured as UND1X, is judged to be 1.8 per cent twelve months ahead and 2.1 per cent after twenty-four months. CPI inflation is judged in turn to be 1.1 per cent after twelve months and 2.0 per cent in twenty-four months' time.

Thus, CPI inflation will be moving closer to underlying inflation. One reason for this is that the downward effect on inflation from house mortgage interest expenditure is diminishing. In other words, just as the previous marked fall in interest rates held back CPI inflation so that it was well below the underlying trend, so house mortgage interest expenditure is now tending to bring them closer together. As I have pointed out before to this Committee, monetary policy ought to disregard these direct effects of interest rates because repo rate adjustments mean that they are accentuated. It is also for this reason that the Riksbank is currently focusing monetary policy on inflation's underlying rate, measured as UND1X.

Transitory factors – changes in indirect taxes, subsidies and house mortgage interest expenditure – are judged to have a downward CPI effect of 0.5 percentage points in one year's time. The contribution from interest expenditure is still negative because the process whereby house mortgage loans at high rates are renewed at the present lower level is still in progress. As the earlier house mortgage loans had a long duration, this process takes time. In two years' time, however, the CPI contribution from transitory factors is judged to be an upward effect of 0.1 percentage point.

Judging from historical patterns, inflation ought not to have remained as low as it has.

The fact that so far, at least, the strong growth has not generated an acceleration of inflation that is comparable to what happened in earlier upward phases has started a discussion of whether the trade-off between growth and inflation has changed in the 1990s. Judging from historical patterns, inflation ought not to have remained as low as it has. The relationship between growth and inflation is, of course, crucial in the assessment of future price trends and thereby for the formulation of monetary policy.

It is not possible to arrive at definite assessments in this field. The analysis is complicated by, for example, the combination of decreased inflation expectations, uncertainty about the rate of potential growth and the size of the output gap, and how the labour market is functioning. The Riksbank has to be alert to every sign that may support or contradict the hypothesis of a lower trade-off between growth and inflation. We have revised our opinion about this on several occasions in recent years and have done so again in the present Report. In this we are not alone. Various international observers have changed their appraisal of the corresponding trade-off in the OECD area as a whole. In Sweden's case it is judged that the low and stable inflation expectations, increased competition and EU membership are among the factors behind a better trade-off.

In the Inflation Report, the Riksbank's main scenario is accompanied by an analysis of likely risks. Since the June forecast the spectrum of risks has changed somewhat; the chances of inflation being higher than in the main scenario are now judged to be greater than the probability of a lower rate. The increased upside risk has to do with fears that inflation will react more quickly to the rising economic activity and that labour market shortages may be more serious and lead to a stronger development of wages.

The assessment of an increase in upside risks is accompanied by less likelihood of a slowdown in the global economy. But there is still the risk of international activity being dampened appreciably in connection with a major correction of the

high stock market prices and the financial imbalances that have been a feature of the American economy in recent years. Such a scenario would affect price tendencies in Sweden. The risk of financial bubbles, with serious real economic effects if they burst, is something that the Riksbank, along with other central banks, has to heed.

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Monetary policy

In the late summer, at the monetary policy meeting on 12 August, the Executive Board had already noted that stronger economic growth in Sweden and rising resource utilisation pointed to growing upward pressure on prices. That in turn indicated that monetary policy might have to be given a less expansionary direction in the future. Two members of the Board even advocated a small repo rate increase in August.

The main scenario in the Inflation Report that is published today does not represent a future development of inflation that threatens price stability. But every inflation

forecast contains an element of uncertainty, and the risk spectrum also has to be considered when formulating monetary policy. The present Report concludes that higher inflation compared with the main scenario is more probable than lower inflation. Remember, moreover, that to be most effective, monetary policy has to focus on the situation one to two years ahead.

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This suggests that the Riksbank is moving towards a situation in which the repo rate will be raised. Yesterday, however, the Executive Board decided in favour of an unchanged repo rate. But sooner or later, if developments continue along the lines in the present assessment, a repo rate increase will be called for. If some kind of international shock with a probable downward effect were to occur, or if indications of more subdued economic activity or prices were to be observed, that would naturally be taken into account in our future assessments.

Why a higher repo rate?

A repo rate of 2.90 per cent is probably too low over a complete business cycle, even in an economy where inflation expectations have settled down around the targeted rate of 2 per cent.

Under such circumstances, the direction of monetary policy can be described as expansionary. This is not countered by a restrictive fiscal policy. In the absence of negative shocks, that normally tends to generate GDP growth above the rate that is sustainable in the longer run. If such a situation is left to continue for too long, various bottleneck problems arise that may push inflation up.

Such a course of events has to be prevented by the Riksbank, which the Riksdag (Sweden's Parliament) has made accountable for maintaining price stability. So in order to counter an acceleration of inflation in an upward cyclical phase, sooner or later the level of the repo rate has to be normalised.

It is generally true to say that a repo rate increase should not be postponed unduly. If a central bank waits too long, the increase has to be larger in order to arrest the overheating and inflationary tendencies. That would run the risk of the next slowdown being deeper and more severe than otherwise.

A higher repo rate may be required for a good and sustained development of employment and growth, as is illustrated by how the Federal Reserve has acted in the United States.

A higher repo rate does not necessarily impede the continuation of a favourable economic trend; it may even be required for a good and sustained development of employment and growth, as is illustrated by how the Federal Reserve has acted in the United States. This shows what a forward-looking

monetary policy can do for sustained growth. The formulation of monetary policy in the United States, with timely restrictive measures, has contributed to the American economy now being in its longest post-war period of growth.

During rapid economic expansion, problems with bottlenecks may occur temporarily because new production facilities are not always available just when they are needed to cope with increased demand. Experience in the 1990s suggests, however, that firms have become more flexible, both in the utilisation of existing capital stocks and in the procurement of new technology, machinery and plants when demand rises. This suggests that, if anything, it is not the level of unutilised capital resources that is critical at present. Instead, an analysis of resource utilisation should probably focus on the labour market. Another reason for this is that in a price analysis at macro level, the weightiest item in costs is wages; total wage costs are equivalent to over two-thirds of GDP.

The level of unemployment has been reduced but remains high, particularly compared with the post-war period up to the early 1990s. Seen from that angle, some might say that the Swedish economy has plenty of unutilised resources. Experience from other European countries has taught us, however, that after a



severe shock, as happened in the early 1990s, unemployment tends to stick at a high level, at least for a while.

Estimates of the equilibrium level of unemployment in Sweden suggest that it moved up in the early 1990s and in terms of registered unemployment is somewhere in the interval 4.5 to 7.5 per cent. Considering that the rate of registered unemployment is currently inside this interval, the estimates would suggest that the Swedish economy is now close to full capacity utilisation.

Estimates of equilibrium unemployment are uncertain, however, and it is important that the Riksbank's monetary policy does not unnecessarily hamper decreased unemployment. All the other information about labour market

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tendencies has to be considered as well. A deeper analysis is needed as a foundation for any conclusions that the economy is approaching full capacity utilisation.

When an economy is moving closer to its capacity ceiling, certain statistical phenomena can be expected to occur more clearly and frequently. The same applies to anecdotal information in such a situation. This can take the form of, for example, bottleneck problems in the labour market and signs of difficulties in recruiting skilled labour. Other signs are an increased propensity to resort to labour disputes, either regular strikes or wildcat behaviour. Moreover, firms may have to compromise over job qualifications and take on less skilled personnel in order to cope with demand for their goods and services.

Some such signs have been observed in recent months. Firms are already finding it difficult to recruit computer consultants, for instance, as well as some other categories of personnel. The situation in some parts of Sweden is also more strained than elsewhere. This suggests that firms will find it increasingly hard to keep up with demand for their products. In other words, a situation where demand is rising too rapidly. To date, however, the bottleneck problems are fairly limited.

Thus, there are still no signs of more widespread shortages that might generate unsettling inflationary impulses; but the risk spectrum has shifted. Moreover, the situation can change at short notice, and the Riksbank has to be alert to this. We must be ready to take preventive action.

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In earlier upward phases, in the 1970s and 1980s, a tightening of economic policy often came too late. The normal result was that the growth of production and employment was checked and unemployment rose. That must not happen



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this time. The purpose of normalising the repo rate in time is to bring GDP growth into line with the path for long-term growth, with a continued increase in employment and as low a level of unemployment as the structure of the economy allows.

This is the starting point as we face the future challenges to monetary policy. That is what is meant by price stability. It is also how we, as members of the Executive Board, perceive the task assigned to us by the Riksdag.

Different ways of conducting inflation targeting – theory and practice

BY MIKAEL APEL, MARIANNE NESSÉN, ULF SÖDERSTRÖM AND ANDERS VREDIN*
*Mikael Apel is an economist at the Economics Department; the remaining authors are
economists at the Research Department.*

The monetary policy debate can at times be difficult to follow. This is partly a reflection of the differences in opinion that may exist between central bankers on the one hand, and other monetary policy analysts, such as academic researchers, on the other. It is also a reflection of the differing views within these groups. In this article, the authors identify and discuss some central issues of inflation targeting policy where they believe the debate needs to be clarified. The issues that are discussed include the consequences of using different time horizons for, and definitions of, the inflation target. Whether the inflation targeting policy should be regarded as the outcome of an “optimal policy” or a “simple rule” is also discussed.

In recent years, several countries with poor inflationary records have been able to render credibility to monetary policies geared towards low and stable levels of inflation by adopting explicit inflation targets.¹ Inflation targeting has formed the basis of a new and active area in academic research. While practical policy thus has inspired academics, the insights generated by this research have helped to improve the precision of practical policy and the clarity of the debate surrounding it. Nonetheless, there remain areas where the gap between theory and practice is large. Moreover, there is no consensus regarding how inflation targeting is best conducted and described, neither among central bankers nor in academia. Thus it is hardly surprising that the debate – both regarding current policy issues and

* The authors would like to thank Claes Berg, Villy Bergström, Per Jansson, Fredrika Lindsjö, Lars Svensson and Staffan Viotti for comments on an earlier draft of this article.

¹ Several books and survey articles have been published on inflation targeting. See, for example, Bernanke et al. (1999) and Clarida et al. (1999), which also contain further references.

the more academically oriented one – at times can be difficult to fully understand, even for those who follow it closely.

With an inflation target, monetary policy is conducted with the intent of reaching the inflation target within a certain time horizon. But should the length of this horizon always be the same?

This article discusses four central aspects of inflation targeting where the monetary policy debate at times can be unclear. Whenever possible, connections will be made between the practical side of monetary policy and relevant macroeconomic research. The first aspect to be discussed concerns the *horizon* of monetary policy. With an inflation target, monetary policy is conducted with the intent of reaching the inflation target within a certain time horizon. But should the length of this horizon always be the same, and if not, under what circumstances should it be allowed to vary? The second aspect regards the *choice of inflation measure*. What are the implications of targeting the rate of change in, say, the CPI, rather than some other measure of inflation; and over what time interval should the rate of change be measured?

The third aspect treated in this article concerns *uncertainty*. The gradual adjustment of monetary policy that characterizes the behavior of central banks is commonly attributed to the banks' uncertainty regarding the effects of their actions. How plausible is this explanation, in theory and in practice? Lastly, the difference between *optimal policy* and *simple rules* is discussed. If inflation targeting is to be conducted according to the principles delineated in the increasingly sophisticated theoretical models found in the academic literature, then great demands are placed on qualified analysis and availability of high-quality data. Could it be, instead, that a monetary policy guided by some simple rules of thumb provides the best macroeconomic outcome?

An analytical framework for inflation targeting

We begin by outlining a simple analytical framework for inflation targeting, so as to provide a coherent structure to the discussions that follow. The framework consists of two components: a *model* of how the economy functions and how it is affected by monetary policy, and a description of the central bank's ultimate goal, i.e. its *objective function*.²

In the model of the economy, the central bank can affect output (GDP) in the

² For a more detailed description of this analytical framework, see Svensson (1997). For a less technical presentation, see Svensson (1999).

following period by changing its policy instrument, the repo rate. In turn, changes in output (or, rather, the deviation of output from its “potential” level – the so-called output gap) affect inflation yet another period hence. In other words, a repo rate change leads, via effects on demand and output, to a change in inflation only after two periods – i.e. monetary policy is assumed to work with a lag. This lag will henceforth be called the *control horizon* of monetary policy.³ In this model, the control horizon is given by structural economic relationships, and cannot be affected by central bank actions. The control horizon in our analytical framework is thus two periods long.⁴

The second component of the analytical framework is the *objective function* of the central bank, which is assumed to reflect two concerns. First, the central bank wishes to stabilize inflation around a given target value, for example 2 per cent which is the target of Sveriges Riksbank. Second, the central bank may also wish to stabilize output growth around its long-term sustainable (or potential) rate. The stabilization of real variables such as output growth or employment are not always considered to be the task of monetary policy, but practical experience shows that central banks seek to avoid excessive real fluctuations. Thus, inflation targeting does not necessarily imply that inflation stabilization is the sole concern of the central bank. The development of other macroeconomic variables can also affect policy.⁵

Inflation targeting does not necessarily imply that inflation stabilization is the sole concern of the central bank.

A cornerstone in the practical implementation of inflation targeting has been to grant a certain degree of independence to the central bank, with the intent of insulating it from inappropriate political pressure. In the analytical framework outlined here, the objective function can be regarded as having been formulated by the government or parliament. The central bank is then assigned the task of achieving this objective. The output goal corresponds to the natural rate, reflecting the assumption that an independent central bank is better at resisting the

³ Svensson (1997) calls the control horizon the “control lag”.

⁴ In practice, a control horizon of 1–2 years is often assumed; it is often defined as the horizon at which monetary policy is assumed to have its *greatest effect*. Hence the assumption is that monetary policy effects are spread out over time according to a certain distribution, which most likely is a good description of true conditions. The simplifying assumption that the *first* effect of monetary policy is seen after two periods simplifies the discussion considerably and is used throughout most of this article.

⁵ In the terminology used by Svensson (1998), the inflation targeting policy is then said to be “flexible” in contrast to “strict” inflation targeting where the central bank is concerned *only* with inflation stabilization. See also the discussion on the Swedish experience with inflation targeting in Heikensten and Vredin (1998). Furthermore, central banks often strive to avoid large fluctuations in interest rates, which may have to do with their responsibility for financial stability. However, in this article we will conduct the discussion as if inflation and output are the only variables in the central bank’s objective function.

temptation of stimulating the economy in the short term. Thus, credibility problems are avoided as well as the “inflation bias” that otherwise would arise.⁶

The central bank adjusts the repo rate so that the inflation forecast is brought closer into line with the target.

In this simple analytical framework, monetary policy is conducted in the following manner. Taking into account the structure of the economy (the *model* of the economy), the central bank sets the repo rate so that the expected deviation of inflation from the target and the expected deviation of output from its potential level are as small as possible over time (i.e. the *objective*, or *loss*, *function* is minimized). Since interest rate changes affect inflation with a lag, monetary policy must be guided by forecasts. Thus, the central bank adjusts the repo rate so that the inflation forecast is brought closer into line with the target (and the forecast of output with its potential level).⁷ Such forecasts will, of course, be based on information known at the time of the forecast. Hence the repo rate level set by the central bank will in effect be determined by the observed state of the economy.

Put differently, a decision rule can be specified for the setting of the repo rate, whereby the repo rate is a function of the determinants of the inflation and output forecasts. Such a decision rule is usually called the central bank’s *reaction function*, since it indicates how the central bank is expected to react to changes in observed variables. Swedish monetary policy is sometimes described in these terms. Sveriges Riksbank uses a large set of indicators in making its inflation forecast. Whenever an indicator changes, the forecast may change too, and the Riksbank may need to adjust the repo rate.

To briefly recapitulate the analytical framework for inflation targeting, the central bank minimizes an *objective function* (which includes both inflation and output) taking into consideration the *model* of the economy (which includes a specification of the *control horizon*). Monetary policy may thus be described in terms of a reaction function, which indicates how the central bank should optimally react to changes in observed variables. We will now use this simple, but nonetheless realistic, framework to discuss some specific aspects of inflation targeting, namely the horizon of monetary policy, the choice of inflation measure and the effects of uncertainty.

⁶ See Apel and Viotti (1998) for a more detailed discussion on these matters.

⁷ Svensson (1997) refers to this as “inflation forecast targeting”, since the inflation forecast can be considered as an intermediate target.

The horizon of monetary policy

One reason why the monetary policy debate at times can be unclear is the failure of some to distinguish between the horizon at which monetary policy can affect the economy and the horizon at which it *should*. In the analytical framework outlined above, the *control horizon* – which specifies the horizon at which it is technically possible for the central bank to affect inflation – is assumed to be two periods, say years, long. Hence, following an unexpected shock to inflation, the central bank can have (expected) inflation back on target in two years.

However, we also noted that central banks do not concentrate exclusively on inflation stabilization; developments in the real economy also affect their decisions. The twin goals of inflation and output stabilization may at times come into conflict with each other. If an unexpected shock leads to a higher forecast for inflation, the central bank will raise the repo rate to dampen the level of economic activity.⁸ Yet, as is easily understood, if the central bank also cares about output stability, the policy response may be milder than if inflation stabilization is the sole concern. This of course means that the expected return of inflation to target will take longer than the minimum two years given by the control horizon. The time it takes for expected inflation to return to target following a shock will henceforth be called the *implicit targeting horizon*.⁹ The length of this implicit targeting horizon is determined by the relative importance of output stabilization in relation to inflation stabilization in the central bank's objective function, and on the magnitude of the unexpected shock.

If the central bank also cares about output stability, the policy response may be milder than if inflation stabilization is the sole concern.

These concepts are illustrated in Figures 1 and 2.¹⁰ In both figures the rate of inflation is initially on target, here 2 per cent. An unexpected shock leads to an increase in the inflation rate to 4 per cent – see Figure 1. The central bank immediately raises the repo rate, but inflation remains at 4 per cent in the following period (since monetary policy is assumed to affect inflation with a two-year lag). The subsequent development of the inflation rate depends on the relative importance of output stabilization versus inflation stabilization in the central bank's objective function (represented here by the parameter λ). If the central bank cares

⁸ In this base-line analytical framework, all shocks to inflation have permanent effects, meaning that the central bank must act to return inflation to the target. The effects of temporary shocks are discussed later in the article.

⁹ This is also the expression used by King (1997). Batini and Nelson (1999) use the expression "optimal policy horizon" and Berg (1999) "target horizon".

¹⁰ The calculations are based on the model in Svensson (1997), with parameter values from Orphanides and Wieland (1999).

Figure 1: The inflation forecast following a shock

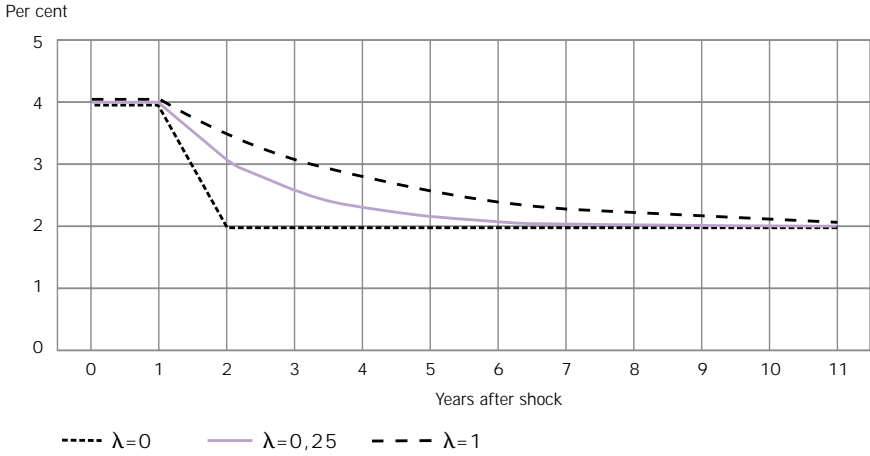
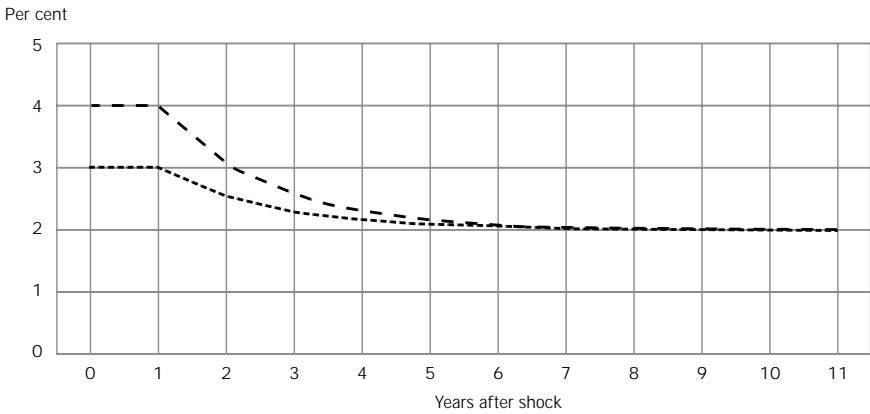


Figure 2: The inflation forecast following shocks of varying size



only about stabilizing inflation (when $\lambda = 0$), inflation will return to the target rate as fast as possible, i.e. at the control horizon (after two years). In contrast, if equal importance is assigned to inflation and output stabilization (when $\lambda = 1$), the central bank will allow the return to target to take significantly longer. After three years the inflation rate is approximately 3 per cent, and after six years it is 2.4 per cent.¹¹ In the intermediate case (where $\lambda = 0.25$), inflation is 2.5 per cent after three years and 2.1 per cent after six years.

¹¹ In the formal model that provides the basis for these calculations (and in the analytical framework discussed in the preceding section), inflation will actually never reach the target exactly, since it is optimal in each period to close only part of the gap between the inflation forecast and the target. Hence, an exact value cannot be assigned to the implicit targeting horizon. However, this feature does not have any practical significance, nor is it something that poses a problem in theoretical analyses.



Figure 2 shows how the magnitude of the shock affects the implicit targeting horizon: the larger the shock, the longer the implicit targeting horizon (for given weight on output stabilization, here $\lambda = 0.25$). After a small shock, it takes approximately two years for inflation to fall to 2.5 per cent, while it takes three years following a larger shock (which is of the same size as in Figure 1). A practical illustration of these ideas can be found in Heikensten (1999, p. 13–14). In the context of clarifying the Riksbank’s inflation targeting policy, it is stated that “in the event of a considerable shock, there may be grounds for not attempting to return inflation to the target level immediately” and that deviations from the target can be justified due to “the social costs that might otherwise be incurred because of avoidable fluctuations in economic activity”.

Thus, while the control horizon indicates how soon it is *possible* for monetary policy to bring inflation back to target, the implicit targeting horizon indicates how soon it is *desirable* to do so. The implicit targeting horizon will exceed the control horizon if the central bank cares also about developments

While the control horizon indicates how soon it is possible for monetary policy to bring inflation back to target, the implicit targeting horizon indicates how soon it is desirable to do so.

in the real economy. If an inflation targeting central bank formally announces a horizon at which the inflation target is to be achieved, this horizon should, logically, reflect not only the lags in the transmission mechanism but also the central bank’s desire to avoid excessive fluctuations in output and employment. Now, for an outside observer to sort out the relative importance of the transmission mechanism (which determines the control horizon) and the central bank’s objective function (which affects the implicit targeting horizon) is not an easy task. Greater central bank transparency on this point is, in our view, desirable. On the other hand, a certain degree of ambiguity is perhaps unavoidable, since our understanding of economic relations in practice never is as complete as is assumed in many theoretical models.

How should inflation be measured?

Another reason why the monetary policy debate at times may seem unclear is that not everyone has the same concept in mind when referring to “inflation”. There are two different aspects to this. First, inflation can be measured in terms of different price indices. Should the central bank aim at stabilizing a broad measure of price changes, or should this measure be adjusted in some way? Secondly, inflation can be measured over different time intervals. Should the target be

defined in terms of the annual inflation rate or as an average over a longer period? We discuss these two issues below.

THE CHOICE OF PRICE INDEX

The majority of central banks with inflation targets focus on the rate of change in some variant of the consumer price index.

The first issue concerns the choice of price index for calculating the rate of inflation. At present, there does not appear to be any consensus regarding which of the various alternative measures of inflation that should be

the focus of an inflation targeting central bank, although there is agreement that it should be a measure of the change in the general price level, suggesting a fairly broad measure. Therefore, the majority of central banks with inflation targets focus on the rate of change in some variant of the consumer price index. These have the added advantage of being price measures that are relatively well known and published at frequent, regular intervals.

However, central banks often calculate other types of inflation indices, where the CPI is adjusted in various ways, for example by excluding certain components. These adjusted measures are often termed “core inflation” and there are several stated reasons for calculating them. To better understand these reasons we will distinguish between different ways of *using* the adjusted index. In principle, there are two different areas of usage. First, the adjusted index can be used to formulate the central bank’s inflation target. In terms of our analytical framework, the index would thus be used in the central bank’s *objective function*. Second, the index can be used when analyzing current and forecasting future inflation, even if the target is defined in terms of a broader index. In the analytical framework, this would correspond to using the adjusted index in the central bank’s *reaction function*. For example, an adjusted index can provide valuable information about the extent to which an observed increase in inflation is temporary.

A central bank that has formulated its inflation target in terms of the CPI can nonetheless let the formation of monetary policy be guided by some other measure, for example the trend rate of inflation.

An important point we wish to make in the analysis below is the following: even though there often are good reasons for using another measure of inflation than the CPI in the reaction function, this does not necessarily imply that the same measure is what enters the central bank’s objective function. For

example, a central bank that has formulated its inflation target in terms of the CPI can nonetheless let the formation of monetary policy be guided by some other measure, for example the trend rate of inflation.

A commonly heard argument for why it may be appropriate to formulate the target in terms of an adjusted index, rather than the CPI, is that central banks should not react to certain movements in the CPI if they wish to avoid unnecessary fluctuations in interest rates, employment and output. It is considered better to formulate the inflation target in terms of an adjusted index, where these movements have been removed from the outset. There are primarily three types of price movements that central banks tend to want to remove:

- 1) Movements which are associated with temporary changes in the rate of inflation. Examples are movements in highly volatile, but over time offsetting, CPI components, and changes in indirect taxes or regulated prices that lead to jumps in the price level, without long-term effects on the inflation rate.
- 2) Shocks to inflation with possibly long-lasting effects, but where a strong monetary policy response would produce unacceptably large fluctuations in the real economy. Examples here are large changes in commodity prices and dramatic disturbances such as natural disasters.¹²
- 3) The direct effects of policy changes on inflation, in cases where the CPI contains components (e.g. mortgage costs) that vary directly with the level of short-term interest rates.

What does our analytical framework have to say about the arguments for removing these types of price movements?¹³

Temporary disturbances to inflation

It is difficult to see why the existence of temporary disturbances to inflation should lead to the use of an adjusted measure of inflation as the target, i.e. including it in the central bank's *objective function*. Rather, these temporary disturbances can be used as an argument for including an adjusted index in the central bank's *reaction function*. Forecasts of future inflation (even when measured as the rate of increase in the CPI) are, of course, much improved if they take into account the fact that part of today's inflation may be of a temporary nature.

The key point to remember here is that monetary policy under inflation targeting is, by its very construction, forward-looking. Since the monetary policy stance is deter-

Monetary policy under inflation targeting is, by its very construction, forward-looking.

¹² In New Zealand, "a natural disaster affecting a major part of the economy" has been specified as an acceptable reason for a deviation from the inflation target. (See Reserve Bank of New Zealand, 1997.)

¹³ The results in this section are primarily based on Nessén and Söderström (1999).

mined by the inflation forecast, a policy that targets the CPI and another that targets CPI excluding temporary disturbances will differ only to the extent that their forecasts differ. Hence, if making the case that CPI excluding temporary disturbances should be used as the target, one must remember that temporary disturbances are those that, by definition, have no or negligible effect on future inflation. Thus, the forecast for overall CPI and CPI excluding temporary disturbances are likely to be very close.

The argument that CPI excluding temporary disturbances should be used as the target is weakened by the forward-looking nature of inflation targeting.

The argument that CPI excluding temporary disturbances should be used as the target, since monetary policy otherwise would become unnecessarily volatile, is therefore much weakened by the forward-looking nature of inflation targeting: policy will more or less automatically focus on long-term trends, rather than on short-term fluctuations. Monetary policy should thus not respond to temporary changes in the CPI, even if the inflation target is defined in terms of the CPI.

A caveat is in order here. Truly temporary disturbances of the kind just discussed are rare. An example was noted above: a change in indirect taxes that alters the rate of inflation during a limited period of time, after which inflation returns to its previous level. However, changes in taxes will also affect the rest of the economy. An increase in indirect taxes (which immediately increases the rate of inflation, but only for a limited period) may reduce aggregate demand and production, which could have long-term effects on the inflation rate. This must, of course, be taken into consideration in the inflation forecast. It could be the case that the proper response to an increase in indirect taxes is not only to refrain from increasing the repo rate, but indeed to lower it, if the inflation forecast has fallen. A similar line of reasoning can be made in relation to temporary oil price shocks. Mechanically excluding certain CPI components from the reaction function can thus result in the loss of potentially important information regarding the future path of inflation.

Large real fluctuations

The second category of price movements that central banks may want to respond less aggressively to includes those disturbances that would lead to large fluctuations in the real economy should the central bank decide to fight them. Again, given our analytical framework it is difficult to see why the occurrence of such disturbances should justify using an adjusted measure of inflation in the objective function. As noted above, inflation targeting does not exclude concern for stabili-

ty in the real economy. Such a concern will lead to a milder policy response following unexpected shocks, whereby the implicit targeting horizon becomes longer than the control horizon (Figure 1). The greater the disturbance, the longer is the implicit targeting horizon (Figure 2).

One argument for using adjusted indices has been that central banks should not attempt to counteract the effects of changes in those prices that it cannot influence (energy prices are often named as an example).¹⁴ We consider this argument to be unclear. Monetary policy neither can nor should attempt to influence relative prices. However, when central banks act to offset the effects of individual price changes on the general price level, this may have negative effects on the real economy. One can easily suspect, therefore, that the true motive behind this argument for using an adjusted index is a concern for real stability, but that for some reason the central bank is unwilling or unable to express this concern explicitly.¹⁵

Direct effects of policy changes

The consumer price index often contains a component that reflects the development in housing costs. In Sweden, this component is measured in such a way that changes in interest rates have a relatively large effect on the CPI. More specifically, a contractionary

monetary policy move, for example, will produce an *increase* in the current inflation rate via its effects on mortgage rates. Does this mean that monetary policy must be tightened further, whereby the central bank would conduct a policy “tantamount to chasing one’s own tail” (Heikensten, 1999)? Is this a reason for adopting a different target variable than the CPI? A basic insight regarding this issue is, as we have pointed out above, that the formation of monetary policy should not be determined by the current rate of inflation. Rather, what is important is how the inflation forecast develops. An increase in the repo rate will initially lead to an increase in the CPI, but eventually to lower inflation through its effects on demand and output. The inflation forecast therefore falls when the repo rate is raised.¹⁶ Thus, a central bank that focuses on the forecast of future inflation has

An increase in the repo rate will initially lead to an increase in the CPI, but eventually to lower inflation through its effects on demand and output.

¹⁴ See Blinder (1997).

¹⁵ See Fischer (1996) and Heikensten and Vredin (1998) for a discussion of this issue. However, a reason for specifying “escape clauses” for the inflation target could be that the central bank is pursuing a strategy that, according to our analytical framework, is not optimal. See the section below on “Optimal policy or simple rules?”

¹⁶ Admittedly, a change in interest rates can also have persistent effects on inflation and the inflation forecast via mortgage rates. However, these effects are most likely dominated by the traditional effect that works through aggregate demand.

no reason to worry about the immediate effects in the “wrong” direction brought about by the central bank’s own actions.

However, one must also take into consideration that the interest rate component of the CPI opens up a new channel for monetary policy, at least in theory. In addition to affecting inflation with a two-year lag via demand and output, i.e. by the usual transmission mechanism (the only one discussed so far), the central bank can now also influence inflation directly through repo rate changes, albeit in the “wrong” direction. What would happen, then, if the central bank deliberately attempted to control inflation in the very short term, using this “direct” interest rate channel? Such a strategy would mean that a positive shock to inflation would be met with a *lowered* repo rate; however, this would lead to added inflationary pressure in the future, prompting further cuts. One quickly realizes that such a policy would result in great economic instability, and that a central bank guided by a more long-term perspective would never pursue such a policy (see Bäckström, 1999).

A central bank should not fully exploit the direct interest rate channel to gain full control over inflation.

Thus, a central bank should not fully exploit the direct interest rate channel to gain full control over inflation. However, it should not entirely disregard the possibility of affecting current inflation. A central bank that targets

CPI inclusive of the interest rate component can, following an inflation disturbance, choose to raise interest rates slightly less than a central bank that excludes the interest rate component from its target variable, since current inflation then rises a little less.¹⁷

MEASURES OF CORE INFLATION¹⁸

Even though a central bank has formulated its target in terms of the CPI, it may be worthwhile to study the development of alternative measures of inflation. As noted above, this can provide valuable information about the extent to which changes in observed inflation are due to temporary factors relative to more trend-related changes. The measures of trend-based (core) inflation published by different central banks are often measures that exclude certain components of the CPI. In Sweden, measures of core inflation are published in which the interest costs for owner-occupied housing, indirect taxes and subsidies, oil and petrol and imported goods are removed in stages.¹⁹ Another measure of core inflation that is often

¹⁷ See Nessén and Söderström (1999).

¹⁸ For a more detailed survey of measures of core inflation, see Taillon (1997), Roger (1998) and Apel and Jansson (1999).

¹⁹ The UNDI_X measure is calculated as CPI excluding interest rate costs and the direct effects of changes in indirect taxes and subsidies. The UNDI_{NHX} also excludes the prices of goods that are mainly imported.

reported is the average increase in CPI that remains after a certain share of the CPI components with the highest and lowest price increases in each given period has been removed.²⁰

The common element in these adjusted measures of inflation is that the general public can relatively easily understand how they have been calculated, since they are the result of fairly “mechanical” operations on the CPI. However, they also have the disadvantage of being difficult to interpret in economic terms, because of the very fact that they are mechanical and not based on any explicit relationships between the development of the real economy and inflation. To interpret in economic terms *why* core (and actual) inflation increases or decreases requires a measure calculated with the aid of an economic model of the inflation process.

Such a model-based measure can be difficult to explain to the general public; moreover, it will be sensitive to the choice of model specifications. Therefore, it may not be suitable to use such a measure as a target variable, since a target variable preferably should be easy for the public to understand and follow. However, if the alternative measure of inflation is mainly used as an aid in analyses and forecasting, there is probably significantly greater scope for the use of economic models and econometric methods. It can also be maintained that an economic model of the inflation process is needed anyway to make forecasts of future inflation. It would then seem reasonable to use this model to analyze the inflation process and to divide changes in current inflation into long-term and more temporary effects.

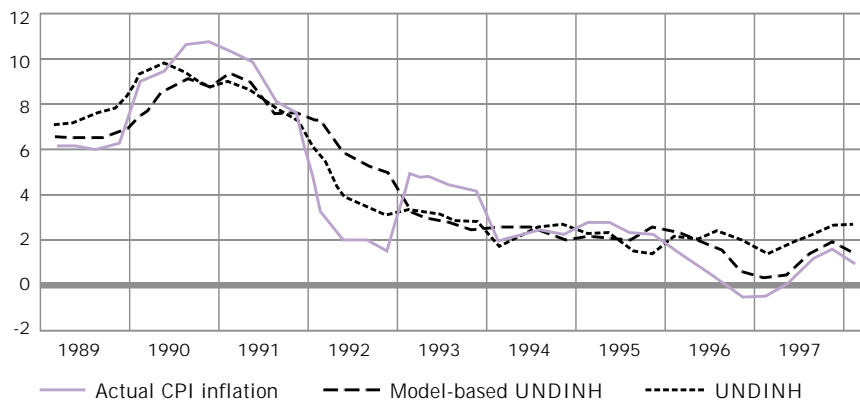
Like most inflation targeting central banks, the Riksbank uses several different types of models to analyze the inflation process. One approach (Apel and Jansson, 1999) divides inflation into three components: (i) long-term inflation, (ii) cyclical inflation, and (iii) that part of inflation that is generated by specific disturbances, such as changes in indirect taxes and energy prices. This approach enables calculations of alternative definitions of the concept ‘core inflation’ (for example, as only (i) or the sum of the components (i) and (ii)), which may be valuable since a generally accepted definition currently does not exist.²¹

Like most inflation targeting central banks, the Riksbank uses several different types of models to analyze the inflation process.

²⁰ Such a measure, called a “trimmed mean”, is advocated by, for example, Bryan et al. (1997).

²¹ For another type of model-based approach, see Blix (1995).

Figure 3. Actual CPI inflation, model-based core inflation and "traditional" core inflation, per cent per annum



Changes in the model-based measure can be given an economic interpretation.

Figure 3 shows such a model-based measure of core inflation, defined as the actual inflation minus the estimated effects of changes in short-term interest rates, import prices and indirect taxes. It is shown together with its closest counterpart among traditional measures of core inflation.²² The most important difference between the two measures is, as indicated above, that changes in the model-based measure can be given an economic interpretation, while the traditional measure cannot. For example, if there is an increase in the traditional measure, all that can be said is that it reflects the price increase of a basket of goods with certain components excluded. On the other hand, if there is an increase in the model-based measure of core inflation, it is possible, at least in principle, to say something about the underlying economic causes; for example, how much of the increase that is due to changes in long-term inflation, changes in cyclical inflation, or price movements resulting from specific disturbances (other than short-term interest rates, import prices and indirect taxes).

This is important information for a central bank. An increase in the long-term inflation rate could, for example, be an indication of lower credibility for the inflation target, while the cyclically based inflation can provide information on the demand situation and the tightness of monetary policy. Naturally, this approach does not solve all problems associated with the calculation of core infla-

²² The measure used here, UNDINH, is the one previously calculated by the Riksbank. Today, Statistics Sweden calculates and publishes this measure under the name UNDINHx.

tion, but most likely it can be used for more detailed analyses than traditional methods.²³

THE MEASUREMENT PERIOD²⁴

The discussion regarding the choice of inflation measure has so far treated different price indices. However, there is also an intertemporal aspect to the choice of inflation measure, namely the length of the time interval over which inflation is to be measured. Most inflation targeting central banks use *annual* inflation as the target variable. For example, the Reserve Bank of New Zealand states that "...the policy target shall be 12-monthly increases in the CPIX of between 0 and 3 per cent" (Reserve Bank of New Zealand, 1997), while the Riksbank has stated that "monetary policy is targeted at keeping CPI inflation at an annual rate of 2 per cent" (see, for example, *Inflation Report 3*, Sveriges Riksbank, 1999). The Reserve Bank of Australia is an exception; it has chosen average inflation *measured over several years* as its target variable.

What are the implications for monetary policy of different measurement periods? Intuitively, taking an average over a longer period will, in effect, remove temporary effects from the measured inflation rate, since the impact of each individual disturbance is smaller. An aggregation over time can there-

There are similarities between the implications of expressing the inflation target in terms of some measure of core inflation and as average inflation over a longer measurement period.

fore be an alternative to expressing the target in terms of a measure of core inflation. In many respects, there are thus similarities between the implications of expressing the inflation target in terms of some measure of core inflation and as average inflation over a longer measurement period.

An important difference, however, is that past deviations from the inflation target can affect current monetary policy when the measurement period is extended. Assume that the central bank's target is to keep average annual inflation, measured over 2 years, at about 2 per cent. If for some reason the inflation rate a certain year exceeds 2 per cent, inflation in the following year must be below the target to the same extent (to maintain a 2 per cent average). Moreover,

²³ Since the method is based on an econometric model, one can take into consideration the fact that price changes (in oil, for example) can have second-round effects both on other prices as well as over time. The first effect is taken into consideration by *estimating* the impact of the oil price change on the entire CPI (instead of removing oil from the CPI basket). The second effect can be taken into consideration since the estimated model is dynamic (e.g. it is possible to estimate how large portion of inflation at a certain time depends on oil price changes in the previous period).

²⁴ The results in this section are taken from Nessén (1999).

A longer measurement period for the targeted inflation rate and an increased concern for output stabilization have similar effects on the formation of monetary policy and the variability of output.

inflation in the subsequent year must exceed 2 per cent. For this reason, a cyclical pattern may arise in both monetary policy and the behavior of output. However, this is true only if the relative importance assigned to output stabilization by the central bank is sufficiently small. In other cases, the central bank will

avoid a monetary policy that creates fluctuations in the real economy, and will therefore allow the average inflation rate to gradually return to the target. For a central bank that also cares about output stabilization, an extended measurement period will therefore lead to a smoother monetary policy and a smoother development of output.²⁵ Thus, a longer measurement period for the targeted inflation rate and an increased concern for output stabilization have similar effects on the formation of monetary policy and the variability of output.

TARGET FULFILLMENT

There is another category of explanations for why central banks may choose to formulate an inflation target in terms of an adjusted index or the average value over a longer measurement period. For a central bank, it is probably easier to fulfill a target expressed in such terms than a target expressed in terms of CPI inflation measured over a relatively short period. Let us assume, as in our analytical framework, that the lag between a change in the repo rate and its effects on inflation (i.e. the control horizon) is two years and that the central bank sets the repo rate to make the inflation forecast two years hence be exactly on target (i.e. the implicit targeting horizon is two years). Since unexpected disturbances continually affect the CPI, inflation after two years will probably miss the target. Any attempt made by the central bank to counteract the effects of these disturbances (that occur after the forecast is made) will not have sufficient time to take effect. Therefore, an inflation target expressed in terms of a measure where certain disturbances have been removed has a greater chance of being achieved.

Thus, the decision to use as a target an adjusted index or an inflation rate calculated over a longer time period could be based on a desire for making monetary policy appear more robust and accurate to the public, even though it is a matter of “tidying up the numbers”. In our view, a better long-term alternative for the central bank is to clearly explain to the public the conditions under which

²⁵ Monetary policy is not cyclical in this case. Only in the case when the central bank assigns very little importance, or no importance at all, to output stabilization does monetary policy (and thus the behavior of output) become cyclical.

monetary policy is conducted, especially the fact that monetary policy works with a lag, and that it therefore can be difficult or impossible to neutralize unforeseen disturbances that occur after the forecast has been made.

HOW SHOULD INFLATION BE MEASURED: A SUMMARY

A summary conclusion for this section on the choice of inflation measure is that there, after all, appear to be good reasons for central banks to set the inflation target in terms of a well-known and broad measure of inflation, such as the CPI. The outlined analytical

If the central bank does not bring inflation back to target in the shortest possible time the negative effects on the real economy are minimized.

model for inflation targeting indicates how the problems that are claimed to arise in setting an inflation target in terms of the CPI can be handled. A reason why central banks sometimes focus on other measures of inflation than increases in the CPI may be that they have targets for other variables than inflation. However, the model used here shows that large disturbances can be handled by the central bank *not* bringing inflation back to target in the shortest possible time; in that way, the negative effects on the real economy are minimized. In other words, the central bank can choose an implicit targeting horizon that is longer than the control horizon.

Since the effects that have been excluded in the calculation of core inflation often are temporary and difficult to predict, the forecast for CPI inflation tends not to differ to any great degree from the forecast for core inflation. Therefore, it is not obvious that a target in terms of CPI inflation in itself would result in a less stable development of output than would any other measure of inflation that excludes certain components. On the other hand, it is of course important to analyze which factors underlie changes in CPI inflation, so that forecasts and monetary policy can be based on all relevant information. Different measures of core inflation can play an important role in this context.

The effects of uncertainty

Central banks often discuss the importance of uncertainty when explaining their policy. However, in the type of models upon which our analytical framework is based, where the only source of uncertainty concerns future disturbances to the target variables, policy is not affected by the degree of uncertainty. Instead, monetary policy is conducted as if the central bank was completely certain about how

the economy is developing.²⁶ Uncertainty is reflected only in the central bank's lack of full control over the target variables, whereby actual outcomes will differ from forecasted outcomes.

However, the actual behavior of central banks indicates that uncertainty is an important factor in the formulation of monetary policy. In order to explain this behavior, it is necessary to go beyond the simple analytical framework that we have used so far and introduce other types of uncertainty.

UNCERTAINTY REGARDING MACROECONOMIC RELATIONSHIPS

A classic conclusion regarding monetary policy in the face of uncertainty about its effects is that the central bank should be more cautious than would be the case if such uncertainty did not exist.

No central bank is endowed with full knowledge of how the economy functions. There is instead widespread uncertainty regarding issues ranging from the effects of monetary policy on the economy to how the economy functions in general. A classic conclusion regarding monetary policy in the face of uncertainty about its effects is that the central bank should be more cautious than would be the case if such uncertainty did not exist. The reason is that central banks directly affect the degree of uncertainty in the economy by their actions. By trying to reach the target more quickly with large changes in interest rates, the risk increases of missing the target by a large margin, since the effects of changes in interest rates on the economy are uncertain. Hence, uncertainty about the effects of policy leads to a more cautious conduct of policy and a slower return of inflation toward the target. The implicit targeting horizon thus becomes longer. This type of argument is intuitive and easy to understand, and is often cited by central bank economists.²⁷

However, this result does not necessarily apply to other types of uncertainty. On the contrary, uncertainty about how inflation develops over time (or, more specifically, its persistence) can result in the central bank taking a *more* aggressive stance in its policy. With incomplete knowledge of the persistence of inflation, a cautious monetary policy may result in inflation not approaching the target at the desired rate, or even diverging from the target. The central bank can lower this risk with large interest rate adjustments, thus reducing uncertainty regarding the

²⁶ This result, which in technical terms is called "certainty equivalence", follows from the assumption that the central bank's objective function is quadratic (i.e. the central bank minimizes the expected squared deviations of inflation and output from their targets), and the economy's development can be described as a linear relationship with additive disturbances to the target variables as the only source of uncertainty. See, for example, Sargent (1987).

²⁷ See Brainard (1967) for the original analysis, and, for example, Blinder (1998) or Goodhart (1999) for a practical discussion.

path of inflation. This more aggressive policy leads to the expectation that inflation will return to the target more quickly, so that the implicit targeting horizon is shortened.²⁸

Another example of how uncertainty may lead to a more aggressive policy is when the central bank attempts to learn about how the economy functions by observing how the economy reacts to different types of monetary policy changes. In this case, it may be

The central bank can learn more about the economy by introducing larger changes in interest rates, and this knowledge can be used to better control the economy in the future.

optimal to experiment with policy. The central bank can learn more about the economy by introducing larger changes in interest rates, and this knowledge can be used to better control the economy in the future.²⁹ However, it should be noted that many central bankers are doubtful about such an argument. For example, Blinder (1998) argues strongly against a strategy that includes experimentation, since the risks associated with such a strategy can be considerable. On the other hand, it is apparent that central banks continuously learn about the functioning of the economy, and that in certain situations it may be natural to use policy to increase the rate of learning. This applies especially to situations where inflation is near the target and the risks of bad outcomes are considered to be small.

A more fundamental source of uncertainty concerns economic relationships in general. Given particular assumptions about the economic structure, it is often possible to derive a theoretically optimal rule for how the central bank should set the repo rate as a function of the state of the economy. However, if the actual structure is different, this rule can be very harmful. The risk for serious mistakes can thus be substantial if a specific model of the economy is relied upon. It may therefore be desirable to find monetary policy rules that are “robust”, in the sense that they lead to acceptable (if not yet optimal) results under a number of different assumptions about how the economy functions. A good strategy for central banks could then be to follow a relatively simple rule, instead of setting interest rates according to a complicated, but under certain circumstances optimal, reaction function. This issue is discussed further in the section below, “Optimal policy or simple rules?”.

²⁸ See Söderström (1999a). If the central bank cares only about stabilising inflation, the implicit targeting horizon is already as short as possible (i.e. equal to the control horizon). In this case, it is not affected by uncertainty about the persistence of inflation.

²⁹ See, for example, Wieland (1998).

UNCERTAINTY IN PRACTICE

It is often assumed in theoretical analyses of monetary policy that the central bank can continually and correctly observe how the economy is developing and make adjustments accordingly, without any uncertainty regarding, for example, the current inflation rate, unemployment or the output gap. However, this is not the case in everyday practical monetary policy. Rather, central banks observe the development of the economy with a certain time lag, and there is often great uncertainty about the most recently obtained statistics. In particular, it is difficult to separate temporary movements in the economy from long-term trends.

These difficulties give the central bank yet another reason to pursue a more cautious policy.³⁰ The reason is that the bank must rely on historical (i.e. more certain) observations to calculate the long-term tendencies. The greater the uncertainty about the most recent information, the less importance it is given, and the greater is the importance given to historical observations. In this way, greater uncertainty leads to greater caution in interest rate policy.

Some types of uncertainty cause optimal policy to become more cautious, while other types have the opposite effect.

From a purely theoretical point of view, it is thus not easy to determine how uncertainty should affect monetary policy in practice. Some types of uncertainty cause optimal policy to become more cautious, while other

types have the opposite effect. Empirical studies can, however, provide a guideline in this respect. Two studies of U.S. monetary policy analyze the effects of sluggishness in important macroeconomic variables and of uncertainty about various relationships in the economy. By calculating optimal policy with and without uncertainty, an understanding can be gained of how policy is influenced by the existing uncertainty, and how well the theoretically optimal strategy agrees with observed policy. The optimal policy is found to be more cautious when uncertainty is taken into consideration, and this policy fits rather well with how the Federal Reserve has acted in practice. A third study shows that a combination of uncertainty about the true model and about the most recent statistics leads to an optimal policy that corresponds well with the behavior of the Fed.³¹

It appears then that theoretical models of inflation targeting give a good understanding of actual central bank behavior, once these models take into consideration the sluggishness of the economy and the uncertainty that characterizes policy. Nonetheless, certain features of actual policy-making require further

³⁰ See Orphanides (1998).

³¹ See Sack (1998) and Söderström (1999b), as well as Rudebusch (1999).

explanation and research. For example, central banks often present their forecasts in the form of a main scenario, together with one or two alternative scenarios. Sometimes they even explicitly report the confidence intervals for the inflation forecasts. An examination of the different ways this can be done goes beyond the scope and purpose of this paper.³²

However, one problem that deserves to be emphasized is that while actual policy appears to be influenced by such representations of uncertainty, this is not captured in the theoretical models reported here so far. The different scenarios and confidence intervals associated with the forecasts are usually not motivated by uncertainty regarding the effects of monetary policy or which model of the economy is the correct one. Instead, they are motivated with reference to “specific factors”, for example, financial instability in Asia or South America, the risks of a market crash in the USA, or domestic fiscal policy and wage negotiations. But in our analytical framework, these factors are examples of the shocks that affect the target variables, and, as we have discussed, such shocks should not affect policy. Hence, a theoretical analysis of the consequences of these types of events probably requires a departure from the traditional (linear) model world, for example in such a way that the consequences of the economy occasionally moving from one regime to another (or between different models) can be studied.³³ There is obviously a need here for studies that span the gap between theory and actual policy.

One research area that appears promising studies the effects of central bank uncertainty regarding the correct model of the economy and the effects of a monetary policy focusing primarily on avoiding serious mistakes.³⁴ This behavior can lead to more or less aggressive policy, depending on the degree of uncertainty and the fear of making mistakes. However, note that this type of analysis presupposes that the fundamental assumptions in our analytical framework are not applicable, since the decision problems of central banks can no longer be described as solely an attempt to minimize deviations from given inflation targets and output targets. In

It appears then that theoretical models of inflation targeting give a good understanding of actual central bank behavior, once these models take into consideration the sluggishness of the economy and the uncertainty that characterizes policy.

³² See instead Blix and Sellin (1998) and Villani (1999) for analyses of two different models that are used by Sveriges Riksbank.

³³ See, for example, Hamilton (1995). A relevant example is the regime shift toward a low inflation regime which the Swedish economy underwent in the early 1990s. The risk of a return to a high inflation regime is something that private forecasters have been forced to take into consideration. This has certainly had consequences for monetary policy, even if the Riksbank itself has not considered it likely that the inflation target would be abandoned. In the same way, the Riksbank must consider the risk that domestic wage trends or share prices can take a sudden surge. See Blix (1999) for a study of inflation in a model with regime shifts.

³⁴ See, for example, Sargent (1999) and Onatski and Stock (1998).

this case, the simple analytical framework must be abandoned, or at least greatly modified, in order to make the description of monetary policy more realistic.

Optimal policy or simple rules?

One purpose of this article has been to demonstrate how a simple analytical framework of inflation targeting can be used to shed light on practical policy issues, thus providing a useful structure for monetary policy discussions. Hopefully, we have given yet another example of the saying that “nothing is so practical as a good theory”.

Attempts to rationalize actual monetary policy in terms of any given theoretical model can be taken too far.

Undoubtedly the theoretical and empirical research regarding inflation targeting has provided policymakers with valuable insights. At the same time, however, there may be a danger

in linking the analysis too closely to one given model, especially if the impression is given that the chosen model is the “only correct one”. Naturally, this is not the case. In fact, we believe that attempts to rationalize actual monetary policy in terms of any given theoretical model can be taken too far.

The monetary policy debate in recent decades has been dominated by two broad themes stemming from the academic literature. First, there is the argument that a central bank, engaged in the type of optimizing behavior described above, may encounter problems of lacking credibility if there in the political system is a desire to raise production or employment above the “natural” or “potential” rate of growth (see Barro and Gordon, 1983). The second argument, with a much longer tradition, emphasizes the difficulty of conducting optimal monetary policy in the face of “long and variable lags” and uncertainty. Milton Friedman has expounded this latter argument for some time (see Friedman, 1968).

These two arguments differ in a fundamental way regarding their view on monetary policy as “social engineering”. The first argument has generally led to the conclusion that central banks should be granted some degree of independence from the political system.³⁵ Note, however, that a maintained assumption is that the central bank is capable of implementing a sophisticated monetary policy; the degree of activism in monetary policy will be no less with an independent central bank than with a central bank under more direct political influence. Friedman’s argument, on the contrary, advocates a less activist monetary policy; for example, monetary policy should concentrate on maintaining a certain con-

³⁵ See Apel and Viotti (1998) for a more detailed presentation of this argument.

stant rate of inflation or, if this proves too difficult, a constant rate of growth in the money supply.

The analytical framework presented in the beginning of this article implicitly builds upon a very favorable view of monetary policy as social engineering. The central bank has a clear mandate – namely of achieving a low and stable rate of inflation with due consideration to output and employment stability – as formulated in its objective function. Furthermore, the central bank has a clear, albeit not perfect, picture of how the economy functions and how it is affected by central bank actions. Hence, the central bank is able to formulate a policy that, *ex ante*, is deemed optimal. *Ex post* another policy will most likely be regarded as more desirable, as briefly discussed earlier. This is of course unavoidable and should thus be easily explained to those whose task it is to evaluate and monitor monetary policy. This in turn, however, requires that openness and transparency characterize the monetary policy decision process. It is, for example, important that the central bank is clear in its choice of inflation measure and over what time horizon inflation is to be stabilized.

There are of course other ways of describing and analyzing inflation targeting than the analytical framework used in this article. According to the Friedman-inspired

An appropriate strategy for the central bank could be to formulate a simple rule.

tradition, the central bank's knowledge of how the economy functions is so limited that it cannot possibly formulate monetary policy in the optimal manner described above. Under these circumstances, with greater scope for discretionary actions, monetary policy may experience credibility problems and the central bank may become vulnerable to outside pressure. An appropriate strategy could then be for the central bank to formulate a simple rule, whereby changes in the repo rate are linked to only a few indicators of macroeconomic development. This rule must be clear and implemented consistently, so that monetary policy becomes transparent and possible to evaluate. Such a strategy has been advocated by several prominent macroeconomists (e.g. McCallum, 1999) in view of the uncertainty that characterizes monetary policy in practice.

As discussed above, a simple rule can also be robust in the sense that it leads to reasonable outcomes under various assumptions regarding the structure of the economy. Some economists have proposed that the central bank should use the inflation forecast when deciding on a suitable level for the repo rate:³⁶ if the inflation forecast is above the target, the repo rate should be raised, and vice versa

³⁶ See, for example, Rudebusch and Svensson (1999) who also analyze so-called Taylor rules.

(given the level of output). The forecast can be based on both econometric models and expertise knowledge without relying too heavily on any given model. Similar strategies are in fact used by several inflation targeting central banks, for example Sveriges Riksbank, the Bank of England and the Reserve Bank of New Zealand.

There is no simple relationship between the optimal change in the repo rate and the deviation of the inflation forecast from the target.

A related argument in favor of simple rules is that even the simplified analytical framework used in this article results in policies that place great, perhaps too great, demands on the central bank, both in terms of implementation of policy and communication with the general public. After each macroeconomic shock, the central bank is seen as calculating exactly how it plans to bring inflation (and output) back to target, resulting in a path for the repo rate. If actual inflation deviates from the previously determined path, a new path for the repo rate must be calculated. However, there is no simple relationship between the optimal change in the repo rate and the deviation of the inflation forecast from the target (the exception being when the central bank places no weight at all on output stabilization). Instead, the optimal repo rate change is determined by the difference between the old and new forecasts of inflation. Obviously, such a policy requires great faith in the accuracy of the forecasts. In addition, if the policy is to be transparent and comprehensible to the general public, the central bank must publish long-term forecasts not only of inflation, but also of output and the repo rate.

Discussions are greatly affected if inflation targeting is seen as an attempt to follow a simple rule, rather than as optimal monetary policy.

Discussions regarding the horizon of an inflation targeting policy, the different definitions of inflation and the effects of uncertainty are greatly affected if inflation targeting is seen as an attempt to follow a simple rule, rather than as optimal monetary policy. Central bank announcements regarding their policy horizon need not then be interpreted in terms of control horizons or implicit targeting horizons. Instead, such announcements can be interpreted as a recognition of the twin facts that monetary policy works with a lag (but the central bank does not know how long the lag is) and that strict attention to the inflation target would have undesirable real effects (although the size of these effects are unknown). The announcement of a policy horizon, without any explanation of whether this is the control horizon or the implicit targeting horizon could be a pragmatic way of taking these circumstances into consideration. Furthermore, it is then not surprising that the policy

horizon is fixed; as we have shown, this is not optimal given more information about the structure of the economy and the types of shocks hitting it. Nonetheless such a strategy can provide satisfactory macroeconomic outcomes and contribute to stabilizing inflation expectations.³⁷

Similarly, the discussion regarding how inflation should be measured is affected by whether monetary policy is seen to follow a (relatively) simple rule or is geared to be (roughly) optimal. One conclusion from the section on the choice of inflation measure is that there do not seem to be any strong arguments for defining the objective function in terms of an index where different components of the CPI are excluded. As illustrated in the analytical framework, the perceived problems of targeting a broad measure of inflation such as the CPI are relatively easily handled. The circumstance that central banks nonetheless define their targets in terms of adjusted inflation measures is perhaps an application of some rule of thumb that makes monetary policy easier to communicate and rationalize ex post.

Regarding the effects of uncertainty, finally, we have noted that theories of optimal monetary policy cannot fully account for the cautious behavior of central banks and why they appear to give such emphasis to their uncertainty about the macroeconomic development. Only some types of uncertainty, and not always the types emphasized in central bank rhetoric, lead to a more cautious optimal policy. If, on the other hand, monetary policy is seen as following some simple rule, it could very well be that various types of uncertainty could justify a rule such as: “Keep the repo rate unchanged, as long as the inflation forecast does not deviate too much from the target.”³⁸

Theories of optimal monetary policy cannot fully account for the cautious behavior of central banks and why they appear to give such emphasis to their uncertainty about the macroeconomic development.

Obviously, the analysis of monetary policy can be misleading if it is based on the erroneous presumption that policy is conducted in an “optimal” manner, when it instead is following a simple rule. In practice, however, it is unlikely that

³⁷ According to Berg (1999), the Riksbank, for example, sees its control horizon as being 1–2 years, while its implicit targeting horizon normally is 5–8 quarters, i.e. the same length as the control horizon. However, following large disturbances, there is reason to extend the implicit targeting horizon in order to avoid large swings in the real economy. According to Heikensten (1999), an announcement should be made in advance to explain how inflation is expected to deviate from the target in the future. This strategy, which is similar to that conducted in New Zealand, can be difficult to understand in terms of our analytical framework. However, it can nonetheless be a reasonable strategy in practice in order to achieve a transparent and clear monetary policy. See Batini and Nelson (1999) for a formal analysis.

³⁸ The debate on the merits of explicit money supply targets (such as those advocated by the ECB) can be interpreted in terms of whether monetary policy should strive to be optimal or simple. However, examining this issue would go beyond the scope of this article.

central banks conduct fully optimal policies or strictly adhere to simple rules. Inflation targeting central banks most likely strive for strategies that are, on the one hand, sufficiently simple so as to make them implementable and transparent, and on the other, sufficiently sophisticated to include some of those many factors theoretical models tell us should be considered. Thus, models of optimal monetary policy and simple rules can be useful in different contexts as approximations of actual policy.

Concluding remarks

The central bank may have an implicit targeting horizon that is longer than the control horizon.

When inflation targeting central banks communicate their policies to the public, they often emphasize that monetary policy is not guided by today's rate of inflation, but by future rates of inflation. The objective is for the inflation rate to be on target at a particular time in the future, typically approximately two years hence. We have shown that this horizon can be interpreted in two different ways. First, it can be a statement about *the structure of the economy*, in particular the lags that characterize monetary policy actions. We have labeled this the *control horizon* of monetary policy. Second, it can be a statement about the central bank's *objective function*, and the fact that it may consider the stabilization of, for example, output and interest rates important too. Hence, even with a target for annual inflation and lags in the transmission mechanism making the control horizon, say, two years, concern about other factors than inflation will lead to monetary policy aiming to reach the inflation target after more than two years. Put differently, the central bank has an implicit targeting horizon that is longer than the control horizon.

The implications of having a horizon of two years will be different, depending on whether it is the control horizon or the implicit targeting horizon that the central bank has in mind. The ex post evaluation of monetary policy is correspondingly much more difficult – both to outside observers and to the central banks themselves – if it is unclear how a stated horizon should be interpreted. Another area where more clarity is desirable concerns the choice of inflation measure and the role of the various measures of core inflation. Should central banks target other measures of inflation than the rate of increase in the CPI? Should monetary policy respond to changes in some measure of core inflation even when the target is to stabilize the CPI? Our inclination is to answer these questions with a no and a yes, respectively. Yet, as the discussion in this article hopefully has demonstrated, these answers are far from self-evident, as is our dis-



inction between control horizon and implicit targeting horizon. What we have interpreted as examples of lacking transparency may thus be proper policy. Nonetheless, we believe that it is important that central banks continually strive for greater transparency in their policy making; examples of such attempts can also be found (see, for example, Heikensten, 1999).

A third source of lack of clarity in the monetary policy message is uncertainty. Even if it was possible to be more precise about the objective function of central banks in terms of an explicit and simple formula (which, of course, it is not), policy would still not be completely transparent, due to uncertainty about how the economy functions in general and about monetary policy effects in particular. This leaves great room for differences of opinion about what constitutes suitable monetary policy. Theoretical and empirical research in these areas can improve our understanding of how the economy functions and reduce the degree of uncertainty. However, existing models do not fully capture how monetary policy makers are affected by uncertainty. Here there is a need for increased integration of theory and practice.

Theoretical and empirical research can improve our understanding of how the economy functions and reduce the degree of uncertainty.

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Structural changes in the banking sector – driving forces and consequences

BY PER LILJA

Payment Systems Department, Sveriges Riksbank.

The Riksbank has a statutory responsibility for maintaining a secure and efficient payment system. This is discharged partly through the provision by the Bank of a system for clearing and settlement of large payments (RIX).¹ Given that the banks are the principal members of the payment system, the Riksbank must monitor developments in the banking system on a continuous basis with respect to the profitability of the players, and their ability to withstand financial disturbances. The insights gained in this process serve as a basis for, among other things, assessing how various trends in the financial system affect the strategic risks to which the banks are exposed.

There is a widely-held perception today that the financial markets and the financial institutions in the European countries are facing significant structural changes. The driving

The financial institutions in the European countries are facing significant structural changes.

forces behind the changes are primarily increased competition in the wake of deregulation, internationalisation, technological development, and the ever more important role being played by financial markets. These changes will, in all likelihood, be of major significance for the financial system, since they affect the process through which the system fulfils its primary functions. As these trends involve greater competition, they also have a significant impact on the ability of the banks to achieve sufficiently high profitability and thereby their ability to withstand financial disturbances. Accordingly, these changes have consequences for the strategic risks faced by the banks in their operations.

This article attempts to explain the major structural changes to which the

¹ The system also fulfils an important function in the execution of monetary policy operations.

banks will be exposed, and the potential consequences of these changes on the strategic risks in the banking system.

Background

The financial system plays a central role in every market economy, and its principal tasks are:


- to provide payment services
- to convert savings into investment
- to make it possible for households and companies to manage financial uncertainty and risk.

An efficient and secure financial system supports and makes a positive contribution to economic growth, while disturbances in the financial system can retard growth to a significant extent. It can be said that an efficient financial system acts as a lubricant for the real economy, and increases its ability to generate prosperity.

As the banks provide both deposits and loans, they also have a key role in the two other main tasks of the financial system: the conversion of savings into investment, and the allocation of risk.

Processing of payments is one of the most fundamental functions of the financial system, and the payment system can therefore be seen as one of its most central elements. The importance of the payment system to the national economy is illustrated by the fact that just about every economic transaction requires some form of payment to be made. The base of the payment system is made up, in addition to the legal tender produced by the central bank, i.e. notes and coins, by all the accounts held by companies and private individuals in the banking system. In this way, payments processing is closely linked to the banks' deposits, which means that the banks have a key role in the payment system. As the banks provide both deposits and loans, they also have a key role in the two other main tasks of the financial system: the conversion of savings into investment, and the allocation of risk. For this reason, the authorities have a natural interest in ensuring that the banking system functions as securely and efficiently as possible.

If a bank were to suspend payment, for example, this could cause a serious disturbance in the payment system if the problem were to spread to other members of the system. If such a course of events came to pass, the stability of the financial system, and thereby the growth of the national economy in general, could be put at risk. The major banking crises which Sweden and other countries



have experienced have shown how expensive disruptions to the banking system can be. Experience has also shown that such crises are in part due to substantial structural changes in the conditions under which banks operate. Increased competition in the wake of deregulation and technological developments are examples of such changes. To gain a deeper insight into the conditions under which the banks operate, it is therefore important to analyse how market conditions for the banks have developed.

Why do banks exist?

In Sweden, as in the rest of Europe, the financial system has been dominated by “universal banks”, which offer companies and households a broad spectrum of financial services. The core business of these banks has been to act as intermediaries in payments, and to accept savings in the form of deposits, which are then lent to companies and households in the form of credits. In this way, the funds saved by individuals and companies have been passed on to players with a need to finance consumption and investment.

There are a number of different theories that attempt to explain why banks exist, and the advantages that this form of financial intermediation has compared with saving and borrowing directly on the financial markets or via other financial intermediaries. Various types of information problems linked to risk management and the complicated process involved in converting savings into bank credits are often cited as explanations.

The banks are regarded as having comparative advantages in handling credit risks compared with the capital markets in cases where specific information on a company's operations and projects are difficult to convey to individual investors. It can also be problematic for players on the capital markets to monitor that borrowers are not acting in a way that is detrimental to their debt servicing capacity after the credit has been granted. In this respect, the banks fulfil an important role, since they have the opportunity to monitor and evaluate on a continuous basis the debt servicing capacity of small and medium-sized companies, which is often difficult for an outside observer to assess. Many companies prefer to obtain credits via the banks to avoid – for competitive reasons – informing a wider circle of investors on the capital markets about their operations.

The banks are regarded as having comparative advantages in handling credit risks, compared with the capital markets, where specific information on a company's operations and projects are difficult to convey to players on the capital markets.

Credit brokerage through banks is therefore a cost-effective method of generating loans and monitoring the behaviour of borrowers.

Monitoring an individual borrower is a relatively expensive activity. Banks are regarded as having two comparative advantages as regards monitoring. The first is the economies of scale which the monitoring of a large number of customers provides, and the second is the diversification of risk which the large number of customers implies (Diamond, 1984).² Credits granted on a bilateral basis, by agreement between investor and borrower, would lead to increased costs of monitoring the borrower. A large number of individual, relatively small lenders monitoring a large number of borrowers would probably increase the total expense of monitoring considerably. Credit brokerage through banks is therefore a cost-effective method of generating loans and monitoring the behaviour of borrowers. In the light of this, it is rational for investors (in the form of depositors) to delegate the monitoring of the borrowers' financial behaviour to the banks.

The difficulties involved in entering the payment market also make it difficult to take market shares in the deposit market.

Bank deposits are one of the most liquid assets that savers can hold, and so it is natural for banks to offer payment services in combination with deposits. As a result of this, the banks have established a central role for themselves in acting as intermediaries in both large and small payments. The Swedish banks play an important part in the Riksbank's system for clearing and settling large payments (RIX), but over a long period, they have also invested in and developed systems for the settlement of retail payments. Given that there are substantial economies of scale in such systems, it is difficult for new players to break into this market. It is also difficult to compete in the market for deposits without being able to offer depositors competitive payment services, since these products complement one another.³ The difficulties involved in entering the payment market also make it difficult to take market shares in the deposit market.

What has proved difficult to explain in theoretical terms is why illiquid lending has come to be combined with highly-liquid deposits in the way that is typical for banks. No generally accepted theory has been developed. A simple explanation may be as follows.

The fact that individuals and companies have deposit accounts with the banks through which they transact payments helps give the banks an information advantage. These accounts provide the banks with access to more detailed infor-

² Diamond, D., "Financial intermediation and delegated monitoring", *Review of Economic Studies*, 1984.

³ For a more detailed discussion of economies of scale and network effects in the payment system, see Gabriella Guibourg, "Efficiency in the payment system – a network perspective", *Quarterly Review*, 1998:3.

mation on their customers. The payment transactions that pass through the deposit accounts in this way provide information on the customers' income and wealth, and on their consumption and investment patterns. This allows the banks, more efficiently than other players, to assess credit risks associated with these individuals and companies, and to check that the borrowers' debt servicing capacity is not being compromised.

A more sophisticated explanation has been put forward by Rajan (1996).⁴ Rajan's analysis is based on the particular capabilities for carrying credit risks arising from the way the banks finance their credits (deposits). The banks' information advantages, and the re-

Bank runs is the principal reason that banks are required to work under a special regulatory framework, and are subject to supervision.

sulting greater ability to assess credit risks and monitor borrowers, make deposits an attractive form of financing for an investor. It provides the opportunity to withdraw the invested funds as soon as there is the least doubt about the solvency of the bank. The banks must, accordingly, act with considerable caution – as soon as any doubt arises about their solvency, they risk losing their financing and suffering a liquidity shortfall. Consequently, the banks' intrinsic liquidity risks and the market discipline that these engender, make the banks particularly suitable for bearing difficult-to-assess credit risks. At the same time, this is the origin of the fundamental instability problem of bank runs, which is the principal reason that banks are required to work under a special regulatory framework, and are subject to supervision.

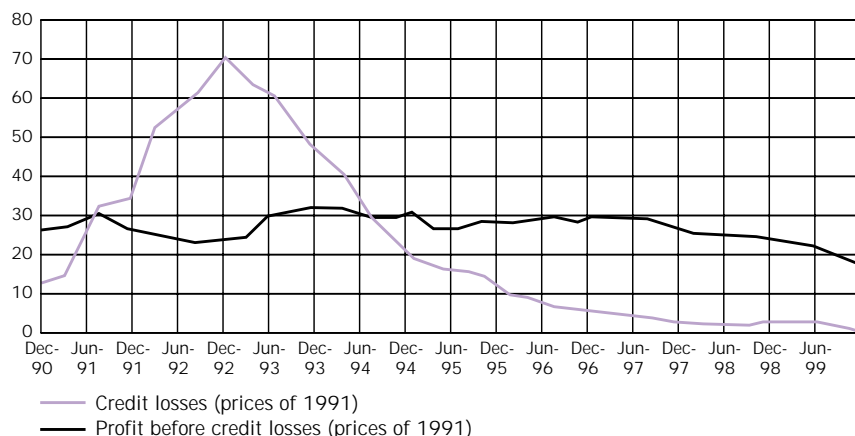
Changed conditions for the banking industry

There are currently many indications that banks will be exposed to fiercer competition, and that their special position will, in part, be weakened. This may mean that the forms of banking operations and the role of the banks will change in the future. There are signs that a number of driving forces are coming together to create pressure for change in the banking sector. An indication that pressure for change is already present to some extent is that profits in the banking sector have been stagnating during most of the 1990s (Diagram 1), after allowing for the extraordinary credit losses resulting from the banking crisis.

Increased competition and a long-term low level of profitability could erode the banks' financial strength, and make them vulnerable to a variety of distur-

⁴ Rajan, Raghuram, "Why Banks Have a Future: Toward a New Theory of Commercial Banking", *Journal of Applied Corporate Finance*, 1996.

Diagram 1. The profits of the major banks before credit losses, adjusted for items affecting comparability, constant prices, rolling 4 quarters, in SEK billion



Source: The Riksbank and the banks' income statements

Increased competition and a long-term low level of profitability could erode the banks' financial strength.

Structural changes in a competitive environment are essential for a dynamic development of the financial sector.

bances. This type of strategic risk could also act as an incentive for the banks to increase risk-taking. For example, it would be possible in the short term to increase reported profits through lending to less creditworthy borrowers at high interest.⁵ In the slightly longer term, however, such an approach would lead to increased vulnerability, since the debt servicing capacity of this type of borrower is, as a rule, more sensitive to financial disturbances.

It is important to point out, however, that structural changes in a competitive environment are essential for a dynamic development of the financial sector. Increased competition in the banking sector should, in principle, improve the efficiency of the financial system, and this should contribute to economic growth. Nor need there be any conflict between efficiency and stability. Fierce competitive pressure in the banking sector can make a positive contribution to the companies' ability to adapt to, and benefit from, changes, and this contributes to both the efficiency and the stability of the financial system.

The following sections examine how factors such as technological develop-

⁵ In the years leading up to the Swedish banking crisis, for example, many banks increased their reported profits as a result of increasing their lending risks, partly by lending greater volumes, and partly by lending to less sound borrowers. When the economy entered a downturn, however, many of these borrowers proved unable to sustain their debt servicing capacity over a business cycle.

ments and disintermediation in combination can result in increased competition and change the underlying conditions for the banks' operations.

The new information technology

The impact of technological developments plays a significant role in assessing the future for a number of industries. This is certainly the case in the banking sector. Due to technological developments, it has been possible to eliminate paper-based and manual processes. One of the many indicators of the large-scale improvements in productivity to which this has contributed is the fact that the number of employees in relation to total assets in the banking sectors in the majority of EU countries fell significantly between 1985 and 1997 (Figure 1 in the Appendix).

Substantial streamlining has also been undertaken in the banks' branch networks, and the number of bank branches in relation to the number of inhabitants has fallen in most western European countries over a long period (Figure 2 in the Appendix). Up to now, this has been due mainly to the introduction of automatic teller machines and telephone banking. Another explanation for this trend is that banks have rationalised their branch networks through acquiring and merging with competitors.

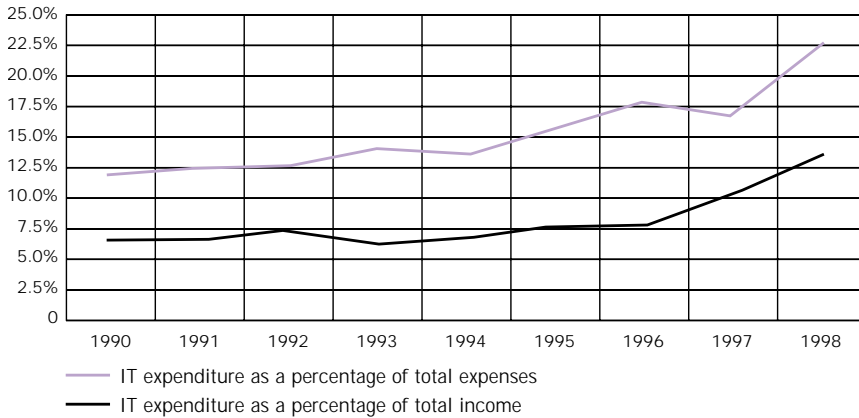
The technological innovation likely to have the greatest impact on the future operations of banks is the Internet. The Internet will increase competition by making it easier for customers to compare prices, as well as by allowing new players to enter the market, since branch networks and other barriers to entry will become less important. These players may be banks or new types of players, either domestic or foreign. Just the threat of such a development can lead to falling prices on bank products.

Bank branch networks are a relatively expensive approach to the distribution of financial services, compared with telephone banking or Internet banking. The cost of processing a transaction via the Internet, for example, is only one-tenth of the cost of a transaction processed through a traditional bank branch office.⁶ Investment in new technology therefore offers banks a substantial potential for cutting their costs. So far, however, the savings do not appear to have been high enough to cover the substantial investment costs of the new technology. The banks' costs for investment in information technology have increased substantially in recent years (Diagram 2).

The Internet will increase competition by allowing new players to enter the market, since branch networks and other barriers to entry will become less important.

⁶ See "The effects of technology on the EU banking systems", ECB, 1999.

Diagram 2. IT expenditure of the major Swedish banks as a percentage of income and expenses



Source: The Riksbank and the banks' income statements

The Internet facilitates a separation of production and distribution of financial services.

The Internet facilitates a separation of production and distribution of financial services. This makes it easier for new players in the market to distribute financial services produced by others. The producers may specialise in their own product areas, which allows them to achieve sufficient economies of scale. New players will, accordingly, be able to specialise in distributing different types of financial services from a number of different providers via the Internet. In Sweden, we see examples of specialised players who offer savers mutual funds from different fund managers via the Internet. These companies offer their clients independent advice and brokerage of mutual fund shares from a range of fund managers. The service is free of charge to the client, and the companies make money by charging commission to the fund managers. Share dealing is another niche, in which a number of operators are offering Internet trading in Sweden.

An independent distributor would be able to bring together the producers who offer the lowest prices within each product group.

It should also be possible for an independent distributor to put together the same wide range of financial services as the universal banks, through linking a number of specialised producers of various types of services to one Internet portal.⁷ The distributor would be able to bring together the producers who offer the lowest prices within each product group. Connected cus-

⁷ See for example "The Internet and Financial Services", Morgan Stanley Dean Witter, August 1999.

tomers can be offered products such as mortgages, consumer credits, deposits, mutual funds, life insurances and stockbroking, all from different producers. There is considerable potential for this approach to force down costs and thereby cut prices.

One type of bank product well-suited to Internet distribution is relatively standardised loans, such as mortgages. Recently, operators offering mortgages via the Internet have set up in Sweden. Credit application and approval, as well as valuation of the property

offered as security for the loan, are carried out via the net. The monitoring of customers, and the administration of interest payments and capital repayments, are carried out by a separate company specialising in these activities. When a sufficiently large pool of loans has been assembled, these are packaged and sold to investors on the market in the form of bonds. According to these new companies, the expenses for distributing and producing mortgages in this way are about 50 per cent lower than through banks/mortgage institutes.

Information technology is also increasing the opportunities for non-financial companies, such as supermarket chains, to supply their customers with credit cards, which makes it easier for these companies to collect information on the consumption patterns of customers. In addition, these companies have access to networks of stores, through which these services can be distributed. The competition banks face from this type of player is often difficult to meet, since the competitive edge required in the new players' core business – such as the food retailing industry – are not the same as in banking operations. It follows from this that the new players can subsidise the price of the financial services they offer, with the aim of attracting customers into their core area. At the same time, the opportunities for banks to cross-subsidise products is reduced as a result of the increased number of niche providers of deposits and mortgages, for example.

On the other hand, however, the banks should be able to exploit their substantial customer base to offer non-financial companies to distribute their products and services through the banks' websites. An increased element of non-financial services in the

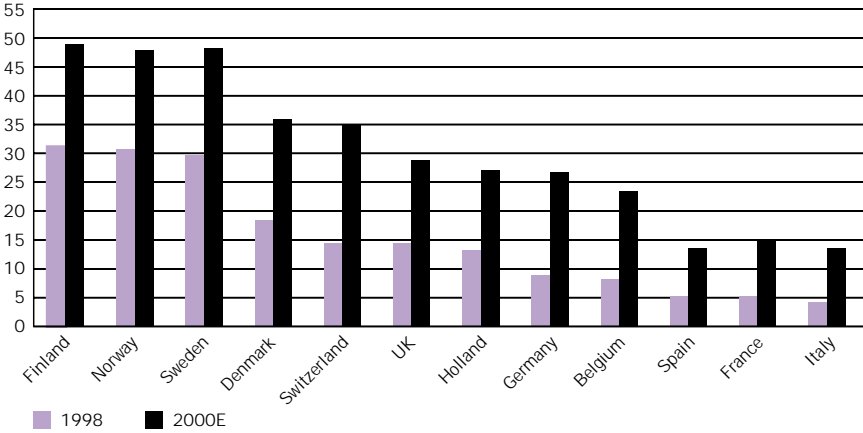
banks' Internet-based range should represent an opportunity for the banks to increase their income without increasing their costs to any great extent.

In international terms, the use of the Internet in Sweden is very extensive (Diagram 3). One possible reason for this is that there seems to be a substantial degree

According to new companies, the expenses for distributing and producing mortgages via the Internet are about 50 per cent lower than through banks/mortgage institutes.

An increased element of non-financial services in the banks' Internet-based range should represent an opportunity for the banks to increase their income.

Diagram 3. Number of Internet users as a percentage of the total population in different European countries



Source: Morgan Stanley Dean Witter, "The European Internet Report", June 1999

of openness towards new technology in Sweden and in the Nordic region in general. The deregulation of the telecom market is another important factor in the widespread use of the Internet in Sweden. Fierce competition among telecom operators has driven down the cost to consumers of using the Internet. Furthermore, PC-density is very high in Sweden, and this naturally facilitates the use of the Internet. All of these represent major challenges, but also great opportunities for the banks, if they succeed in adapting their business ideas to the new conditions.

Swedish banks are comparatively well-equipped to cope with increased competition both from existing operators and from new types of national and international players.

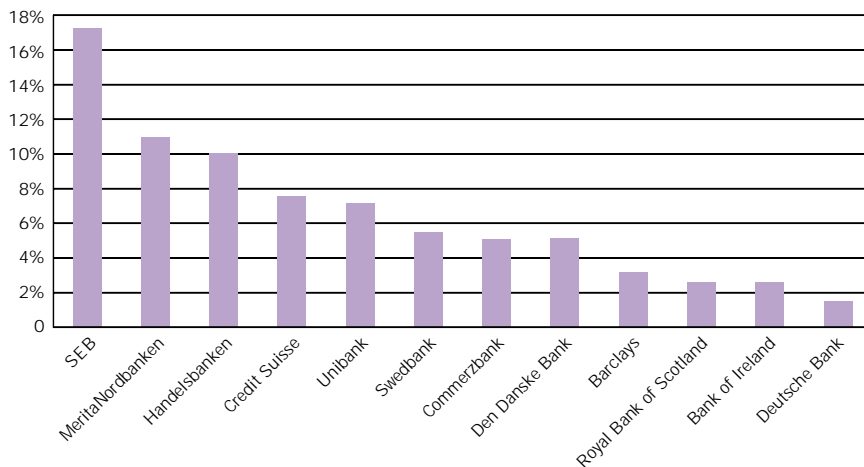
In comparison with banks abroad, Swedish banks appear to have well-developed strategies for using the Internet. This is reflected in the relatively large number of Swedish bank customers who are connected to the Internet (Diagram 4).⁸ Some banks are also attempt-

ing to export their expertise in Internet banking to other markets, by acquiring banks in other countries. This should mean that Swedish banks are comparatively well-equipped to cope with increased competition both from existing operators and from new types of national and international players. With the potential efficiency gains stemming from the Swedish banks' significant presence on the Internet, they would be in a favourable position to compete with new players on price, without paying an excessively high penalty in terms of falling profitability.

⁸ This survey was carried out during the first half of 1999, but it should be pointed out that all figures rapidly become obsolete due to the speed of developments within this area. The comparison, however, gives an idea of how the Nordic banks appear in an international comparison.



Diagram 4. Percentage of total customers connected to the Internet in the twelve European banks with the most developed Internet service range



Sources: The Banker and Lafferty Business Research

The implementation and development of Internet banks is proceeding very fast. This means that new systems have a relatively short life, which adds significantly to the expense of keeping abreast of developments in the introduction of new generations of Internet banks, and makes it difficult to know which technology will dominate in the future. There is a risk of investing in the wrong technology, and of permanently high investment expenditure. This underlines the importance to the banks of rationalising their existing distribution channels as new ones are introduced. An inability to adapt existing operations to the new conditions could otherwise lead to permanently higher costs and, as a result, poor profitability.

Overall, technological developments in general, and the Internet in particular, create the potential for increased competition and depressed prices in banking, since they can increase competition among existing banks, from non-financial companies and from new types of players. Increased price pressure on banking business puts considerable pressure on every player to reduce costs, not least to maintain sufficient margins to cover future credit losses.

Technological developments in general, and the Internet in particular, create the potential for increased competition and depressed prices in banking.

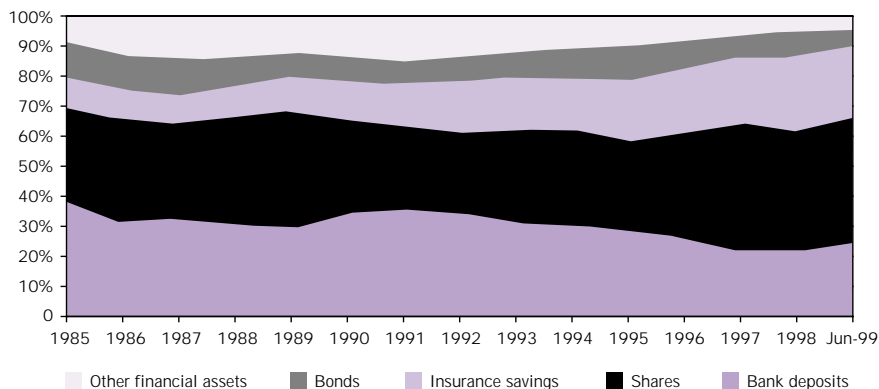
The disintermediation process

As we have already mentioned, there are a number of explanations for the banks' traditionally important role as intermediaries in the conversion of savings into investment. Technological developments may lead to the banks being challenged to a greater extent than before by new types of players. Many commentators believe that several of the special competitive advantages the banks have traditionally enjoyed over the capital markets are declining in importance. This could result in increased competition from the capital markets on deposits and lending. Such a development would add to price pressure and cause the banks to lose market shares to the capital markets. The consequence would be that net interest income/expense, traditionally the banks' most important source of income, would come under pressure.

A large proportion of household savings is transferred from bank deposits to other forms of savings, such as mutual funds and insurance saving.

In Sweden, the increased role of the capital markets has so far expressed itself primarily through the transfer of a large proportion of household savings from bank deposits to other forms of savings, such as mutual funds and insurance saving. These forms of saving are outside the banks' balance sheets (Diagram 5). Since deposits are a relatively cheap form of financing, this will result in higher interest expenses for banks, which squeezes net interest income. The strong market position of the banks in, for example, mutual funds savings and new insurance savings⁹ has, however,

Diagram 5. Households' financial assets, percentage distribution



Source: SCB

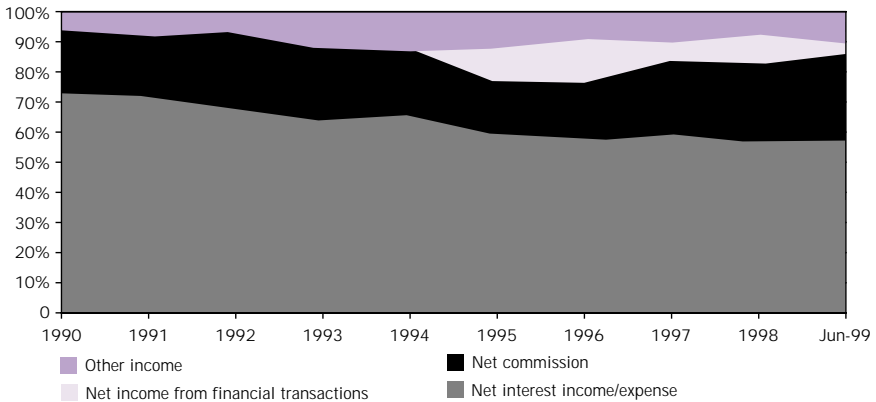
⁹ See, for example, Financial Stability Report 1999:1, Figure 3 in the indicator appendix.

largely enabled them to offset a falling net interest income with increased fee income (Diagram 6).

There are also indications that the banks' information advantages in lending to households are becoming less significant. Lending to individuals is becoming increasingly standardised. The continuous expansion in calculation capacity resulting from improved information technology, in combination with the increased accessibility of the necessary information for risk assessment, has facilitated the development and use of credit scoring¹⁰ techniques. Pools of homogeneous loans generated in this way can be securitised¹¹ and sold to investors on the capital markets, given that they can be credit rated by a rating institution. The securitisation of loans means in practice that the process of granting credit can be divided into a number of sub-operations, all of which were traditionally handled by banks (Brennan, 1997).¹² The following operations can be differentiated: brokerage and distribution of loans, risk assessment, monitoring borrowers and the administration of interest payments and capital repayments, as well as financing.

For example, a bank could specialise in distributing and administering mortgages, while a rating agency determines the risk assessment criteria. When a sufficiently large pool of loans has been generated, it can then be financed via the

Diagram 6. The income distribution of the major banks, per cent



Source: The Riksbank and the banks' income statements

¹⁰ "Credit scoring" is the name for the standardised credit assessment methods based on probability assessments of the propensity towards bankruptcy of different types of borrower, given certain parameters such as income, wealth and payment record.

¹¹ For a more detailed discussion of securitisation, see Blåvarg, M, Lilja, P, "Securitisation – a future form of financing?", *Quarterly Review*, 1998:3.

¹² Brennan, M.J., "Developments in the Financial Sector", in " Forces and Implications of Structural Changes in the Financial Sector", Riksbanken 1997.

An increase in securitisation of standardised household loans may allow the banks largely to offset the lost interest income with fee income.

capital markets through securitisation. Securitisation means that the bank shifts the credit risk onto investors on the capital markets. In this case the bank receives fee income, through performing the services of distribution and administration of credits, while those financing the credits, the bondholders, receive the interest income. An increase in securitisation of standardised household loans may, accordingly, allow the banks largely to offset the lost interest income with fee income. Shifting the credit risk would also make their income less dependent on the economic cycle, since credit losses is the item that varies most with macroeconomic trends.

The increased accessibility of information for credit assessment eliminates some of the information advantages traditionally enjoyed by banks.

The division of the credit-granting process into several different sub-operations may increase competition by making it easier for new players to enter and compete in the various sub-activities.¹³ It is easier to achieve costefficiency in these sub-activities without the requirement to attain the size traditionally linked with institutions which gather all the activities under a single roof (banks/mortgage institutions). The increased accessibility of information for credit assessment, through the ever greater presence of the ratings institutions, is helping to eliminate some of the information advantages traditionally enjoyed by banks. Reduced barriers to entry can, accordingly, lead to considerable price pressure on standardised credits.

EMU and the role of the capital markets in the financial system

There are some indications that the establishment of EMU may lead to a substantially enhanced role for the bond markets in the allocation of credits to large and medium-sized companies in Europe. An obvious question is why this has taken place to such a limited extent in Sweden and the rest of Europe so far, compared with in the USA. In the USA, the bond markets play a larger role as intermediaries between savers and investors than the banks do. The American experience is partly explained by a regulatory framework which allowed only investment banks to guarantee securities issues. These investment banks have been able to focus on securities-related activities, and this has helped foster the

¹³ The credit-granting process can be divided into the brokerage and distribution of loans, risk assessment, monitoring of borrowers, and the administration of interest payments and capital repayments, as well as financing.

development of efficient and liquid capital markets. Limitations of this type have not been established in Europe, and the dominant universal banks have not, therefore, had the same incentive to develop the bond markets.

The difference between the USA and Europe can also be explained in part by the fact that the European markets have not individually comprised sufficient numbers of investors and borrowers to create the required level of efficiency and liquidity in trading in credit instruments. This has probably contributed to increased costs, and so reduced the competitiveness of the capital market relative to the banks. Differing national regulatory frameworks in the European countries and the existence of currency risks have been further obstacles to the development of cross-border trade in corporate bonds.

The introduction of the single European currency, the euro, will probably improve the conditions for an efficient and liquid European market in corporate bonds. A single currency eliminates the currency risk in investing in corporate bonds issued in other EMU countries, which leads to an increased focus on the credit risks. At the same time, the investment rules for European institutional investors are being liberalised, and this makes it easier to invest in different types of assets. The harmonisation of the regulatory framework governing the information to be provided in connection with bond issues within the EU is currently in progress. In addition, European companies are beginning to use international accounting principles to an increasing extent.¹⁴ This makes it easier for investors to compare the credit risks of bonds issued by companies in different countries.

The introduction of the single European currency, the euro, will probably improve the conditions for an efficient and liquid European market in corporate bonds.

There is also increased interest among institutional investors in investing in securities with credit risk. As more companies from different sectors and with varying degrees of creditworthiness turn to the capital markets it is becoming increasingly possible to diversify the credit risks associated with investment in corporate bonds.

Another important trend is that the supply of government securities within the EU will tend to fall, as a result of the improved finances of the European countries. Since long-term private saving in Europe is tending to increase as the pension systems are reformed, institutional investors need to broaden the range of assets in which

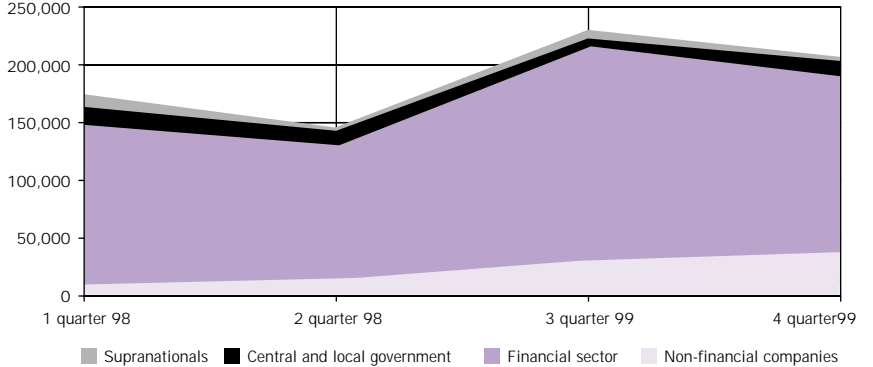
In Europe, in contrast to the USA, a mature market in corporate bonds has been lacking.

¹⁴ Graham, B., "Delivering the Benefits of EMU", Salomon Smith Barney, Occasional Paper, July 1999.

pension funds are invested. In Europe, in contrast to the USA, a mature market in corporate bonds has been lacking. The result is that there are limited alternatives to investment in government securities.

At the same time, there is a need among companies to widen their financing base, both to reduce the cost of borrowing and to make themselves less dependent on bank financing, and thereby achieve greater flexibility in borrowing. European bank shareholders also have an interest in the establishment of an efficient market in corporate bonds, since it is relatively unprofitable for banks to have outstanding loans, above all to large companies. The margins on such loans are usually very low in relation to the amount of capital the current capital adequacy rules oblige the banks to hold for this type of lending.

Diagram 7. Issue volumes per quarter in the market for guaranteed euro-denominated bonds, by category of issuer



Sources: Salomon Smith Barney och Capital Data Bondware

The issue of euro-denominated bonds by non-financial companies grew by almost 170 per cent during the first half of 1999.

Figures for the euro area as a whole show that the development of a European market for corporate bonds has proceeded relatively quickly since the creation of the currency union. The issue of euro-denominated bonds by non-financial companies grew by almost 170 per cent during the first half of 1999, compared with the corresponding period in 1998 (Diagram 7). This can be compared with a reduction of about 25 per cent in the issue of central and local government bonds in the same period.¹⁵ As a result, the share of bond issues by

¹⁵ Source: Capital Data Bondware and Salomon Smith Barney. The figures cover all markets and include all euro-denominated public and non-public bond issues. The figures, however, exclude all domestic central government debt which is allotted by auction.

non-financial companies increased during the second quarter of 1999 to approximately 19 per cent of all issues, an increase of 13 percentage points on the corresponding period in 1998. During the same period, the issue of government securities fell as a percentage of total issues by about 3 percentage points, to just over 6 per cent. The increasing issuance of corporate bonds demonstrates that borrowing directly on the capital markets is beginning to be a competitive alternative to borrowing from banks in Europe.

The trend towards a more capital market-orientated credit brokerage need not, as we have seen, mean a fall in bank income. It is possible that the lost interest income may

Competing for fee income on a European corporate bond market requires a large balance sheet.

be offset by increased fee income from acting as intermediaries when corporations issue bonds and commercial paper. The banks may, however, differ in their ability to compete in both these areas of operation. For Swedish banks, which are small in global terms, it would probably not be easy to attract issuers of corporate bonds. Competing for fee income on a European corporate bond market requires a large balance sheet, which can absorb substantial volumes of the issued loans. Moreover, substantial capacity is required to distribute bonds to international institutional investors, which requires a large international network of contacts.

A study of the list of banks with the largest share of the market for new issues of European corporate bonds shows that the 20 banks which dominate this market are of substantial size (Table 1 in the Appendix). Relatively small banks, which concentrate their operations on providing large companies with financial services, can therefore find it difficult to compete in this market. The trend towards a greater proportion of securities financing might depress the margins in the banks' traditional lending to companies, since these customers are increasingly able to use the prices on the financial markets as a yardstick in price negotiations with the banks.

Even though corporate financing directly through the capital markets may increase over time, the banks will probably continue to play an important role in the provision of liquidity. Banks often provide a credit commitment to companies borrowing via the commercial paper market. In these cases, the bank guarantees that the issuing company may borrow from the bank, if an insufficient quantity of commercial paper can be sold on the market to cover the company's financing requirements. The fees charged by the bank for this type of liquidity service should compensate for part of the lost interest income.

Comments and conclusions

Experience from the Swedish banking problems of the early 1990s shows that these can arise as a result of mistaken strategic decisions during periods of significant change in the external climate.

As a central bank with oversight responsibility for the stability of the payment system, the Riksbank must carefully monitor the risks in the banking sector. The strategic risks which arise in connection with substantial structural changes and increased competition are an important component in these assessments.

Experience from the Swedish banking problems of the early 1990s shows that these can arise as a result of mistaken strategic decisions during periods of significant change in the external climate. The trend towards increased pressure for change and competition, which has been described above, also opens considerable opportunities for the banks if they succeed in adapting the shape of their operations to meet the new conditions.

In the light of what has been said about the banking business and the significant potential for price pressure on the various services provided by the banks, it is natural to consider whether the banking sector in general is in a stagnation phase. The answer would be no if one examines the demand for financial services in the broad sense. Growing demand is providing an expanding market for the services that banks offer (Figure 3 in the Appendix). On the other hand, these services can, to a considerable extent, be distributed, produced and financed by a larger number of competing players than before. This is a consequence of the fact that the banking business in its traditional form is losing some of its special position. The banks have, however, for a variety of reasons, such a dominating role in the Swedish financial system, particularly with respect to payment intermediation, that they will probably continue to play an important role in the future.

The barriers to entry are probably still substantial in this market. The provision of payment services is closely linked with deposit accounts, and this in turn provides significant access to information about the customers' financial behaviour and position. The banks' important role in the payment system most probably means that they will continue to play an important role in the financial system, as long as the high barriers to entry in the payment market remain.

If the banks can adapt their strategies to the new technological conditions, they should continue to benefit from their large customer bases and relative economies of scale. Technological developments offer potential for rationalisation and cost savings within banking operations, but may also mean that the savings in staff and branch expenses may be counterbalanced to some extent by investment



in IT projects. The connection between these expenses and the savings to the bank may sometimes be difficult to assess, and there is a risk that mistaken investments can hit the banks' earnings hard. The speed of technological change today makes it hard to judge which technology will dominate in the future. It is also vital to make savings in the traditional distribution channels to generate a positive net effect.

If the banks can adapt their strategies to the new technological conditions, they should continue to benefit from their large customer bases and relative economies of scale.

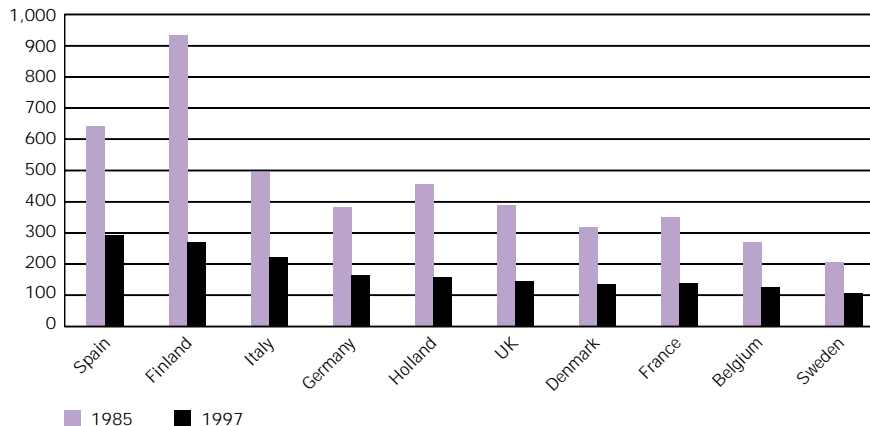
An increase in securities financing may constitute a threat to some banks. Given the relative smallness of Swedish banks in international terms, it may be difficult for them to compete successfully for capital market financing for large companies. In addition, any increase in the securitisation of standardised credits to individuals could lead to increased competition and depressed margins in this market segment. On the other hand banks ought to be able to benefit from the potential cost advantages and increased ability to even out income over the business cycle, which securitisation can lead to.

Banks ought to be able to benefit from the potential cost advantages and increased ability to even out income over the business cycle, which securitisation can lead to.

The trend towards an ever-increasing role of the capital markets in the credit allocation process should, in the longer term, help reduce risks in the financial system. There could be increased diversification of credit risks in the financial system through the improved opportunities for investors other than banks to invest in credit risks, and by the banks being able to invest in credit risks originated in geographical areas other than those in which they operate. An increase in bond financing should not, therefore, be seen by the authorities as a negative development, while, at the same time, the risks inherent in a rapid process of change should not be overlooked.

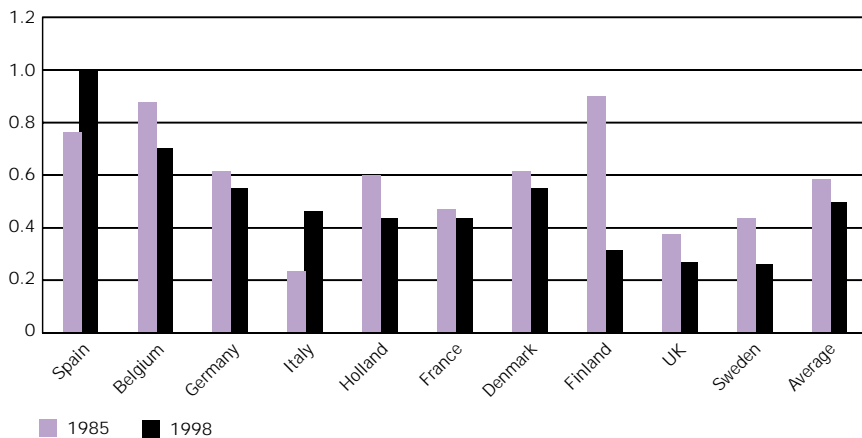
Diagram Appendix

Figure 1. Number of employees per ECU billion of assets in Sweden and a number of other EU countries



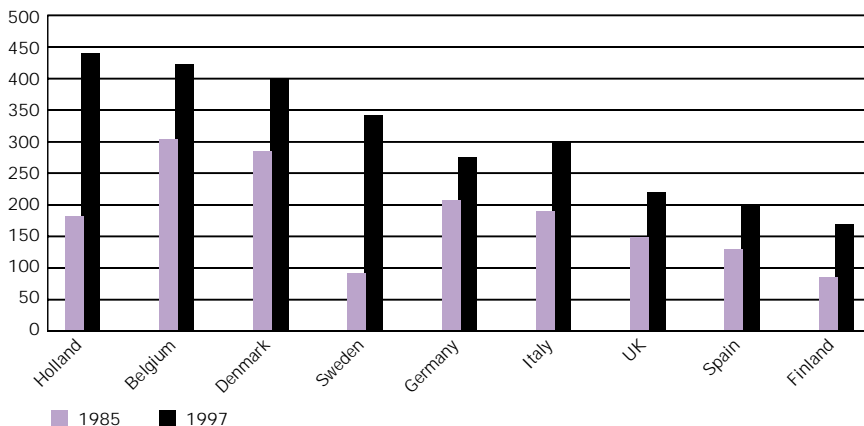
Source: The European Central Bank

Figure 2. Number of bank branch offices per inhabitant in a number of EU countries



Source: The European Central Bank

Figure 3. Outstanding financial assets (loans, shares and bonds) as a percentage of GDP in a number of European countries



Source: The European Central Bank

Table 1. Leading banks in the management of new issues of western European corporate bonds

1 H 1999	Amount (USD million)	Number of issues
Deutsche Bank	8,542	28
Morgan Stanley	8,257	37
Goldman Sachs	7,229	17
Dresdner Kleinwort Benson	6,721	19
Lehman Brothers	6,664	11
Merrill Lynch	6,560	24
Warburg Dillon Read	6,200	29
Société Générale	5,158	9
JP Morgan	5,051	17
Crédit Suisse First Boston	4,294	20
Chase Manhattan	4,160	8
BNP	4,135	12
Barclays Capital	4,004	14
Paribas	3,819	16
ABN	3,763	14
Mediobanka	3,042	5
Donaldson Lufkin & Jenrette	2,694	3
Salomon Smith Barney	2,661	12
Banco Bilbao Vizcaya	2,142	6
Commerzbank	1,826	5

Sources: Euromoney och Capital Data Bondware



Notices

Y2K brochure

The Riksbank considers that the financial sector is well prepared for the new millennium. There is no tangible concern today among the general public that the banking system will fail to cope with the transition to the new millennium.

The Riksbank has produced a brochure “Your money won’t disappear at the millennium transition” to give people a good ground to stand on if confronted by less reliable information.


The brochure has been distributed to the public via post offices and banks, and it describes the preparations that have been made and how the payment system functions, as well as giving concrete advice. For example:

- Your money will not disappear. The banks and Sweden Post have built up safety procedures over the years. If anything happens to the computers, it shall be possible to retrieve the information.
- Do not withdraw more money than usual. Money is safer at the bank than in a drawer.
- Behave normally. Carrying on using your cards, withdrawing money from cash machines and paying your bills as usual.

More information about the millennium transition, as well as the web version of the brochure, is available on www.riksbank.se

The Riksbank’s own preparations

The financial sector has put considerable resources into measures to minimise the risk of technical problems, and to ensure that all systems can cope with the transition to the new millennium.



The role of the Riksbank in this connection is bound up with its regular tasks as a central bank, i.e. to implement monetary policy, to promote a secure and efficient system of payments, and to ensure that sufficient notes and coins are available in the economy.

The Riksbank currently assesses that economic activity will not be affected to any great extent by the transition to the new millennium. The available information also suggests that the risk of more serious disturbances to production is small.

New procedure for decisions on key interest rates

At the meeting on 5 October, the Executive Board of the Riksbank decided to change the procedure for decisions on key interest rates. Under the new arrangement, the Executive Board will normally only make decisions on interest rates at the special monetary policy meetings, which are held at 6–8-week intervals. Any decision on key interest rates will remain in force until further notice. This replaces the previous procedure, whereby the Board made decisions on key interest rates at intermediate meetings.

The intention is to establish a procedure that better reflects the process of monetary policy decision-making.

Support for the inflation target increases for the third year in a row

71 per cent of the Swedish population supports the inflation target of 2 per cent, compared with 68 per cent a year ago, and 60 per cent in 1996. The proportion who felt that the Riksbank was handling monetary policy correctly rose to 61 per cent, compared with 57 per cent a year ago, and 50 per cent in 1996.

Since the surveys started, there has also been a tendency towards greater knowledge of the Riksbank's goals and its principal tasks, while the percentage of "don't knows" has fallen. One example is the question "What are the principal tasks of the Riksbank?", to which the proportion of "don't knows" has fallen by 13 percentage units since 1996.

This and much more emerges from the results of the knowledge and attitude surveys carried out annually since 1996 by Eureka Marknadsfakta on behalf of the Riksbank.

In total, 1002 people, aged 16 to 74, were interviewed between 6 and 25 September.



The Riksbank to go on handling foreign exchange transactions on behalf of the Swedish National Debt Office

During 2000, the Riksbank will continue to apply the method used for foreign exchange transactions on behalf of National Debt Office since 1997.

In 2000, the National Debt Office will amortise about SEK 25 billion net of the government's foreign currency debt. In addition to net amortisation of about SEK 25 billion, interest payments equivalent to about SEK 20 billion will be made on the foreign currency debt. This means that, during 2000, the Riksbank will purchase approximately SEK 45 billion of foreign currency on the market, corresponding to the National Debt Office's net amortisations and interest payments.

The Riksbank's foreign currency transactions on behalf of the National Debt Office will, as before, be carried out every trading day between 08.30 and 08.45. In contrast to previous practice, the Riksbank will draw up a six-monthly reconciliation of the foreign exchange requirement.

The foreign currency transactions will be carried out through institutions which have signed primary dealer agreements with the Riksbank for the Swedish foreign exchange market.

Monetary policy calendar

1997-01-02 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent as of 3 January 1997.

1997-04-01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1997-07-01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1997-10-01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1997-12-11 The *fixed repo rate* is increased by the Riksbank Governor from 4.10 to 4.35 per cent as of 17 December 1997. Due to the Christmas and New Year holidays, the repo rate set on 16 December will apply for four weeks until 14 January 1998.

1998-01-02 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1998-04-01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1998-06-04 The *fixed repo rate* is lowered by the Riksbank Governor from 4.35 per cent to 4.10 per cent as of 9 June 1998.

1998-07-01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.0 per cent as of 2 July 1998.

1998-11-03 The *fixed repo rate* is lowered by the Riksbank Governor from 4.10 per cent to 3.85 per cent as of 4 November 1998.

1998-11-12 The Riksbank lowers its *deposit and lending rates*, in each case by 0.5 percentage points, as of 18 November 1998, thereby setting the deposit rate at 3.25 per cent and the lending rate at 4.75 per cent.

1998-11-24 The *fixed repo rate* is lowered by the Riksbank Governor from 3.85 per cent to 3.60 per cent as of 25 November 1998.

1998-12-15 The *fixed repo rate* is lowered by the Riksbank Governor from 3.60 per cent to 3.40 per cent as of 16 December 1998.

1999-01-04 The *reference (official discount) rate* is confirmed by the Riksbank Governor at 1.5 per cent as of 5 January 1999.

1999-01-05 The *fixed repo rate* is confirmed by the Riksbank Governor at 3.40 per cent. The decision is extended on 29 January 1999 to apply until 17 February 1999.

1999-02-12 The *fixed repo rate* is lowered by the Riksbank Governor to 3.15 per cent as of 17 February 1999.


1999-02-12 The Riksbank lowers its *deposit and lending rates*, in each case by 0.5 percentage points. The deposit rate is set at 2.75 per cent and the lending rate at 4.25 per cent. The decision takes effect on 17 February 1999.

1999-03-25 The *fixed repo rate* is lowered by the Riksbank Governor from 3.15 per cent to 2.90 per cent as of 31 March 1999.

1999-04-01 The *reference (official discount) rate* is confirmed by the Riksbank Governor at 1.0 per cent as of 6 April 1999.

1999-10-01 The *reference (official discount) rate* is confirmed by the Riksbank at 1.5 per cent as of 4 October 1999.

1999-11-11 The *repo rate* is increased by the Riksbank from 2.90 per cent to 3.25 as of 17 November 1999.



2000-01-03 The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.0 per cent as of 4 Januari 2000.

Statistical appendix

Statistics from Sveriges Riksbank are to be found on the Internet (<http://www.riksbank.se>). Dates of publication of statistics regarding the Riksbank's assets and liabilities including foreign exchange reserves plus financial market and the balance of payments statistics are available on the homepage of the International Monetary Fund, IMF (<http://dsbb.imf.org>). Dates of publication can also be obtained from the Information Centre at Sveriges Riksbank.

Daily capital market interest rates (Table 13), daily overnight and money market interest rates (Table 14) and daily krona exchange rates (Table 16) can be ordered from the Information Centre at Sveriges Riksbank via e-mail: info@riksbank.se, fax: +46 8 787 05 26 or phone: +46 8 787 01 00.

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1

Riksbank's assets and liabilities

Assets. Period-end stock figures. SEK million

		Foreign exchange	Government securities	Lending to banks	Fixed assets	Other	Total
1999	Jan	113 875	36 086	1	1 162	44 617	195 757
	Feb	142 998	32 862	730	1 094	38 977	216 678
	March	130 172	33 376	1 997	1 104	52 872	219 538
	April	133 770	34 152	229	1 089	47 483	216 732
	May	140 671	33 279	98	1 090	42 424	217 568
	June	137 691	33 163	2 412	1 140	39 344	213 756
	July	141 359	32 712	65	1 140	36 802	212 085
	Aug	152 249	32 660	117	1 138	32 869	219 042

		Gold	Government securities	Lending to monetary policy counterparts	Receivables in foreign currency	Other	Total
	Sept	13 834	31 932	31 122	136 565	3 053	216 506
	Oct	13 834	31 728	31 929	135 222	2 220	214 933
	Nov	13 834	31 579	27 577	143 963	1 647	218 600
	Dec	13 834	31 332	45 633	139 153	1 775	231 727

Liabilities

		Notes and coins in circulation	Riksbank liquidity bills	Bank deposits in the Riksbank	Capital liabilities	Other	Total
1999	Jan	81 539	–	653	37 162	76 403	195 747
	Feb	80 470	–	95	49 848	86 265	216 678
	March	81 609	–	1 188	49 848	86 893	219 538
	April	81 738	–	1 007	49 848	84 139	216 732
	May	82 652	–	808	49 848	84 260	217 568
	June	83 024	–	2 301	60 487	67 944	213 756
	July	83 950	–	145	60 487	67 503	212 085
	Aug	84 525	–	3 792	60 487	70 238	219 042

		Notes and coins in circulation	Capital liabilities	Debts to monetary policy counterparts	Debts in foreign currency	Other	Total
	Sept	85 070	60 487	97	14 395	56 457	216 506
	Oct	86 161	60 487	61	11 421	56 803	214 933
	Nov	88 375	60 487	86	12 113	57 539	218 600

2 Money supply

End-of-month stock

	SEK million		Twelve months change in per cent		
	MO	M3		MO	M3
1997					
Jan	67 503	791 513	Jan	5.3	7.4
Feb	67 490	783 635	Feb	5.8	7.4
March	68 683	807 482	March	7.4	6.5
April	67 473	788 247	April	5.4	4.3
May	67 527	794 077	May	5.1	4.1
June	68 101	807 112	June	4.7	5.3
July	66 763	791 753	July	5.0	3.2
Aug	68 623	804 033	Aug	4.0	4.6
Sept	68 118	799 854	Sept	3.7	2.1
Oct	68 556	799 604	Oct	5.7	3.4
Nov	69 762	807 415	Nov	4.6	1.3
Dec	74 380	826 242	Dec	3.0	1.3
1998					
Jan	70 751	821 712	Jan	4.8	3.8
Feb	70 434	806 800	Feb	4.4	3.0
March	69 560	802 877	March	1.3	-0.6
April	70 181	807 368	April	4.0	2.4
May	70 783	814 796	May	4.8	2.6
June	71 118	829 968	June	4.4	2.8
July	71 369	835 079	July	6.9	5.5
Aug	73 042	835 199	Aug	6.4	3.9
Sept	71 954	838 568	Sept	5.6	4.8
Oct	73 041	846 579	Oct	6.5	5.9
Nov	73 929	852 805	Nov	6.0	5.6
Dec	78 139	843 416	Dec	5.1	2.1
1999					
Jan	74 940	855 180	Jan	5.9	4.1
Feb	74 621	853 298	Feb	5.9	5.8
March	75 302	853 557	March	8.3	6.3
April	75 533	861 790	April	7.6	6.7
May	76 532	868 965	May	8.1	6.6
June	76 413	879 325	June	7.4	5.9
July	77 050	872 482	July	8.0	4.5
Aug	78 080	889 413	Aug	6.9	6.5
Sept	78 479	899 645	Sept	9.1	7.3
Oct	79 413	930 423	Okt	8.7	9.9
Nov	80 681	915 557	fNov	9.1	7.4

3 Interest rates set by the Riksbank

Per cent

	Date	Repo rate	Deposit rate	Lending rate		Date	Discount rate		
1996	08-14	5.40			1993	01-05	9.00		
	08-21		4.75	6.25		04-02	7.00		
	08-28	5.25				07-02	6.00		
	09-11	5.15				10-08	5.00		
	09-25	5.05				1994	01-04	4.50	
	10-09	4.95					07-04	5.50	
	10-23	4.80					10-04	7.00	
		10-30	4.60	4.25		5.75	1995	07-04	7.50
		11-27	4.30					10-06	7.00
		12-11		3.75		5.25	1996	01-03	6.00
		12-18	4.10					04-02	5.50
	1997	12-17	4.35					07-02	4.50
1998	06-10	4.10				10-02	3.50		
	11-04	3.85			1997	01-03	2.50		
	11-18		3.25	4.75		07-02	2.00		
		11-25	3.60			1998	01-05	1.50	
		12-16	3.40				04-06	1.00	
1999	02-17	3.15	2.75	4.25		10-04	1.50		
	03-31	2.90			2000	01-04	2.00		
	11-17	3.25							

4 Capital market interest rates

Effective annualized rate for asked prices. Monthly average, per cent

		Bonds issued by:					
		Central government				Housing	(Caisse)
		3 years	5 years	7 years	9-10 years	2 years	5 years
1997	Aug	5.33	5.82	6.00	6.53	5.24	6.27
	Sep	5.26	5.70	5.86	6.38	5.15	6.13
	Oct	5.42	5.76	5.86	6.22	5.36	6.19
	Nov	5.57	5.88	5.98	6.30	5.56	6.42
	Dec	5.46	5.71	5.77	6.03	5.55	6.29
1998	Jan	5.15	5.33	5.49	5.65	5.56	5.81
	Feb	5.02	5.19	5.36	5.53	5.37	5.63
	March	4.95	5.06	5.18	5.35	5.27	5.44
	April	4.88	4.99	5.05	5.21	5.16	5.31
	May	4.83	4.98	5.04	5.20	5.08	5.25
	June	4.46	4.70	4.79	4.97	4.70	4.96
	July	4.36	4.61	4.71	4.88	4.58	4.88
	Aug	4.39	4.60	4.66	4.80	4.68	4.99
	Sept	4.37	4.56	4.63	4.79	4.72	5.15
	Oct	4.35	4.53	4.68	4.75	4.71	5.30
	Nov	3.94	4.19	4.47	4.59	4.18	4.79
	Dec	3.64	3.86	4.12	4.25	3.89	4.46
1999	Jan	3.38	3.59	3.87	4.02	3.59	4.14
	Feb	3.36	3.67	4.01	4.18	3.52	4.13
	March	3.39	3.80	4.25	4.44	3.55	4.29
	April	3.12	3.53	3.99	4.24	3.26	3.99
	May	3.30	3.80	4.26	4.50	3.47	4.54
	June	3.72	4.28	4.67	4.87	3.82	5.09
	July	4.17	4.81	5.12	5.26	4.64	5.75
	Aug	4.43	5.09	5.39	5.49	5.02	6.15
	Sept	4.51	5.29	5.60	5.69	5.08	6.22
	Oct	4.70	5.53	5.83	5.92	5.22	6.33
	Nov	4.52	5.17	5.46	5.56	4.99	5.89
	Dec	4.61	5.26	5.49	5.59	5.05	5.93

5

Overnight and money market interest rates

Monthly average, per cent

		Repo rate	Inter-bank rate	SSVX			Company certificates	
				3 months	6 months	12 months	3 months	6 months
1997	Jan	4.10	4.20	3.79	3.84		3.95	4.00
	Feb	4.10	4.20	3.96	4.03		4.13	4.20
	March	4.10	4.20	4.16	4.26	4.45	4.34	4.43
	April	4.10	4.20	4.06	4.18		4.24	4.35
	May	4.10	4.20	4.12	4.23		4.30	4.40
	June	4.10	4.20	4.08	4.18	4.47	4.28	4.37
	July	4.10	4.20	4.09	4.24		4.36	4.46
	Aug	4.10	4.20	4.20	4.36		4.45	4.60
	Sept	4.10	4.20	4.13	4.28	4.66	4.37	4.53
	Oct	4.10	4.20	4.26	4.44		4.49	4.68
	Nov	4.10	4.20	4.33	4.54	5.16	4.59	4.79
	Dec	4.19	4.29	4.45	4.73	5.09	4.70	4.99
1998	Jan	4.35	4.45	4.44	4.58		4.44	4.59
	Feb	4.35	4.45	4.36	4.54	4.71	4.56	4.73
	March	4.35	4.45	4.51	4.59	4.72	4.68	4.76
	April	4.35	4.45	4.50	4.61		4.66	4.76
	May	4.35	4.45	4.52	4.54	4.48	4.18	4.23
	June	4.16	4.28	4.23	4.23	4.29	4.39	4.38
	July	4.10	4.20	4.14	4.14		4.29	4.30
	Aug	4.10	4.20	4.23	4.26		4.37	4.39
	Sept	4.10	4.20	4.22	4.21	4.29	4.36	4.36
	Oct	4.10	4.20	4.20	4.18		4.36	4.34
	Nov	3.83	3.93	3.82	3.75		4.00	3.96
	Dec	3.51	3.61	3.45	3.51	3.53	3.65	3.69
1999	Jan	3.40	3.50	3.27	3.25		3.45	3.46
	Feb	3.30	3.40	3.14	3.16		3.31	3.35
	March	3.14	3.24	3.13	3.18	3.17	3.30	3.33
	April	2.90	3.00	2.87	2.90		3.04	3.07
	May	2.90	3.00	2.92	2.96	3.26	3.11	3.15
	June	2.90	3.00	2.97	3.03	3.37	3.18	3.22
	July	2.90	3.00	3.01	3.16		3.30	3.57
	Aug	2.90	3.00	3.00	3.20	3.83	3.32	3.77
	Sept	2.90	3.00	3.05	3.28	3.91	3.27	3.75
	Oct	2.90	3.00	3.23	3.55		3.87	4.00
	Nov	3.06	3.16	3.38	3.63	4.26	3.83	3.91
	Dec	3.25	3.35	3.41	3.73	4.24	3.71	3.95

6

Treasury bills and selected international rates

Annualized rate. Monthly average, per cent

		3-month deposits					6-month deposits				
		USD	DEM	EUR	GBP	SSVX	USD	DEM	EUR	GBP	SSVX
1997	Jan	5.58	3.13		6.47	3.79	5.67	3.14		6.66	3.84
	Feb	5.50	3.19		6.35	3.96	5.60	3.19		6.49	4.03
	March	5.62	3.29		6.42	4.16	5.79	3.30		6.54	4.26
	April	5.81	3.25		6.48	4.06	5.99	3.29		6.74	4.18
	May	5.80	3.20		6.54	4.12	5.97	3.26		6.72	4.23
	June	5.77	3.16		6.77	4.08	5.89	3.22		6.91	4.18
	July	5.72	3.16		7.05	4.09	5.81	3.23		7.24	4.24
	Aug	5.69	3.28		7.25	4.20	5.82	3.42		7.37	4.36
	Sep	5.67	3.34		7.29	4.13	5.80	3.48		7.43	4.28
	Oct	5.73	3.65		7.36	4.26	5.80	3.78		7.46	4.44
	Nov	5.83	3.78		7.71	4.33	5.87	3.89		7.77	4.54
	Dec	5.89	3.76		7.69	4.45	5.94	3.84		7.77	4.73
1998	Jan	5.52	3.45		7.42	4.44	5.58	3.54		7.41	4.58
	Feb	5.51	3.41		7.38	4.36	5.52	3.48		7.38	4.54
	March	5.56	3.46		7.41	4.51	5.60	3.58		7.42	4.59
	April	5.57	3.58		7.39	4.50	5.62	3.66		7.39	4.61
	May	5.57	3.54		7.34	4.52	5.64	3.65		7.32	4.54
	June	5.59	3.49		7.59	4.23	5.63	3.59		7.65	4.23
	July	5.57	3.47		7.66	4.14	5.64	3.56		7.71	4.14
	Aug	5.56	3.43		7.57	4.23	5.60	3.52		7.56	4.26
	Sept	5.39	3.42		7.32	4.22	5.30	3.48		7.18	4.21
	Oct	5.18	3.48		7.05	4.20	4.97	3.45		6.83	4.18
	Nov	5.24	3.56		6.79	3.82	5.06	3.51		6.55	3.75
	Dec	5.14	3.26		6.27	3.45	5.00	3.22		5.97	3.51
1999	Jan	4.88		3.04	5.74	3.27	4.89		2.99	5.52	3.25
	Feb	4.87		3.02	5.38	3.14	4.93		2.97	5.25	3.16
	March	4.89		2.98	5.26	3.13	4.97		2.93	5.17	3.18
	April	4.87		2.63	5.17	2.87	4.94		2.62	5.12	2.90
	May	4.90		2.51	5.20	2.92	5.01		2.51	5.18	2.96
	June	5.09		2.57	5.08	2.97	5.28		2.63	5.09	3.03
	July	5.22		2.61	5.03	3.01	5.53		2.81	5.21	3.16
	Aug	5.37		2.64	5.13	3.00	5.78		2.97	5.43	3.20
	Sept	5.48		2.66	5.29	3.05	5.87		3.03	5.68	3.28
	Oct	6.11		3.29	5.85	3.23	6.02		3.33	5.95	3.55
	Nov	6.01		3.38	5.72	3.38	5.96		3.40	5.88	3.63
	Dec	6.07		3.38	5.91	3.41	6.09		3.46	6.10	3.73

Krona exchange rate: theoretical ECU index, TCW-weighted index and MERM-weighted index; selected exchange rates

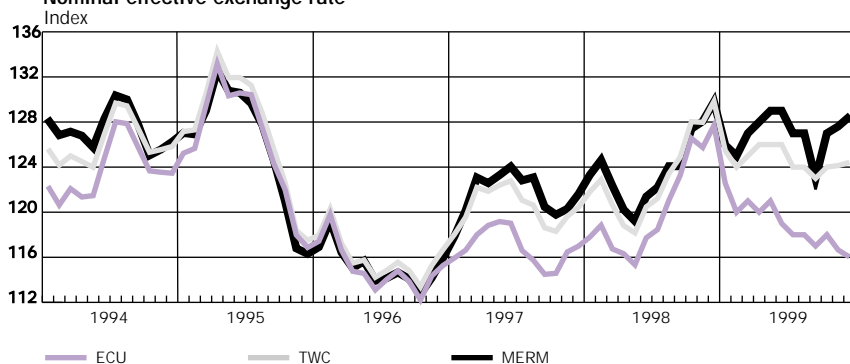
Annual and monthly averages; annual highs and lows

		ECU index	TCW index	MERM index	SEK per			USD per	
					USD	100 DEM	100 JPY	DEM	JPY
1997	Jan	115.89	118.02	117.84	7.06	440.02	5.99	1.60	117.83
	Feb	116.63	119.55	120.15	7.40	442.22	6.02	1.67	122.93
	March	119.00	122.20	123.07	7.65	450.95	6.25	1.70	122.57
	April	118.83	121.85	122.56	7.68	449.31	6.12	1.71	125.56
	May	119.17	122.40	123.29	7.67	450.73	6.47	1.70	118.61
	June	119.03	122.79	124.04	7.74	448.77	6.78	1.73	114.29
	July	116.60	121.06	122.82	7.81	436.41	6.78	1.79	115.24
	Aug	115.74	120.63	123.09	8.00	433.89	6.78	1.84	117.91
	Sept	114.49	118.62	120.47	7.70	430.56	6.38	1.79	120.73
	Oct	114.58	118.36	119.78	7.57	430.99	6.26	1.76	120.96
	Nov	116.47	119.62	120.29	7.56	436.58	6.04	1.73	125.18
	Dec	116.94	120.44	121.55	7.78	438.03	6.01	1.78	129.49
1998	Jan	117.80	121.66	123.30	8.01	441.19	6.18	1.82	129.50
	Feb	118.84	122.89	124.62	8.08	445.30	6.43	1.81	125.69
	March	116.74	120.65	122.35	7.97	436.38	6.18	1.83	129.00
	April	115.32	118.81	120.23	7.82	431.28	5.93	1.81	132.13
	May	115.33	118.17	119.21	7.69	433.46	5.70	1.77	134.96
	June	117.70	120.47	121.43	7.91	441.36	5.62	1.79	140.15
	July	118.46	121.22	122.20	7.98	444.30	5.68	1.80	140.63
	Aug	121.04	123.41	124.08	8.13	447.56	5.61	1.79	144.68
	Sept	123.25	124.88	124.68	7.91	464.26	5.88	1.70	134.57
	Oct	126.56	128.03	127.40	7.85	479.02	6.49	1.64	120.78
	Nov	125.74	127.97	128.06	7.99	475.49	6.64	1.68	120.35
	Dec	127.70	129.83	129.79	8.05	482.79	6.86	1.67	117.24
1999	Jan	122.57	125.46	125.95	7.82	464.45	6.92	1.69	113.16
	Feb	120.37	124.00	125.18	7.95	455.54	6.82	1.75	116.72
	March	120.81	125.43	127.09	8.22	457.34	6.87	1.80	119.64
	April	120.49	125.75	127.91	8.32	455.88	6.97	1.83	119.72
	May	121.24	126.87	129.16	8.44	458.97	6.93	1.84	122.05
	June	119.34	125.69	128.56	8.51	451.67	7.05	1.88	120.76
	July	118.16	124.40	127.41	8.46	447.31	7.07	1.89	119.54
	Aug	118.26	124.17	126.77	8.26	447.81	7.29	1.84	113.25
	Sept	116.66	123.42	126.41	8.22	441.40	7.67	1.86	107.01
	Oct	117.93	124.35	126.85	8.15	446.30	7.69	1.83	106.03
	Nov	116.65	124.14	127.61	8.34	441.27	7.93	1.89	104.70
	Dec	116.03	124.42	128.48	8.48	439.16	8.27	1.93	102.59

Note. The base for the ECU index is the central rate with the ecu on 17 May 1999; for the MERM-weighted and the TCW index it is 18 November 1992.

8

Nominal effective exchange rate



Note. The base for the ECU index is the central rate with the ECU on 17 May 1991; for the MERM-weighted and TCW index it is 18 November 1992.

9

Forward foreign exchange market

Forward net position with authorized currency dealers. SEK million, period ends

	Non-bank public		Bank abroad	Riksbank	Totalt (1+2+3+4)
	Resident (1)	Non-resident (2)	Net (3)	Net (4)	
1998 Jan	-212 998	-22 001	140 364	- 262	- 94 897
Feb	-186 583	-18 304	119 476	1 382	- 84 029
March	-192 115	-19 175	142 227	5	- 69 058
April	-186 239	-17 669	122 320	397	- 81 191
May	-174 575	-47 495	133 608	0	- 88 462
June	-220 387	-23 274	112 675	0	-130 986
July	-218 997	-22 052	129 587	0	-111 462
Aug	-284 131	-27 586	201 845	0	-109 872
Sept	-239 370	-26 312	178 740	0	- 86 942
Oct	-283 253	-29 446	157 158	0	-155 541
Nov	-304 235	-26 910	158 008	0	-173 137
Dec	-274 469	-16 164	129 535	0	-161 098
1999 Jan	-251 675	-11 774	117 395	0	-146 054
Feb	-252 950	-12 878	93 133	0	-172 695
March	-272 142	-11 752	131 858	0	-152 036
April	-274 127	- 9 540	127 642	0	-156 025
May	-289 324	- 4 744	150 131	0	-143 937
June	-283 220	- 1 091	129 813	0	-154 498
July	-279 761	- 2 317	147 386	0	-134 692
Aug	-271 051	+ 4 393	143 815	0	-122 843
Sept	-262 300	-11 669	156 294	0	-117 705

Signed articles in earlier issues

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Foreign exchange markets in April 1989 – a global study	<i>Robert Bergqvist</i>	1990:1
The balance of payments	<i>Gunnar Blomberg</i>	1990:2
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