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Employment and the Riksbank

By Villy Bergström, Annika Svensson and Martin Ådahl

Villy Bergström is Deputy Governor of the Riksbank, Annika Svensson and Martin Ådahl work in the Monetary Policy Department.

Can the Riksbank use the instrumental rate to influence employment? The fact that, despite strong economic growth, the labour market in Sweden has been weak in the 2000s has brought this question to the fore. This article aims to clarify the relationship between monetary policy and employment. Such a relationship does exist in the short run but is transitory and overshadowed by other factors. In the long term unemployment is not responsive to monetary policy. The present high unemployment figures are instead mainly a consequence of structural problems in the labour market.

The authors are most grateful to Karine Jabet, who has contributed valuable comments and material, and to Hans Dellmo and Kent Friberg for comments and suggestions.

The relationship between monetary policy and unemployment

During 2003 and 2004 Sweden experienced high economic growth, low inflation and weak employment. In such a situation it is naturally tempting to lump these phenomena together and argue that the development of employment is mainly, or at least to a considerable extent, a direct consequence of monetary policy.

In reality, however, the relationship between monetary policy and employment raises two distinct issues, one being the long-term connection between employment and inflation and the other monetary policy's short-term impact on economic activity and employment.[1] The long-term relationship has been researched and debated more than most other issues in modern macroeconomics and is therefore considered only briefly in an opening section. Our focus here is the subsequent discussion of the questions to do with monetary policy in the short run. This is followed by a section on the structural factors that have been particularly important for employment.

[1] Apel & Heikensten (1996) also look at the relationship between monetary policy and employment but focus mainly on the first issue.

Monetary policy and employment in the long term

A thesis in the early post-war period was that a direct trade-off existed between unemployment and inflation.

Monetary policy's relationship to unemployment was a central issue in the twentieth century's macroeconomic debate, not least in Sweden. A basic thesis, inherited from Keynes, in the early post-war decades was that a direct trade-off existed between unemployment and inflation, the implication being that decision-makers could "buy" less unemployment for the price of more inflation. This was demonstrated with the Phillips curve, which relates unemployment to inflation.

This argument meant that combating inflation was completely subordinated to the management of demand. Moreover, the Bretton Woods exchange rate cooperation at that time, based on fixed exchange rates, restricted monetary policy's potential. The goal of economic policy in post-war Sweden was full employment, mirrored in the detailed accounts of labour supply and demand in the budget bills from the 1950s and 60s.

The policy appeared to be successful – unemployment stayed clearly below 4 per cent.

The notion of full employment allowed for a small amount, around 2.5 per cent, of what was know as frictional unemployment, though the exact level was never stated explicitly in political documents. This type of unemployment was assumed to be made up of persons who, at any one time, are either moving from job to job or joining the labour market, for instance from education. The prevailing view saw increased unemployment as being invariably due to insufficient demand. The policy appeared to be highly successful – unemployment in Sweden was clearly below 4 per cent for much of the post-war era; in annual terms it never exceeded 4 per cent from 1950 to 1990.

What put an end to this? To understand this it is necessary to realise that in those decades there was a gradual shift in inflation expectations and economic policy. In the early post-war years there were recollections not only of the inter-war period's mass unemployment but also of its price stability. Prices had fallen at times and risen at others but on the whole, the price level in the 1930s had been stable, in keeping with the Riksbank's explicit goal at that time. This experience left its mark on early post-war inflation expectations, an instance being that the government anticipated a falling price level as the changeover to peacetime production generated productivity gains.[2]

By the late 1980s, inflation expectations had anchored at a high level.

As the general price level moved up, but never down, people tended to see inflation as a normal phenomenon. Expectations of rising prices were gradually established. In the period 1956–64 the annual increase in the general price level, measured by the CPI, averaged 3.4 per cent, fol-

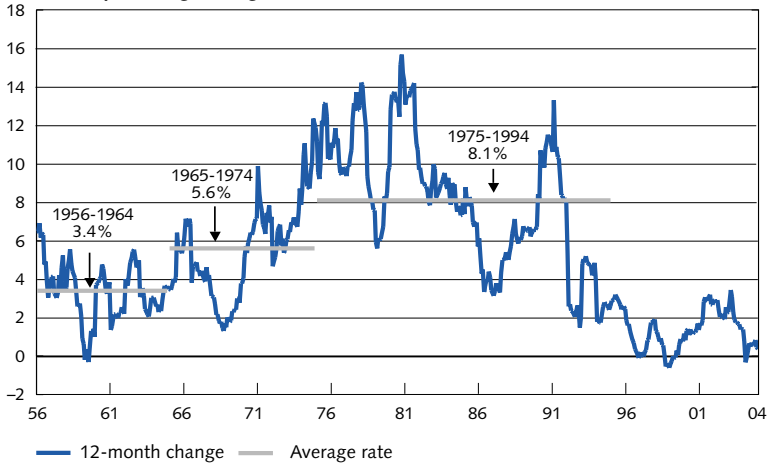
[2] Bill no. 252, April 1944, page 19. "An improvement in post-war supply should accordingly occasion a corresponding improvement in the value of money. As a rule, money incomes should be neither raised nor lowered."

lowed by 5.6 per cent in 1965–74 and then by 8.1 per cent up to the mid 1990s (see Figure 1). In the period 1973–82, after the Bretton Woods cooperation on fixed exchange rates had come to an end, Sweden devalued the krona no less than six times. By the late 1980s, after a successively rising rate of inflation and repeated devaluations, inflation expectations had anchored at a high level. It became increasingly clear that the once so self-evident trade-off between inflation and unemployment no longer applied, that each new attempt to boost employment by expanding demand led in time simply to increasingly high inflation.

In the long run there is no trade-off between inflation and unemployment.

The explanation is simple. Rising inflation influences wage demands in the coming round of negotiations. Wage-earners are interested in the purchasing power of wages and formulate their demands accordingly. This leads to rising inflation without affecting employment. Consequently, in the long run there is no trade-off between inflation and unemployment, which are ultimately determined by different factors.[3] Inflation is influenced by monetary policy, while employment responds above all to such factors as the workings of the labour market, the construction of wage negotiations, tax and social security systems, and so on. In the long

Figure 1. The path of inflation and its average rate in selected periods
Annual percentage change



Source: Statistics Sweden.

[3] See e.g. Kydland & Prescott (1977) and Barro & Gordon (1983).

run the Phillips curve is vertical in the sense that any rate of inflation is compatible with a given level of employment.[4]

But while there is no direct trade-off between inflation and employment in the longer run, a high and variable rate of inflation can tend to inhibit growth and welfare, partly because it disturbs the mechanism whereby prices signal the relative values of different goods and distorts the motives for saving. This is a problem, for instance, when investments are expected to generate a return for a long time to come; uncertainty about future prices may then be a deterrent. There will also be greater uncertainty about future wages and other costs, for example. Creditors may choose to charge higher interest rates to compensate for uncertainty about inflation, while firms refrain from investing in new machinery or hiring labour.

The new monetary policy regime, focused on low and stable inflation, draws on the experiences from the 1970s and 80s. The target is 2 per cent inflation, which leaves a margin down to zero inflation and thereby lessens the risk of deflation and paves the way for relative wage adjustments that do not normally require various groups in the labour market to accept nominal wage cuts.

Inflation and unemployment both fell in the 1990s.

The introduction of the inflation target was followed by a parallel fall in inflation and unemployment in the 1990s, perhaps the clearest demonstration that there is no trade-off between the two. Meanwhile, the absence of a long-term relationship between inflation and unemployment has been confirmed by extensive studies from many OECD countries.[5]

Monetary policy and employment in the short run

After these remarks about monetary policy's role for employment in the long term (or rather the absence of such a role), it remains to consider its influence in the short run.

By adjusting the interest rate with a view to stimulating or subduing economic activity, the Riksbank's monetary policy is liable to have a short-term impact on output and employment.

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[4] Akerlof, Dickens & Perry (1996, 2000) have questioned whether the long-term Phillips relationship is consistently vertical and argue for a trade-off at very low rates of inflation. Their first study (1996) holds that inflation should not be too low: the downward rigidity of nominal wages calls for some inflation to provide room for real wage adjustments. Unduly low inflation may impede a full adjustment and thereby result in lower employment. In the other study (2000) they conclude that certain wage- and price-setting economic agents disregard expected inflation when this is sufficiently low. This means that, provided inflation is above zero, wages and prices do not keep pace with it, which leads to higher employment. The higher the inflation the agents are prone to disregard, the greater the gain in employment. Note, however, that this only applies when inflation is relatively low. Lundborg & Sacklén (2001) present a version of this study based on Swedish data with similar conclusions. However, the results of Akerlof, Dickens & Perry (2000) are not supported by a recent empirical evaluation based on Swedish and US data by Bryan & Palmqvist (2005).

[5] See Lucas (1972) and, for recently published estimations of a broad selection of countries, see e.g. Richardson et al. (2000) and Clifton, Lean & Wong (2001).

A SIMPLIFIED MODEL

Consider an output gap – the discrepancy between actual and potential output.

Let us first consider a simplified model in the form of an output gap – the discrepancy between actual and potential output, where the potential level is determined, not by monetary policy, but by fundamental factors such as growth of the labour force, investment and advances in technology. The output gap can then be said to represent economic activity's cyclical variation. A negative output gap implies a lack of pressure from demand for goods, services and factors of production, so that the economy has plenty of unutilised resources. Price and wage increases are small and inflation is usually below the target. Conversely, a positive output gap implies that actual output is above the potential level so that resources are strained, labour demand exceeds supply, wages are pushed up and inflation is typically above the target.

The Riksbank's monetary policy involves selecting the interest rate that influences demand so as to minimise the output gap.

In this short perspective monetary policy plays a role for economic growth as well as for employment. The output gap mirrors demand pressure, which in turn affects inflation. So the Riksbank's monetary policy involves selecting the interest rate that moves demand so as to minimise the output gap. If actual and potential output coincide and the output gap is accordingly closed, the notion is that inflation will be in line with the Riksbank's target.

In such a simplified world there is a very direct relationship between monetary policy, the output gap and employment. If the Riksbank is off target, employment will be affected. Inflation below the target means that employment is lower than it could be, while inflation above the target generates stronger labour demand than the supply can provide in the longer run.

A MORE COMPLEX REALITY

Firstly, monetary policy is incapable of fine-tuning either the output gap or employment.

However, reality is more complex than this. For one thing, monetary policy is incapable of fine-tuning either the output gap or employment. It takes time for monetary policy to influence inflation, so policy decisions have to be based on the expected future development of prices. Neither do we know the exact size of the output gap today, still less in the years ahead. In reality, supply and demand are being disturbed all the time, with effects on both actual and potential output. Consequently the output gap is seldom completely closed. In addition, in every forecast period there are events and political decisions which are difficult or impossible to foresee. The terrorist attacks on 11 September 2001 are a case in point. All this means that forecasts will inevitably contain some form of error. We must therefore accept the fact that for fairly long periods the output

gap will not be closed. The point is that, with a view to stabilising inflation, the Riksbank strives to keep deviations from the target as small and short-lived as possible.

With the type of symmetric inflation target the Riksbank has adopted, the incentives to avoid misses on the upside and the downside are equally strong.

With the type of symmetric inflation target the Riksbank has adopted, the incentives to avoid misses on the upside and the downside are equally strong. The Riksbank accordingly devotes its efforts, analyses and resources equally to avoiding overshooting and undershooting the target. The short-run deviations from the inflation target will then cancel out over time and result in no permanent job gains or losses. The average rate of inflation in the decade since the target was introduced (a fairly short period for such an evaluation) does not, in fact, point to any systematic deviation or bias. At 1.4 per cent, the CPI (the variable by which the Riksbank is evaluated) has admittedly been below the target on average but it must be born in mind that this was a period when interest rates were falling to a large extent because monetary policy gradually dispelled the previously high inflation expectations. Interest expenditure has an "inappropriate" direct effect on inflation via house mortgage rates. In terms of UND1X, a price index that excludes the impact of interest expenditure, inflation has averaged 1.8 per cent, close to the 2 per cent target.

Secondly, it is not just the output gap that affects inflation; expectations do so, too.

Secondly, another matter that complicates the picture of a simple relationship between monetary policy and employment is that, besides being affected by the output gap, inflation is highly dependent on inflation expectations, which in turn are dependent on confidence in monetary policy. Provided the Riksbank's monetary policy is perceived as credible, minor interest rate adjustments will suffice in certain situations to signal that the Bank is keeping a watchful eye on inflationary tendencies. If, instead, inflation expectations deviate markedly from the Riksbank's target, more vigorous measures may be required.

Central bank independence is important for establishing the credibility of the inflation target. Sweden, along with many other countries, has therefore chosen a arrangement whereby monetary policy decisions are taken independently by the central bank with reference to the statutory objective of price stability. This construction requires a great deal in the way of central bank transparency and clarity.

Thirdly, the short-term impact of many factors differs greatly between inflation, the output gap and employment.

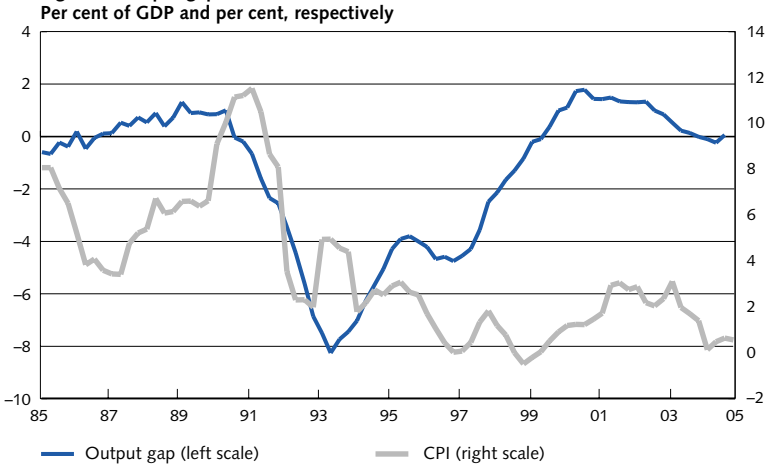
Thirdly, the short-term impact of many factors is sizeable on inflation but only marginal on the output gap and employment, just as other factors and policy decisions affect registered open unemployment more than the output gap and inflation. Clear examples of inflation being influenced more than the output gap and unemployment are mad-cow disease's impact on meat prices and the tendency for electricity prices to fluctuate with the rainfall-dependent capacity of hydroelectric power. One example

of decisions with consequences that are considerable for open unemployment but smaller for the output gap and inflation is the cutbacks to labour market measures in 2003.

All this means that the relation between the output gap and inflation or employment is not straightforward, as is evident when these variables are followed side by side (see Figures 2 and 3).

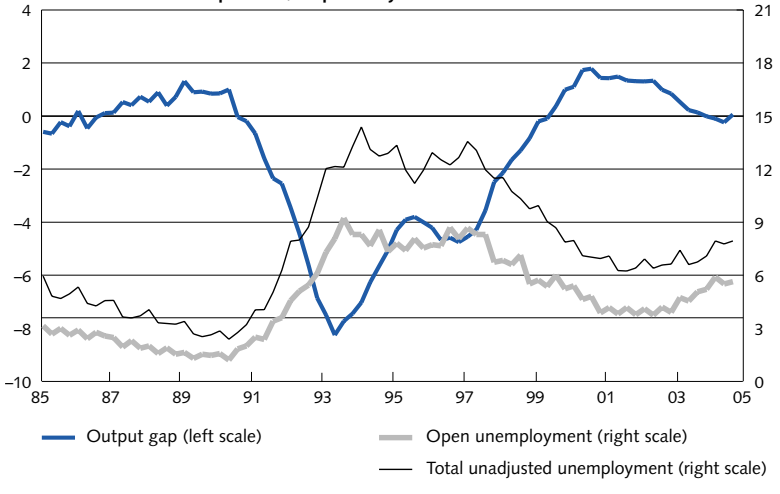
Consequently there is no simple relationship that ties a particular interest rate decision to a particular level of unemployment.

Figure 2. Output gap and CPI
Per cent of GDP and per cent, respectively



Sources: Statistics Sweden and the Riksbank.

Figure 3. Output gap and unemployment (open and total)
Per cent of GDP and per cent, respectively



Sources: Statistics Sweden and the Riksbank.

Notable examples of this are the episodes of inflation below the target in the late 1990s and early 2000s, periods characterised by positive supply shocks such as unexpectedly high productivity growth, unexpectedly low imported inflation and other more transitory phenomena. The low inflation was not occasioned by a tightening of monetary policy to subdue demand. On the contrary, the very low interest rate means that monetary policy has been expansionary. Despite this, inflation has been kept down as a result of the positive supply shocks. The effects of such shocks on employment differ from those elicited by an unduly restrictive monetary policy. The Riksbank can influence demand via the interest rate but the extent to which firms then respond to demand by varying the number of employees will depend on the development of productivity, which lies beyond the reach of monetary policy. The flows to and from labour market measures are likewise outside the Riksbank's domain. What the Riksbank can do is simply construct an assessment in the light of the experience and knowledge that are available one to two years before monetary policy has its full impact.

Finally it is worth recalling that the Riksbank does not aim to be on target as soon as possible regardless of the cost.

Finally it is also worth recalling that the Riksbank does not aim to be on target as soon as possible regardless of the cost. When inflation deviates from the target, the normal aim is a gradual return in order to avoid the sizeable real economic costs of large fluctuations in demand and output. This also allows the Riksbank to combine its objective of price stability with the requirement – expressed in the Government Bill 1997/98:40 ("Riksbankens ställning") – that, as an agency under the Riksdag, the Bank shall support the goals of economic policy in general, for example sustainable growth and full employment. Moreover, the Riksbank's clarification of the inflation target, from 1999, states that in the event of very large deviations, there may be grounds for allowing a longer period of time than usual to bring back inflation on target.[6] In certain cases a return within the normal time horizon could occasion undesirable fluctuations in economic policy.

Structural factors behind unemployment

The above illustrates the difficulty in arriving at a figure for monetary policy's contribution to the weak development of employment in recent years. But given that annual economic growth has been between 3 and 4 per cent, accompanied by a historically low instrumental rate, it seems that the weak employment trend is not primarily a consequence of slack

[6] See Heikensten (1999).

demand. The explanation has to be sought instead among more long-term factors of a structural nature.

The first thing to note is that the employment problems are even greater than registered open unemployment suggests. As the decline in employment in the early 1990s was accompanied by a reduction of the labour force, unemployment did not rise to the same extent. The size of the labour force and employment both commonly co-vary with the business cycle. A slowdown depresses not just employment but also the number of persons who seek work. This is natural when people know that jobs are hard to come by. But since then, despite historically high economic growth, the employment rate has not recovered from the steep fall in connection with the crisis in the early 1990s. The proportion of the active age group that is outside the labour force is still large, which means that in addition to open unemployment there is in practice a large component of disguised unemployment. The fact that not even open unemployment fell more during the cyclical upswing in the 1990s suggests that the labour market does not function properly.

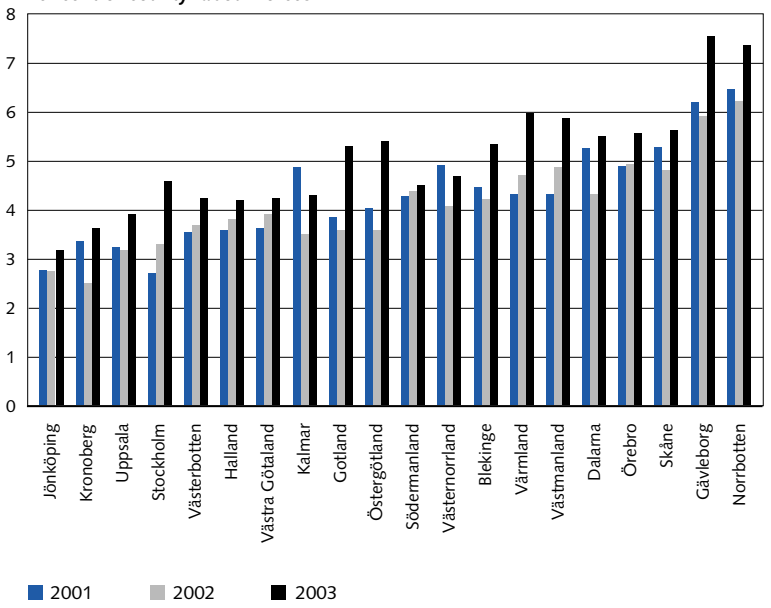
Although monetary policy is the same, unemployment in some regions is twice as high as in others.

Another indication that the problem of unemployment is structural is the large differences that exist between regions and occupational categories. Although monetary policy applies uniformly throughout the Swedish economy, unemployment in some regions is twice as high as in others and in some occupational groups many times higher than in others (see Figures 4 and 5). These differences seem to persist over long periods, which indicates low labour-market mobility. In some regions, moreover, high unemployment rates are accompanied by large proportions of people who, instead of being economically active, are on long-term sick leave or have retired early. Neither have these differences diminished in recent years.

There are signs of a growing need for labour-market mobility.

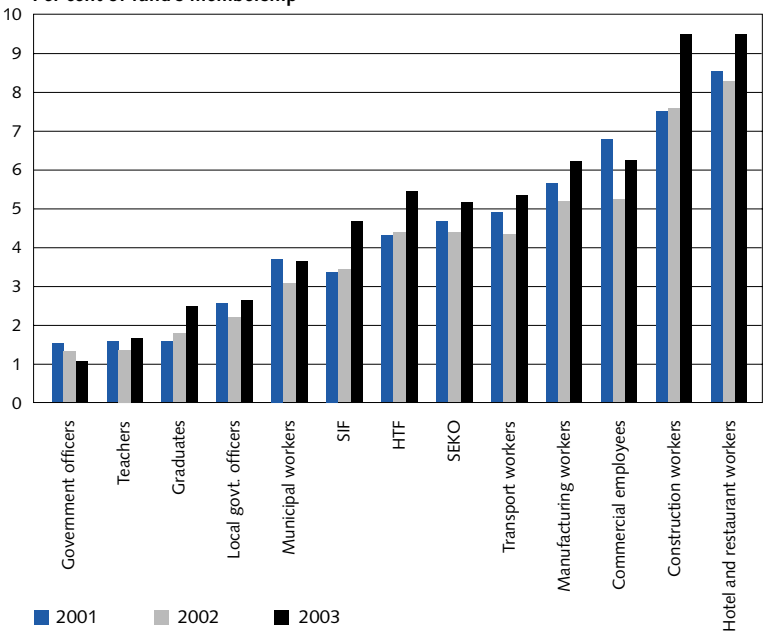
At the same time there are signs of a growing need for labour-market mobility. A comparison of cyclical fluctuations in employment shows that in many industries jobs are lost during upswings as well as slowdowns, while jobs are gained continuously in others (see Figure 6). Thus, the typical cyclical pattern, whereby jobs lost in a particular industry during slowdowns are recovered in that same industry during upswings, does not seem to apply in every industry. To some extent, decreased employment in a slowdown is replaced by productivity growth and information technology, particularly in manufacturing. Economic growth does generate new jobs but not where they used to be. This means that more people have to find a new industry or workplace, which calls for adaptability. More jobs must be created, for instance in the services sector, perhaps in entirely new firms.

Figure 4. Unemployment by counties 2001-03
Per cent of county labour forces



Source: Statistics Sweden.

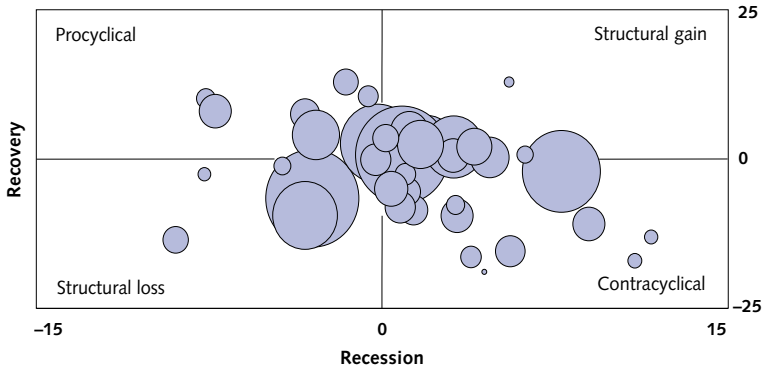
Figure 5. Openly unemployed members of unemployment insurance funds 2001-03
Per cent of fund's membership



Note. SIF = Swedish Union of Clerical & Technical Employees in Industry, HTF = Salaried Employees' Union, SEKO = Union of Service & Communication Employees.

Source: Statistics Sweden.

Figure 6. Sectoral employment in cyclical ups and downs 2000-04



Note. Each circle represents an industry and its size corresponds to the number employed there. When the number of persons employed falls in a cyclical up and increases in a cyclical down this is regarded as procyclical behaviour, the opposite as contracyclical. Increased or decreased employment in a recession *as well as* in a recovery is regarded as structural behaviour. For a similar study of the United States, see Groschen & Potter (2003).

Sources: Statistics Sweden and the Riksbank.

It follows that high growth does not necessarily confer greater job security in the traditional sense. On the contrary, it may involve rapid transformation and strong productivity growth, and that more jobs are lost in certain parts of the economy, while new opportunities are created in others. This is a pattern that has been discussed in the United States in the debate about jobless growth. But it is not a new phenomenon. Structural change and jobless growth have been features of the Swedish economy for a century and a half.

Rapid structural change makes low labour-market mobility more costly.

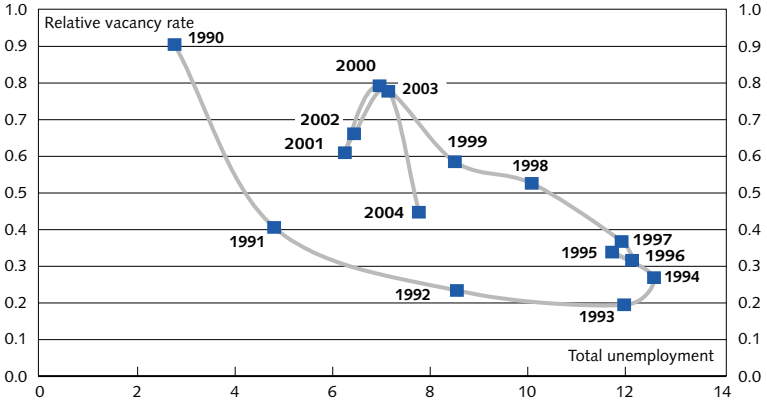
Rapid structural change makes low labour-market mobility more costly and increases the need for new firms and jobs. More people will be involved in transitions between firms and industries, sometimes between residential areas. More of them are liable to get stuck in this process if employees lack incentives to changes jobs at short notice and move to a different industry at the same time as firms' incentives to recruit labour from other industries are weakened by insufficient wage dispersion and costs for sick leave and job security. That would entail higher frictional unemployment due to problems with matching job-seekers and vacancies.

Frictional unemployment can be analysed in terms of the Beveridge curve, which relates total unemployment to job vacancies. The probability of a person finding a job, which reduces unemployment, increases with the number of vacancies, so the relationship has a downward slope. Cyclical developments often cause movements along the curve, while the position of the curve can be used to interpret the matching process. A

The position of Beveridge curve is possibly an indication that since the crisis the labour market has continued to function badly.

position close to the origin indicates relatively efficient matching and hence a quicker flow from unemployment. In the early 1990s the curve shifted outwards as the crisis excluded many people from the labour market (see Figure 7). The fact that since then the curve has not moved back towards the origin (which would imply fewer vacancies and less unemployment) is possibly an indication that the labour market has continued to function badly. Vacancy and unemployment rates are still much higher than in the 1950s and 60s.[7]

Figure 7. Beveridge curve for Sweden
Per cent



Note. Relative vacancy rate = job vacancies still unfilled after 10 days or more divided by persons in the labour force and training schemes. Total unemployment = open + labour market measures, adjusted.

Sources: National Labour Market Board and Statistics Sweden.

Moreover, if rapid structural changes leave more people searching for a new job and a greater number become so discouraged that in practice they stop looking for work, long-term unemployment is liable to rise. A passive mood among the unemployed can lead to laid-off people becoming permanently excluded from the labour market.

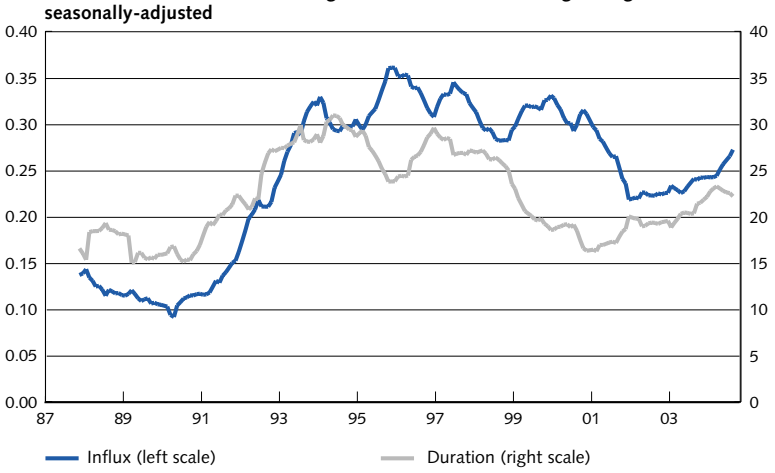
The phenomenon known as hysteresis – an increase in unemployment that is not subsequently reversed because more and more people get stuck in long-term unemployment – can be evident as soon as the workings of the labour market and the structure of various incentives make it difficult for those who have lost their jobs to find new work. The reasons may be that wage formation is not sufficiently affected by the unemployed's potential labour or that, for example, job-seekers are slow to adjust their wage expectations and job qualifications to the situation in another occupation. Hysteresis may also be connected with transitory

[7] Analyses of this form of the Beveridge curve must allow for the fact that the position of the curve is affected if a higher sick rate entails less unemployment or if cuts in public sector employment generate more unemployment, as happened during the austerity programmes in the 1990s.

unemployment as a result of the cyclical fluctuations that monetary policy aims to smooth. However, these fluctuations, which cannot be entirely eliminated, probably account for only a small proportion of all the jobs that disappear during a period of structural change. With a labour market and a structure of incentives that rest on the principle that job losses are only temporary and will turn into opportunities at the same workplace when the economy recovers, structural changes whereby the new jobs are created in other industries can increase the risk of long-term unemployment. The average duration of unemployment lengthened during the crisis years in the early 1990s and then gradually shortened up to 2001; but since then and despite favourable economic growth, it has lengthened again and so, therefore, has the risk of long-term unemployment (see Figure 8).

The duration of unemployment gradually shortened up to 2001 but since then it has lengthened again and so, therefore, has the risk of long-term unemployment.

Figure 8. Unemployment: influx and duration
Per cent (left scale) and weeks (right scale); 12-month moving average, seasonally-adjusted



Note. Influx measured as the number of persons who have been unemployed for one week, expressed as a percentage of the labour force; duration measured as the total number unemployed divided by the number who have been unemployed for one week.

Sources: Statistics Sweden and the Riksbank.

Concluding remarks

It is important that unemployment's fundamental causes are seriously discussed and that demands are directed at those who actually have the power to make the necessary changes. Monetary policy has no impact on employment in the long run, though in the short run it can affect demand and thereby unemployment.

However, the short-term relationship between monetary policy and unemployment is not straightforward; there are a number of complicating factors that are also not stable over time. Monetary policy is capable of

The relationship between monetary policy and unemployment is complicated by a number of factors and these are not stable over time.

smoothing the cyclical variations around an underlying trend and thereby minimise the output gap. But some fluctuation is unavoidable because the Riksbank cannot succeed in closing the output gap on every occasion and will therefore not be exactly on the inflation target in other than exceptional cases. This has to do with the shocks that occur more or less continuously and unexpectedly as well as with the inevitable uncertainty of forecasts. What matters, however, is that provided monetary policy succeeds in maintaining price stability, the cyclical variations around the trend will cancel out in the longer run. The effects on unemployment of deviations from the inflation target will then be relatively small and short-lived, particularly compared with the dramatic development of unemployment figures in the 1990s and 2000s.

The policy issue should be why unemployment has not been brought down to the low figures that prevailed in the 1950s and 60s.

Instead of the small short-run fluctuations – whether an infallible monetary policy might have altered the unemployment rate by some tenths of a percentage point – the major policy issue should be the broad underlying trends, that is, why unemployment has not been brought down to the low figures that prevailed in the 1950s and 60s.

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Experience of inflation-targeting in 20 countries

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It is now twelve years since the Swedish inflation target was announced and a decade since it became operative.[1] When Sweden gave up the policy of a fixed exchange rate, we had very little experience of conducting monetary policy with a flexible exchange rate.[2] Faced with the task of formulating an inflation target, the Riksbank therefore considered the solutions chosen by countries where inflation-targeting systems with a flexible exchange rate had been introduced some years earlier: Canada, New Zealand and the United Kingdom.[3] In recent years these pioneers of inflation targeting have been joined by a number of developing countries, for example Brazil, South Africa and Thailand, as well as by such East European transitional economies as Poland, the Czech Republic and Hungary. At present, around twenty central banks around the world are conducting monetary policy with a flexible exchange rate and an explicit target for inflation.[4]

In this article I discuss the monetary policy experiences of the countries that have adopted an inflation target. How has the delegation of monetary policy to an independent central bank been implemented? Which inflation targets have countries chosen? To what extent do the central banks state that they also take real economic stability into consideration? What part do inflation reports and monetary policy minutes play for communication and accountability? Have central banks fulfilled their inflation targets without generating unnecessary fluctuations in growth and employment?

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1 Sweden's inflation target was announced in January 1993 and applied as of 1995.

2 Sweden did have a flexible exchange rate and a price stability objective for monetary policy for some years in the 1930s but that was a long time ago and of little consequence for the formulation of stabilisation policy after World War II. For an account of Sweden's price-level target in the 1930s, see Berg & Jonung (1999).

3 The first country to adopt an inflation target was New Zealand, in 1990. Chile also announced an inflation target in that year but both its target and inflation were considerably higher than in the other pioneer countries.

4 As more and more countries adopt the combination of an inflation target and a variable exchange rate, the scientific literature in this field is growing rapidly. Moreover, time series for major macro variables since the changeover to targeting inflation are now so long that it is becoming possible to draw conclusions about the policy's effects. Thus, a good deal of experience is available as regards conducting, analysing and evaluating inflation-targeting monetary policies. Meanwhile, inflation targeting is attracting growing interest in countries such as Japan and the United States, where the discussion of the advantages of a numerical price stability target for monetary policy is starting to spread beyond academic circles.

Policy framework with five components

A central bank should aim for price stability without unnecessary real economic fluctuations.

There is widespread agreement that monetary policy's long-term objective should be price stability. A low and stable rate of inflation provides favourable conditions for the economic decisions of households and firms. Moreover, monetary policy's long-term effects are confined to nominal variables such as inflation and the exchange rate. A central bank cannot affect either average growth or employment in the long run. In the short term, on the other hand, monetary policy clearly can have an impact on such real variables. So there is a consensus that a central bank should aim to generate price stability without this leading to unnecessary fluctuations in real economic activity. The delegation of monetary policy to an independent central bank makes it more credible that low inflation will be achieved without more marked variations in employment or growth.[5]

Inflation-targeting monetary policy can be said to have an institutional framework with the following components:

1) The political system delegates monetary policy to an independent central bank.
2) The central bank objective is to achieve a publicly explicit numerical target for price stability.
3) The central bank aims to achieve the inflation target without generating unnecessary real economic variability.
4) The central bank regularly publishes reports that describe the prospects of achieving the inflation target.[6]
5) The political system regularly holds the central bank accountable for achieving the objective.

Between them, the components of this analytical framework function as a mechanism with a strong incentive to keep inflation down. By providing a credible anchor for inflation expectations in the longer run, the framework helps to eliminate the inflation bias described by Kydland & Prescott (1977).[7]

Instrumental-rate adjustments by the central bank affect inflation via a variety of channels in monetary policy's transmission mechanism: short- and long-term real interest rates, the exchange rate and the volume of

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5 Following Rogoff (1985), an extensive literature has been produced in which the issue is analysed in a principal agency perspective. For a review of the relations in this theoretical framework between an optimal inflation target, the stabilisation of employment and linear inflation contracts, see Svensson (1997a). See also footnote 22.

6 However, not all central banks publish inflation forecasts in their inflation reports. Moreover, the monetary policy minutes of some central banks are more explicit than their inflation reports about how monetary policy is conducted to achieve the inflation target.

7 Orphanides & Williams (2004) show in a model how an inflation target can help to anchor inflation expectations by making it easier to estimate future inflation.

An inflation target enables the central bank to supplement the traditional transmission channel with an expectations mechanism.

credit, each with a different time lag, see Svensson (2002). When the central bank lowers (raises) the instrumental rate, these different channels tend to lead in time to higher (lower) inflation. However, inflation is also subject to exogenous shocks that have nothing to do with monetary policy, for example oil price shocks. The central bank therefore needs to explain how inflation can be brought back to target after a deviation. In their external communications, central banks that target inflation, particularly those that publish their inflation forecasts, therefore attach great importance to managing the formation of expectations. It can be said that an inflation target also enables the central bank to supplement the traditional transmission channel more explicitly with the expectations mechanism that is a feature of modern macro models.

Delegating monetary policy

Delegating monetary policy to an independent central bank promotes economic efficiency.

The delegation of monetary policy to an independent central bank is not an end in itself but a means of contributing to a more efficient economy. Central bank independence wards off pressure from the political system and interest groups; it also provides full control of monetary policy's implementation in the form of open market operations, that is, instrumental independence. Today, the central bank is instrument independent in principle in all the inflation-targeting countries.[8] Still, the delegation may involve some form of exemption whereby the government or the parliament is entitled, usually under very exceptional circumstances, to rescind the inflation target. The law provides for such an exemption in less than one-third of the countries (see Table 1).[9]

Whichever authority announced the target, in every country its fulfilment is the responsibility of the central bank.

In inflation-targeting countries the target was usually announced by the government alone or together with the central bank (see Table 1). The announcement was made by the central bank alone in just over one country in four. Government participation in the announcement of an inflation target may have the advantage of conferring greater credibility if the introduction of the new monetary policy regime needs to be backed up by a realignment of fiscal policy and national debt administration. A drawback may be that the government can be in a position to alter the inflation target and thereby weaken its long-term credibility. Whichever authority announced the target, in every country the central bank is held

[8] A number of industrialised countries, including Sweden, adopted an inflation target before their legislation had been amended and the central bank became instrument independent. Among emerging-market countries, on the other hand, the common procedure has been to amend the law and make the central bank independent before announcing an inflation target. In many cases this has had to do with the importance of making a break with a history of government interference in monetary policy, weak government finances and very high inflation.

[9] In the United Kingdom the Treasury is entitled to issue instructions to the Bank of England if this were to be in the public interest on account of extreme economic circumstances.

Table 1. Inflation-targeting countries

	Since	Target set by:	Instrument independent	Current target (per cent)[2]	Target variable
Australia	1993	Government & central bank	Yes[1]	2–3 (b)	CPI
Brazil	1999	Government	Yes	4.5 ±2.0[3](p)	CPI
Canada	1991	Government & central bank	Yes[1]	2 ±1 (p)	CPI
Chile	1990	Central bank	Yes	2–4 (b)	CPI
Colombia	1999	Central bank	Yes	3.5–5.5[4]	CPI
Czech Republic	1997	Government & central bank	Yes	2–4[5] (b)	CPI
Hungary	2001	Government & central bank	Yes	4 ±1 (p)	CPI
Iceland	2001	Government	Yes	2.5 ±1.5 (p)	CPI
Israel	1991	Government	Yes	1–3 (b)	CPI
Mexico	1995	Central bank	Yes	3 ±1 (p)	CPI
New Zealand	1990	Government & central bank	Yes[1]	1–3 (b)	CPI
Norway	2001	Central bank	Yes[1]	2.5 (p)	CPI
Peru	2002	Central bank	Yes	2.5 ±1 (p)	CPI
Philippines	2002	Government & central bank	Yes	4–5 (b)	CPI
Poland	1998	Central bank	Yes	2.5 ±1 (p)	CPI
Republic of Korea	1998	Government & central bank	Yes[1]	3 ±1 (b)	UND[6]
South Africa	2000	Government & central bank	Yes	3–6 (b)	CPIX
Sweden	1993	Central bank	Yes	2 ±1 (p)	CPI
Thailand	2000	Central bank	Yes[1]	0–3.5 (b)	UND[6]
U.K.	1992	Government	Yes[1]	2 (p)	CPI (HICP)

[1] Normally but government can intervene.
[2] p = point target, b = band target.
[3] For 2006
[4] For 2005.
[5] Through 2005, thereafter 3% point target.
[6] CPI excl. food and oil prices.

Sources: The central banks' web sites, Truman (2003) and Carare et al. (2003).

accountable for fulfilling it. Doing that requires, however, some decisions of a more technical nature concerning the target variable and the target's level.

CPI the normal target variable

The target variable for inflation that has been chosen by most countries, Sweden included, is the consumer price index (see Table 1). This index is an appropriate target variable for monetary policy for several reasons. Besides being a cost-of-living index that maps the development of prices for an average basket of goods and services, it is well-known and is published regularly. Stabilising the CPI facilitates consumers' decisions in a market economy.

As an operational index for monetary policy, however, the CPI does pose problems. The most common problem is that in the short run the housing item (house mortgage interest expenditure) responds to the central bank's interest adjustments in a contrary manner. An interest rate hike

The CPI entails a problem in that in the short run an interest rate adjustment has a contrary effect on the housing item.

lifts house mortgage rates and the CPI tends to rise, while a cut lowers mortgage rates and tends to lower the CPI.[10] Another problem is that the CPI may be affected by other transitory effects – primarily price fluctuations for energy and food – that the central bank may want to disregard. There are various ways in which such transitory effects can be ignored in the implementation of monetary policy.

The problem of the housing item in the operational target variable is commonly avoided by using a CPI that excludes interest expenditure; this is the case in the United Kingdom and South Africa and it used to be done in New Zealand.[11] In some countries – Republic of Korea and Thailand, for example – the target variable is the CPI excluding food and oil prices.

An alternative approach is to be explicit in connection with monetary policy decisions about the types of transitory effects on inflation that monetary policy ought not to counter in full. In Sweden, the Riksbank has published a clarification of its view related to this issue.[12] In practice, the Riksbank has chosen as a rule to disregard interest expenditure by normally using an index of inflation (UND1X) that does not include this item.[13] The Swedish clarification also has the advantage that it provides for statements about other types of transitory effects that monetary policy does not aim to counter. In the event of a temporary inflationary shock related to volatile energy prices, one possibility is to show a measure that excludes energy prices and on this basis explain why the central bank does not want to counter the shock. Another possibility is to extend the forecast horizon somewhat.[14]

Target level positive in every country

Improvements in the quality of goods and services give the CPI a positive bias.

Turning now to the level of inflation targets, it can be noted that every country has chosen a positive number. There are several reasons for not choosing 0 per cent inflation, even though this may seem most natural if price stability is taken to imply an unchanged yardstick. In practice, improvements in the quality of goods and services give the CPI a positive

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10 In Sweden this problem was particularly evident when the Riksbank cut the instrumental rate in the course of 1996 by almost 5 percentage points and this contributed to CPI inflation being clearly below the targeted rate.

11 In the United Kingdom the target variable used to be RPIX (retail prices excluding interest expenditure); in 2004 it was replaced by a CPI that corresponds to the HICP and likewise excludes house mortgage interest costs. Following a redefinition, the CPI in New Zealand no longer includes interest expenditure.

12 See Sveriges Riksbank (1999) and Heikensten (1999).

13 UND1X is defined as the Swedish CPI excluding indirect taxes, subsidies and house mortgage interest expenditure.

14 In recent years there have been a couple of occasions when inflation has been driven up by rapidly rising prices for energy in particular but also for food. In this way, inflation moves up sharply in one year and then falls back steeply in the following year when the transitory disturbances no longer affect the 12-month change figures. So even when inflation is fairly close to the target on average, it may deviate markedly at times.

bias. In most countries this bias is judged to be at least 1 percentage point but in Sweden the CPI enquiry put it at about 0.3 of a percentage point. Another reason is that some positive inflation can facilitate relative wage adjustments if labour-market rules and standards impede nominal wage cuts. The analysis in Akerlof, Dickens & Perry (1996) suggests that the inflation target ought not to be below 2 per cent. Finally, a positive inflation target is an advantage in the event of a deep recession with a risk of deflation. If the central bank's inflation target is 0 per cent, deflation is liable to occur from time to time. As the nominal interest rate cannot be negative, it may then be difficult for the central bank to prevent a self-generating deflation spiral. This is because in such a situation the central bank is unable to bring the real interest rate down sufficiently if expectations of deflation arise when the nominal interest rate is already as low as possible. With a positive inflation target and thus a margin to zero, there is less probability of such a scenario.

Most industrialised countries have chosen inflation targets in the 1–3 per cent range, while the targets in developing countries and transitional economies tend to be higher, 3–6 per cent (see Table 1). The developing countries that started to target inflation when it was relatively high have reduced their targets successively, so the current difference between the country groups is not particularly great. One reason why the developing countries as a group should nevertheless have higher inflation targets than industrialised countries is that, according to the so-called Balassa-Samuelson effect, they have higher inflation as long as they are catching up with the industrialised countries.[15]

Approximately half the countries have a point target for inflation, with or without a tolerance interval.

Approximately half the countries have a point target for inflation, with or without a tolerance for deviations, as a rule ±1 percentage point. A point target has the advantage, when inflation is currently deviating from it, of indicating just what the central bank is aiming to bring inflation back to. In that way the target should help to anchor inflation expectations. A drawback with a point target, however, can be that it gives a misleading impression of precision and focuses undue attention on decimal points. In this context the tolerance interval can play an important role by indicating a normal range for inflation. If inflation moves outside this interval, as a rule the central bank needs to explain why.[16] In the other half of the countries the central bank operates with a band for tolerable inflation instead of a point target. A drawback with a band is that it may

[15] GDP growth and wage increases can be fairly high during the process of growth in developing countries. Moreover, wage increases in the sheltered sector often keep pace with those in the competitive sector without being matched by the same productivity growth.

[16] The use of a tolerance interval is criticised, however, by Faust & Henderson (2004), who argue that an optimal monetary policy often means that inflation should be outside the interval.

not be clear just what rate of inflation the central bank is aiming for.[17] In both cases, inflation is normally targeted symmetrically, that is, the central bank is expected to react equally strongly to downward and upward deviations from the inflation target. This also helps to anchor inflation expectations.

Consideration for real economic stability

Central banks usually take real economic developments into account.

To what extent are growth and employment a consideration in monetary policy? Even though monetary policy's long-term focus is on inflation, central banks usually also take real economic developments into account, that is, they implement a flexible inflation-targeting policy, see Svensson (1998, 2002).[18] Central banks are not inflation nutters, to cite a pithy coinage in King (1997).

Still, central banks differ a good deal in their explicitness about the extent to which they take fluctuations in growth or employment into account. Those who are more forthcoming about also considering the real economy in the implementation of monetary policy are the central banks in Australia, New Zealand, Norway and Sweden, while the Reserve Bank of Canada is more reticent.[19, 20]

A major reason why all central banks that target inflation do so flexibly in practice is that in the economic models that are normally used, the difference between actual and potential growth (the output gap) is of central importance for future inflation. The instrumental rate's impact on the output gap is lagged in practice by approximately one year. The output gap in turn affects inflation with a further lag of another year.[21] So if the central bank raises the interest rate in order to check an upswing in inflation that rising demand is expected to generate about two years ahead, this automatically helps to stabilise the real economy approximately one year ahead.

However, inflation is also exposed to other types of shock that can-

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17 The difference should not be exaggerated because to maximise the probability of inflation being inside the interval in the longer run, even central banks with a band target should aim for the mid-point in the event of a deviation.

18 More specifically, "flexible" inflation targeting implies that the central bank can assign some weight to the stabilisation of target variables other than inflation, in the first place the output or the unemployment gap but also interest rates. For an instructive review, see Svensson (2002).

19 Sveriges Riksbank, for example, has stated that there may be grounds for not striving to return inflation to the targeted level immediately after a sizeable shock. Deviations can be motivated by the macroeconomic costs that would otherwise be incurred due to unnecessary fluctuations in economic activity; see Heikensten (1999) and Sveriges Riksbank (1999).

20 According to Kuttner (2004), Norges Bank has shown the way among central banks in clarifying that monetary policy also attempts to stabilise the real economy. The Reserve Bank of Canada holds that the inflation target contributes to good growth, a more traditional central-bank view that Sveriges Riksbank also voiced when it announced the inflation target, see Sveriges Riksbank (1993).

21 This description of the transmission mechanism is a simplification because there are other channels, too. Moreover, time lags are difficult to measure and estimates vary with the methods as well as with the data. For a review, see Christiano, Eichenbaum & Evans (1999).

not be handled so straightforwardly as changes in demand. A negative supply shock – a sharp oil price rise, for example – can lead to the combination of rising inflation and a drop in output to below the potential level. Returning inflation rapidly to the targeted rate under such circumstances could entail unduly large and undesirable fluctuations in output, see Svensson (1997b, 1998) and Woodford (2004). This suggests that a central bank may want to attach some weight to output stabilisation as such, over and above what is directly related to the role of the output gap in the inflation forecast.[22]

The trade-off between stabilising inflation and output, respectively, can be specified in various ways; one is in terms of the central bank's objective function.

The trade-off between stabilising inflation and output, respectively, can be specified in various ways. The most attractive in theory would be to specify the central bank's objective function. Lars Svensson has recommended in a number of papers that the central bank should clarify the weight it attaches to real economic stability in relation to achieving the inflation target, see e.g. Svensson (2002). This could be done by publishing an objective function for the trade-off between the output gap and inflation. The central bank then sets the instrumental rate to minimise the deviations over time in inflation from its target and in output from its potential level. No such objective function has, in fact, been published to date by an inflation-targeting central bank. This probably has to do with the practical difficulties, particularly when monetary policy is decided by a collegial board, see Goodhart (2001) and Mishkin (2004). In the real world the economy is so complex that it could be hard to specify an appropriate objective function.[23]

An alternative would be for the central bank to publish monetary policy's reaction function.

An alternative would be for the central bank to publish monetary policy's reaction function, that is, an equation that relates the instrumental rate to a number of variables to which this rate reacts. From a theoretical standpoint, however, this is less attractive than an objective function. Specifying a realistic reaction function for monetary policy is even more difficult, for a number of reasons. Even with a relatively stylised model of the economy, the reaction function is liable to be rather complex because in principle it should include every factor that influences aggregate demand and aggregate supply.[24] Moreover, a reaction function is model-dependent and instead of being tied to a particular model, central banks normally prefer to base their forecasting work on several models of differ-

[22] In Rogoff's (1985) model, lower inflation due to less weight for stabilising employment leads to a higher variability in employment. Svensson (1997a) shows that this is not necessarily the case if the central bank's objective is specified as a contract with an explicit and low inflation target, an implicit employment target and an implicit weight for stabilising employment relative to stabilising inflation.

[23] According to Faust & Henderson (2004), the objective function can be rather complex and variable over time even in a fairly simple model of the economy.

[24] See e.g. Svensson (2003b).

ent types as well as on sector experts and subjective assessments.[25] No inflation-targeting central bank has published a monetary policy reaction function.

A third alternative is for the central bank to clarify what is a reasonable way of returning inflation to the target.

A third and more practical alternative is for the central bank to clarify what is a reasonable way of returning inflation to the targeted rate without generating unnecessary fluctuations in real economic activity. While the *control horizon* indicates how far ahead monetary policy is *capable* of affecting inflation, the targeting horizon indicates the time by which it is *desirable* that inflation is back on target. The *control horizon* is often said to be approximately one to two years because this is the interval in which an interest rate adjustment is considered to have most effect on prices in general.[26]

Five inflation-targeting central banks have an explicit targeting horizon.

Five inflation-targeting central banks have an explicit targeting horizon: Canada, Chile, New Zealand, Norway and Sweden (see Table 2). The *normal* targeting horizon is usually expressed as an interval, e.g. one to two years in Sweden, six to eight quarters in Canada and New Zealand and one to three years in Norway.[27] This form of target has the advantage

Table 2. Inflation report/Monetary policy report

	Frequency	Accountable for report	Explicit targeting horizon	Inflation forecast
Australia	4/year	Bank as a whole	No	Yes
Brazil	4/year	Monetary policy committee	After target deviation	Yes
Canada	2 + 2/year	Executive board	6–8 quarters	Yes
Chile	3/year	Executive board	8 quarters	Yes
Colombia	2/year	Executive board	No	Yes
Czech Republic	4/year	Executive board	No	Yes
Hungary	4/year	Staff	No	Yes
Iceland	4/year	Bank as a whole	After target deviation	Yes
Israel	2/year	Executive board and staff	After target deviation	Yes
Mexico	4/year	Bank as a whole	No	Yes
New Zealand	4/year	Governor	In practice 6–8 quarters	Yes
Norway	3/year	Governor and executive board	4–12 quarters	Yes
Peru	3/year	Bank as a whole	No	Yes
Philippines	4/year	Monetary policy committee	After target deviation	Yes
Poland	4/year	Staff	No	Yes
Republic of Korea	4/year	Monetary policy committee	No	Yes
South Africa	4/year	Staff	No	Yes
Sweden	4/year	Executive board	Normally 4–8 quarters	Yes
Thailand	4/year	Monetary policy committee	No	Yes
U.K.	4/year	Monetary policy committee	After target deviation	Yes

Sources: Central banks' inflation reports and Fracasso, Genberg & Wyplosz (2003).

[25] Svensson (2005) shows how a central bank can incorporate subjective judgements in model work and then choose the forecasts for the target variables that look good without specifying a reaction function.

[26] Leeper (2003) asserts, however, that the VAR literature does not unequivocally confirm one to two years as a control horizon.

[27] If the targeting horizon is longer than two years, this also affects the forecasting horizon, which needs to be longer that the targeting horizon. Leeper (2003) considers that a forecasting horizon of more than two years is also important for testing the consistency of model outcomes.

of serving as a rule of thumb for the central bank's ambition without the need to state in advance exactly how the bank will react to different shocks. The drawbacks of discretionary decision-making and inflation bias can then be avoided without relinquishing the possibility of stabilising the real economy, see Woodford (2004).

If a shock were to greatly increase the forecast rate of inflation, the central bank may want to bring inflation back more gradually and therefore extend the targeting horizon. The bank could admittedly use large interest rate hikes to bring inflation back inside the control horizon or the normal targeting horizon, but if it attaches weight to output stabilisation, this can be manifested by a slower return to the target, that is, the targeting horizon can be flexible.[28] This *flexible* targeting horizon is dependent on the weight the central bank attaches to stabilising output relative to stabilising inflation and to the magnitude of a particular shock, see Apel, Nessén, Söderström & Vredin (1999).

Working with a flexible targeting horizon for inflation is therefore in large measure tantamount to conducting monetary policy by making forecasts for both the output gap and inflation and then choosing a path for the instrumental rate that results in a suitable compromise between returning inflation to its target and minimising fluctuations in the output gap, see Svensson (2002), Batini & Haldane (1999) and Svensson (1999). Woodford (2004) has pointed out that this matches the requirements of an optimal monetary policy in connection with supply shocks in that it is along the path of inflation that a potential conflict exists between stabilising inflation and the output gap, respectively.[29]

A practical example of this is provided by Norges Bank (2004): "Norges Bank sets the interest rate with a view to stabilising inflation at the target within a reasonable time horizon, normally 1–3 years. The more precise horizon will depend on disturbances to which the economy is exposed and how they will affect the path for inflation and the real economy ahead."

Five central banks present an explicit targeting horizon only when inflation has clearly deviated from the target: Brazil, Philippines, Iceland, Israel and the United Kingdom. In other countries there is no explicit targeting horizon. In Australia this is because it is average inflation over an unspecified business cycle that is targeted. In practice, however, monetary policy is conducted in a similar manner in all countries in the sense that

Five other central banks present an explicit targeting horizon when inflation has clearly deviated from the target; in other countries there is no explicit targeting horizon.

[28] The Riksbank's clarification of monetary policy provides for such a flexible targeting horizon, see Sveriges Riksbank (1999).

[29] Faust & Henderson (2004) are critical about adjusting the targeting horizon for inflation out of consideration for the real economy and find it would be better to work with a clear objective function and minimise the variability in both inflation and the output gap.

inflation is stabilised in the medium run so as to avoid unnecessary fluctuations in employment and growth.[30]

Inflation reports promote understanding

There are several reasons why independent, inflation-targeting central banks should be transparent about the assessments behind monetary policy decisions, see e.g. Woodford (2004). A clear motivation of how the inflation target is to be met facilitates decisions by households and firm. It also makes monetary policy more understandable and permits accountability, which is important in a democracy. An open attitude to the basis for monetary policy probably also makes central-bank economists more concerned to produce sound assessments, which enhances efficiency. It is important, however, to strike a reasonable balance between unduly detailed information and the central components for achieving the inflation target. All in all, there are therefore grounds for regularly publishing reports that analyse the fundamental factors behind monetary policy decisions.

An inflation or a monetary policy report is published in every country where inflation is targeted.

An inflation report or a monetary policy report is published in every country where inflation is targeted; most central banks present such a report four times a year, others do so two or three times a year (see Table 2). The content of these reports is relatively similar. As a rule, there are accounts of the factors that influence the path of inflation, i.e., international economic and financial market developments, supply and demand in the real economy, transitory effects (e.g. tax changes) and inflation expectations. Faust & Henderson (2004) consider that the publication of inflation reports is a very valuable way of promoting the understanding of monetary policy and that this type of information about monetary policy, assembled in a single document, is not available in countries that do not target inflation.

Still, inflation reports do differ in a number of respects. In an evaluation of inflation reports in 19 inflation-targeting countries, Fracasso, Genberg & Wyplosz (2003) note fairly large differences in the extent to which they are informative about target trade-offs, inflation forecasts and the monetary policy rule system.[31] All of a year's inflation reports in New Zealand, Sweden and the United Kingdom are evaluated by Leeper (2003), who analyses the credibility of the inflation forecasts and what

[30] This includes Australia, see Debelle (1999).

[31] Fracasso, Genberg & Wyplosz (2003) did not study all the information in every inflation report over a year, neither did they look at all the press notices and monetary policy minutes that many central banks publish; this markedly affects the result of their evaluation. For a more descriptive account of the differences between the central banks' inflation reports, see Schmidt-Hebbel & Tapia (2002).

can be done with the aid of econometric models to improve the accounts of the current economic situation and the forecasts.

Below I shall discuss some of the most policy-relevant aspects that are analysed in the literature on central banks' inflation reports. They include the presence of inflation forecasts and assessments of uncertainty, as well as the assumptions made about the paths of interest and exchange rates.

Inflation forecasts motivate interest rate decisions

There are a number of reasons for the central bank to be transparent about its assessment of future inflation, see Svensson (1997b, 2002) and Geraats (2002). One important reason is that, due to the time lag between an interest rate adjustment and its impact on inflation, the inflation forecast plays a central part in the monetary policy decision. If inflation is expected to deviate from the target at the given horizon, monetary policy should react. Publishing the inflation forecast makes it is easier for the central bank to motivate its interest rate decision. The central bank may have more information than the private sector, so that publishing the forecasts can reduce uncertainty.[32]

Inflation forecasts are published by all inflation-targeting central banks.

Inflation forecasts are published by all inflation-targeting central banks (see Table 2). A number of the first central banks to adopt an inflation target have successively developed the information about their forecasts; the Riksbank is one of them, for example, see Berg, Jansson & Vredin (2004). Central banks in emerging-market countries, e.g. Brazil, have been able to learn from the pioneers and publish comprehensive inflation reports from the start.

Leeper (2003) finds it difficult to tell just how the inflation forecast that is presented in inflation reports has been produced because it is not based on a specific statistical model. However, while all inflation-targeting central banks use models of various kinds, experience has shown that the forecast can hardly be based on a single model of the economy. Sector experts and judgements of various kinds are also needed to obtain good forecasts. Most central banks work continuously to improve pedagogic aspects, econometric forecasting and simulation models. Central banks that publish their inflation forecasts face a number of challenges in the work of forecasting.

[32] Another advantage with published forecasts is that it is then more possible to call the central bank to account, see below.

Constant interest rate assumption – pros and cons

A common alternative is to publish inflation forecasts that assume an unchanged instrumental rate.

The first challenge concerns the interest rate assumption on which the forecast is based. While market observers are very interested in the interest rate adjustments that may lie ahead, the central bank is normally not prepared to be explicit about this because it can be misinterpreted as a binding commitment. A common alternative, therefore, is to publish inflation forecasts that assume an unchanged or constant instrumental rate; this is done by about two out of three of the central banks that publish inflation forecasts (see Table 3). There is a pedagogic advantage in starting from a constant instrumental rate: the monetary policy decision is made in the light of whether, given the current direction of monetary policy, inflation is expected to deviate from the target; there is then a clear motivation for an instrumental rate adjustment if forecast inflation is above or below the target.

At the same time, assuming a constant instrumental rate has the drawback of a rather small probability of this assumption holding throughout the forecast period. This has a number of consequences. Sector experts and modellers may have difficulty in producing assessments with this technical assumption. Sector experts use various types of household and business surveys, for instance, in which the responses are

Table 3. Confidence interval and forecasting assumptions

	Confidence interval inflation	Confidence interval GDP growth	Interest rate assumption	Exchange rate assumption
Australia	No	No	–	–
Brazil	Yes	Yes	Constant rate[1]	Constant rate[1]
Canada	No	No	–	–
Chile	Yes	Yes	Constant rate	Market-expected
Colombia	Yes	No	Endogenous	Endogenous
Czech Republic	Yes	Yes	Endogenous	Endogenous
Iceland	Yes	No	Constant rate	Constant rate
Israel	Yes	No	–	–
Hungary	Yes	No	Constant rate	Constant rate
Mexico	No	No	–	-
New Zealand	No	No	Endogenous	Endogenous
Norway	Yes	Yes	Market-expected	Market-expected
Peru	Yes	No	Constant rate	–
Philippines	Yes	No	Constant rate	PPP
Poland	Yes	No	Constant rate	Market-expected
Republic of Korea	Yes	No	Constant rate	–
South Africa	Yes	No	Constant rate	–
Sweden	Yes	No	Constant rate[2]	Endogenous
Thailand	Yes	Yes	Constant rate	Endogenous
U.K.	Yes	Yes	Market-expected	Average of UIP and random walk

[1] In Brazil the forecast is also presented assuming market-expected interest rates and exchange rates.
[2] As of March 2005 scenarios based on market-expected interest rates are also included.

Sources: Central banks' web sites and Fracasso, Genberg & Wyplosz (2003).

not conditioned on a constant interest rate. Neither is it easy to assume a constant monetary policy in an econometric model; moreover, the effect will depend on how this assumption is interpreted. Consequently, the published inflation forecast will not necessarily be the best possible forecast. This problem is accentuated when the instrumental rate is unusually far above or below its normal level.

Some central banks prefer other interest rate assumptions based on a path.

Some central banks therefore prefer other interest rate assumptions for their inflation forecasts. One alternative here is to start from a path for the interest rate that is consistent with inflation being on target at a given horizon. This can be done with an econometric model with monetary policy as an endogenous component. In many cases such models also have to be supplemented with some type of "judgement" for the monetary policy trade-off. Three inflation-targeting central banks that publish inflation forecasts present endogenous interest rate paths, namely those in Colombia, New Zealand and the Czech Republic. Publishing such interest rate paths has the advantage that as prices and wages are not fully flexible, expectations of future monetary policy have real economic effects. In more advanced models of monetary policy, it is the entire future path of short-term real interest rates that has consequences for consumption and investment, see e.g. Woodford (2003).

Another alternative is to start from the instrumental-rate expectations of market agents.

However, publishing interest rate paths can have the drawback of making the central bank's internal decision-making more difficult, see Mishkin (2004). Agreeing on a path for monetary policy that stretches several years into the future can be a problem, particularly when this is done by a collegial board. Another alternative, therefore, is to condition the inflation forecast on market agents' expectations of the future path of the instrumental rate. One approach to approximating the market's expected interest rate path is to use implied forward interest rates.[33] The Bank of England and Norges Bank publish projections conditioned on a path for official interest rates implied by market yields. From October 1999 until March 2003 the Inflation Report of Sveriges Riksbank contained boxes with estimates based on a survey of market expectations of the repo rate. As of March 2005 the Inflation Report will include scenarios, based on implied forward rates, with an extended forecast horizon (see Table 3).

[33] However, forward interest rates include maturity premiums and perhaps these should be taken into account when approximating the interest rate expectations of market agents.

Another way is to use survey data on the interest-rate expectations of market agents.

Another way is to use survey data on the interest-rate expectations of market agents. An advantage of this type of interest rate path is that it can be seen as a technical assumption that is more realistic than a constant instrumental rate without amounting to a central bank commitment. As shown by Bernanke & Woodford (1997), however, the strategy has the drawback that it may contribute to uncertainty if market agents assume that the central bank bases its decisions on the market's view and this leads to a vicious circle of market guesses and the central bank's interest-rate decisions. Consequently the central bank may have difficulty from time to time in refraining from adopting a position about such an interest rate path, particularly when it results in a forecast that deviates from the target.

Discussing a complete interest rate path can thus create new conditions for communicating monetary policy. Norges Bank demonstrated this in the summer of 2004 when, conditioned on a path for official interest rates implied by market yields, its published forecast pointed to inflation below the target. Two alternatives for easing monetary policy were discussed in the inflation report. One was to lower the short-term instrumental rate. The Bank chose the other, which was to communicate that it had grounds for keeping the interest rate at the current low level for longer than the market had counted on, see Norges Bank (2004). Does this type of communication mean that the central bank may also need to pick out the best possible interest rate path for fulfilling the inflation target? If so, it seems rather natural to also want to be transparent about this and publish such a path, which the Bank of New Zealand already does, for example. The Norwegian example shows that it is perfectly possible for the central bank to note that market expectations represent an unduly restrictive monetary policy without the need to present an alternative path.

Tactical forecasts?

Central banks that publish inflation forecasts are also liable to be criticised for presenting forecasts that tend to be close to the target or coloured by tactical considerations. Such criticism is not particularly relevant. On the contrary, it is quite reasonable that, given a credible inflation target, the forecast is fairly close to the target. For one thing, a credible target provides an anchor for inflation expectations. A target also seems to render the inflation process less persistent.[34] For another, as central banks adjust the instrumental rate whenever fundamental factors modify inflation

[34] In other words, future inflation becomes less dependent on past inflation, see page 41.

prospects, sizeable changes in the inflation forecast are seldom called for.[35]

Neither is the forecast likely to be conditioned by tactical considerations. In that it is published, outside observers are in a position to compare it with other forecasts and judge whether or not it is biased. Central banks might therefore also present the forecasts of other institutions in their inflation reports, as is done, for example, in Sweden, Thailand and the United Kingdom.

The publication of inflation forecasts enables people to judge whether or not the forecast is biased.

The challenge of uncertainty

The uncertainty inherent in all forecasting work is a greater challenge. Besides the instrumental rate's relatively uncertain impact on the demand situation and hence on inflation, there is the potential impact of factors the central bank cannot control. The latter include supply shocks on account of genuinely exogenous changes due to, for example, the weather, oil prices or technology. There are also international imbalances, geopolitical developments and other events with consequences that are very unpredictable. Finally, inflation may be affected by political decisions, particularly of a fiscal nature, either directly (indirect taxes) or after a time lag due to changes in aggregate demand. The best way for the central bank to deal with problems of this type is to make the prevailing uncertainty clear in some way.

The most common way is to publish a fan chart showing the confidence intervals for the inflation forecast. Roughly two out of three inflation-targeting central banks do this (see Table 3) and almost one in three also presents a fan chart for GDP growth. Moreover, a fan chart depicting the possibility of various future inflation outcomes indicates whether the balance of risks in the main scenario's inflation forecast is upside or downside. If upside risks are judged to predominate, the area above the main scenario is larger than the area underneath and vice versa. The main scenario normally represents the forecast mode, that is, the scenario that is judged to be most probable (this is done in, for example, the United Kingdom and Sweden), while monetary policy is more likely to be based on the path that represents the expected mean of future inflation. So if the upside risks are larger (smaller) than the downside risks, monetary policy will be based on a path for inflation that is higher (lower) than the main scenario.

Roughly two out of three inflation-targeting central banks present confidence intervals for their inflation forecasts.

[35] Inflation prospects may change quickly, however, in a clear cyclical upturn or slowdown, as well as in the event of a marked, exogenous inflation shock.

Svensson, Houg, Solheim & Steigum (2002) consider it would be more natural to use the expected mean of future inflation for the main scenario. It can be added that in the actual forecasting process the main scenario constitutes a very detailed assessment and when this scenario is produced, both sector and model experts may find it easier to condition it on the expected mean. The spectrum of risks is obtained iteratively and is normally less detailed.[36]

The Riksbank also publishes an indication of the degree of uncertainty in the assessment and this determines the width of the inflation fan chart two years ahead. Leeper (2003) has pointed out that the Riksbank sometimes gauges the uncertainty in its reports as more than normal but never as less than normal. This could be because in the period since the introduction of the new Executive Board, inflation has been exposed to unusually many sizeable shocks. It may also be the case that decision-makers always feel rather uncertain and are psychologically averse to the notion that uncertainty is below normal. Still, over a longer period these uncertainty assessments ought to average out as normal uncertainty. This suggests that in time there will be grounds for re-calibrating what is meant by normal uncertainty.

Exchange rate forecasts – genuinely uncertain

Another challenge when forecasting inflation concerns the exchange-rate assumption. Exchange rate forecasts are genuinely uncertain but even though they seldom hold, it is important to be clear about the assumptions behind them. This helps to make the inflation assessment in the report comprehensible.

Six central banks, including the Riksbank, use an exchange-rate assessment motivated by fundamentals.

In the short run the exchange rate moves in an arbitrary way, known as a random walk. This could justify the assumption of a constant exchange rate. In practice, however, that is done by only three of the central banks that disclose their exchange rate assumption (see Table 3). This is probably because, over a period of years, the exchange rate is affected by fundamental factors and taking these into account can make the exchange rate forecast more accurate than the assumption of a constant rate. Moreover, a path for the exchange rate is a more reasonable assumption in econometric models. Six central banks, including the Riksbank, use an exchange-rate assessment motivated by fundamentals (see Table 3).[37] Another common approach is to condition the projection for inflation on the development of exchange rates that the financial mar-

[36] For a suggested way of setting up an analysis of uncertainty, see Blix & Sellin (1999).

[37] If the instrumental rate is assumed to be constant in the forecast period, a correction may be needed when establishing the path of the exchange rate.

kets count on (in the forward market), though that poses the problem that this assumption may not be consistent with other assumptions in the forecast.[38]

Decision-making and accountability

Decision-making is an important aspect of monetary policy. The decisions of inflation-targeting central banks usually concern both the instrumental rate and the assessment of inflation.

There are arguments in favour of deciding monetary policy in a collegial board.

There are a couple of arguments to the effect that monetary policy should be decided by a collegial board, not by a single person. One stems from the need to balance different preferences. Members of a board can differ about, for example, the trade-off between stabilising inflation and the output gap, respectively. At the same time, central bank credibility needs to be maintained even when board members are replaced. Faust (1996) and Waller (1989) consider that this favours a committee whose members have different backgrounds and are replaced successively. The other argument concerns the importance of ensuring that decisions are made with broad competence that is the best available.

The Riksbank's monetary policy decisions are made collegially by an executive board with six members, of whom the chairman (the central bank governor) has the casting vote, see Berg & Lindberg (2001). Decisions by most other central banks are likewise made by a board or a committee but in a couple of cases, Israel and New Zealand, the interest rate is set by a single person, the governor (see Table 4).

In Sweden the executive board is also accountable for the inflation report and the inflation forecast, as is only natural since this is the basis for the monetary policy decisions. The central bank's management is likewise responsible for the inflation report in almost half of the other countries (see Table 4). An inflation forecast is also published in every case where the management is accountable for the inflation report.

Publishing inflation forecasts makes it more feasible to hold the central bank accountable.

An important advantage of publishing the forecasts is that it makes it more feasible to hold the central bank accountable. Current monetary policy can be evaluated as soon as the inflation forecast has been published and motivated. The general public and the political system can then judge whether the forecast is reasonable and monetary policy well balanced given the published forecast. An evaluation can also be made after some time when the outcome of inflation is available. This outcome can

[38] There are, moreover, central banks, especially those which do not publish any forecasts, that do not specify the exchange rate assumptions on which the assessment in the inflation report is based.

Table 4. Monetary policy meetings and minutes

	No. of members	Decision taken by:	Press notice	Minutes published
Australia	9	Consensus	Yes	No
Brazil	9	Vote[1]	Yes	Yes, after 8 days
Canada	6	Consensus	Yes	No
Chile	5	Vote[1]	Yes	Yes, after 12 weeks
Colombia	7	Vote	Yes	No
Czech Republic	7	Vote[1]	Press conference	Yes, after 11 days
Hungary	Maximum 6	Vote[1]	Yes	No
Iceland	3	Vote[2]	Yes	No
Israel	5	Governor	Yes	No
Mexico	5	Vote	Yes	No
Norway	7	Consensus	Yes	No
New Zealand	Varies	Governor	Speech by governor	No
Peru	7	Vote	Yes	No
Philippines	7	Vote	Yes	No
Poland	10	Vote	Press conference	Yes, after 6 weeks
Republic of Korea	7	Vote	Press conference	Yes, after 3 months
South Africa	8	Vote[1]	Press conference	No
Sweden	6	Vote[1]	Yes[3]	Yes, after 2 weeks
Thailand	7	Consensus	Press conference	No
U.K.	9	Vote[1]	Yes	Yes, after 2 weeks

[1] The Governor has the casting vote, reservations are published in the minutes.
[2] The monetary policy committee is an advisory body with no vote.
[3] For an interest rate adjustment there is also a press conference.

Sources: Central banks' web sites and Fracasso, Genberg & Wyplosz (2003).

be compared with the target and the forecasts that were published earlier.[39]

In countries where the interest rate is set by the central bank governor alone, it is the governor as a rule who is also accountable for the inflation report. In three countries (Hungary, Poland and South Africa), however, the report is the responsibility of the staff. The inflation forecast is published in these countries. Making the staff accountable for the forecast can serve to relieve the board of full responsibility for it and use it as just a part of the basis for monetary policy. This can have the advantage of providing more freedom when deciding monetary policy. The drawback is that should the board decide not to endorse the published forecast, uncertainty may arise about the grounds for the interest rate decision and accountability. There are also a number of countries where responsibility for the report rests with the bank as a whole or its management plus the staff.

A challenge for central banks with collegial decision-making is that those involved often disagree. Decisions are made on a majority vote in

[39] This is more complicated, however, if the forecast is based on an assumed constant instrumental rate.

about three out of four of the countries, including Sweden; in other countries with a collegial system, a consensus is required. In roughly one out of two of the countries where a vote is taken for interest rate decisions, the minutes of the meeting are also published and reservations against the decision are noted. The time lag before the minutes are published ranges from eight days to three months; the interval in Sweden is a fortnight. Publishing the minutes of monetary policy meetings has the advantage that it informs the market about the reasoning behind the decision. Moreover, the minutes can be used to accentuate the board members' individual accountability.

In most countries, including Sweden, decisions are made on a majority vote; in other countries a consensus is required.

In two out of three of the inflation-targeting countries the central bank is also held accountable in parliamentary hearings (see Table 5), as important aspect of the process of delegation in a democracy. In a third of the countries, if inflation deviates from the target, the central bank is required to submit a letter or a report explaining the causes of the deviation and how inflation is to be brought back on target.

All in all, in a majority of countries the introduction of an inflation target has entailed a major institutional change in the implementation of and accountability for monetary policy. The next step in the present analysis is to consider whether this institutional change has also affected economic developments in these countries.

Table 5. Accountability

	Hearing in parliament	Open letter or report when off target
Australia	Yes	No
Brazil	No	Yes
Canada	Yes	No
Chile	Yes	No
Colombia	Yes	No
Czech Republic	Yes	No
Hungary	Yes	No
Iceland	No	Yes
Israel	Yes	Yes
Mexico	Yes	No
New Zealand	Yes	Yes
Norway	Yes	Yes
Peru	No	No
Philippines	Yes	Yes
Poland	Yes	Yes
Republic of Korea	Yes	No
South Africa	No	No
Sweden	Yes	Yes
Thailand	No	No
U.K.	Yes	Yes

Sources: Truman (2003) and Heikensten (1999).

Economic effects of inflation targets

What are the effects of conducting monetary policy with an explicit target for inflation? The earliest inflation targets have now been implemented for between ten and fifteen years, so it is becoming possible to analyse the economic consequences of this practice. This is usually done by comparing developments in the inflation-targeting countries with a control group of countries without such a target. Economic theory holds that the introduction of an inflation target should primarily affect the path of inflation, its variability and inflation expectations. If the target enhances monetary policy's credibility, one would expect an effect on nominal variables such as inflation and inflation expectations. But as monetary policy does not influence either growth or employment in the longer run, the impact on the real economy should be less evident. Nevertheless, if inflation targeting does lower inflation and its variability, it is important to check whether or not this is achieved at the expense of greater fluctuations in the real economy. Has a reduction of inflation and its variability been accompanied by increased fluctuations in GDP growth?

Studies indicate that inflation is reduced in countries that adopt an inflation target.

A number of studies show that the introduction of an inflation target is followed by lower inflation, see Pétursson (2004)[40]. They find that, even after controlling for the global fall in inflation in the 1990s and the domestic business cycle, introducing an inflation target contributes to a reduction of the average rate of inflation by 2–3 percentage points. There is one study, however, where the reduction of inflation in inflation-targeting countries was found to be no greater than in a control group of countries without such a target, see Ball & Sheridan (2004). The reason for this result, according to the authors, is that before a target was adopted, inflation in the countries that did so had been higher than in the control group and this introduced a bias in the econometric estimation, a regression towards the mean. With an adjustment for this (the inclusion of earlier inflation on the right-hand side), the study found little evidence that inflation outcomes had become lower in inflation-targeting countries. However, these results raise two problems. One is that they permit the alternative interpretation that the inflation target did in fact bring inflation down in the targeting countries but that this is reflected in the adjusted estimation by the coefficient in front of earlier inflation, see Gertler (2003).[41] The other problem is that the analysis by Ball & Sheridan (2004) is confined to inflation-targeting industrialised countries and in these

[40] See also Corbo, Landerretche & Schmidt-Hebbel (2002), Neumann & von Hagen (2002) and Truman (2003).

[41] Ball & Sheridan (2004) seem to consider that inflation returns to a low level by itself, irrespective of the direction of monetary policy or the monetary policy regime.

countries inflation had usually been brought down a good deal before the introduction of an inflation target.

The same adjusted equation has been estimated by Pétursson (2004) for all inflation-targeting countries, including emerging-market countries. He finds that, if other factors and non-targeting countries are controlled for, the introduction of a target does lead to lower inflation but mainly in emerging-market countries. It can be concluded that the adoption of an inflation target does seem to have lowered the average rate of inflation in all targeting countries but that this effect is most pronounced in emerging-markets. At the same time, there are measurement problems which make it difficult to be more specific about the degree of this reduction, particularly in industrialised countries.

Studies indicate that inflation has become less persistent in countries that target it.

A number of studies also suggest that inflation has become less persistent in countries where it is targeted, see Levin, Natalucci & Piger (2004)[42]. Less persistence makes future inflation less dependent on inflation in earlier periods. After a disturbance that drives inflation up or down, in targeting countries inflation moves back towards the target.

A central role in this process is played by inflation expectations. The announcement of inflation targets has also been followed by lower inflation expectations, see Johnson (2002). This fall in targeting countries was greater than in a control group without a target. Moreover, inflation expectations correlate with earlier inflation in a control group but not in countries that target inflation, see Levin, Natalucci & Piger (2004). A study of survey data suggests that in Sweden, the inflation target has helped to anchor inflation expectations, whereas the corresponding effect could not be detected in the United States, see Bryan & Palmqvist (2004). In addition, errors in forecasting future inflation are reduced in inflation-targeting countries, see Corbo, Landerretche & Schmidt-Hebbel (2002). Taken together, these results are highly important in that they support the idea that adopting an explicit inflation target plays a role in anchoring long-run inflation expectations. The policy of targeting inflation can therefore be seen as a regime that enhances the credibility of combating inflation.

Studies indicate that after the adoption of a target, inflation has been less variable.

A number of studies indicate that after the introduction of a target, the variability of inflation has also been lower, see Jonas & Mishkin (2003) and Pétursson (2004). This is hardly surprising, since inflation normally varies less when it is lower. Some studies do in fact also indicate that inflation's variability has decreased to the extent the lower inflation motivates,

[42] See also Pétursson (2004), Kuttner & Posen (1999), Siklos (1999), Kuttner & Posen (2001) and Corbo, Landerretche & Schmidt-Hebbel (2002).

see Johnson (2002) and Truman (2003).[43] Thus, the introduction of a target can be said to have contributed to both lower inflation and lower inflation expectations, which in turn has helped to make inflation less variable.

This brings us to the question of whether this increased credibility for anchoring long-run inflation expectations has been achieved at the expense of greater fluctuations in real economic activity. The empirical findings do not point to greater variability in GDP growth. According to Levin, Natalucci & Piger (2004), for example, less persistent inflation in the inflation-targeting countries has not been accompanied by more volatile growth. Pétursson (2004) finds that the adoption of an inflation target has actually led to improved growth in emerging-market countries, though in industrialised countries there is no impact on growth. The results in Corbo, Landerretche & Schmidt-Hebbel (2002) suggest that after the adoption of an inflation target, manufacturing output in these countries has become less volatile and the output gap less sensitive to disturbances in inflation.

All in all, the available studies indicate that in the countries that have adopted a target, inflation has become lower and inflation expectations more clearly anchored to the target. The consequences for growth are less clear-cut, as is also expected. But there is no support for inflation-targeting countries having lower or more volatile growth.

Conclusions

Inflation-targeting has proved to be a successful policy in the countries concerned.

In the countries that have adopted an inflation target, the policy has proved successful. An inflation target clarifies what a central bank can achieve – price stability – and what it cannot – boosting average growth or employment. Central banks that target inflation are transparent about their assessments, which helps to anchor inflation expectations to the target. A numerical inflation target also makes it easier to hold the central bank accountable for its monetary policy. All in all, inflation-targeting policy is a rule-based regime that has established greater credibility for low inflation and low inflation expectations without leading to increased volatility in growth or employment.

All inflation-targeting central banks are transparent about their assessments of future inflation and publish forward-looking reports of high quality. Here, however, there are some interesting differences.

Relatively few inflation-targeting central banks make it clear *whether*

[43] Levin, Natalucci & Piger (2004) find, however, that inflation is more volatile in inflation-targeting countries than in a control group but that this is explained by the former being exposed to larger inflation shocks.

or *in what way* monetary policy decisions take real economic developments into account. In view of the difficulty in specifying an explicit objective function for the trade-off between the inflation target and the fluctuations in growth or employment, some central banks have begun to be more explicit about paths for future inflation and growth, with a discussion of the considerations behind the judgement that is deemed most likely to lead to the target.

Roughly one in two of the central banks that publish inflation reports base their interest rate assumption on a constant instrument rate. This assumption has been found to carry a pedagogic advantage for a monetary policy decision in that it clarifies the expected outlook for inflation, given the current direction of monetary policy.[44] Still, counting on a constant instrument rate throughout the forecast period may be unrealistic. Some central banks have therefore introduced other interest rate assumptions when forecasting inflation. The Bank of England and Norges Bank condition their projections on an interest rate path derived from implied forward interest rates. As of March 2005, Sveriges Riksbank will supplement the assumption of an unchanged repo rate with long-term forecasts based on implied forward rates. The Reserve Bank of New Zealand publishes an endogenous interest rate path that leads to target fulfilment, a practice that is facilitated by the interest rate decision being made by a single person, the governor. In this way, several inflation targeting central banks have created new conditions for the monetary policy communication of current and future interest rate decisions.

[44] This definition of the current direction of monetary policy is not self-evident; if the current direction is defined instead as the expected path of interest rates, the pedagogic advantage of assuming a constant interest rate is less clear.

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The "new economy" and productivity in Sweden in the 2000s

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In the late 1990s there was an upswing in productivity growth in Sweden that came to be associated in the public debate with the notion of a "new economy" and information technology (IT).[1] When the IT bubble burst and a global economic slowdown began in 2001, the era of the "new economy" seemed to be over. Apart from a brief dip, however, productivity growth has remained strong in recent years, to the surprise of many observers. So what are the conceivable factors behind this stronger growth and how long is it likely to last? When answering these questions it is relevant to consider the parallels between productivity growth in Sweden and the United States, where growth has also been unexpectedly strong in recent years.[2] A comparison in this respect could be of interest to identify common factors. One such factor is clearly the influence of information technology, both for investment and output in the IT sector and, perhaps above all most recently, for IT-induced organisational change.

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The "new economy"

"New economy" is a concept associated with higher productivity growth.

In the late 1990s the US economy had a long period when growth and employment were high and inflation was low. In media and the public debate this was associated with the growing importance of information technology, above all the internet. The concept of "the new economy" was coined and could denote anything from a new period of prosperity to

1 Sometimes also referred to as ICT (information and communication technology).

2 A number of recent articles have considered questions to do with differences in productivity between the United States and Europe, the size of the gap and possible explanations for it. Due to country differences in methods for collecting statistics, particularly on IT, comparable data are difficult to obtain for analyses of this type. Here we have not attempted to homogenise the statistics; the patterns in the United States and Sweden are compared mainly in terms of the national statistics in each case. In order to delimit the account, comparisons and parallels with countries other than the United States and Sweden are made only in passing. For comparisons with a larger sample of countries, including attempts to homogenise the statistics, see e.g. van Ark, Inklaar & McGuckin (2003), Gordon (2004), Blanchard (2004), IMF (2004) and Jorgenson (2003).

an entirely new era that suspended traditional economic relationships. Among economists the term "new economy" came to be linked with higher productivity growth than in earlier decades, thereby accounting for the combination of higher growth and moderate inflation. For them, the relevant question was whether this stronger productivity was just a transitory reflection of a long boom, unsustainable investment growth and the turn of the millennium, or something more permanent. Did it relate to IT production alone or had the increasingly intensive use of IT enhanced the performance of the US economy as a whole?

In Sweden, like the USA, productivity and IT use in the 1990s were higher than in the larger European economies.

The strong US trend in the 1990s was soon being compared with the simultaneous slackening of productivity growth in the larger European economies. Along with Finland and Ireland in particular, Sweden was then seen as an intriguing European exception. Like the United States, Sweden had higher productivity growth and higher IT use, as well as an expanding IT sector that included the mobile phone giant Ericsson and its suppliers plus what were then regarded as extremely promising internet companies. Did this signify a Swedish "new economy"? In Sweden's case, however, the enhanced growth had a rather prosaic explanation: the most profound post-war crisis in 1991–93 had led to a rapid restructuring of a number of industries and left a great deal of unutilised resources.

From 2000 to 2001 the debate swung as stock markets plunged around the world and IT investment was sharply cut. The terrorist attacks on 11 September 2001 then accentuated the slowdown. This discredited the "new economy" concept in so far as it had been used to motivate unrealistic stock market predictions and unreasonably high IT investment that had failed to deliver the expected yield. Growth dropped in the United States and unemployment rose; the tendencies were clearest in what had recently been such a flourishing IT industry. Sweden experienced a marked recession and Ericsson suffered severely from sluggish investment in infrastructure for mobile telephony.

However, the productivity slowdown did not last long. In the United States, productivity growth slackened briefly and then picked up again, so that in the following years it was actually even higher than in the late 1990s. In time this generated a new debate there about jobless growth. Instead of generating more jobs, the economic upswing was characterised by higher labour productivity, so employment took longer to recover than in earlier upturns. Once again, Sweden seemed to follow the American pattern, at least in certain respects. The crisis in the Swedish IT sector – mobile phone telephony – did not result in a lengthy fall in productivity growth; here, too, the trend turned upwards in 2002–04.

The vigorous recovery has helped to make the hypothesis of higher trend long-term productivity growth increasingly accepted on both sides

The hypothesis that long-term productivity growth has moved up is being increasingly accepted on both sides of the Atlantic.

of the Atlantic. Compared with earlier decades, average productivity growth has now been higher for a long period that includes business ups as well as downs. So it can hardly be dismissed as a purely cyclical phenomenon. Moreover, the severe shock to the IT sector makes it increasingly difficult to see the high productivity as solely a feature of IT production. In the following we discuss conceivable explanations for the strong productivity growth in Sweden, both in the late 1990s and most recently in the 2000s. Are there any parallels with developments in the United States and is it reasonable to believe that average productivity growth will continue to be higher than before?

We deliberately conduct the analysis at a comparatively simple technical level in the hope that it will be transparent, though without this making the results less interesting. When demonstrating the importance of capital growth and production technology, we make do with various standard conventions for decomposing changes in labour productivity. We look in particular at the importance of IT both for the output of IT goods (primarily telecom products in Sweden) and as regards the use of these IT goods. We also discuss various factors, for example measurement problems, that can lead to erroneous conclusions.

A cyclical or a structural improvement?

When considering the strong productivity growth in both the late 1990s and the early 2000s it is natural to ask whether it is primarily a cyclical phenomenon rather than a consequence of more long-term, structural factors. One explanation for productivity's co-variation with the business cycle lies in factor utilisation. A common phenomenon here is labour hoarding.[3] In that recruitment and discharge tend to entail direct and indirect costs (for induction, severance pay, etc.), in a slowdown firms may find it reasonable to maintain a somewhat larger labour force than they need to cope with the lower demand. Labour is then used less intensively and output per hours worked declines. When demand picks up, the same labour force is available for more intensive use without increasing the total number of hours worked: labour productivity rises.

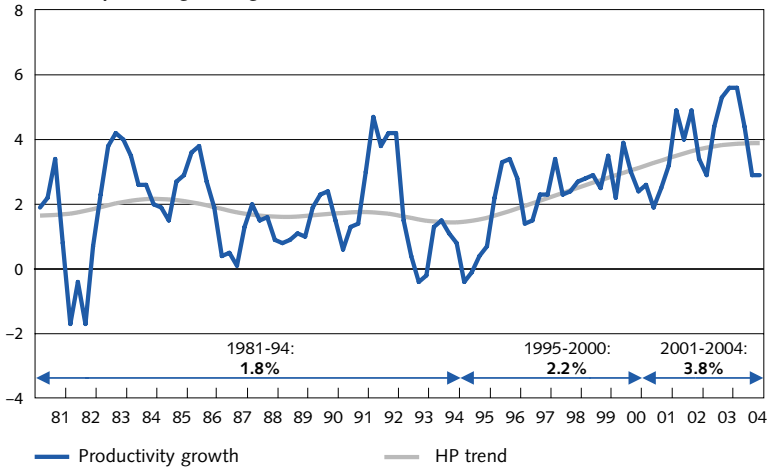
In view of this pro-cyclical pattern, the initial years of higher productivity growth after 1995 in the United States were commonly interpreted as being largely a cyclical phenomenon,[4] though the boom was unusually long-lasting, 1994–2001.[5] In the subsequent slowdown, however, productivity growth in annual terms did weaken for two quarters but then

[3] See e.g. Björklund et al. (2000).
[4] Gordon (1998).
[5] According to business-cycle dating by the National Bureau of Economic Research (NBER).

picked up again to levels that were higher than in the late 1990s. Productivity growth's strong trend throughout the business cycle in the United States has led more and more observers to believe that it cannot be just a cyclical phenomenon. Figure 1 shows corporate sector productivity growth in the United States from 1981 to 2004 together with an estimation of the trend using a Hodrick-Prescott filter.[6] Measured in this simple way, trend productivity in the United States showed an appreciable increase in 1995–2000, followed by some further acceleration.[7] In any event, it does seem to be clear that, compared with the preceding decade, in the period 1995–2004 there has been a persistent non-cyclical increase.

Strong productivity growth throughout the business cycle in the United States has been seen as being more than a purely cyclical phenomenon.

Figure 1. USA: corporate sector productivity 1981 Q1-2004 Q4
Annual percentage change



Sources: Statistics Sweden and own calculations.

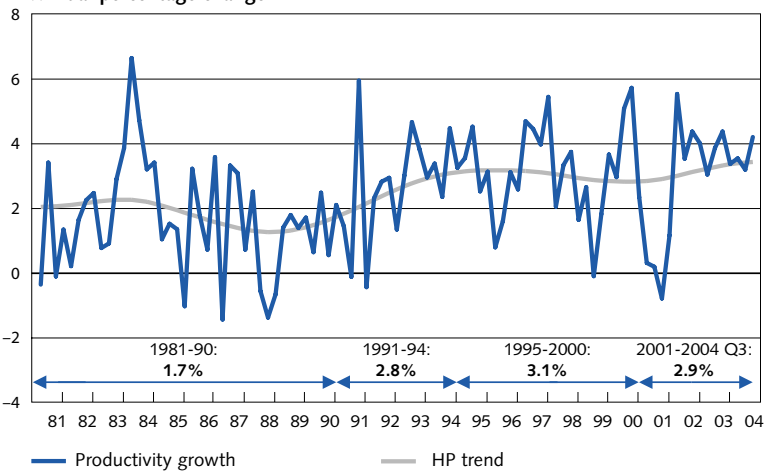
The corresponding development in Sweden, shown in Figure 2, follows a somewhat different pattern. During the crisis in the early 1990s a sharp drop in productivity was followed by a prompt recovery that may have been partly cyclical and partly a consequence of the major structural changes within and between industries as the crisis eliminated firms with low productivity and resources were redistributed to firms in more efficient industries. But instead of falling back again after the quick recovery during the crisis, productivity remained at a high level. Calculations by the Swedish National Institute of Economic Research[8] show that this clear improvement in productivity growth's long-term component came from

Productivity growth in Sweden has risen after the crisis in the early 1990s and remained on a higher level.

6 Hodrick & Prescott (1997).
7 Note, however, that the characteristics of an HP filter call for a cautious interpretation of the trend at the beginning and end of the period in question.
8 Konjunkturinstitutet (2004).

manufacturing as well as services industries. In the years after the slowdown in 2000–01, a sizeable proportion of the increased productivity was probably of a cyclical nature but the trend for 2000–04 seems to have been about as high as in the late 1990s.

Figure 2. Sweden: corporate sector productivity 1981 Q1-2004 Q3
Annual percentage change



Sources: Statistics Sweden and own calculations.

If it is the case that much of the improvement in productivity growth represents a more permanent, non-cyclical development, what are the conceivable explanations? We shall begin by focusing on the factor that has recently attracted most attention, namely the impact of information technology.

Information technology as an explanatory factor

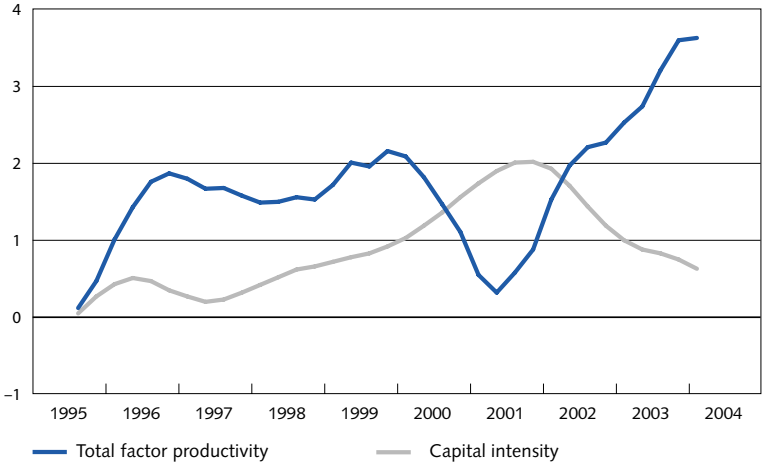
Information technology stands for more than just computers and their programmes. It constitutes an entire sphere of developments in interacting technologies, involving basic components such as transistors and microprocessors as well as lasers, fibre optics, satellite technology and magnetic storage, to mention only some examples. Official data are liable to be misleading in that "traditional" capital, forest machinery for example, can have as much IT, in the form of software and microprocessors, as ordinary office equipment. Ideally, therefore, the importance of IT should be measured in terms of all these components in manufacturing as well as services. In practice the analysis is limited by the categorization in official statistics. As there is no specific IT sector in the national accounts, the lit-

erature contains a variety of definitions.[9] Instead of constructing such an aggregated measure, we have made do with a study of a number of relevant sectors, above all the production of computers and software in the United States and of telecom products in Sweden.[10] In the case of investment in different IT components, we have been restricted to the official statistics in this field, mainly computers and their peripheral equipment (hardware) and various forms of computer programmes (software).

A common initial step when considering IT's impact on labour productivity (output per hours worked) is to use growth accounting to separate effects of changes in the capital intensity of production from those of advances in technology. The component of labour productivity that represents increased output due to a larger supply of physical capital (capital intensity) is identified first and the residual, known as total factor productivity (TFP), is usually attributed to improvements in technology and organisation.[11] This decomposition is shown for the United States and Sweden in Figures 3 and 4.

One approach to analysing IT's impact on labour productivity involves separating effects of changes in capital inputs from those of technology.

Figure 3. USA: total capital productivity and capital intensity 1995 Q3-2004 Q1
Annual percentage change, five-quarter moving average



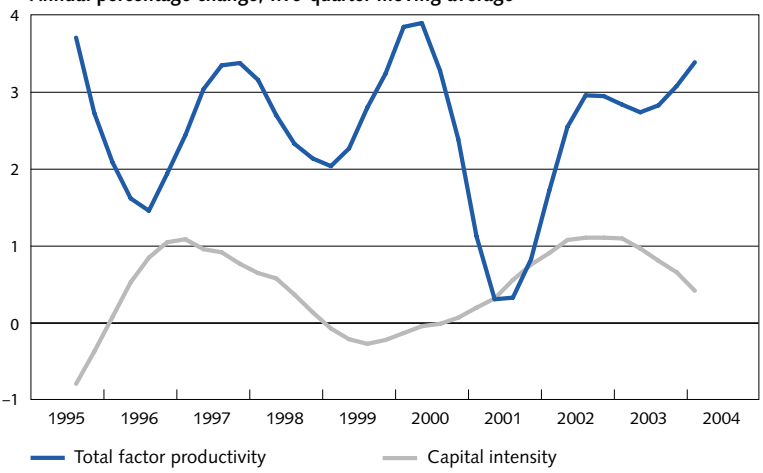
Sources: OECD and own calculations.

[9] For detailed definitions see e.g. OECD (2002) or Statistics Denmark et al. (2001).

[10] More precisely, sector 32 (Swedish Standard Industrial Classification 92): Industry for radio, television and communication equipment and apparatus.

[11] The TFP data presented here have been calculated in the simplest and most standardised way. The method is described in detail in e.g. OECD (2001a). Briefly, the calculations start from a production function using hours and capital stocks as inputs; TFP is then derived from a measure of output as the change in output that is not explained by changes in capital and labour. TFP then reflects the effects of new technology, better organisations etc. In practice, however, this component will also include effects of, for example, the utilisation of production factors, which shows a clear cyclical pattern. Measurement errors will also be included. A further complication is that the calculations assume constant returns to scale. For calculations that also allow for this, see e.g. Carlsson (2003).

Figure 4. Sweden: total capital productivity and capital intensity 1995 Q3-2004 Q1
Annual percentage change, five-quarter moving average



Sources: OECD and own calculations.

Another feature of the strong growth of US productivity in the second half of the 1990s was that TFP growth was also higher for a longer period.

The strong growth of US productivity in the second half of the 1990s included both a very high rate of investment (around 8 per cent a year on average), which raised capital intensity, and TFP growth that up to the end of 1999 was higher and also remained high for a longer period of time than in earlier upswings. During 2001 investment came to an abrupt halt. Capital intensity fell back sharply but productivity was still strong as a result of some further increase in TFP.

In Sweden, investment had been strong after the crisis in the early 1990s but slackened during the slowdown of 1996–97 and likewise came to a halt in the early 2000s. This meant that capital intensity did not rise as steadily as in the United States and instead it was other factors, reflected in TFP, that accounted for the major part of productivity growth in the second half of the 1990s. TFP in Sweden has remained strong in the 2000s.

What are the links to IT? In very simple terms there are three conceivable effects:

- *The production of IT goods*, not least IT capital goods, has increased considerably, with rapidly rising productivity leading to a major contribution to overall productivity.

The combination of new technology in the IT sector and an increasingly efficient production of IT capital goods with falling prices has provided incentives for increased IT investment in other industries. This in turn can have two effects:

- A direct effect when investment in IT capital boosts the amount of capital per hours worked in production – *increased capital intensity*.
- An indirect effect when the higher proportion of IT capital paves the way in turn for more *efficient methods of production*, new ways of organising firms, new labour know-how and a more efficient dispersion of information in society.

IT PRODUCTION

Between 20 and 40 per cent of TFP growth in the United States in 1995–2002 is considered to have been a result of TFP improvements in the IT sector.

The United States is the world leader in the production of both hardware and software, with an IT sector that contributed almost 9 per cent of GDP in 2002. According to studies in the late 1990s, the greater part of TFP growth in the United States had occurred in IT production.[12] The implication was that the notion of a "new economy" had to do above all with the production of new IT goods such as computers, their peripheral equipment and software. Subsequent studies suggested, however, that the role of IT production was less dominant, particularly when the IT sector declined in 2001–03 and contributed less and less to the persistently high productivity growth. More recently, TFP growth in the IT sector have been estimated to have accounted for 20–40 per cent of TFP growth in the overall economy 1995–2002.[13] The calculations in Jorgenson, Ho & Stiroh (2004), for example, indicate that IT production generated 35 per cent of the increase in TFP growth in 1995–2003 compared with 1973–95.

In Sweden, in contrast to the United States, the production of computers, peripheral equipment and software is a relatively small item. Figures for 2003 show that hardware made up less than 0.2 per cent of corporate sector output or of hours worked. The discussion about IT production has focused instead on mobile phone telephony. Ericsson is one of the world's largest manufacturers of mobile phone telephony infrastructure and for a long time was also a leading mobile phone producer. The aggregate telecommunications product industry also includes many suppliers and collaborators with Ericsson and other mobile phone producers. This industry's share of total corporate sector hours worked rose from just over 1 per cent in 1993 to 1.7 per cent in 2000. However, the aggregate telecommunications product sector has never been as prominent in the Swedish economy as, for example, Nokia has in Finland.[14]

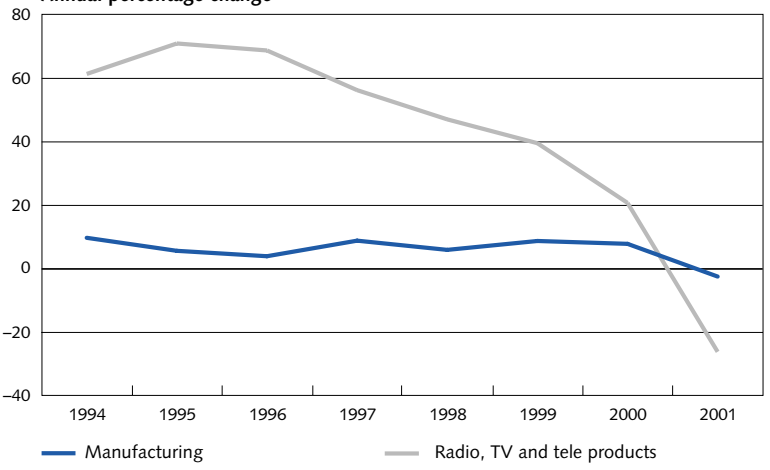
In the national accounts, productivity growth in Sweden 1994–2000 was highest in the telecommunications product sector, where it averaged around 52 per cent (see Figure 5). This represented a major contribution

[12] Gordon (2000) and Oliner & Sichel (2000; 2002).
[13] Jorgenson (2003) and Council of Economic Advisers (2003).
[14] Paija (2001).

Productivity growth in Sweden 1994–2000 was highest in the telecommunications product sector, with a major contribution to overall productivity growth.

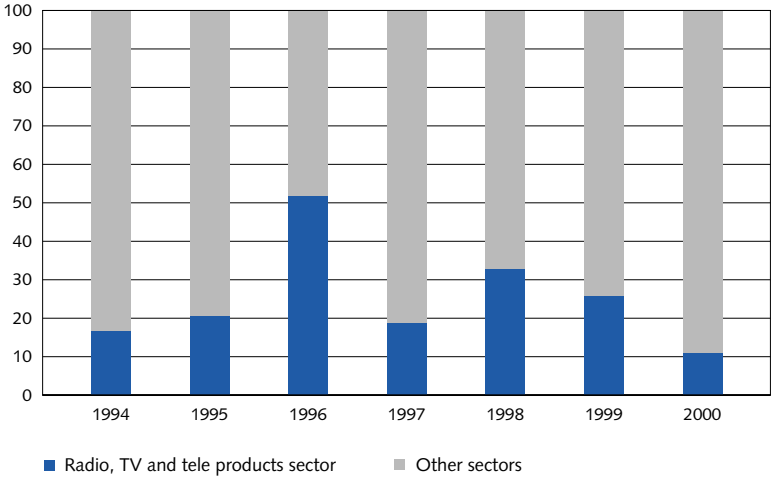
to overall productivity growth. A simple shift-share analysis of productivity data, which approximates the telecommunications product sector's contribution to total corporate sector productivity growth, shows that in 1994–2000 this contribution averaged roughly a quarter of the total (see Figure 6).[15] These calculations accordingly indicate that a large part of the increase in productivity growth in the Swedish economy in 1994–1999

Figure 5. Productivity in manufacturing and the radio, TV and tele products sector
Annual percentage change



Sources: Statistics Sweden and own calculations.

Figure 6. Contribution to corporate sector productivity growth from the radio, TV and tele products sector and from other sectors (shift-share analysis)
Per cent



Sources: Statistics Sweden and own calculations.

[15] See e.g. van Ark (2001). The contribution in the present case is the intra-component in the shift-share analysis, which stands for the contribution to total corporate sector productivity growth that comes from separate industries' *internal* productivity growth. Productivity growth in each industry is weighted with that industry's share of the previous year's total hours worked. See also the analysis in Lind (2003).

unquestionably came from telecom products. It was in this period that GSM standards for mobile telephony were established, with Ericsson as one of the pioneers.

However, assessing the time path of productivity in individual industries is not a simple matter and the significance of the telecommunications product sector for the overall increase in productivity has recently been debated. The basic problem lies in making price comparisons over time in industries where technology is changing rapidly. While prices have not risen much for either mobile phones or radio base stations for mobile telephony, their performance has been greatly improved. In order to compute volume changes in the manufacture of telecommunications products, Statistics Sweden constructs price indexes that reflect such changes in performance.[16] This is done in close collaboration with the producers, not least Ericsson, on the grounds that such comparisons require detailed knowledge of the products. Giving producers a major role in the assessment of their own productivity requires that the information they provide is reasonably objective. Comparing the performance of different generations of computers (the usual focus in studies of US productivity) encounters problems but is most probably easier than following changes in the quality of integrated national mobile telephony systems (including their radio base stations, software, maintenance and transfer of knowledge) and also specifying whether a particular value has been added in Sweden or abroad. As volume changes in telecommunications products affect the calculation of total productivity in the economy, all this leads to uncertainty about at least a part of the aggregated productivity growth.[17]

From 2001 to 2003 the mobile phone sector's contribution to Swedish productivity growth was modest.

Still, it is fairly clear that from 2001 to 2003 the mobile phone sector's contribution to Swedish productivity growth was modest. The stock-market fall in 2000–01 was accompanied by a drastic drop in telecom investment as many operators judged that they had plenty of unutilised capacity and plans for the third generation of mobile telephony (3G) were postponed. The inflow of telecommunications product orders plummeted and problems with profitability were such that for a time the telecommunication product sector's value-added at current prices was negative, making it difficult to interpret the picture at constant prices and thereby calculating productivity. The conclusion, nevertheless, is that productivity's favourable development in Sweden from 2001 to 2003 did *not* stem from

[16] The method mainly used by Statistics Sweden for mobile phones and radio base stations for mobile telephony is "matched model", which aims as far as possible to identify products with equivalent or overlapping contents.

[17] Edqvist (2004a, b) considers that productivity in the Swedish telecommunications product industry and thereby aggregated productivity were not as strong as the national accounts suggest, partly owing to shortcomings in national accounts deflators. See Haglund & Svensson (2004) and http://www.scb.se/statistik/NR/NR0102/2003A01/edquist5.doc for Statistics Sweden's comments on this criticism.

the manufacture of telecommunications products, though during 2004 some recovery in this industry has probably helped to improve productivity.[18]

INCREASING THE CAPITAL STOCK THROUGH IT INVESTMENT

Over two-thirds of the increase in the capital stock per hours worked in 1995–2001 in the United States came from investment in computers and software.

The improvement in US productivity growth in the late 1990s was partly driven, as mentioned earlier, by a strong investment boom. This seems to have resulted in a growing share for IT capital. Various calculations indicate that over two-thirds of the increase in the US capital stock per hours worked in 1995–2001 came from investment in computers and software.[19] One cause of IT's leading role for investment was that IT capital had become cheaper than other capital and its share of total capital was therefore expanded. Calculations by Jorgenson (2004) indicate that while the price of IT capital in the United States fell almost 12 per cent a year from 1995 to 2002, the price of other forms of capital was virtually unchanged.

Fewer calculations are available on the importance of IT capital in Sweden. A basic problem here is that, in contrast to the United States, Sweden has no direct information from firms about the decomposition of machinery investment into hardware and software. What does exist is statistics on imports and domestic production of hardware and software, plus a business survey, terminated in 1995, with information about investments in different categories of capital. On this basis, Statistics Sweden has constructed estimates of investments in software and hardware for the total corporate sector and, with some uncertainty, for separate industries in the period 1995–2002. The results have been used in attempts to elucidate the role of IT capital for investment in 1995–2000 as well as for productivity growth.[20]

Capital intensity in Sweden rose for IT capital 1994–2000 but fell for other types of capital.

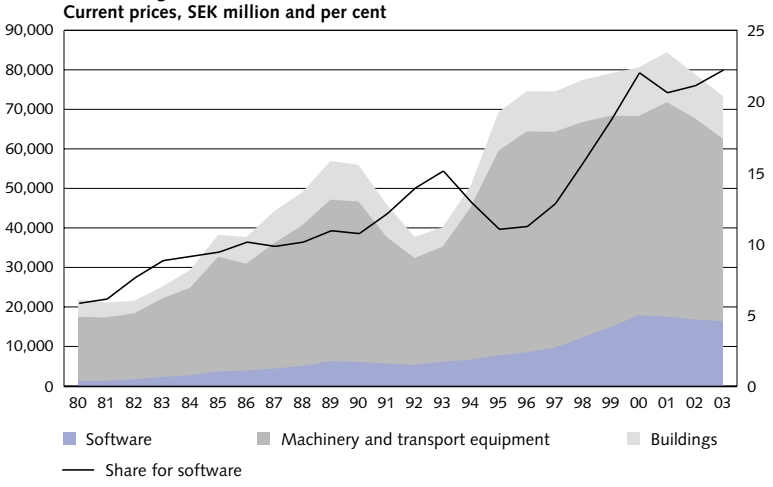
A general observation is that compared with the United States, capital intensity in Sweden was much lower in the late 1990s and did not clearly pick up until the beginning of the 2000s. In other words, investment growth did not outstrip the labour input in hours. It is interesting to note, however, that according to Forsling & Lindström (2004), capital intensity rose for IT capital 1994–2000 but fell for other types of capital. Their calculations indicate that the intensity of IT capital contributed about 0.8 percentage points to productivity growth 1994–2000, while the contribution from other types of capital intensity was close to zero. Moreover, data at current prices show a growing proportion of software

[18] See Isaksson (2004).
[19] Council of Economic Advisers (2003) and Jorgenson, Ho & Stiroh (2003).
[20] See Lindström (2003) and Forsling & Lindström (2004).

in manufacturing investment (see Figure 7). An international comparison from the OECD shows that IT capital's investment share grew rapidly in Sweden (see Figure 8).

However, IT-capital comparisons between Sweden, other European countries and the United States are not a simple matter. One of the chal-

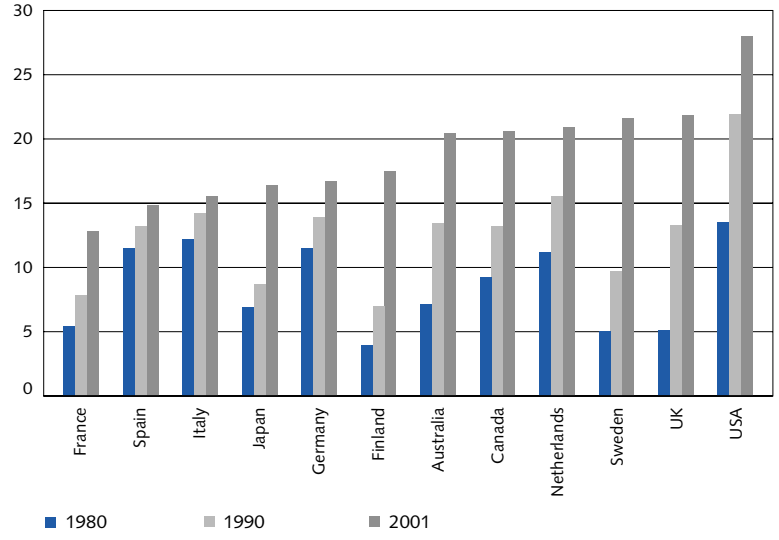
Figure 7. Decomposition of manufacturing investment (left scale) and share for software (right scale) 1980-2003
Current prices, SEK million and per cent



Note. Including mineral prospecting prior to 1933.

Sources: Statistics Sweden and own calculations.

Figure 8. IT investment as a share of total investment in 1980, 1990 and 2001 in selected countries
Per cent



Note. Total investment does not include residential construction.

Source: OECD.

lenges, mentioned above, for producers of statistics concerns the construction of price indexes that allow for the rapid improvements in performance that have characterised the IT sector and continue to do so. If the price of a computer or a programme has fallen at the same time as the IT performance of these products has been improved (greater computation capacity, for example), the volume of IT capital per invested dollar will rise for both these reasons.

The productivity gap between the United States (probably also Sweden) and certain EU countries may be smaller than the official figures imply.

The methods for calculating these price indexes for computers and software differ to some extent between Sweden and the United States, which in itself leads to marginal discrepancies in productivity.[21] The measurement differences are greater when it comes to a number of European countries. Germany and the UK use other types of price index and treat a smaller proportion of software as investment than do Sweden and the United States. This leads to less IT capital at the same time as a larger share of IT expenditure is treated as consumption, which means that productivity growth as measured in these European countries is some tenths of a percentage point lower than figures for the United States and Sweden. Studies (in which Sweden was not included) aiming to summarise the consequences of the differences in the treatment of hardware and software investment have found that the figures for European countries understate capital intensity by more than one third compared with the United States. Thus, the productivity gap between the United States and the largest EU countries (probably also between Sweden and some of its European neighbours) is somewhat smaller than the official figures imply.[22] Even so, Sweden and the United States, along with Finland and Australia, for instance, appear to be countries where large IT investment has played a particularly important role.

A lagged impact of the previously massive IT investments could help to explain why productivity growth has remained high after 2000–01.

IT investment, like investment in general, came to a sudden halt in 2000–01 in the United States as well as Sweden. All else equal, arrested investment leads to a diminishing share for capital intensity in labour productivity. In the United States, capital intensity actually fell because annual investment shrank faster than hours worked. That was the case in particular for IT capital, though this recovered in 2003. In Sweden the slowdown was less pronounced and capital intensity levelled out rather than fell, though manufacturing investment in software did decline here 2001–02 (see Figure 7). Import figures for computers suggest that IT investment did not start to recover until late in 2003. Even so, productivity growth remained high. One explanation for this, put forward in the

[21] Sveriges Riksbank (2000).

[22] Colecchia & Schreyer (2003) and van Ark, Inklaar & McGuckin (2003).

American debate, is that the previously massive IT investments had a lagged impact on the organisation of workplaces.

IT CAPITAL'S INDIRECT EFFECTS ON PRODUCTION

In the past, the impact of advances in technology has been lagged, depending on the time it took to adapt organisations so as to benefit in full from the innovations. A much-quoted example is the description by economic historian Paul David of the electrification of the United States at the turn of the nineteenth century.[23] It took several decades to arrive at the most relevant applications for electricity, adapt production processes, wait for existing capital to be worn out so that a complete reorganisation of factories would be profitable, and give employees the time to learn the new technology.

Network-based technology has to attain a critical mass before it has an impact on productivity numbers.

Parallels to the computerisation of workplaces are easy to find and other authors have pointed to a similar S-shaped response to innovations.[24] The initial phase consists in a long period of laborious testing, adjustment and learning-by-doing, with a slow dissemination and subsequent impact on productivity. This gives way to a strongly upward phase in which the technology is used intensively and generates a high return that declines in the final phase when most of the innovation's potential has been exhausted. In the 1990s this was a popular explanation for the long interval between the first computerisations in the 1970s and 80s and the improvement in productivity at the turn of the century. Given that the late 1990s involved further changes, with link-ups between electronics, computer networks, telecom and the internet, what we now see could be a correspondingly lagged impact of yet another generation of advances in IT technology. Then there are network externalities, that is, the utility of an innovation increases with the number of those who adopt the technology. The success of telephony or electrification obviously depends on the size of their networks and the same can be said to apply to e-mail and commercial sites on the internet. It follows that network-based technology has to attain a critical mass before it has an impact on productivity numbers.

It is also evident from firm-level empirical research in the United States that reorganisation and learning-by-doing are needed if new technology is to improve the pace of productivity growth and that, as a rule, the effect is lagged.[25] The results show that productivity in firms that invest more in IT is higher than in other firms in the same industry but

[23] E.g. David (1990; 1999).
[24] Kuznets (1953) and e.g. Jovanovic (1997).
[25] See e.g. Brynjolfsson, Hitt & Yang (2002), Brynjolfsson & Hitt (2003) and Basu et al. (2003).

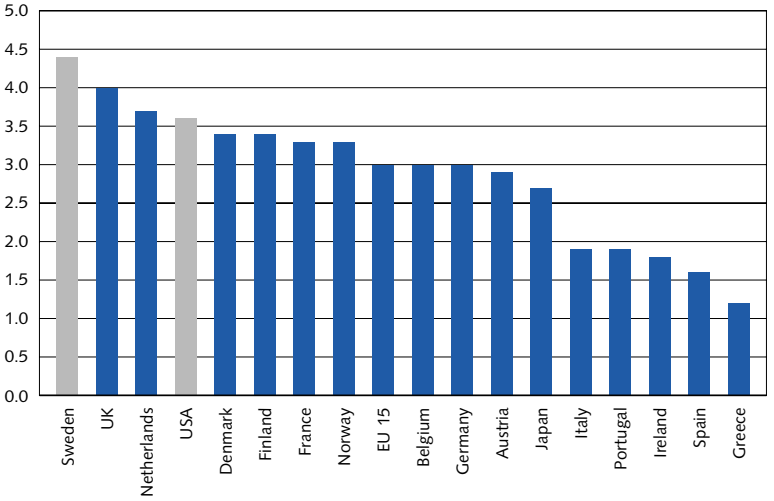
Provided they adapt to the new technology, firms that invest more in IT achieve higher productivity than other firms in the same industry.

only after an organisational adjustment to the new technology. One interpretation is that in the late 1990s US firms (possibly Swedish firms, too, if the corresponding phenomenon occurred here) implemented reorganisations for which the costs were treated at the time as current expenditure, not investment. That would have tended to lower measured productivity in the years of the reorganisations and the positive effects would have been spread over the following years.[26] Not until the early 2000s, when the reorganisations had had time to settle down, were the firms able to benefit in full from the IT investments.

IT also seems to be more widespread in US and Swedish society in general than in many other countries. If so, it could help to explain why IT's impact on productivity has occurred earlier here. IT's share of annual per capita expenditure is higher in Sweden than in most other EU countries (see Figure 9); for a number of years, moreover, Sweden seems to have led the use of the internet, e-mail and broadband, though this gap in relation to other EU countries has now narrowed appreciably or, to judge from current European statistics, possibly closed (see Figure 10). The liberalisation of Sweden's telecom sector in the 1990s, as regards both mobile and fixed telephony, also gave rise to the establishment of many new enterprises connected with IT services and this may have affected supply and demand for IT goods and services in Sweden.

The services sector and its growing use of IT have attracted particular attention after some writers claimed that the United States's relative pro-

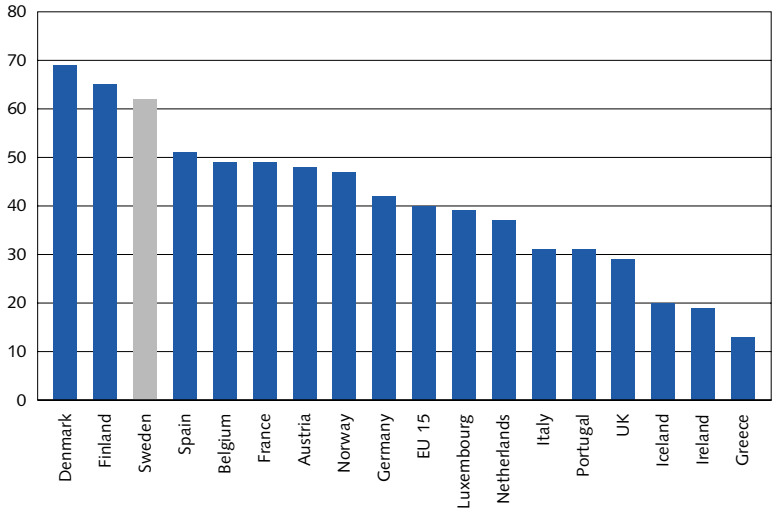
Figure 9. GDP share for IT expenditure in selected countries in 2003
Per cent



Source: Eurostat.

[26] For productivity effects of reorganisations, see NUTEK (1996).

Figure 10. Prevalence of broadband connections in EU countries in 2003
Per cent of firms



Source: Eurostat.

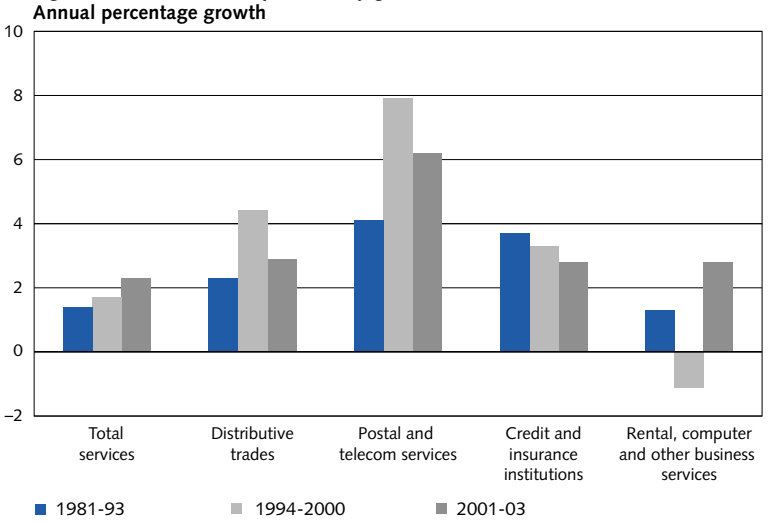
In the services sector, capital intensity has risen for IT capital and fallen for other types of capital.

ductivity advantage over Europe can be traced to a handful of services industries, above all retail trade where productivity per employee has been driven to a maximum by the phenomenon of so-called big boxes (vast mega-stores on the outskirts of towns).[27] In Sweden's case, a comparison of the periods 1981–93 and 1994–2003 reveals some increase in the total services sector's productivity growth, partly due to higher productivity in business services, some of which are related to IT (see Figure 11). From attempts to delineate the IT capital in Sweden's services sector it has been estimated that capital intensity has risen for IT capital and fallen for capital of other types.[28] Two industries that stand out, as they do in the United States, are wholesale and retail trades and postal and telecommunication services.[29] For retailing, however, the picture in Sweden differs from that in the United States, with a slackening of productivity growth after the acceleration in the mid 1990s. This is somewhat surprising considering the rationalisation and stronger competition in retailing in Sweden and this industry's high productivity growth in the United States.

The question of statistical measurement errors also applies, however, to the services sector. In Sweden as well as the United States, the constant prices of many services are deflated with a wage index, which by definition overlooks many changes in quality. The fact that for some years now business services are measured with a new index and this has been

[27] van Ark, Inklaar & McGuckin (2003).
[28] Lindström (2003) and Forsling & Lindström (2004).
[29] As noted earlier, productivity comparisons over time for a particular industry should be interpreted with caution because the results can be influenced by changes in definitions, for example.

Figure 11. Services sector productivity growth, total and in selected industries
Annual percentage growth



Sources: Statistics Sweden and own calculations.

accompanied by a higher measured productivity growth may indicate that the entire services sector's productivity has been underestimated earlier. The statistics on financial services pose particular problems. An example from the United States concerns the transfer of many banking services from branch offices to automation such as ATMs; this seems to have made little impression on the statistics at first but measured productivity here has recently been rising more clearly.[30] In Sweden, after a decade of automation, the internationalisation of financial services, falling costs for financial transactions, the securitisation of mortgage loans and banking via the internet, the productivity figures for the financial sector are suspiciously low. In the decade after the bank crisis (1994–2003), productivity growth in Sweden's financial sector averaged 3.3 per cent as against an average of 2.4 for the sub-period 2000–03.

Other conceivable explanations for the productivity hike

IT investment and productivity gains in the manufacture of IT products were clearly important for the acceleration of productivity growth in the late 1990s. It should be noted, however, that other factors may have contributed, too. As described above, the high productivity growth after 2001 is difficult to explain, at least directly, simply in terms of IT produc-

[30] Sichel (1999).

tion and IT investment. An explanation in the form of a lagged impact of IT investment is still just a hypothesis, at least as regards Sweden. Let us therefore briefly investigate some other conceivable explanations that have been mentioned in the productivity debate. They include country-specific factors as well as factors that may be relevant for both Sweden and the United States.

MACROECONOMIC STABILITY

Low, stable inflation, combined as a rule with a stable fiscal policy, is a classic explanation for higher productivity.

Low, stable inflation, combined as a rule with a stable fiscal policy, is a classic explanation for higher productivity. Price stability and strong public finances reduce both uncertainty and disturbances to allocation mechanisms, thereby rendering the economy more efficient. A positive effect on productivity from a reduction of inflation has been documented in many studies, although there have been certain indications that the relationship is less clear-cut when inflation is low.[31] The stricter macroeconomic discipline in Sweden, with an inflation-targeting monetary policy and a new budget process, was implemented in the early 1990s, which was when the period of high productivity growth began. In the United States, too, there was first a halving of inflation to around 2 per cent in the early 1990s and then a consolidation of public finances up to 2001 following the large deficits in the 1980s. It is probable that in both Sweden and the United States, this greater macroeconomic stability was at least an important precondition for the persistently high productivity growth.

CHANGES IN THE COMPOSITION OF THE LABOUR FORCE

Sick leave has recently been a topical subject for debate in Sweden. Sick leave numbers fell in the early 1990s but started to rise again from 1998 and reached a peak during 2003. Changes in the composition of the labour force obviously influence the development of productivity, though the direction and size of the effects are not always self-evident. If sick leave were to be primarily prevalent among persons who, for various reasons, have a lower working capacity and thereby lower productivity than other groups, an increased sick rate could result in average productivity being higher. In practice, however, the existence of such a direct link is highly uncertain; the replacements for sickness absentees may, for example, be unemployed persons whose working capacity is lower. Neither does sick leave appear to correlate particularly strongly with productivity. A simple comparison over time shows that earlier peaks in sickness absen-

[31] See e.g. Bassanini, Scarpetta & Hemmings (2001).

teeism, for example in the mid 1980s, were not associated with a sizeable improvement in productivity. Similarly, sick leave has fallen recently but productivity growth has remained high.

A type of composition that may have affected productivity recently is the labour force's educational attainment.

Another type of composition that may have had a sizeable effect on productivity recently has to do with the labour force's rising educational attainment. Forsling & Lindström (2004) use a growth-accounting analysis to calculate how labour productivity is affected not only by TFP and physical capital intensity but also by human capital intensity. In other words, they attempt to measure the effect of changes in labour quality, approximated as formal educational attainments. In Sweden, just as in the United States and other western countries, the proportion of the labour force that has a higher formal education shows a rising trend. One explanation that has been put forward is that advances in technology had led, not least recently, to a growing demand for more qualified labour. Thus, human capital and IT capital should be complementary considerations for firms. Lindström & Forsling do, in fact, find signs that an improvement in human capital – largely due to an increased prevalence of higher education – raised productivity growth in the second half of the 1990s, when the annual contribution to corporate sector labour productivity averaged around 0.2 percentage points.

STRONGER COMPETITION AND INTERNATIONALISATION

Competition in product markets accelerates the transfer of resources between firms as well as industries.

Increased competition in an industry strengthens incentives to rationalise and innovate in order to obtain temporary relief from depressed profit margins.[32] Competition in product markets also accelerates the transfer of resources between firms as well as industries. According to the OECD product market regulation index, the most efficient product markets are to be found in Sweden and the United States, along with the UK.[33] During the 1990s, moreover, the electricity and telecom markets in Sweden were liberalised and competition policy was generally reinforced in that the Swedish Competition Authority was established, as well as via the EU's single competition policy.

The services industries with the highest productivity growth 1994–2003 include two – postal and telecom firms and wholesale and retail trade –where the authorities aimed to strengthen competition by means of liberalisation (Figure 11). After the most extensive deregulation of the electricity market in 1999, productivity growth in the electricity,

[32] An early thesis, promoted by Schumpeter (1936) and others, is that innovation is easier for organisations that are large and less threatened by competition. Nowadays, however, empirical studies mainly point in the opposite direction; for a review of the literature see Ahn (2002).

[33] OECD (2001b).

gas, heating and water industry did in fact rise, from virtually zero in 1994–99 to an annual average of around 4 per cent in 2000–03. It should be noted, however, that calculations of the electricity industry's productivity are greatly affected by short-run fluctuations in energy prices and the supply of hydroelectric power.

International competition is no doubt at least as important as the domestic variant. Another explanation for the jump in productivity growth may be a more efficient international division of labour as a result of the liberalisation of trade in the 1990s.

More and more labour-intensive phases of production have become outsourceable from Sweden and the degree of processing in domestic production has risen.

The increasingly rapid process of international integration is explained in part by the dismantling of global trade barriers under the auspices of GATT's Uruguay Round and the advent of the WTO in 1995 and in part by increased regional integration. Sweden joined the European Union in 1995, having previously participated in the common market via the EEA Agreement. Nafta, formed in 1994, has contributed to a closer integration of the United States and its neighbours Mexico och Canada. During the 1990s, moreover, many potential trade partners in developing countries benefited from increasingly stable institutional and macroeconomic conditions at the same time as neighbouring countries in Eastern and Central Europe have become increasingly important as trade partners for Sweden. This has made it possible to outsource labour-intensive phases of production to an increasing extent and improve the value added in Sweden and the United States. At the same time, more and more industries are being exposed to stronger competition.[34]

In the branches of manufacturing where import penetration was relatively high in 2001, average annual productivity growth was also higher.

The present context debars us from demonstrating possible relationships between increased internationalisation and enhanced productivity.[35] But it is worth noting that in the branches of manufacturing where import penetration was above the median (over 31 per cent) in 2001, annual productivity growth in the period 1994–03 averaged 4.7 per cent as against an average of 3.1 per cent in branches where import penetration was lower than the median. The corresponding figures for services industries are 3.9 per cent for above-median import penetration and 2.6 per cent for the remainder.

For how long is higher productivity growth likely to last?

The most relevant policy issue concerning productivity growth is, of course, the future prospects: for how long is the good productivity

[34] See e.g. Mann (2003).
[35] See e.g. Edwards (1997).

It is not just cyclical factors that have raised productivity growth; the cyclically-adjusted level has probably risen, too.

growth likely to continue? The first thing to note from our analysis is that it was not just cyclical factors that raised productivity growth in the latter part of the 1990s. A part of the most recent improvement is no doubt cyclical, however, and will diminish as activity rises; but it is still reasonable to assume that even the level of the cyclically-adjusted rate is higher than it was before 1993.

We also know that strong productivity growth in the telecommunications product industry contributed to the overall increase in productivity growth in the period 1994–2000 but not in 2001–03. However, the trend for this industry seems to have turned during 2004 and it is conceivable that its contribution to productivity will grow again, particularly if the third generation of mobile telephony, which is so crucial for this industry, exceeds the relatively low expectations. As regards investment in IT capital, productivity growth was directly affected in the United States and, to some extent, Sweden up to 2000–01 but since then TFP has played a greater part.

It is still too early to draw any definite conclusions about the possibility of lagged effects on Swedish productivity from earlier IT investment and reorganisations. More research at industry and firm level is needed for clarity. The available studies, mostly on US data, suggest that due to the need for learning-by-doing and reorganisation, productivity's response to investment in technology was delayed, not only in the second half of the 1990s but again in the early 2000s. Earlier development blocks, for example electricity and the internal combustion engine, affected productivity growth over several decades but the most intensive impact was more short-lived.

Given that IT really is an equally important development block and that more efficient information flows affect nearly every process in a firm, there are arguments for both a shorter and a longer period of higher productivity growth. As the most intensive period of IT investment to date was the late 1990s and the response to this – given the hypothesis of a lagged impact – is due some way into the 2000s, the most recent increase in productivity growth can be expected to slacken by degrees, at least during the present decade. This would, of course, be vitiated by a new wave of investment and further developments to innovations in this block. It should be borne in mind here that productivity growth today, both in Sweden and in the United States, is not exceptionally high when seen in relation to a longer post-war period. In the first three post-war decades, average productivity in both Sweden and the United States was as high as in the period 1995–2003.

Finally, we do not know how internationalisation and the liberalisation of product markets will progress; both are dependent on future policy

decisions. But it is clear that countries in Asia, Central and Eastern Europe will be increasingly important driving forces as partners in an international division of labour.

A summary guess is that the very strong productivity growth rates at present will probably become somewhat weaker as activity recovers but that for a number of years to come the underlying, cyclically-adjusted growth of productivity will still be on a higher level than in the 1980s.

The strong productivity growth rates at present will probably become somewhat weaker but still be on a higher level than before for a number of years to come.

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On the need to focus more on the asymmetry problem within the EU Fiscal Policy Framework

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The cornerstone of the EU Fiscal Policy Framework is the requirement that budget deficits are not allowed to exceed 3 per cent of GDP. The regulations state that Euro countries which do not adhere to this requirement can be penalised. In this paper it is argued that from the viewpoint of stabilisation policy, the 3 per cent rule might penalise the wrong countries; instead it is high-debt countries with a slow pace of debt reduction and countries contributing to an asymmetric and pro-cyclical fiscal policy that should be criticised. The European Commission's recent proposal to focus more on debt is therefore welcome. However, there have been fewer suggestions about how to deal with the problem of asymmetry and pro-cyclicality. This article discusses and compares three different budgetary rules addressing the latter problem: (i) a rule that makes the deficit ceiling a function of the debt, (ii) an expenditure ceiling based on cyclically adjusted revenue, and (iii) a budget device that imposes appropriate targets for the annual actual budget balance in both good and bad times, given a pre-determined medium-term objective.

The note has benefited by comments from Claes Berg, Frida Fallan, Jonas Fischer, Jan Hansen, Urban Hansson-Brusewitz, Per Jansson, Yngve Lindh, Johanna Lybeck, Stefan Palmqvist, Eva Srejber, Staffan Viotti and Anders Vredin. The views expressed in the article are the responsibility of the author and do not necessarily represent the opinion of the acknowledged commentators or the Riksbank.

The ongoing discussion on the EU Fiscal Policy Framework

There is an ongoing economic-policy debate on the EU Fiscal Policy Framework. The ambition behind this framework is to promote a stable macro-economic environment, characterised by low and stable inflation and sustainable public finances. The framework consists of numerical rules as well as procedures and mechanisms for implementation and surveillance.[1] Some argue that the numerical rules should be changed, others

The EU Fiscal Policy Framework aims to promote a stable macro-economic environment, with low and stable inflation and sustainable public finances.

[1] In the monetary policy literature it is customary to interpret a "rule" as a behavioural reaction function for the central bank. In this paper (and the consulted literature) the rule concept is broader; here a rule can, for example, be interpreted as a numerical fiscal constraint.

that it is the mechanisms for implementation and surveillance that should be improved. Those who argue for new numerical rules do so from different points of departure. Some consider that the rules should be more flexible, for instance to allow for country-specific characteristics (for example, structural conditions such as the need to borrow for infrastructure investments) as well as for fiscal stabilisation measures in the event of very asymmetrical cyclical developments in individual euro countries. Those who argue instead that the rules and/or the mechanisms for implementation and surveillance should be strengthened do so in the light of current budgetary problems in several euro countries and the failure to apply the framework as originally intended. This paper's focus is on the numerical rules/constraints.

The numerical constraints in the EU Fiscal Policy Framework

It has three numerical fiscal rules or constraints; the 3 per cent deficit ceiling, the 60 per cent debt constraint and the "close-to-balance" criteria.

There are, in principle, three numerical fiscal rules or constraints in the EU Policy Framework:[2]

- Under normal circumstances the budget deficit is not to exceed 3 per cent of GDP. A persistent excessive deficit is supposed to lead to a fine.
- The general government gross debt should not be above 60 per cent of GDP but, if it is, it must be decreased towards 60 per cent of GDP at a "satisfactory pace". However, in practice this rule has been interpreted as not allowing debt to grow if it exceeds 60 per cent of GDP. Violation of this rule does not incur sanctions. The deficit and the debt ceilings are strongly linked. If the nominal GDP growth rate is 5 per cent and the average deficit is 3 per cent, the debt-to-GDP ratio will move towards 60 per cent.[3] Both ceilings are evaluated by means of the Excessive Deficit Procedure (EDP).
- The EDP has been supplemented with the Stability and Growth Pact (SGP). A key element in the SGP is the requirement that member countries *should achieve* a budgetary position that over the cycle is "close to balance or in surplus". One purpose of this rule is to provide a safety margin to the 3 per cent deficit ceiling so as to allow for

[2] See, for example, Brunila et al. (2001) and Fischer (2004) for a more detailed overview of these rules and how they have developed.

[3] Given that positive and negative stock-flow adjustments cancel out over time, debt development can be described by $\dot{d} \approx -b - gd$ where $\dot{d}$ is the change in the debt-to-GDP ratio from the previous year, b is the budget balance-to-GDP ratio and g is nominal GDP growth. A constant debt-to-GDP ratio (that is, $\dot{d} = 0$) gives $d \approx -b / g$. Thus, if the average deficit is 3 per cent and nominal GDP growth is 5 per cent, we get $d = -(-0.03/0.05) = 0.6$.

fiscal stabilisation (by automatic stabilisers and discretionary measures) without going into excessive deficit. The member states have now agreed on that the close to balance or in surplus criteria should be evaluated in terms of the estimated structural budget balance. However, there are no penalties if the rule is not observed.

Although the EU fiscal framework consists in theory of several numerical rules, in practice it is the 3 per cent deficit ceiling that is its cornerstone.

The need for fiscal rules in the EMU

Several arguments favour fiscal constraints in the EMU system.

There are several arguments for the necessity of fiscal constraints in the EMU system:

(i) There may be concern that high-debt member countries will lobby for lower interest rates.[4]

(ii) Fiscally irresponsible member countries may ask the ECB for financial bail-outs.

(iii) With autonomous national monetary policies, fiscal stimuli will be met by appropriate monetary policy responses. With a single monetary policy conducted by the ECB, fiscal stimuli in a single euro country will have a diluted impact on the euro area as a whole and will be met by a less contractive monetary policy than would have been the case if monetary policy had been nationally autonomous. Consequently there might be a strong temptation for a single euro country to "free ride" by expanding its budget at the expense of the other euro area countries. If a few sizeable euro countries or a majority were to behave like this, it would be rational for a country that initially did not intend to "free ride" to behave in the same manner. Otherwise it might end up among a minority of countries that do not expand but are still subjected to the correspondingly tighter monetary policy.[5]

There are also some additional arguments in favour of fiscal constraint from a monetary policy perspective as well as from a stabilisation policy viewpoint in a wider sense, no matter whether monetary policy is nationally autonomous or conducted by a common central bank within a monetary union:

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[4] This will only be a problem if members of the Governing Council of the ECB allow national considerations to sway their monetary policy decisions.

[5] Of course, countries that observe the sustainability restriction may not, even in such situations, follow the behaviour of other countries.

(iv) If the debt level is high and a large part is financed with domestic (or intra-union) loans, the positive (negative) income effect for people holding government bonds of an increase (decrease) in the interest rate caused by an increase (decrease) in the central bank's key interest rate will partly counteract the intended stabilisation effect. That is, high debt levels may make monetary policy less effective.[6]

(v) There is a possibility that unsustainable public finances, represented by high debt, will influence inflation expectations. If it does, it will affect the effectiveness and possibly also the credibility of monetary policy.[7]

(vi) Experience shows that governments tend to use additional revenue in good times for permanent reforms. This is a problem for both sustainability and stabilisation policy. An asymmetric fiscal policy where public saving in good times fails to balance the corresponding deficits in bad times results, on average, in an unduly expansive fiscal policy and rising debt. Monetary policy then has to be more contractive than otherwise, leading to unnecessarily high interest rates. Such a policy mix is clearly suboptimal.[8] A government that cares about sustainable public finances can, of course, compensate "inadequate" saving in good times by running a contractive fiscal policy in downturns, but such pro-cyclical behaviour accentuates the swings in real GDP and unemployment. Furthermore, severe recessions might, in such cases, require substantial monetary policy stimuli. However, the central bank's key interest rate cannot go below zero per cent and in a severe recession a cut to zero per cent might not suffice to generate a recovery. In such a case, the combination of a contractive fiscal policy and an impotent monetary policy can result in a prolonged recession.[9] In what follows, such government behaviour will be referred to as the "asymmetry problem".

Obviously, all these arguments call for a fiscal framework that promotes fiscal discipline. In the academic literature, however, some argue that, from a theoretical point of view, fiscal constraints may not be necessary at all, at least not to ensure price stability [see, for example, Canzoneri et al. (2002)]. While this is still an open question in the theoretical literature, most policy makers would probably agree that fiscal constraints should

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6 See, for example, Taylor (1995). An empirical study by Fair (1994) indicates that this problem weakened the ability of monetary policy to affect GDP in the US between 1980 and 1990.

7 In the academic literature a new theory has been developed which shows that under certain circumstances it is fiscal policy, not monetary policy, that determines inflation. See, for example, Christiano & Fitzgerald (2000) and Gordon & Leeper (2002) for a discussion of the issue.

8 See, for example, Blinder (2002).

9 See, for example, Taylor (2000) for a discussion of the zero bound on interest rates and the role for discretionary fiscal policy.

make it easier to maintain price stability and would help to avoid policy-induced economic disturbances due, for example, to an asymmetric fiscal policy. Experience shows that unsustainable public finances tend to trigger periods of high inflation. There are also empirical studies which indicate that a regime with a properly defined fiscal and monetary policy mix provides a better explanation of actual inflation during periods of low fiscal discipline (see, for example, Favero & Monacelli, 2003). The basis for the discussion in the remainder of this paper is that arguments (i)–(vi) are important for stabilisation policy.

Fiscal constraints that contribute to sound fiscal policy behaviour should also be important from other perspectives. For example, optimal taxation should warrant fiscal rules that contribute to a stable tax ratio over time. However, from such a perspective, fiscal rules should primarily be a concern for individual member countries, not for the ECB.

Criticism of the current EU fiscal framework from a stabilisation policy perspective

Are the current EU numerical fiscal rules appropriately designed as regards their implications for stabilisation policy?

The design of appropriate fiscal rules does, of course, have to meet a variety of criteria, such as consistency with the desired policy goals, transparency, operational simplicity and comprehensibility.[10] This note is mainly concerned with the question of whether the current EU *numerical fiscal rules* are appropriately designed with regard their implications for stabilisation policy as described by (i)–(vi) above.

Arguments (i)–(ii) and (iv)–(v) are directly linked to the level of debt, not to deficits. Thus, rules for debt development appear to be more appropriate than deficit limits for achieving the objectives. Of course, some would argue that a restraint on the deficit should prevent the accumulation of future debt and would also penalize high-debt countries because large interest payments would make it difficult to comply with the deficit limit. However, the main concern should be whether a country (or group of countries; members of a monetary union) is able to service its debt. That is, rules directed towards debt development are likely to be more efficient.[11]

Argument (vi) calls in the first place for a rule that supports a symmetric fiscal policy over the cycle. Argument (iii) might favour a deficit ceiling, like the current 3 per cent constraint. On the other hand, fiscal rules that are capable of handling the other arguments would most likely

[10] See, for example, Kopits (2001) and European Commission (2001, 2003).
[11] See also Beetsma (2001) and Canzoneri, Cumby & Diba (2002).

No, the focus should rather be on fiscal rules that do more to reduce high debt levels and contribute to a symmetric fiscal policy.

also satisfy the third argument. The 3 per cent deficit ceiling, the 60 per cent debt constraint and the "close to balance" requirement in the SGP have obviously not managed to achieve sufficiently fast debt reduction by high-debt countries or a symmetric fiscal policy over the cycle. Thus, the focus should be on how to define fiscal rules that put more weight on the need to reduce high debt levels and that contribute to a symmetric fiscal policy over the business cycle.

Fiscal rules that focus more on debt

One suggestion in the general debate and from the European Commission is that relatively low-debt countries should be allowed less demanding medium term objectives.

One of the suggestions put forward in the general debate as well as by the European Commission is that countries with relatively low debt levels should be allowed to have less demanding medium-term objectives (measured in terms of the structural budget balance) than high-debt countries. Another suggestion is to impose more demanding requirements on high-debt countries in terms of the medium-term objective with the purpose of speeding up debt reduction.[12] Since not just current debt but also expected future debt is a cause for concern, rules have also been suggested that take implicit liabilities (for example, future pension expenditures) into account when defining the medium-term objective. This means that countries that have not yet reformed, or do not intend to reform, their social security systems to cope with adverse future demographic developments should rapidly reduce their debt to avoid large future increases in expenditure and tax levels, with consequences for both the intergenerational distribution of income and the functioning of the economy.

From a stabilisation policy perspective, these suggestions deserve to be supported. However, while they are helpful in reducing debt levels, they are not likely to contribute to the solution of the asymmetry problem. The remainder of this note is therefore devoted to the latter problem. Three different "rules" will be discussed that address, directly or indirectly, the asymmetry problem as defined by argument (vi) above.

Making the deficit ceiling a function of debt

Calmfors et al. (2003) argue that loosening the medium-term objective for low-debt countries (as suggested by the European Commission) without amending the deficit ceiling reduces the safety margin and therefore increases the risk that the 3 per cent ceiling will be breached. They also

[12] For a discussion and survey of rules focusing on debt development, see, for example, European Commission (2002 a, b, 2003 and 2004).

argue that low-debt countries should have the benefit of more room for manoeuvre in recessions.[13] Their solution to both those problems is to make the deficit ceiling a function of the debt level.[14] Instead of a continuous function, they suggest that different deficit ceilings could apply to different debt intervals. They argue that this could be done in various ways. One could be to leave the present deficit ceiling unchanged for high-debt countries and raise it for low-debt countries. An alternative would be to have higher ceilings for low-debt countries and correspondingly lower ceilings for high-debt countries. Low-debt countries would then be allowed to run budget deficits above 3 per cent of GDP. They argue that "A major advantage of such discontinuous "ladders" of deficit ceilings … is that they provide a strong incentive for fiscal discipline in normal times as well as in booms by allowing countries to move to categories with a higher 'status'. Even if it is future governments that would get the advantage of a greater scope for stabilisation policy in recessions, it becomes much more visible to the general public that the incumbent government has made an investment that represents a future gain", Calmfors et al. (2003), page 63.

Calmfors et al. suggest that low-debt countries should have the benefit of more room for manoeuvre in recessions and that this can be done by making the deficit ceiling a function of debt.

The suggestion by Calmfors et al. is reasonable in the sense that low-debt countries should have the benefit of a higher deficit ceiling than high-debt countries and that this extra margin could be used for fiscal stabilisation in the event of large country-specific disturbances in which they are not helped by the common monetary policy. For the asymmetry problem, however, the effect of such a rule would be very indirect. From a public choice perspective it could be argued that this rule may not greatly influence the incumbent government's behaviour in good times, when the next recession may seem to be a long way off; it may even occur under another government. A rule that addresses the asymmetry problem more directly is probably needed.

Expenditure ceilings

Expenditure ceilings, properly defined and applied, should contribute to a symmetrical fiscal policy. One way to define an expenditure ceiling for the entire public sector – given the ambition to keep the overall tax ratio constant on average over time – is to make it a constant fraction of potential GDP. If actual GDP happens to be below the potential, which defines a recession, the expenditure ceiling provides room to manoeuvre for fiscal stabilisation. In a boom, the ceiling, constructed in this way, prevents

Expenditure ceilings should contribute to a symmetrical fiscal policy.

[13] See also Pisani-Ferry (2002).
[14] See also Calmfors & Corsetti (2002, 2003).

expenditures from rising with actual revenues. In this sense, an expenditure ceiling, constructed in this way, would also help to achieve a symmetric fiscal policy over the cycle.

However, there are some potential application problems. Defined as above, the expenditure ceiling can be circumvented by replacing new expenditures with tax reductions. This has happened in, for example, Sweden. Besides undermining the purpose of the expenditure ceiling, such behaviour is liable to contribute to an asymmetric fiscal policy. In principle, this problem could be handled by adjusting the expenditure ceiling when new "tax expenditures" are introduced.[15] Moreover, there are alternative definitions of the expenditure ceiling that eliminate the incentives to circumvent it through tax reductions.

In Switzerland a rule has been suggested whereby the expenditure ceiling is a function of cyclically adjusted revenue.

In Switzerland a rule has been suggested that makes the expenditure ceiling, one year ahead, a function of the predicted revenue adjusted for the cyclical position of the economy, see Danninger (2002). Such a construction removes the incentive to circumvent the expenditure ceiling because any (planned) tax cut will lower tax revenue and therefore also the expenditure ceiling. Formally, the suggested rule can be expressed by

$$(1) \qquad E^{C}_{t+1} = R^{e}_{t+1} \cdot C^{e}_{t+1} + A_{t+1},$$

where E^{C}_{t+1} is the expenditure ceiling for period t+1, R^{e}_{t+1}, is expected revenue at time t for period t+1 and C^{e}_{t+1} is a measure of the cyclical position of the economy at time t for period t+1. A_{t+1} is an adjustment factor to correct for past differences between budget targets and outcomes. It will prevent a systematic increase in debt due to *consciously* overly optimistic revenue forecasts. In principle, the rule is intended to maintain a balanced structural budget balance while allowing the actual balance to vary with the business cycle. Clearly, this is a step in the right direction if one wants to apply formal rules that contribute to a symmetric fiscal policy. However, the rule as defined by equation (1) has a drawback: the adjustment factor A_{t+1} can contribute to a pro-cyclical policy in certain cases; for example, in a prolonged recession when overspending is likely to result from *unconsciously* overly optimistic revenue forecasts.

Targets for the annual actual budget balance

Much of the debate on the SGP has focused on how to force countries to achieve medium-term budget balances that are close-to-balance or in surplus. It has been agreed that countries which have not yet reached this

[15] See Boije (2002).

target should gradually improve their structural budget balance. It has also been agreed that the structural budget balance should be estimated with the production function method provided by the European Commission.

The SGP debate has focused on forcing countries to achieve medium-term budgets that are close-to-balance or in surplus.

A relevant question is how to define the "close-to-balance" criterion and how to maintain the balance once it has been achieved. One definition holds that the budget should be approximately balanced on average over the business cycle. However, this target can be met with a combination of low surpluses in good times and a contractive fiscal policy during economic downturns. Such a policy works pro-cyclically and will not contribute to an appropriate monetary and fiscal policy mix. Fortunately, given the close-to-balance requirement or some other predetermined medium-term objective, the information used to calculate the structural budget balance can also serve to construct a budget rule that will support the achievement of a symmetric fiscal policy over the cycle. In what follows, such a rule is described in more formal terms. The likelihood of governments being willing to commit to such a rule and whether it would be suitable for surveillance within the EU fiscal policy framework will be discussed in the latter part of this article.

A relevant question is how to define and uphold the "close-to-balance" criterion.

STRUCTURAL BUDGET BALANCES

The estimated structural budget balance indicates what the actual balance would be if production factors were being utilised at a "normal" level.

The estimated structural budget balance indicates what the actual budget balance would be if the utilisation of production factors were at a "normal" level.[16] In other words, it represents the difference between revenue and expenditure in a notional cyclically normal situation. To estimate it, one has to estimate the business cycle's impact on the budget balance. This is usually done with a measure of the output gap and the budget elasticity. The output gap is usually defined as a percentage of (potential) GDP. The budget elasticity indicates the budget balance's average estimated response, expressed as a percentage of GDP, to a one percentage point change in the output gap.[17] The structural budget balance (b^s) can then be estimated as

$$(2) \qquad b^s = b - \beta\left(\frac{Y-Y^*}{Y^*}\right),$$

where b is the actual budget balance, β is the budget elasticity, Y^* is trend (or potential) GDP and $(Y-Y^*)$ is the output gap. The structural budget balance is thus obtained by subtracting the cyclical component of the

[16] Here I do not distinguish between the structural and the cyclically-adjusted budget balance.

[17] See, for example, Boije (2004) for a survey of methods for estimating the structural budget balance.

budget balance from the actual balance. If β is estimated with econometric methods, without controlling for discretionary fiscal measures, it may contain the effect of regular discretionary measures of stabilisation policy as well as automatic stabilisers. By controlling for discretionary measures (which is likely to be extremely burdensome due to long time series) or by using macro models with a rich description of the public sector or micro data models, it is, in principle, possible to estimate the effect on the budget balance of just the automatic stabilisers. In what follows, it will be assumed that β captures only the effect of the automatic stabilisers on the budget balance.

A BUDGETARY DEVICE INDICATING THE APPROPRIATE ANNUAL BUDGET BALANCE

Given a predetermined medium-term target, the targets for the annual actual budget balance can be defined as a function of the estimated output gap and the budget elasticity.

Given a predetermined medium-term target, the appropriate targets for the annual actual budget balance can simply be defined as a function of the estimated output gap and the budget elasticity. This can be expressed formally as

$$b = \theta + \beta\left(\frac{Y-Y^*}{Y^*}\right) \text{ where } \beta > 0, \tag{3}$$

where θ denotes the country's medium-term objective. That is, the actual budget balance (net lending) must be equal to the medium-term objective plus the budget elasticity times the output gap.

Of course, this rule is equivalent to stating that the structural budget balance *each year* should match the medium-term objective. However, pedagogic, budget transparency and stabilisation policy reasons speak in favour of translating the medium-term objective into yearly targets for the annual actual budget balance. The following may make this point clearer.

As the rule is defined by expression (3), fiscal stabilisation depends entirely on the symmetric work of the automatic stabilisers. Thus, it does not admit discretionary fiscal stabilisation policy. This problem could, of course, be solved by accepting temporary deviations from the medium-term objective if they are a consequence of stabilisation policy actions. However, such a loose rule is likely to be rather arbitrary. A better alternative would probably be an ex ante definition of a "room to manoeuvre" for fiscal stabilisation. Suppose that the government is entitled by the parliament (or by law) to use discretionary measures to stabilise the economy, corresponding to the share γ of the output gap. Then the budget rule can be defined as

$$(4) \qquad b = \theta + \beta\left(\frac{Y-Y^*}{Y^*}\right) + \gamma\left(\frac{Y-Y^*}{Y^*}\right) = \theta + (\beta + \gamma)\left(\frac{Y-Y^*}{Y^*}\right),$$

where $\beta, \gamma > 0$.

Some would argue that a rule like that provided by equation (4) is nothing but a reaction function for fiscal policy and that, as such, it would encourage fiscal fine-tuning. Firstly, however, equation (4) is not a reaction function as defined in the theoretical literature, since b is not fully controllable by the government. The equation indicates instead what each year's ideal budget balance should be to satisfy the medium-term objective and avoid a pro-cyclical fiscal policy. Secondly, given that the rule is based on a predetermined medium-term objective for the entire public sector, it constitutes a budget balance restriction for the total public sector rather than a reaction function for the central government, although responsibility for adhering to it should rest with the central government.[18] To decrease the risk of fiscal fine-tuning, the rule could be combined with a restriction whereby active fiscal stabilisation measures may be taken only in the event of large country-specific disturbances, for example when the output gap exceeds ω x 100 per cent of GDP.[19] With such a restriction, equation (4) can be written as

$$(5) \qquad b = \theta + (\beta + j\gamma)\left(\frac{Y-Y^*}{Y^*}\right),$$

where $\beta, \gamma > 0$ and $j = 1$ if $\left(\left|(Y - Y^*)/Y^*\right| > \omega\right)$, otherwise $j = 0$.

THE MEDIUM-TERM OBJECTIVE

The rule as defined by equation (5) says nothing about the appropriate level of the medium-term objective, which is also beyond the scope of this paper. However, since the rule is based on a pre-determined medium-term objective, a few words about it are perhaps in place. In the debate some have argued that the medium-term objective should be a function of both the initial debt and implicit liabilities. From a sustainability perspective, this seems to be appropriate. Equation (5) could then be written as

For stabilisation policy it seems reasonable that in a prolonged recession, low-debt countries which observe their medium-term objectives should be allowed to have deficits above 3 per cent of GDP.

$$(6) \qquad b = \theta(D, IL) + (\beta + j\gamma)\left(\frac{Y-Y^*}{Y^*}\right),$$

[18] The central government could, of course, impose budget constraints on lower levels of government that would support the achievement of the overall balance.

[19] See *Stabilisation Policy in the Monetary Union – A Summary of the Report, 2002*, for a similar argument.

where D denotes the initial debt and IL implicit liabilities. For a country with little debt and limited implicit liabilities, the medium-term objective could be allowed to be negative, given the requirement of a stable debt-to-GDP ratio over the cycle and appropriate assumptions about nominal GDP growth. For example, a country with an initial debt level of 40 per cent of GDP, limited implicit liabilities and a nominal GDP growth rate of 5 per cent would be able to keep the debt-to-GDP ratio stable over the business cycle if the medium-term objective is set to –2 per cent of GDP.[20] Obviously, the margin to the 3 per cent deficit ceiling in a recession would then be very small, especially for a country where budget elasticity is high. This might mean that the automatic stabilisers would not be allowed to work freely and there would be no room for fiscal stabilisation. From a stabilisation policy perspective it therefore seems reasonable for a low-debt country, as far as its medium-term objective is concerned, to be allowed to have deficits of more than 3 per cent of GDP in a prolonged recession. At the same time, high-debt countries should be forced to have positive medium-term objectives in order to speed up debt reduction. For such countries the medium-term objective could be determined by a simple function relating it to the debt (see European Commission 2004 for examples).

THE RULE APPLIED TO THE SWEDISH CASE

In 2000 the Swedish government adopted the medium-term goal of a budget surplus that averages 2 per cent over the business cycle.

In 2000 the Swedish government, with the approval of the parliament, adopted a medium-term goal to the effect that the actual budget balance is to be 2 per cent on average over the business cycle. Adherence to the goal is intended to last up to 2015. Its main aim is to reduce debt rather quickly to pave the way for a future increase when the budget balance deteriorates on account of adverse demographic prospects. That would also lessen the risk of having to introduce dramatic tax increases in the future.[21] Another aim is to provide room to manoeuvre for fiscal stabilisation without incurring an excessive deficit. The Swedish surplus target, as presently defined, does not preclude the use of an asymmetric fiscal policy. The target can be met even with small surpluses when times are good, but fiscal policy would then have to be contractive during economic downturns. However, such a policy works pro-cyclically and will not lead to an appropriate fiscal and monetary mix in terms of stabilisation policy. Aware of this problem, in its 1999 Convergence Programme the Swedish government stated (pages 4–5):

[20] See formula in footnote 3.

[21] This rule is thus somewhat more ambitious than the medium-term objective stipulated by the SGP.

"As the medium-term goal refers to the public sector fiscal balance seen over the business cycle, the actual budget surplus could fall below 2 per cent of GDP in a phase of the business cycle with relatively high idle capacity in the economy, but conversely exceed 2 per cent of GDP in the peak phase of the business cycle. Thus, the level that the budget surplus will reach in an individual year is dependent on the phase of the business cycle, which provides scope for the automatic stabilisers to work. In this way it is possible to refrain from a pro-cyclical policy. A medium-term goal of a public sector surplus equivalent to 2 per cent of GDP should also be compatible to some extent with conducting an active fiscal policy, with the aim of moderating swings in the business cycle without risking excessive deficits during down-turns."

Obviously, the Swedish government aimed to avoid a pro-cyclical fiscal policy using some measure of the automatic stabilisers. Rather than translating this view into a formal rule similar to equation (3) or (6), it chose instead to refer to the use of the nominal expenditure ceiling for the central government as a means of supporting a symmetric fiscal policy.

Table 1. A comparison of required and expected budget balance

	2004	2005	2006	2007
(1) Budget balance	0.7	0.6	0.4	0.9
(2) GDP gap	–1.3	–0.5	–0.2	0.0
(3) Automatic stabilisers	0.9	0.4	0.1	0.0
(4) Annual target for budget balance (required by equation (3))	1.1	1.6	1.9	2.0
(5) Under/overshooting, (1)–(4)	–0.4	–1.0	–1.5	–1.1

Sources: 2005 Budget Bill, Swedish Ministry of Finance, and own calculations.

However, an asymmetric fiscal policy and the introduction of new tax expenditures mean that the annual budget balances are not in line with the medium-term target.

Given the forecast of the automatic stabilisers and the annual budget balance as provided by the Swedish government in the 2005 Budget Bill, Table 1 shows the difference between the expected actual budget balances and those that would have been required if equation (3) had applied (the Swedish government is using a budget elasticity of 0.70). During the relevant forecast period the annual target would, ex ante, have been missed for every year. The government must have been aware that the forecasts of the annual budget balances were not in line with the medium-term objective. The government's ex-post defence has been that a labour market upswing has been delayed despite strong GDP growth and that this has motivated some stabilisation measures which weaken the actual and the structural budget balances. However, a closer look at the recent reforms indicates that most of them are intended to be permanent. Thus, they cannot be regarded as stabilisation measures. One

explanation for the non-adherence to the medium-term objective is rather that the government has circumvented the expenditure ceiling to a large extent by introducing new tax expenditures.

A comparison of the three rules

As noted earlier, a variety of aspects clearly have to be taken into account when designing fiscal rules. This section presents a brief comparison of the three rules as regards (i) their ability to solve the asymmetry problem, (ii) the likelihood of government commitment, (iii) implementation and their suitability as an instrument for surveillance within the EU fiscal policy framework.

RELATIVE STRENGTH FOR SOLVING THE ASYMMETRY PROBLEM

Targeting the annual budget balance in terms of the medium-term objective, the budget elasticity and the expected output gap is the most straightforward approach to the asymmetry problem.

Obviously, targeting the annual budget balance as a function of the medium-term objective, the budget elasticity and the expected output gap is the most straightforward way of dealing with the asymmetry problem. An expenditure ceiling defined as a function of potential GDP is also helpful, but suffers from the possibility of being circumvented by tax expenditures. Making the expenditure ceiling a function of cyclically adjusted revenue and defining it so as to be consistent with an overall medium-term objective avoids the latter problem. Like the other two rules, making the deficit ceiling a function of the debt has the advantage of providing room for stabilisation measures but its ability to contribute to the solution of the asymmetry problem is questionable.

RELATIVE STRENGTH AS REGARDS COMMITMENT

It is probably easier for a government to commit to a rule where the deficit ceiling is a function of debt.

It is probably easier for a government to commit to a rule that makes the deficit ceiling a function of the debt, than to ex ante requirements on the annual budget balance or to an expenditure ceiling based on cyclically adjusted revenue. The reason, of course, is that such a "distant limit" provides more "political freedom". Precise annual targets are also sensitive to forecast errors, especially if they involve non-observable variables such as the output gap (we return to the latter issue in the discussion of implementation issues).

RELATIVE STRENGTH AS REGARDS IMPLEMENTATION AND SUITABILITY AS AN INSTRUMENT FOR SURVEILLANCE WITHIN THE EU FISCAL POLICY FRAMEWORK

Targeting the annual budget balance as above has some attractive features for EU surveillance.

Targeting the annual budget balance as a function of the medium-term objective, the budget elasticity and the expected output gap obviously has some attractive features for EU surveillance. No matter how the medium-tem objective is determined (it can, for example, be determined by an arbitrary linear requirement on the pace of debt reduction for high-debt countries and also take into account implicit liabilities), this rule works symmetrically and can be applied to both high- and low-debt countries. Two countries with equivalent medium-term objectives but different budget elasticities could be allowed to have different budget balances even if they happen to have equal output gaps. The rule is also attractive in that, basically, it does not require any information apart from what is already needed to calculate structural budget balances with the European Commission's current method for evaluating the "close-to-balance" criteria of the SGP. This method has been agreed on by the euro countries.

However, there are some drawbacks.

However, there are some drawbacks. Although the euro countries have accepted the European Commission's method to calculate structural budget balances, the debate on the appropriate measures of the output gap and budget elasticity would probably be sharper if the same measures were to be used for precise annual targets.

Rules based on the output gap are of value as a preventive tool; if they are well established, generally understood and properly evaluated, they could be used for "peer pressure".

Some would argue that a budget rule based on an uncertain and unobservable variable such as the output gap should be avoided (in that case, the same criticism should apply to an expenditure ceiling based on potential output or cyclically adjusted revenue).[22] However, solving the asymmetry problem without a rule based on a measure of the output gap seems to be difficult. If governments have to adhere to a properly defined medium-term objective at the same time as they should avoid a pro-cyclical fiscal policy, they obviously need to have some idea about the economy's cyclical position. However, since the estimation of the output gap entails uncertainty, the rule should not be too strict, neither should non-adherence lead to monetary penalties. Thus, a rule based on an uncertain measure of the output gap is most likely unsuitable for the stringent EDP. The same problem is associated with the "close-to-balance" criteria as currently defined in the SGP. The value of rules based on the output gap lies instead in their use as a preventive tool. If such fiscal rules are well established, understood by the public and properly evaluated, they should serve in the first place to exert "peer pressure".

[22] See, for example, Calmfors et al. (2003).

There are, of course, further objections to applying a rule that requires precise targets for the actual budget balance, similar to the one for structural budget balances.[23] For example, the budget elasticity represents an average of the effects of the automatic stabilisers and therefore may not accurately capture the actual effects if a disturbance is not of an average nature. For example, a shock in export demand is likely to affect taxes differently from a shock in private consumption. In other words, the aggregated budget elasticity does not capture so-called composition effects. In principle, however, this problem can be handled by estimating different gaps for the different tax and expenditure bases, while the aggregate output gap could still be used for the discretionary fiscal stabilisation component. The appendix to this note briefly describes how this can be done and what it would imply for the budget rule.

There are also some other practical issues connected with a rule requiring precise targets for the actual budget balance. Even if the government does everything it can to adhere to the rule, there might be circumstances beyond its control that lead to the yearly required budget balance being missed. One such situation arises if the outcome of the output gap (the ex post gap) deviates from the predicted (ex ante) gap. This must, of course, be taken into account in the ex post evaluation of target fulfilment. Provided the forecast is unbiased, the calculations are transparent and there is an open evaluation of target fulfilment by the European Commission or a national politically independent fiscal body, such an ex post clause should not provide scope for undetected manipulation of the rule.

Another relevant question is how the rule should be applied if, due to forecasting errors, the government during a boom runs higher surpluses than the rule requires. Some would argue that the government should then be allowed to run somewhat higher deficits than required by the rule during the following economic downturn. However, since the forecasts for the coming years are also uncertain, such a strategy would probably not be optimal. Instead, it would increase the risk of the target not being met at all. If forecasts are unbiased, positive and negative random forecasting errors will cancel out over time. Thus, unconscious forecasting errors that cannot be allowed for during the ongoing budget year should be treated as bygones.

A further question is what a government should be required to do if it consciously deviates from the annual targets. In the Swiss expenditure rule described above, this problem was handled by the adjustment factor A_{t+1}, which corrects for past differences between budget targets and out-

[23] See, for example, Boije (2004) for a discussion of the problems associated with estimating structural budget balances.

comes. A similar adjustment factor could, in principle, be included in a rule requiring precise annual targets for the actual budget balance. However, as noted earlier, such adjustment factors might themselves contribute to a pro-cyclical policy.

The rule suggested by Calmfors et al. (2003), which is based solely on the actual deficit and the debt level, does not require calculations of the output gap and the budget elasticity. Consequently it would probably be easier to reach political agreement on such a rule. In addition, for the same reasons, it would be more suitable than the other two rules for the stringent EDP. However, as noted above, the rule primarily provides more room to manoeuvre in recessions for low-debt countries. It will probably not contribute to the solution of the asymmetry problem. In addition, even such a rule would entail some practical problems. One is how to account for stock flow adjustments when defining the deficit ceiling for a specific country.

A rule based solely on the actual deficit and debt level does not require calculations of the output gap and the budget elasticity.

Some concluding comments

The conclusion above was that it seems to be difficult to handle the asymmetry problem without a rule based on a measure of the output gap. At the same time, however, the measurement problems and the risk of a critical political discussion about the "right" measure of the output gap and the budget elasticity make it unlikely to be politically feasible to agree on a common formal EU rule that imposes restrictions on the annual actual budget balances in both good and bad times. This problem highlights the need to strengthen national fiscal frameworks. Introducing fiscal rules at the national level that directly address the asymmetry problem (as a rule providing targets for the annual actual budget balance or an expenditure ceiling based on cyclically adjusted revenue) would clearly be a step in the right direction. If such rules were, moreover, to be evaluated by supervisory fiscal bodies that are politically independent, departure from them would not be possible without a public debate. A budget rule linked to the measure of the output gap should be a relevant device for such bodies when evaluating fiscal policy's consistency with a symmetrical fiscal policy, irrespective of whether or not the government has undertaken to follow such rules.

Introducing national fiscal rules that directly address the asymmetry problem would clearly be an advantage; such rules, evaluated by politically independent supervisory bodies, could not be broken without a public debate.

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Appendix

In the main text it was argued that in some cases the aggregated budget elasticity will not accurately capture the automatic stabilisers' impact on the budget balance. This may occur when the economy is hit by shocks that affect the relative sizes of the different tax and expenditure bases. This appendix describes how the impact of the automatic stabilisers on the budget balance (i.e. the cyclical component of this balance) can be measured by a method that takes into account such composition effects.[24]

To keep expressions simple, we assume that there is a single type of tax revenue (T) and only one type of public expenditure (E_U) that depends on the business cycle. There are also other expenditures that we assume are independent of the business cycle (E_O). To give this example "life", let us assume that T denotes revenue from personal labour income taxes and E_U represents the government's outlays for unemployment benefits and expenditure on active labour-market programs.

THE STRUCTURAL COMPONENT OF TAX REVENUE

Revenues from a particular tax can be written as the product of the implicit tax rate and the relevant tax base (X):

$$T = \left(\frac{T}{X}\right) X. \qquad \text{(A:1)}$$

In this example, X denotes taxable labour incomes.

If both sides of equation (A:1) are multiplied by (Y/Y), where Y denotes actual GDP, we get

$$T = \left(\frac{T}{X}\right)\left(\frac{X}{Y}\right) Y. \qquad \text{(A:2)}$$

This expression shows that revenue depends on three variables: the implicit tax rate, the base-to-GDP ratio and GDP.

Now let us assume that, for a given set of policy rules, the tax is proportional to the tax base. This should be a reasonable assumption for a proportional tax system and, given other uncertainties, should probably also result in a decent approximation of a slightly progressive (or regressive) tax system. Given this assumption, the cyclically adjusted revenue can be defined as

[24] This exposé follows closely Braconier & Forsfält (2004). They also discuss some pros and cons of this method.

(A:3) $$T^* = \left(\frac{T}{X}\right)\left(\frac{X}{Y}\right)^* Y^*,$$

where $(T/X) = (T^*/X^*)$, Y^* denotes potential GDP and $(X/Y)^*$ is the normal (trend) base-to-GDP ratio.

THE STRUCTURAL COMPONENT OF EXPENDITURES

Let us now assume that the government's outlays for unemployment benefits and expenditure on active labour-market programs, at given policy rules, are proportional to the number of unemployed persons (U). The cyclically adjusted (or trend) unemployed-related expenditures can then be defined as:

(A:4) $$E_U^* = \frac{E_U}{U} U^* + E_0,$$

where U^* denotes the equilibrium or trend number of unemployed.

THE CYCLICAL COMPONENT OF THE BUDGET BALANCE

The structural (or the cyclically adjusted) budget balance can now be written as

(A:5) $$B^* = \left(\frac{T}{X}\right)\left(\frac{X}{Y}\right)^* Y^* - \frac{E_U}{U} U^* - E_0.$$

The corresponding expression for the actual budget balance is

(A:6) $$B = \left(\frac{T}{X}\right)\left(\frac{X}{Y}\right) Y - \frac{E_U}{U} U - E_0.$$

The cyclical component of the budget balance, which thus is assumed to capture the effects of the automatic stabilisers on the budget balance, can then be written as

(A:7) $$B - B^* = \frac{T}{X}\left(\left(\frac{X}{Y}\right) Y - \left(\frac{X}{Y}\right)^* Y^*\right) - \frac{E_U}{U}(U - U^*).$$

This equation shows that the difference between the actual and the structural budget balance depends on the output gap, the deviations of the tax base-to-GDP ratio from its trend level and on the unemployment gap (the deviation of unemployment from its trend value). This equation can also be written as

$$B - B^* = T\left(\frac{X - X^*}{X}\right) - E_U\left(\frac{U - U^*}{U}\right). \quad \text{(A:8)}$$

That is, the cyclical component of the actual budget balance can also be expressed as the actual tax revenue times the "tax base gap" minus the actual unemployment related expenditure times the unemployment gap.

This expression can now be extended to capture the more realistic case with several cyclically dependent taxes (we still assume that only unemployment-related expenditures are dependent on the business cycle):[25]

$$B - B^* = \sum_{i=1}^{n} T_i\left(\frac{X_i - X_i^*}{X_i}\right) - E_U\left(\frac{U - U^*}{U}\right). \quad \text{(A:9)}$$

In contrast to the aggregated method, whereby the cyclical component of the budget balance is estimated by a measure of the aggregated budget elasticity and the output gap, this expression thus takes into account composition effects. Dividing both sides by Y and substituting the resulting expression into equation (6), we get the following budget rule

$$b = \theta(D, IL) + \left(\frac{1}{Y}\right)\sum_{i=1}^{n} T_i\left(\frac{X_i - X_i^*}{X_i}\right) - E_U\left(\frac{U - U^*}{U}\right) + (\beta + j\gamma)\left(\frac{Y - Y^*}{Y^*}\right). \quad \text{(A:10)}$$

[25] Given some assumptions, this expression could be adjusted to take into account elasticities between the relevant bases and the taxes/expenditures capturing progressive or regressive elements in the tax and expenditure system. See Bouthevillain et al. (2001).

Notices

New distribution of work in the Executive Board

The Executive Board of the Riksbank decided on 14 December 2004 on certain changes in the distribution of the Board's work that were aimed at clarifying the responsibilities between the Executive Board members and enhancing the conditions for coherent management of the Bank's organisation. The new distribution of work came into force on 1 January 2005, entailing the following delineation of responsibilities:

- Lars Heikensten is Governor of the Riksbank.
- Eva Srejber is the Governor's alternate and Deputy Governor of the Riksbank with responsibility for presenting proposals regarding asset management.
- Villy Bergström is Deputy Governor and responsible for presenting proposals regarding fundamentally important opinions and for making decisions in other matters relating to consultation documents.
- Lars Nyberg is Deputy Governor and responsible for presenting proposals for Financial Stability Reports and proposals on measures aimed at ensuring the stability and efficiency of the payment system.
- Kristina Persson is Deputy Governor and responsible for presenting proposals regarding strategic information and communication issues.
- Irma Rosenberg is Deputy Governor and responsible for presenting proposals for Inflation Reports and for decisions concerning monetary and exchange rate policy measures.

As before, the Executive Board has collective responsibility for the Bank's entire activities.

Swedish portfolio holdings 2003

The total value of Swedish portfolio assets abroad amounted at the end of 2003 to SEK 1,536 billion; an increase of 17 per cent compared with the end of 2002. The increase was mainly due to rising equity prices, but also stemmed from larger acquisitions of both equity and debt securities. Almost one third of Swedes' total foreign portfolio assets were invested in American securities. The largest holder category for the portfolio assets was the sector "Other financial institutions".

These statistics come from the annual survey of Swedish investors' holdings of foreign portfolio shares and debt securities, which was pub-

lished on 17 December 2004. The data in the survey are part of a global survey conducted by the International Monetary Fund (IMF). The report can be downloaded from the Riksbank's website (www.riksbank.se).

Survey of the general public's knowledge of the Riksbank

Six in ten Swedes consider the Riksbank to be credible or highly credible. However, half do not know the Riksbank's inflation target. Almost all Swedes – 95 per cent – have heard of the Riksbank but a large proportion, 40 per cent, has limited knowledge about the Bank and its activities.

These are two findings of a survey of the general public's knowledge of and attitudes to the Riksbank, carried out by Temo on behalf of the Bank. The survey was carried out between 29 September and 16 October 2004 in the form of telephone interviews with 1,001 people in the age range 16–74. The Riksbank has conducted similar surveys since 1996. The purpose is to provide the Riksbank with a picture of the information needs regarding the Bank's activities. The report can be downloaded from the Riksbank's website (www.riksbank.se).

Issues of commemorative coins 2005

At its meeting on 14 December 2004, the Executive Board of the Riksbank decided on the commemorative coins that will be issued during 2005. These are a coin to commemorate the 100th anniversary of the birth of Dag Hammarskjöld, issued in silver with a value of SEK 200 and gold with a value of SEK 2,000, a coin to commemorate the dissolution of the union between Sweden and Norway, issued in silver with a value of SEK 200 and gold with a value of SEK 2,000, and a coin to commemorate the 150th anniversary of the first Swedish postage stamp, which will either be a bi-metal coin or in "Nordic gold" alloy with a value of SEK 50.

The design of the commemorative coins will be determined by the General Council. Editions, prices and a final timetable for the respective coins will be established by the Executive Board.

The preliminary timetable for issuing the coins is as follows:
100th anniversary of the birth of Dag Hammarskjöld, June/July 2005,
100th anniversary of the dissolution of the union between Sweden and Norway, September/October 2005 and
150th anniversary of the first Swedish postage stamp, autumn 2005.

Exchange of EU payment

Sweden's EU membership entails monthly contributions to the EU's budget. These are made in Swedish kronor and must be converted by the recipient central bank. Around the end of the year, the amounts tend to be unusually large, at the same time as market turnover often is low. Therefore, for market reasons, the Riksbank has previously exchanged the EU flow around the end of the year. The EU contribution made at the end

of 2004/beginning of 2005 amounted to SEK 7.2 billion. The Riksbank purchased Swedish kronor for euro and then repurchased the corresponding amount in euro on the foreign exchange market during the months immediately following the exchange. The transaction had no monetary policy significance.

Riksbank reallocates its gold and foreign currency reserve

The Riksbank has up to 18 January 2005 sold a total of 15 tonnes of gold under the renewed Central Bank Gold Agreement (CBGA) established between fifteen European central banks and which came into force on 27 September 2004. The agreement, which runs for five years, gives the Riksbank the possibility to sell up to 60 tonnes of gold during this period. The proceeds from the sale have been reinvested in foreign currency securities.

The purpose of the reduction in gold holdings was to enable the Riksbank to achieve higher risk-adjusted returns on its assets. However, gold will continue to be an important asset on the Bank's balance sheet. After the reallocation, the gold holdings at the Riksbank amount to approximately 170 tonnes, or around 10 per cent of the value of the gold and foreign currency reserve.

The Riksbank's Annual Report 2004

The Riksbank presented its Annual Report for 2004 to the Riksdag, the Swedish parliament, on 14 February 2005. The bank reported a loss before appropriations of SEK 2.8 billion. A stronger krona during 2004 led to a foreign exchange loss of SEK 5.6 billion. Lower interest rates than in 2003 meant that the value of the Riksbank's bond holdings rose. However, with effect from 2004, unrealised gains are entered directly into a special revaluation account in the balance sheet and have no effect on the result.

General Council's decision on allocation of net income

The General Council of the Riksbank has, in accordance with the Sveriges Riksbank Act, presented a proposal to the Riksdag (the Swedish parliament) regarding the allocation of the Riksbank's net income for the financial year 2004. The General Council proposes that SEK 6.7 billion be transferred to the Treasury.

According to the current guidelines, 80 per cent of the average income before appropriations over the past five years shall be transferred to the Treasury. The income used as a base for calculating the size of the transfer is adjusted for exchange rate effects and changes in the market value of the Riksbank's gold reserve.

Moderate increase in direct investment assets

The Riksbank's annual survey of direct investment assets, which was published on 18 February 2005, showed that the value of Swedish direct investment assets abroad amounted to SEK 1,266 billion at the end of 2003, an increase of SEK 5 billion over the year. Income on Swedish assets abroad totalled SEK 122 billion in 2003, which was an increase of SEK 25 billion on the previous year.

Foreign direct investment in Sweden amounted to SEK 1,094 billion at the end of 2003, which was an increase of SEK 40 billion over the year. Income on foreign-owned assets in Sweden totalled SEK 36 billion in 2003, which was SEK 4 billion less than the previous year. The 2003 survey showed a positive contribution to the current account of SEK 86 billion for 2003, which entailed a revision of SEK 27 billion to the earlier, preliminary figures.

Monetary policy calender

2002-03-18 The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 20 March 2002. The *deposit rate* is accordingly adjusted to 3.25 per cent and the *lending rate* to 4.75 per cent.

04-25 The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 2 May 2002. The *deposit rate* is accordingly adjusted to 3.5 per cent and the *lending rate* to 5.0 per cent.

06-28 The *reference rate* is confirmed by the Riksbank at 4,5 per cent for the period 1 July 2002 to 31 December 2002.

11-15 The *repo rate* is lowered by the Riksbank from 4.25 per cent to 4.0 per cent as of 20 November 2002. The *deposit rate* is accordingly set at 3.25 per cent and the *lending rate* to 4.75 per cent.

12-05 The *repo rate* is lowered by the Riksbank from 4.0 per cent to 3.75 per cent as of 11 December 2002. The *deposit rate* is accordingly set at 3.0 per cent and the *lending rate* to 4.5 per cent.

2003-01-01 The *reference rate* is confirmed by the Riksbank at 4.0 per cent for the period 1 January 2003 to 30 June 2003.

03-17 The Riksbank decides to lower the *repo rate* from 3.75 per cent to 3.50 per cent, to apply from 19 March 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.75 per cent and 4.25 per cent respectively.

06-05 The Riksbank decides to lower the *repo rate* from 3.50 per cent to 3.00 per cent, to apply from 11 June 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.25 per cent and 3.75 per cent respectively.

06-30 The *reference rate* is confirmed by the Riksbank at 3.0 per cent for the period 1 July 2003 to 31 December 2003.

07-04 The Riksbank decides to lower the *repo rate* from 3.0 per cent to 2.75 per cent, to apply from 9 July 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.00 per cent and 3.50 per cent respectively.

2004-01-01 The *reference rate* is confirmed by the Riksbank at 3.0 per cent for the period 1 January 2004 to 30 June 2004.

02-06 The Riksbank decides to lower the *repo rate* from 2.75 per cent to 2.50 per cent, to apply from 11 February 2004. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 1.75 per cent and 3.25 per cent respectively.

03-31 The Riksbank decides to lower the *repo rate* from 2.50 per cent to 2.00 per cent, to apply from 7 April 2004. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 1.25 per cent and 2.75 per cent respectively.

06-30 The *reference rate* is confirmed by the Riksbank at 2.0 per cent for the period 1 July 2004 to 31 December 2004.

2005-01-01 The *reference rate* is confirmed by the Riksbank at 2.00 per cent for the period 1 January 2005 to 30 June 2005.

Statistical appendix

Statistics from Sveriges Riksbank are to be found on the Internet (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 website of the International Monetary Fund (IMF) (dsbb.imf.org). Dates of publication is also available on www.riksbank.se.

1 Riksbank's assets and liabilities

ASSETS. PERIOD-END STOCK FIGURES. SEK MILLION

		Gold	Lending to banks	Fixed assets	Other	Total
2003	July	18 210	15 601	158 042	1 723	193 576
	Aug	18 210	17 186	161 861	3 642	200 899
	Sept	18 210	15 206	161 340	2 444	197 200
	Oct	18 210	14 971	163 016	1 198	197 395
	Nov	18 210	15 669	165 571	3 901	203 351
	Dec	18 030	23 825	143 076	10 445	195 376
2004	Jan	18 029	15 901	146 891	12 110	192 931
	Feb	18 029	14 887	146 551	11 828	191 295
	March	19 130	14 509	151 951	11 897	197 487
	April	19 129	14 975	150 885	12 255	197 244
	May	19 129	10 001	149 736	2 866	181 732
	June	17 719	10 760	146 234	3 182	177 895
	July	17 718	10 635	153 528	2 897	184 778
	Aug	17 718	10 801	150 035	2 800	181 354
	Sept	18 095	10 269	150 885	2 718	181 967
	Oct	18 095	10 405	147 908	2 807	179 215
	Nov	18 095	11 063	150 093	2 706	181 957
	Dec	17 392	17 002	145 256	5 935	185 585
2005	Jan	16 436	11 101	145 391	5 725	178 653
	Feb	15 952	10 210	147 097	5 575	178 834

LIABILITIES. PERIOD-END STOCK FIGURES. SEK MILLION

		Notes and coins in circulation	Capital liabilities	Debts to monetary policy counterparties	Debts in foreign currency	Other	Total
2003	July	100 055	50 556	100	2 939	39 926	193 576
	Aug	101 644	50 556	69	7 247	41 383	200 899
	Sept	100 136	50 556	89	4 933	41 486	197 200
	Oct	99 987	50 556	58	6 483	40 311	197 395
	Nov	100 779	50 556	18	7 416	44 582	203 351
	Dec	108 940	50 556	540	3 653	31 687	195 376
2004	Jan	101 954	80 697	64	8 408	1 808	192 931
	Feb	100 615	80 697	61	7 774	2 148	191 295
	March	100 295	80 697	98	6 079	10 318	197 487
	April	100 863	80 697	68	4 769	10 847	197 244
	May	102 008	65 317	95	3 099	11 213	181 732
	June	102 858	65 317	190	4 159	5 371	177 895
	July	102 747	65 317	37	10 883	5 794	184 778
	Aug	102 979	65 317	280	6 821	5 957	181 354
	Sept	102 670	65 317	79	8 900	5 001	181 967
	Oct	102 821	65 317	25	5 326	5 726	179 215
	Nov	103 297	65 317	101	6 557	6 685	181 957
	Dec	108 894	65 317	613	7 448	3 313	185 585
2005	Jan	104 438	65 317	36	5 817	3 045	178 653
	Feb	103 557	65 317	94	6 453	3 413	178 834

2 Money supply

END-OF-MONTH STOCK

		SEK million			Percentage 12-month change	
		M0	M3		MO	M3
2002	Jan	89 737	1 031 807	Jan	6.4	7.4
	Feb	88 950	1 014 905	Feb	5.5	7.1
	March	89 998	1 033 020	March	5.6	6.5
	April	88 666	1 049 030	April	2.6	7.6
	May	88 818	1 025 757	May	2.4	4.3
	June	89 383	1 053 910	June	2.4	4.1
	July	88 631	1 037 162	July	2.2	6.1
	Aug	89 945	1 051 986	Aug	2.6	6.7
	Sept	89 567	1 061 341	Sept	1.9	5.2
	Oct	89 461	1 051 867	Oct	0.7	2.9
	Nov	90 465	1 068 389	Nov	0.6	2.8
	Dec	95 866	1 086 057	Dec	–0.9	4.5
2003	Jan	90 122	1 085 994	Jan	0.4	5.3
	Feb	90 505	1 072 732	Feb	2.9	5.7
	March	91 966	1 092 435	March	2.2	5.8
	April	92 334	1 095 256	April	4.1	4.4
	May	92 346	1 097 622	May	4.0	7.0
	June	92 296	1 106 661	June	3.3	5.0
	July	91 608	1 090 284	July	3.4	5.1
	Aug	93 324	1 109 725	Aug	3.8	5.5
	Sept	92 451	1 113 021	Sept	3.2	4.9
	Oct	92 364	1 114 967	Oct	3.2	6.0
	Nov	93 070	1 107 251	Nov	2.9	3.6
	Dec	98 481	1 119 288	Dec	2.7	3.1
2004	Jan	93 087	1 109 798	Jan	3.3	2.2
	Feb	92 465	1 117 521	Feb	1.0	4.2
	March	92 399	1 116 429	March	0.5	2.2
	April	92 653	1 130 152	April	0.3	3.2
	May	93 032	1 132 356	May	0.7	3.2
	June	94 732	1 115 232	June	2.6	0.8
	July	92 962	1 115 661	July	1.5	2.3
	Aug	94 355	1 126 118	Aug	1.1	1.5
	Sept	93 992	1 147 939	Sept	1.7	3.1
	Oct	93 657	1 149 171	Oct	1.4	3.1
	Nov	95 163	1 161 064	Nov	2.2	4.9
	Dec	98 239	1 171 100	Dec	–0.2	4.6
2005	Jan	95 017	1 159 341	Jan	2.1	4.5

3 Interest rates set by the Riksbank

PER CENT

	Date of announcement	Effective from	Repo rate	Deposit rate	Lending rate	Period	Reference rate[1]
2002	03-19	03-20	4.00	3.25	4.75	2002:2hå	4.50
	04-26	05-02	4.25	3.50	5.00	2003:1hå	4.00
	11-15	11-20	4.00	3.25	4.75	2003:2hå	3.00
	12-05	12-11	3.75	3.00	4.50	2004:1hå	3.00
2003	03-18	03-19	3.50	2.75	4.25	2004:2hå	2.00
	06-05	06-11	3.00	2.25	3.75	2005:1hå	2.00
	07-04	07-09	2.75	2.00	3.50		
2004	02-06	02-11	2.50	1.75	3.25		
	03-31	04-07	2.00	1.25	2.75		

[1] 1 July 2002 the official discount rate was replaced by a reference rate. which is set by the Riksbank at the end of June and the end of December.

4 Capital market interest rates

EFFECTIVE ANNUALIZED RATES FOR ASKED PRICE. MONTHLY AVERAGE. PER CENT

		Bond issued by:					
		Central Government				Housing institutions	
		3 years	5 years	7 years	9–10 years	2 years	5 years
2004	Jan	3.22	4.00	4.46	4.65	3.39	4.35
	Feb	3.04	3.86	4.42	4.55	3.19	4.19
	March	2.72	3.53	4.16	4.31	2.85	3.86
	April	2.77	3.75	4.40	4.55	2.88	4.09
	May	2.96	3.97	4.55	4.68	3.09	4.36
	June	3.01	4.03	4.60	4.72	3.11	4.40
	July	2.86	3.88	4.45	4.57	2.95	4.22
	Aug	2.75	3.85	4.29	4.42	2.83	4.05
	Sept	2.80	3.90	4.26	4.37	2.86	4.02
	Oct	2.68	3.75	4.13	4.25	2.75	3.84
	Nov	2.56	3.60	4.01	4.13	2.62	3.69
	Dec	2.34	3.33	3.76	3.90	2.38	3.38
2005	Jan	2.62	3.16	3.58	3.84	2.25	3.20

5 Overnight and money market interest rates

MONTHLY AVERAGE. PER CENT

			Interbank	Treasury bills			Company certificates	
		Repo rate	rate	3-month	6-month	12-month	3-month	6-month
2002	Jan	3.75	3.85	3.74	3.81		3.94	3.97
	Feb	3.75	3.85	3.87	3.99		4.01	4.14
	March	3.84	3.94	4.09	4.29	4.64	4.27	4.43
	April	4.00	4.10	4.25	4.41		4.52	4.69
	May	4.25	4.35	4.29	4.48	4.79	4.64	4.79
	June	4.25	4.35	4.28	4.42	4.71	4.88	5.00
	July	4.25	4.35	4.26	4.37		4.89	4.95
	Aug	4.25	4.35	4.19	4.29	4.43	4.83	4.87
	Sept	4.25	4.35	4.17	4.21	4.29	4.82	4.84
	Oct	4.25	4.35	4.07		4.14	4.67	4.64
	Nov	4.15	4.25	3.91	3.84	3.93	4.20	4.19
	Dec	3.85	3.95	3.66	3.68	3.77	3.97	3.95
2003	Jan	3.75	3.85	3.65			3.90	3.88
	Feb	3.75	3.85	3.61	3.40	3.55	3.85	3.79
	March	3.64	3.74	3.40	3.36	3.35	3.64	3.57
	April	3.50	3.60	3.42			3.62	3.59
	May	3.50	3.60	3.18	2.96		3.43	3.37
	June	3.16	3.26	2.81	2.71	2.61	3.03	2.94
	July	2.82	2.92	2.68			2.87	2.82
	Aug	2.75	2.85	2.71	2.81		2.88	2.90
	Sept	2.75	2.85	2.71	2.73	2.91	2.88	2.92
	Oct	2.75	2.85	2.73			2.89	2.93
	Nov	2.75	2.85	2.72	2.75		2.88	2.93
	Dec	2.75	2.85	2.69	2.70	2.83	2.86	2.87
2004	Jan	2.75	2.85	2.60			2.77	2.74
	Feb	2.59	2.69	2.46	2.38	2.47	2.59	2.59
	March	2.50	2.60	2.27	2.23	2.28	2.43	2.40
	April	2.10	2.20				2.15	2.18
	May	2.00	2.10	1.99	2.07	2.33	2.15	2.23
	June	2.00	2.10	1.98	2.07	2.38	2.15	2.24
	July	2.00	2.10				2.15	2.24
	Aug	2.00	2.10	2.03	2.13		2.15	2.25
	Sept	2.00	2.10	2.00	2.13		2.15	2.26
	Oct	2.00	2.10				2.16	2.27
	Nov	2.00	2.10	2.03	2.12		2.14	2.25
	Dec	2.00	2.10	2.00	2.05		2.12	2.16
2005	Jan	2.00	2.10				2.10	2.12

6 Treasury bill and selected international rates

MONTHLY AVERAGE. PER CENT

		3-month deposits				6-month deposits			
		USD	EUR	GBP	SSVX[1]	USD	EUR	GBP	SSVX[1]
2002	Jan	1.74	3.28	3.94	3.74	1.85	3.28	4.04	3.81
	Feb	1.81	3.30	3.94	3.87	1.94	3.33	4.08	3.99
	March	1.91	3.34	4.03	4.09	2.15	3.45	4.23	4.29
	April	1.87	3.39	4.06	4.25	2.11	3.47	4.26	4.41
	May	1.82	3.40	4.05	4.29	2.01	3.56	4.26	4.48
	June	1.79	3.41	4.06	4.28	1.93	3.52	4.27	4.42
	July	1.76	3.34	3.94	4.26	1.82	3.40	4.07	4.37
	Aug	1.69	3.28	3.90	4.19	1.69	3.31	3.91	4.29
	Sept	1.73	3.24	3.88	4.17	1.71	3.18	3.89	4.21
	Oct	1.71	3.20	3.88	4.07	1.67	3.08	3.87	
	Nov	1.39	3.07	3.88	3.91	1.40	2.96	3.89	3.84
	Dec	1.33	2.86	3.92	3.66	1.34	2.81	3.92	3.68
2003	Jan	1.27	2.76	3.88	3.65	1.29	2.69	3.87	
	Feb	1.25	2.63	3.65	3.61	1.25	2.51	3.59	3.40
	March	1.19	2.47	3.56	3.40	1.17	2.39	3.50	3.36
	April	1.22	2.48	3.54	3.42	1.20	2.41	3.48	
	May	1.20	2.35	3.53	3.18	1.16	2.25	3.49	2.96
	June	1.03	2.09	3.55	2.81	1.00	2.02	3.48	2.71
	July	1.04	2.08	3.38	2.68	1.05	2.04	3.37	
	Aug	1.05	2.09	3.43	2.71	1.11	2.12	3.52	2.81
	Sept	1.06	2.09	3.60	2.71	1.10	2.12	3.70	2.73
	Oct	1.08	2.09	3.72	2.73	1.12	2.12	3.87	
	Nov	1.08	2.10	3.88	2.72	1.17	2.17	4.07	2.75
	Dec	1.08	2.09	3.93	2.69	1.15	2.13	4.08	2.70
2004	Jan	1.04	2.03	3.96	2.60	1.10	2.06	4.11	
	Feb	1.03	2.02	4.08	2.46	1.09	2.03	4.19	2.38
	March	1.02	1.97	4.21	2.27	1.07	1.95	4.34	2.23
	April	1.06	1.99	4.30		1.19	2.01	4.45	
	May	1.16	2.03	4.44	1.99	1.44	2.08	4.63	2.07
	June	1.41	2.06	4.69	1.98	1.72	2.13	4.91	2.07
	July	1.54	2.06	4.77		1.80	2.13	4.93	
	Aug	1.66	2.06	4.86	2.03	1.87	2.11	4.98	2.13
	Sept	1.85	2.06	4.84	2.00	2.01	2.14	4.93	2.13
	Oct	2.01	2.10	4.80		2.15	2.13	4.85	
	Nov	2.24	2.12	4.77	2.03	2.42	2.16	4.81	2.12
	Dec	2.44	2.12	4.76	2.00	2.65	2.16	4.78	2.05
2005	Jan	2.60	2.10	4.75		2.85	2.15	4.77	

[1] Treasury bills.

7 Krona exchange rate: TCW index and selected exchange rates

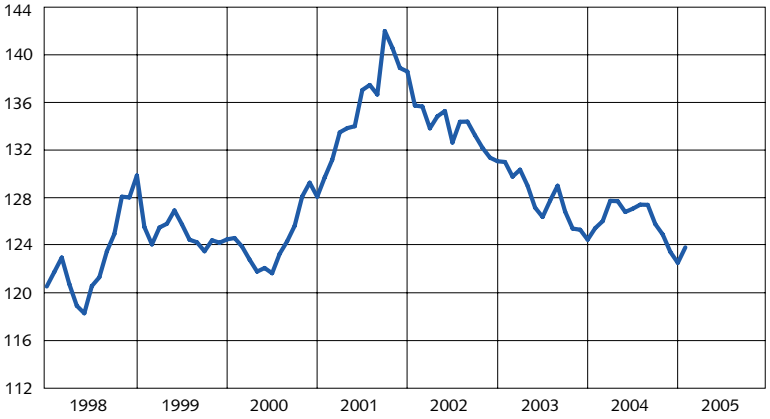
MONTHLY AVERAGE

			SEK				
		TCW-index	EUR	GBP	USD	JPY	CHF
2002	Jan	135.7390	9.2292	14.9642	10.4398	0.0788	6.2594
	Feb	135.6543	9.1869	15.0223	10.5603	0.0791	6.2179
	March	133.8096	9.0600	14.7064	10.3396	0.0789	6.1690
	April	134.8265	9.1331	14.8742	10.3105	0.0788	6.2300
	May	135.2764	9.2236	14.6763	10.0519	0.0796	6.3300
	June	132.6093	9.1190	14.1612	9.5591	0.0774	6.1959
	July	134.3652	9.2705	14.5199	9.3400	0.0791	6.3380
	Aug	134.3777	9.2524	14.5486	9.4641	0.0795	6.3235
	Sept	133.2278	9.1735	14.5449	9.3504	0.0775	6.2617
	Oct	132.1625	9.1053	14.4489	9.2793	0.0749	6.2156
	Nov	131.3311	9.0785	14.2485	9.0655	0.0746	6.1869
	Dec	131.0292	9.0931	14.1771	8.9458	0.0732	6.1861
2003	Jan	130.9609	9.1775	13.9590	8.6386	0.0727	6.2767
	Feb	129.7272	9.1499	13.6813	8.4930	0.0711	6.2358
	March	130.3167	9.2221	13.5031	8.5298	0.0720	6.2777
	April	128.9566	9.1585	13.2756	8.4370	0.0704	6.1248
	May	127.1076	9.1541	12.8520	7.9229	0.0676	6.0426
	June	126.3154	9.1149	12.9638	7.8108	0.0660	5.9211
	July	127.6987	9.1945	13.1295	8.0807	0.0681	5.9417
	Aug	128.9600	9.2350	13.2074	8.2825	0.0697	5.9957
	Sept	126.7679	9.0693	13.0143	8.0861	0.0703	5.8616
	Oct	125.3358	9.0099	12.9077	7.6966	0.0703	5.8195
	Nov	125.2370	8.9908	12.9783	7.6831	0.0703	5.7642
	Dec	124.3958	9.0169	12.8514	7.3632	0.0682	5.8001
2004	Jan	125.3707	9.1373	13.1985	7.2493	0.0681	5.8343
	Feb	125.9654	9.1814	13.5574	7.2599	0.0682	5.8367
	March	127.6783	9.2305	13.7500	7.5243	0.0694	5.8922
	April	127.6519	9.1711	13.7941	7.6501	0.0711	5.9008
	May	126.7383	9.1312	13.5751	7.6061	0.0679	5.9248
	June	127.0144	9.1422	13.7711	7.5332	0.0688	6.0193
	July	127.3590	9.1954	13.8041	7.4931	0.0685	6.0222
	Aug	127.3415	9.1912	13.7313	7.5444	0.0683	5.9753
	Sept	125.7140	9.0954	13.3500	7.4484	0.0677	5.8943
	Oct	124.8272	9.0610	13.1085	7.2557	0.0666	5.8730
	Nov	123.3656	9.0036	12.8863	6.9390	0.0662	5.9155
	Dec	122.4392	8.9786	12.9405	6.7030	0.0646	5.8495
2005	Jan	123.7464	9.0538	12.9620	6.8996	0.0668	5.8527
	Feb	124.4271	9.0839	13.1666	6.9778	0.0665	5.8614

Note. The base for the TCW index is 18 November 1992. TCW (Total Competitiveness Weights) is a way of measuring the value of the krona against a basket of other currencies. TCW is based on average aggregate flows of processed goods for 21 countries. The weights include exports and imports as well as "third country" effects.

8 Nominal effective TCW exchange rate

INDEX: 18 NOVEMBER 1992=100



Note: TCW (Total Competitiveness Weights) is a way of measuring the value of the Swedish krona against a basket of other currencies. TCW is based on average aggregate flows of processed goods for 21countries. The weight includes imports, exports as well as "third country" effects.

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