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341 123
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Contents

- Can we be best again? The role of capital formation in long-term growth 5

Villy Bergström

During the quarter-century from the early 1970s living standards in Sweden slipped in relation to other countries. Catching up again requires a rate of productivity growth that is some tenths of a percentage point higher than in other countries year after year. This calls for a high rate of capital formation, more people at work and a great deal of effort for research and development. Even if Sweden managed to achieve higher productivity growth, catching up with Denmark and Norway would take two to three decades.

- The financial accelerator and corporate investment 23

Claes Berg, Jan Hansen and Peter Sellin

The authors analyse how corporate balance sheets and credit terms influence corporate investment via the financial accelerator and the part played by monetary policy in this context. The empirical findings suggest that in addition to the variables that normally feature in predictive equations, the financial accelerator has effects on corporate investment in Sweden that are substantial. The accelerator also seems to be of importance for monetary policy's impact on the business cycle.

- Swedish monetary policy 47

Staffan Viotti

In 1993 Sweden adopted an inflation target regime for monetary policy. Today the regime is well established and Sveriges Riksbank, the Swedish central bank, has developed an elaborate framework for its implementation. The article gives an overview of both the analytical framework of the inflation target regime and the actual implementation of this policy. The focus is on the period after the Riksbank gained formal independence in 1999.

- Notices 77

- Monetary policy calendar 79

- Statistical appendix 81

- Articles in earlier issues 90

■ Can we be best again? The role of capital formation in long-term growth

BY VILLY BERGSTRÖM

Villy Bergström is Deputy Governor of Sveriges Riksbank.

During the quarter-century from the early 1970s living standards in Sweden slipped in relation to other countries. Catching up again calls for a high rate of capital formation, more people at work and a great deal of effort for research and development. The prerequisites for succeeding include a higher rate of investment, early entry to the labour market, a higher retirement age and lower sickness rates over a period of decades. Even if Sweden managed to achieve higher productivity growth, catching up with Denmark and Norway would take two to three decades.

A sincere thank you to Annika Svensson in the Monetary Policy Department for providing data, particularly on the labour force.

Sweden has unquestionably lost its leading position in the “prosperity league”. Sweden was one of the world’s four most prosperous countries at the beginning of the 1970s. By the mid 1990s we had fallen below the average for the industrialised countries. There has been some recovery since then but most of our neighbours now have a higher standard of living than we do.

Numerous ways of coming to terms with this situation by strengthening economic growth in Sweden have been put forward in the economic debate. Regardless of whether the proposals concern taxes, social security, education or research and technical development, they need to act via three channels, that is, by affecting labour supply, capital formation or the technology factor. At a theoretical level, the recipe for growth is, after all, very simple. The crucial ingredients are the rates of increase for labour and capital and the pace of advances in technology.

While the Riksbank can contribute to the creation of a favourable environment for growth, monetary policy is not one of growth’s driving forces. Even so, the mechanisms of economic growth are of interest to the Riksbank because rapid growth makes the Bank’s tasks easier. The Riksbank tightens and eases monetary policy with a view to keeping demand more or less under control so that discrepancies between the conditions for production and the demand for consumption and investment goods

Growth is dependent on the rates of increase for labour and capital together with the pace of advances in technology.

The Riksbank can contribute to the creation of a favourable environment for growth but monetary policy is not one of growth’s driving forces.

from households and firms, as well as the public sector's requirements, do not become unduly large. This stabilises the development of prices. High long-term growth (potential output) provides room for high total demand without this leading to inflationary pressure. So while monetary policy is not capable of increasing potential output, in the worst case it can – as we saw in the 1970s and 1980s – impair the conditions for high potential output by stimulating demand in the economy to such an extent that this leads to rapid inflation. That was what happened in the 1970s when a series of devaluations was accompanied by an excessively expansionary fiscal policy. The Riksbank accordingly distinguishes between two concepts of growth: “potential output”, which is determined by the supply-side factors I mentioned earlier, and “demand growth”, which consists of the development of consumption, investment and net exports.

Productivity – a welfare indicator?

It is the standard of living that is of interest and this does not necessarily improve just because the population and the labour force are growing.

In country comparisons of growth, however, noting that growth in a country is high on account of a rapid increase in the labour force is not all that relevant. The interesting point is the standard of living, which does not necessarily improve because the population and the labour force are growing. What matters is the rate at which output per capita is rising, which brings us to the concept of productivity in a wide sense.

There are various ways of measuring productivity. Labour productivity in a country can be measured per inhabitant but the result then depends on the relative size of the working population. Measurements per person in active age groups are dependent in turn on labour force participation and absenteeism, e.g. due to unemployment or illness. Measures per person in employment are affected by the duration of working hours. A more “robust” indicator of labour productivity is output per hour worked. Such measurements avoid confusion from variations in labour force participation, overtime or other demographic changes that affect productivity but they do not tell us much about a country's living standards. High productivity per hour worked can be achieved by a few persons working a few hours, so that GDP per capita is low.

Finally I want to draw attention to the important concept of total factor productivity, which relates output to inputs of all factors of production. Output in terms of GDP is related to a weighted combination of the inputs of labour and capital. The result indicates the efficiency with which all production factors are being utilised. It shows in principle the extent to which output can be increased with unchanged inputs of labour and capital. The concept is synonymous with technological development.

The term productivity, without further qualification, refers to labour productivity measured in one of the above-mentioned ways, usually per employee or hour in the case of corporate sector productivity and per capita in the context of GDP and living standards. The latter concept is more closely related to a country's welfare than is economic growth, for which changes in the labour force play a part. It is noteworthy that for a long time the main factor behind the high growth in the United States has been a rapidly growing labour force; labour productivity there has not risen faster than in Sweden except in the past two years (2002 and 2003).

In the first half of the 20th century, Sweden was one of the countries with the highest rates of productivity growth, regardless of how this is measured. The result was increased prosperity. Swedish productivity growth then became even stronger in the 1950s and 1960s.¹ This was partly because strong demand in connection with post-war reconstruction led to decreased unemployment. Moreover, the liberalisation of trade in these decades resulted in increased competition and, above all, capital formation was rapid. In other words, the unemployed were drawn into production at the same time as production factors were allocated more efficiently than during the war years. This favourable productivity performance generated further improvements in prosperity. In 1970 Sweden came fourth in the OECD's "prosperity league", which meant that Sweden was one of the world's four most prosperous countries.

In the next two decades, however, productivity growth was considerably weaker and it is generally acknowledged that things did not go well for Sweden in either the 1970s or the 1980s. By the beginning of the 1990s Sweden had slipped to 18th place, below the average for the industrialised countries, since when we have climbed back a little. So what were the causes of the decline? Identifying the factors behind the weak growth in the twenty years from the mid 1970s to the mid 1990s can be instructive. The mistakes in that period need to be avoided in the future.

Unsuccessful economic policy in Sweden in the quarter-century after 1970 entailed a marked weakening of productivity growth. In order to explain labour productivity, the basic "recipe" for growth I mentioned earlier needs some modification. According to the modified version, changes in labour productivity (given certain conditions: living standards) are dependent on capital growth per employee and technology. This assumes a constant composition of the population, with a uniform distribution by age. The fundamental relationship for changes in the standard of living can then also be written as a function of capital growth per

In the first half of the 20th century, Sweden was one of the countries with the highest rates of productivity growth.

Unsuccessful economic policy in Sweden in the quarter-century after 1970 entailed a marked weakening of productivity growth.

¹ This applies to output as well as labour productivity. For penetrating analyses of developments from 1870 to 1979 see Bentzel (1979) and Schöön (2000).

employee and technology. A complication to which I shall be returning is that in practice the distribution by age is not constant.

Excessively slow capital formation contributed to weaker productivity growth in Sweden

The first oil crisis meant that most industrialised countries experienced decreased productivity growth some way into the 1970s.

What lay behind Sweden's poor performance in the 1970s and 1980s? The first point to note is that a slackening of productivity growth occurred in most industrialised countries some way into the 1970s. It had to do with the supply shock in the form of the first oil crisis, when the price of oil tripled. Then came the second oil crisis at the end of that decade, when the oil price not only tripled again but did so from a considerably higher level. The oil-producing countries can be said to have imposed a tax on the industrialised countries in the form of massive net transfers. The price of oil is economically important in many ways. Oil provides energy for transportation and heating, so its price has a direct impact on costs for these purposes. Corporate expenditure is also affected because petroleum products are used as intermediate goods, for example as raw materials for plastic products.

A multifold increase in the price of such an essential input as oil necessitates adjustments to production processes and structural changes, besides entailing disruptions, so that productivity growth weakens at least for a time. The supply shocks accordingly caused problems in every country. In Sweden, however, productivity growth weakened more markedly than in other countries that were correspondingly dependent on oil.

The oil price shocks coincided in Sweden with a domestic cost crisis.

Many explanations have been suggested. Social welfare benefits were improved in this period. Sickness benefits were increased in 1974 and again in 1987, accompanied by legislation on job security and co-determination. Business costs rose and production was disrupted by absenteeism for sickness and other forms of leave that were also introduced.² While these factors are difficult to evaluate, it is probable that they contributed. So the oil price shocks coincided in Sweden with a domestic cost crisis that led to a loss of production. The collapse of the Bretton Woods system of fixed exchange rates was followed by a loss of discipline in the labour market. Sweden's currency was devalued five times between 1976 and 1982. Public sector expenditure rocketed and the policy of "bridging" the international slowdown in the mid 1970s meant that firms retained labour to a greater extent than in other countries and labour productivity rose more slowly. One can say that in the

² See Henrekson et al. (1992) for health insurance and Myhrman (1994) for labour market legislation.

absence of the norm the Bretton Woods system had provided, economic policy suffered a breakdown.

The dramatic changes that also occurred in capital formation in the mid 1970s unquestionably explain a part of the slowdown in productivity growth. The accumulation of capital is, of course, dependent on all manner of economic conditions for business enterprises and the public sector, including those I have mentioned earlier.

Investment activity is usually expressed in terms of gross fixed capital formation. This component of GDP includes the investments that are needed to make up for the wear and tear that all production entails. Deducting the part of gross investment that represents compensation for capital depreciation leaves what is known as net investment, which accordingly consists of additions to the real capital that is already at work in production in the form of machinery, factories and other buildings.

When we look at the figures on capital formation, it must be borne in mind that with the structural changes in the past quarter-century, capital now weighs less heavily in the Swedish economy. The structure of the corporate sector has changed. The manufacturing sector as a whole, including the “heavy” basic industries such as mining, the iron and steel industries and the pulp and paper mills, have shrunk relative to GDP at the same time as the production of services has expanded. The GDP share for the basic industries has decreased from 6.5 per cent in 1970 to little more than 4 per cent at present, while the share for the production of business services has grown from approximately 30 per cent to over 40 per cent. In other words, capital-intensive production has increasingly given way to production that is more dependent on human capital than on heavy machinery and plant.

Another factor that leads to lower figures for capital formation is the decline in residential construction. For productivity growth, however, residential construction is not as important as manufacturing investment. So the dramatic fall in capital formation does not necessarily imply an equally marked weakening of productivity growth. Still, net investment – the contribution to capital formation – fell by more than half in relation to disposable national income in the mid 1970s.³ It therefore looks as though Sweden is investing less than before in capital formation that enhances productivity. This is evident from the limited extent of the structural changes compared with the drastic contraction of net investment relative to GDP.

Capital formation also changed dramatically in the mid 1970s.

Production has shifted from capital-intensive operations to a greater dependence on human capital.

Net investment fell by more than half in relation to disposable national income in the mid 1970s.

³ Disposable net national income consists of GDP less reinvestment and net outward transfers (e.g. development assistance and net interest expenditure on external debt).

This implies, for one thing, lower capital growth per employee or hour worked.

This has two implications. One is that capital growth per employee or hour worked will be lower. The significance of capital input per employee will be readily understood if we take the drastic example of what a single worker with a pick and shovel can achieve compared with a hydraulic digger. The latter requires a great deal more capital per employee than digging with a spade and is much less of a physical strain on the worker. Another drastic example is the bucksaw or the crosscut compared with a modern forest harvester.

For another, new capital brings new technology into the production process.

These examples also illustrate the other implication, which acts indirectly: new capital brings new technology into the production process.⁴ Investments are a means of bringing new technology, new methods and new research findings into practical production. So slower capital formation can be expected to lead to a slower development of production technology. A digger or a harvester is very much more than a substitute for a lot of spades or saws; it represents an entirely new technology that affects the entire production process – planning, transportation and ancillary services. The computerisation of forest harvesters has replaced entire corps of professionals such as forest engineers and forest keepers. So when capital growth per employee declines, we should expect productivity growth to slacken as a consequence of a smaller volume of capital as well as a slower pace of technological developments. Developments in IT, which lie behind much of real capital formation's effect on productivity, also enhance productivity in the administrative systems of manufacturing companies (as well as elsewhere).⁵

Capital per employee grew more slowly from the mid 1970s onwards, which meant that new technology was not utilised to the same extent as before.

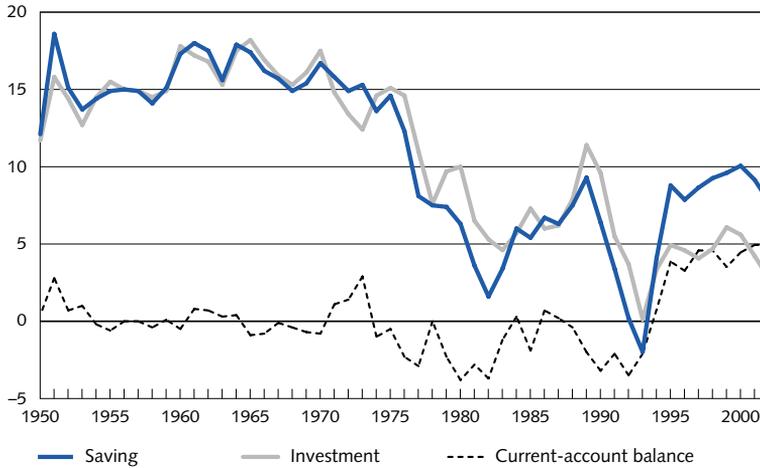
Figure 1 shows that capital formation – net investment as a share of national disposable income – decreased from a level of about 15 per cent in the mid 1970s to about 5 per cent at the turn of the century.⁶ In other words, capital per employee grew more slowly from the mid 1970s onwards, which meant that new technology was not utilised to the same extent as before. Such a dramatic change is bound to have consequences. The balance on current account (the curve low down in the figure) was almost continuously in deficit for twenty years from 1975 because saving in Sweden fell even more than investment. It was not until the second half of the 1990s that a current-account surplus was restored in connection with a weakened currency, higher capital formation and even higher

⁴ What I have in mind here is "embodied technological growth". New technology can also be incorporated in production processes through organisational changes and small, everyday improvements in productivity with a given capital stock, that is, without investment; this is referred to as "disembodied".

⁵ As the discussion here concerns the decreased volume of net investment, it should be mentioned that even reinvestment (the difference between net and gross) brings new technology into production processes.

⁶ The calculation involves deducting computed capital depreciation from gross fixed capital formation to give net investment, which represents the change in the stock of capital. The measurements of gross investment are fairly precise, while depreciation is estimated in a relatively standardised way.

Figure 1. Saving, net investment, and current-account balance relative to disposable national income
Per cent



Source: Berg (2000) updated.

saving. That means that there are resources in Sweden for capital formation without increased saving. I shall be returning to that.

To illustrate the importance of the lower capital formation, Table 1 presents data for productivity in the period when the major shift occurred. By the 1980s a lower rate of capital growth had been established. Capital growth per employee (capital intensity) had more than halved both in manufacturing and in the corporate sector as a whole. Productivity growth followed suit; it more than halved from the high figures in the 1960s.

TABLE 1. CAPITAL INTENSITY AND PRODUCTIVITY GROWTH
RATIO AND PER CENT

	Manufacturing		Corporate sector	
	Capital/employee	Productivity	Capital/employee	Productivity
1963–70	8.3	7.6	6.5	5.3
1970–80	6.3	3.4	6.2	3.2
1980–86	2.8	3.2	3.0	2.0

Source: Sparfrämjandet (1989).

From Figure 1 it will also be seen that the capital formation Sweden achieved in relation to total resources in the 1960s has not been restored and the fluctuations have been greater after the mid 1970s. The average proportion we invest in new capital is roughly one-third of what it used to be. A difference is the increase in saving compared with investment, which means that Sweden is exporting capital and has a current-account surplus.

In the first half of the 1990s, rationalisations and the elimination of relatively unproductive enterprises meant that productivity growth rose but also high unemployment.

Although the rate of capital formation continued to be relatively low, the weak trend for labour productivity in Sweden's corporate sector in recent decades was broken in the first half of 1990 and productivity growth picked up. But this was not caused by capital formation. It was extensive rationalisations and the elimination of relatively unproductive enterprises in connection with the economic crisis in the early 1990s that gave higher productivity growth but they also resulted in high unemployment. Sweden became less prosperous relative to other OECD countries. High unemployment and a falling GDP meant that we slipped down to below the average living standard.

With a view to creating conditions for a more sustainable long-term economic trend, in this period there were also changes in Sweden's economic policy. A realignment of fiscal and monetary policy resulted in greater stability and predictability; this probably made the economy more efficient in that resource allocation was no longer driven by inflation expectations. The reforms of the tax and social security systems presumably had similar effects.

In the late 1990s Sweden managed to achieve higher growth and recovered some of the ground that had been lost earlier.

At the same time, Sweden's adherence to the EU's common market and deregulations in a number of important markets resulted in stronger competitive pressure. Moreover, high growth in the private compared with the public sector and the development of information and computer technology in the second half of the 1990s probably contributed to the higher productivity growth. In the late 1990s Sweden managed to achieve growth rates that were higher than for many years, with rapidly rising real wages, and recovered some of the ground that had been lost earlier.

But in view of the relatively low rate of capital formation since the 1970s, there are grounds for wondering about Sweden's future growth prospects. Will we be able to recover something of our earlier prominence as a relatively prosperous industrialised country? What does the low capital formation imply in this context? Will labour force growth be sufficient to cope with the need for care in an aging population? Let us start by considering the latter question.

Will the supply of labour be sufficient?

Besides productivity, a country's long-term growth potential is determined by the supply of labour, which depends on how many of its inhabitants are capable of working and for how many hours each of them is prepared to work.

The number of hours worked rose after the crisis in the early 1990s. The underlying factors included increased labour demand, more people in the economically active age group (20–64 years) and comparatively low absenteeism for sickness. In recent years, however, the upward trend for hours worked has been broken. The main reason is the rising number of persons on sick leave since 1997–98. Absenteeism for sickness, as measured in the usual ways, is higher in Sweden than in any other EU country. Holiday and other leave has also risen, while overtime and additional working hours have decreased. Neither has the Swedish labour market been sufficiently successful in utilising people born abroad; the participation rate for this group has been considerably lower than for persons born in Sweden.

The number of hours worked rose after the crisis but in recent years the upward trend has been broken.

In the future, moreover, demographic developments according to Statistics Sweden will be less favourable for the labour force than they have been to date. The active age group will admittedly continue to grow but the net increment will diminish because of a sharp rise in departures from this group. The latter has to do with the fact that people in the large birth cohorts from the 1940s are now approaching retirement. This could have a negative effect on potential growth.

Demographic developments will be less favourable in the future.

In the coming ten years it is calculated that the number of persons over 65 will rise by 270,000, which gives an average annual increase of approximately 1.6 per cent, whereas the number in the active age group rises by 170,000 or by only approximately 0.3 per cent a year. This ongoing shift from active to passive generations will continue after that: from 2012 to 2030 the number of over-65s is calculated to rise by about 1.3 per cent a year while the number in the active age group is virtually unchanged.

All this calls for measures to increase the future labour supply. Lower absenteeism for sickness and fewer people retiring early can contribute to this. There will also be a growing need for people to enter working life at an earlier age, as well as for a higher participation rate among older age groups, perhaps with a higher retirement age. At present, moreover, there is an unutilised labour reserve among the immigrant population. The average employment rate for people born abroad is about 30 per cent lower than for persons born in Sweden. Measures for improving the labour market integration of persons with a foreign background could make a positive contribution to labour supply.

This calls for measures to increase the future labour supply.

If the Government's target of halving sick leave is achieved, the annual increase in hours worked, for example, could be 0.4 percentage points higher up to 2008. An additional 0.1 percentage point a year could be gained if the labour reserve among people with a foreign background were to be utilised to the same extent as among persons born in Sweden.

This would be positive for potential growth. But as the increment to the active population would stop at half of one per cent and only apply for a time, the maintenance burden on the active group would still grow.

More pressure on the public finances

The active age group in Sweden will need to maintain an increasingly large proportion of young and elderly people.

The unfavourable age structure in the future is not only a challenge in terms of potential growth. It will have other consequences, too. The trends imply, for instance, that the number of over-65s will increase from 17 per cent of the population today to 23 per cent in 2030, while the proportion in the active age group decreases from 59 to 54 per cent. This means that the active age group in Sweden will need to maintain an increasingly large proportion of young and elderly people. At present, each person in the active age group maintains 0.70 inactive persons who are either younger or older. By 2030 it is calculated that this maintenance burden will have risen to 0.84 persons, an increase of 20 per cent.

The increase in the maintenance burden is explained by large birth cohorts reaching the retirement age – in the period 2005–15 for those born in the 1940s and in the years around 2030 for those born in the 1960s – together with an assumed increase in life expectancy. Looking at just the over-65s, today their number per person in the active age group is 0.29, while by 2030 the ratio is calculated to have risen to 0.42.

Today's problems with public sector financing are trivial compared with what they will be if nothing is done.

The problems we see today with public sector financing and high tax pressure are trivial compared with what they will be if nothing is done. The age structure of the population implies large requirements for welfare services and thereby increased pressure on the public finances. At the same time, a lower labour supply and thereby lower output lead to lower central government revenue.

Even with a more balanced demographic development, the problems would still grow. The structural shift towards a growing proportion of services in production contributes to this. People who produce services demand the same wages as employees elsewhere, yet productivity growth for services is considerably lower than in industries exposed to competition. The latter undergo continuous rationalisation with a growing capital input per employee, whereas this is harder to achieve in all kinds of services. As a result, the relative price of services rises over time.

This is a problem in particular if, as is the case in Sweden and other predominantly social democratic countries, services are largely provided by the public sector and financed with tax revenue. Wage increases negotiated in the highly productive manufacturing sector spread to the production of services and may lead to increases in prices and taxes. This view may need to be qualified if it turns out that, unlike earlier innova-

tions, the so-called IT revolution paves the way for rationalisations in services industries, although the effects in such fields as medical care, social services and education will be limited.

How can we respond to the challenge?

Many proposals have been put forward for coping with the active population's increased burden in the future. Increased saving today has been recommended, for instance by adding a percentage point or so to Government's target for the budget balance as a way of successively reducing central government debt.⁷ It is envisaged that a lower central government financing requirement leaves more room for capital formation in the private sector (crowding in). Here a distinction needs to be made between two ways of securing the future for an ageing population: increased saving either without increased capital formation or as a way of providing resources for increased investment in Sweden and thereby a larger capital stock.

The first way results in a current-account surplus that ultimately generates interest income, dividends and other capital income that adds to Sweden's national income. The tax base does not grow to the same extent as with investment in Sweden because it is only a matter of capital taxes on dividends and other income from abroad. Still, this would be a solution if Sweden wants to import services in the future by locating care of our elderly to sunny countries like Greece and Portugal and letting young people study abroad. The imported services would be financed with the external assets. It is possibly this strategy that Japan is aiming for in relation to its Chinese and Korean neighbours.

The other response to the challenge is to stimulate capital formation in Sweden. Capital growth then rises to compensate for the slower growth of the labour force. Saving already exists in the form of the current-account surplus and could be utilised. The calculations from Berg (2004) indicate that a five per cent surplus would suffice to double capital formation's share of disposable national income. This approach can be seen as a natural consequence of a fall-off in labour force growth. Economic growth is maintained by stimulating its other source, capital formation. Capital is substituted for labour, giving a rising input of capital per hour worked (a higher capital intensity), rising real wages and a growing tax base that contributes to the continued financing of public activities such as care and social services.

A distinction should be made between two ways of securing the future for an ageing population: increased saving without and with increased capital formation.

Increased capital formation adds to the tax base, making it possible to finance care and social services.

⁷ See SOU 2002:16 and SNS (2004).

The difference from investment abroad lies in the expansion of the tax base in Sweden and thus the potential to finance care and social services here. External investment contributes much less to the tax base compared with increased capital formation in Sweden. On the other hand, care and social services can be located to more temperate countries, in which case the drain on external assets leads to a smaller current-account surplus or a deficit. The importance of high real capital formation is considered in the next section.

Basic industries – a good example!

A high rate of capital formation can lead to increased output without a larger input of labour.

With a high rate of capital formation so that capital intensity rises, increased output can be achieved without a larger input of labour or even with less labour. Sweden's basic industries are an example that points to a feasible way of coping with the unfavourable age structure of the population in the future. A resolute increase in capital intensity releases labour for the production of services. Such a process has been in progress for a long time in the form of declining employment in manufacturing and rising employment in services industries. It must continue and be accelerated. Developments in the basic industries illustrate how this can be achieved.

Those who debated the so-called new economy in the 1990s were prone to predict that the days of the traditional industrial society were over and that manufacturing faced the fate that agriculture previously experienced. The basic industries – in Sweden primarily mining, the iron and steel industry, paper manufacturing and wood products – are a component of the corporate sector that tends to be overlooked. Their role has admittedly diminished in recent decades, particularly for employment, but they remain important for net exports. While the rise and fall of the ICT sector in the course of some years has dominated the debate, an industrial evolution has been in progress for a long term in other parts of the corporate sector. It is, after all, in industries outside the ICT sector that much of the new technology's benefits have been and will be reaped. Neither are the services industries excluded from this.

There have been major structural adjustments in basic industries.

There have been major structural adjustments in basic industries. In the past forty years the average capacity of plants in forest industries, for example, has risen eight-fold for paper manufacturing and six-fold for pulp. Small plants have been closed and operations are now highly concentrated. Economies of scale and more stringent environmental standards have necessitated considerable investments. Today, about 3 per cent of world paper output is located in Sweden, which has 9 per cent of paper exports (of Sweden's output of paper and commercial pulp, almost

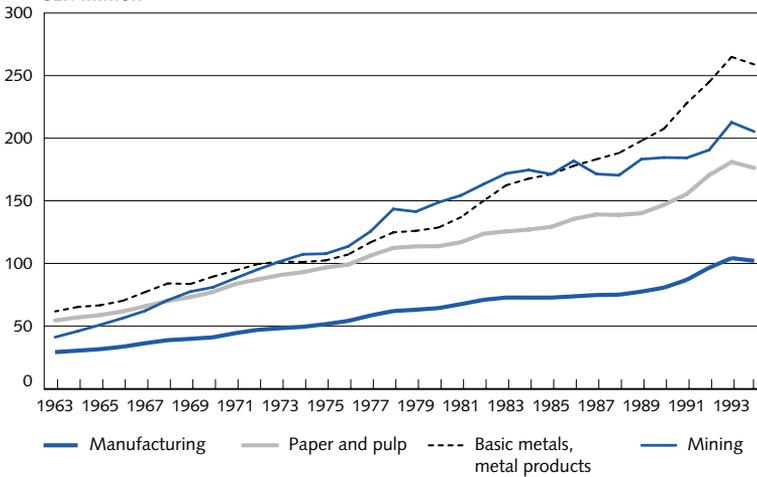
85 per cent is exported). The mining industry is admittedly smaller than it used to be; value-added here now contributes just over 1 per cent of the total for mining and manufacturing. But net ore exports, which hardly changed in the early 1990s, picked up towards the end of that decade to about 2 per cent of total net exports of industrial products.

The mining company LKAB contributes about 4 per cent of world trade in iron ore.⁸ Employment at LKAB peaked at 8,297 persons in 1961, when the output of iron ore stood at 17.1 million tonnes. Today, 2,750 persons work there and now produce 21.5 million tonnes. Upgrading and further processing have raised the value of output from SEK 0.92 billion to SEK 6.2 billion in mines where workers and heavy labour are virtually absent. Drilling, loading and transportation are directed via computer screens in an office environment.

In spite of the competition from countries where trees grow much faster and ores are cheaper, plus the fact that technology in some fields has become easier to transfer between countries, the basic industries have weathered numerous crises over the years. The explanation for this and their comparative importance today is probably that their owners and executives have been quick to invest and adopt new technology while constantly attempting to refine their products and find new niches. They have rapidly substituted capital for labour (see Figure 2).

The basic industries have weathered numerous crises over the years, probably by being quick to adopt new technology.

**Figure 2. Capital stock per employee
SEK million**



Sources: Statistics Sweden and the Riksbank.

⁸ Ds 2001:63.

Thus, basic industries in Sweden have achieved the essential adjustments to modern structures and then more than held their own in international competition. This is a striking contrast to the rusting steel industry and the problems for forest industries in the United States, where import tariffs are being used in an attempt to avoid having to adjust.

While Swedish manufacturing as a whole lost almost 20 per cent of its world market share relative to other OECD countries between 1970 and 1990, towards the end of the 1980s the basic industries staged a recovery. Productivity in the basic industries also developed more favourably than in other industries, with a strong positive trend, particularly in the second half of the 1980s.

Sweden has specialised in capital-intensive process industries, based on cheap energy and a good supply of raw materials, above all from forests. Thus, the main driving forces have been the supply of energy and raw materials, not cheap real capital. But within the framework of an overall contraction of capital formation in Sweden, a great deal of real capital has been invested in basic industries.

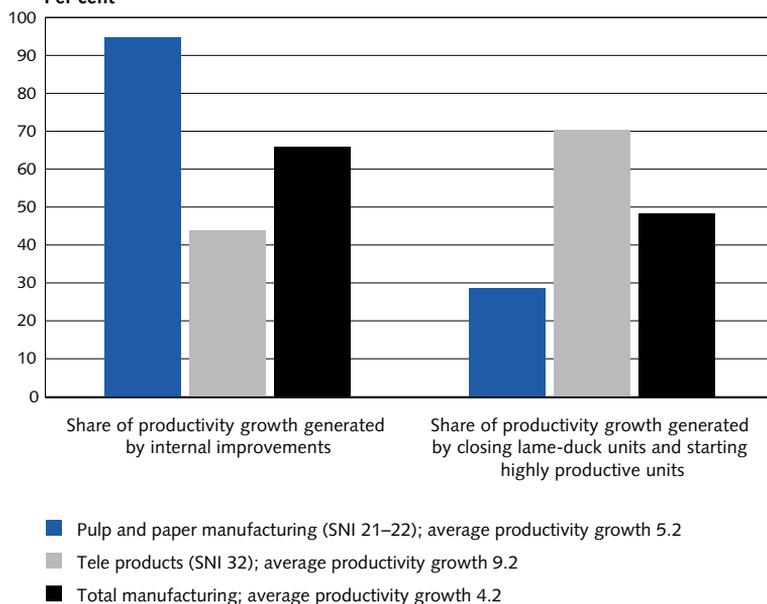
A phenomenon of importance for the success of the basic industries is total factor productivity.

Another phenomenon of importance for the success of the basic industries is total factor productivity. This is a reflection of advances in technology and indicates in principle the extent to which output in a given period can rise with unchanged inputs of labour and capital. It is largely via investment, however, that new technology is incorporated in production. Total factor productivity is dependent on the resources a country or an industry devotes to research and development (R&D), as well as on the ability to make day-to-day rationalisations and to adapt structures and organisations. The intensity of R&D in Sweden is higher than in other OECD countries in 12 out of 19 industries. This relative level of R&D intensity is particularly high in the basic industries, above all in the steel industry and paper manufacturing. In addition to the cheap supply of energy and raw materials, the success of the basic industries has to do with their strong commitment to R&D and investment in real capital, whereby new technology is harnessed to production processes.

It will be seen from Figure 3 that, in contrast to the manufacture of tele products, productivity in the pulp and paper industry has more to do with technical developments generated internally than with the closure of lame-duck plants.⁹

⁹ The underlying calculation includes a small interaction term that is difficult to interpret intuitively but which causes the results to sum to 100 per cent.

Figure 3. Decomposition of changes in total factor productivity 1990-98
Per cent



Sources: Statistics Sweden and the Riksbank.

It has been said that as relative R&D expenditures and capital investment have been particularly high in the basic industries, they have tended to “conserve” the traditional industrial structure. It has even been claimed that our living standard lags behind that of other countries because production factors have been locked into the traditional basic industries. This, of course, is not the case. The conclusion to be drawn instead is that if the corporate sector as a whole had been as alert as the basic industries and put as much into R&D relative to other countries, then Sweden would not have declined into relative poverty.

The basic industries have invested a great deal and thereby maintained output and released labour for other types of production. So the weak investment trend I mentioned earlier has not applied to them. Elsewhere it is all the clearer that capital formation in Sweden has decreased sharply. A case in point is neglected infrastructures such as roads, streets and other facilities. Rail transport functions poorly and the low level of investment will soon become apparent in the field of housing, where we are still benefiting from the high investment in earlier decades.

If the corporate sector as a whole had gone in for R&D as much as the basic industries relative to other countries, Sweden would not have declined into relative poverty.

Can we be best again?

If we manage to raise potential growth, the Riksbank will not need to tighten monetary policy on that account.

Economic growth is currently a focal subject for political debate in Sweden. It is a question of restoring a relatively high living standard and coping with the consequences of the unfavourable demographic tendencies – not least in view of the public finances. Besides, if we manage to raise potential growth, the Riksbank will not need to tighten monetary policy on that account.

It is important that conditions are created for an increased labour supply in the future. This includes enabling people with a foreign background to get a job. Moreover, ways should be found so that economic policy reduces the distortionary effects of the system of benefits and taxes, not least as regards people's propensity to work and the desire to launch new enterprises in all walks of economic life.

A fundamental prerequisite for success is to restore a high rate of capital formation and thereby the introduction of new technology.

Creating conditions for long-term growth is above all a matter of increased productivity. A fundamental prerequisite for success is therefore the restoration of a high rate of capital formation and thereby the introduction of new technology. But with a large current-account surplus, it is not increased saving that is needed most. Capital exports can be replaced by investment in Sweden. A higher investment intensity can release labour for the production of services, where substituting capital for labour is not as feasible as in the production of goods. Developments in basic industries also show that efforts for research and technical development can generate substantial gains in productivity and that traditional industries do not necessarily belong to the past.

Sweden's basic industries have demonstrated an ability to survive; they have coped with major structural upheavals and show stable growth. They are also the industries in Sweden that have achieved most, relative to other countries, in the level of technology, productivity and innovative ability. Other industries and branches of the corporate sector should emulate the basic industries in a drive for capital investment and R&D so as to release labour for the services industries where rationalisation is less feasible.

Certainly Sweden can be one of the best again. But it calls for diligence, new enterprises, increased investment and a healthier population.

So certainly Sweden can be one of the best again. But it calls for diligence, new enterprises, increased investment and a healthier population. Declining from being one of the richest countries to a relatively poor industrialised country took twenty years. In order to recover a leading position, productivity needs to rise some tenths of a percentage point faster than in other countries year after year for several decades. That is what happened when Sweden rose out of poverty to become a prosperous

country between 1870 and 1970. So what is needed is a long period of sustained effort.¹⁰

Here are some estimates to illustrate this. Compared with Sweden, in 2002 the standard of living (represented by GDP adjusted for purchasing power) was roughly 30, 20 and 10 per cent higher, respectively in the United States, Norway and Denmark.¹¹ The Riksbank usually counts on the sustainable average annual growth of total productivity in Sweden being between 1.5 and 2 per cent. Assume that the same applies to the United States, Norway and Denmark (even though the United States seems to be in a better position), and that Sweden can maintain a rate that is half a percentage point higher ($\lambda = 0,005$) than in those countries. In terms of our earlier history, that would not be out of the question. How long would it then take to catch up with the living standard in those countries; alternatively, how rapidly would our productivity need to grow to achieve this in ten years ($t=10$)? The results of the calculations are presented in the following table.

	$\lambda=0.005$	$t=10$
USA	52 years	+ 2.62 %
Norway	36 years	+ 1.82 %
Denmark	19 years	+ 0.95 %

If Sweden managed to generate a rate of productivity growth that was constantly half a percentage point higher than in the United States, catching up would take more than half a century. The corresponding estimates show that catching up with Norway would take 36 years and with Denmark 19 years. The differential is not unreasonable. Somewhat higher growth than in other countries transformed Sweden in a hundred years from one of the poorest countries in Europe to one of the most prosperous in the world by the early 1970s. But it did take a long time and we were aided by not being involved in two world wars!

Catching up in the course of a decade, on the other hand, appears to be out of the question. Annual productivity growth would need to be over 2.5 percentage points higher than in the United States and average more than 4 per cent ($1.5+2.62$). Not even catching up with Denmark in ten years looks possible as productivity growth would then have to be a full percentage point higher in Sweden throughout this period.

If Sweden managed to generate a rate of productivity growth that was constantly half a percentage point higher than in the USA, catching up would take more than half a century.

¹⁰ Cf the analyses in Schöön (2000) and Bentzel (1979).

¹¹ According to The Economist (2002).

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■ The financial accelerator and corporate investment

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The influence of the financial sector on the business cycle is an important issue that has come to the fore in recent years, partly on account of the financial crises in the early 1990s, the Asian crisis in the middle of that decade and the repercussions of the asset price bubble at its end. In this article we analyse how corporate balance sheets and credit terms influence corporate investment via the financial accelerator and the part played by monetary policy in this context. Our empirical findings suggest that in addition to the variables that normally feature in predictive equations, the financial accelerator has effects on corporate investment in Sweden that are substantial. We also find that the accelerator is of importance for monetary policy's impact on the business cycle.

We are grateful for comments from Sonja Daltung, Magnus Jonsson, Kerstin Mitlid, Mattias Persson, Staffan Viotti and Per Åsberg Sommar as well as from participants in seminars at the Riksbank.

Introduction

Theory and empirical evidence both suggest that a well-developed financial sector favours GDP growth per capita.¹ In the wake of credit market deregulation in a number of countries in recent decades, increased financial intermediation has contributed to a higher level of assets as well as liabilities in corporate and household balance sheets. This may also play some part in cyclical developments. The role of the financial sector's structure in the business cycle or in economic variations over several years is an important issue that has come to the fore in recent years, partly on account of the financial crises in the early 1990s, the Asian crisis in the middle of that decade and the repercussions of the asset price bubble at its end. It is partly the experiences from these crises that have made economists and central banks increasingly interested in how the balance sheets and financial conditions of households and firms affect economic developments and the part played by monetary policy in this context.

¹ There is an early analysis in Schumpeter (1911); see also Carlin & Mayers (2000) and Rajan & Zingales (1998).

The purpose of this article is to analyse how the terms for corporate borrowing can influence corporate investment via the financial accelerator. While the conditions for corporate funding are affected by numerous factors, from a central bank perspective the part played by monetary policy is particularly relevant. We therefore begin by briefly describing how monetary policy affects investment via the traditional channels of interest rates and asset prices. Then we review the role of asymmetric information in the theory about how corporate balance sheets affect the finance premium that a firm has to pay on external borrowing, followed by a section on empirical experiences in some other countries. Then we present own calculations on Swedish macro data which throw light on the part that finance premiums and the financial accelerator can play in addition to the variables that are normally used to explain corporate investment. The article ends with some conclusions.

Monetary policy and corporate investment

Monetary policy influences corporate investment via a number of channels, for example the traditional interest rate channel.

Monetary policy influences corporate investment via a variety of channels. The notion behind the traditional interest rate channels is that monetary policy steers the short-term money market rates and these in turn affect the longer-term bond rates and thereby a firm's costs for investment finance. An expansionary adjustment of monetary policy lowers costs for corporate capital and therefore stimulates business investment. Conversely, a monetary tightening has the opposite effect on interest rates and restrains demand.

Monetary policy also influences demand via various channels involving asset prices, for instance Tobin's q .

Monetary policy also influences demand via various channels involving asset prices. In the context of business investment these channels focus on Tobin's q , which is the ratio of a firm's market value to the replacement value of its capital stock.² Monetary expansion tends to generate a higher value of q , which means that financing new investment by issuing shares becomes more profitable for the firm and investment rises. A monetary tightening contributes instead to a lower value of q , which is associated with lower investment demand. Tobin's original model of investment assumes perfect competition and sees the monetary policy transmission mechanism as acting solely via q . Empirical studies and more realistic assumptions about monopolistic competition indicate that monetary policy also influences investment via aggregate demand. Theory and empirical work have therefore been extended to include effects of

² See Tobin (1969).

demand restrictions. A term for the state of demand should therefore be included as an explanatory variable in the investment function.³

There are many indications that in addition to the traditional monetary policy channels, there is a role for a broader credit channel through which asymmetric information between creditors and borrowers may influence assessments of corporate balance sheets and lead to cyclical variations in funding costs.

There are various versions of the credit channel.⁴ Initially the analysis focused on the so-called *bank lending channel* and bank balance sheets. Banks are in a special position when it comes to dealing with asymmetric information in the financial markets. For some categories of borrowers, access to the credit market is confined to borrowing via banks. For them, a more expansionary monetary policy, whereby bank balance sheets permit increased lending, means that they can borrow more in the banking system, which stimulates demand. Conversely, a monetary tightening leads to a contraction of bank balance sheets and lending to these borrowers is subdued. In a widely recognised analysis, Bernanke (1983) shows how the bank lending channel tended to deepen the depression in the United States in the 1930s. In deregulated economies today, a broader bank lending channel also plays a role in monetary policy's transmission. The problem of asymmetric information can affect the external funding of small banks in particular and thereby their provision of credit.

The deregulation of financial markets and changes in how central banks work have been followed by the emergence of a theory about a broader *credit or balance-sheet effect* on risk premiums. Here the notion is that asymmetric information can play a part in corporate funding facilities more generally. The broad credit channel focuses on the role that a firm's balance sheet and financial standing play in obtaining credit not only from banks but also from other financial market agents. The theory holds that effects of monetary policy can be accentuated in that changes in corporate balance sheets influence credit risk; this may contribute to a firm having to pay a premium on external investment financing compared with internal funding, a premium that varies over the business cycle. A *financial accelerator effect* is assumed to arise if a firm's internal funding potential declines in connection with an economic slowdown at the same time as external funding costs rise. Besides leading to higher interest rates in general, a fall in q and ultimately a slackening of demand, a monetary tightening is thus assumed to contribute to a weakening of corporate bal-

There is also a broader credit channel that takes asymmetric information between creditors and borrowers into account.

The theory indicates that the effects of monetary policy can be accentuated in that changes in corporate balance sheets affect credit risk – a financial accelerator effect can arise.

³ See e.g. Precious (1987) and Cuthbertson & Gasparro (1995). As aggregate demand is also affected by, for example, foreign trade and fiscal policy, it can be difficult empirically to isolate just monetary policy's impact on investment.

⁴ For reviews of the literature in this field see Bernanke & Gertler (1995) and Walsh (2003).

ance sheets that further increases credit risk and funding costs. The opposite occurs after a monetary easing and the financial accelerator fuels the economic recovery.

Corporate risk premiums are susceptible to other factors besides balance sheets and the central bank's instrumental rate.

It does not follow that cyclical fluctuations are inevitably accentuated by the financial accelerator. If, for example, the central bank targets inflation and endeavours to stabilise demand in order to fulfil the target at a given time horizon, the interest rate adjustments to this end may be somewhat smaller in the presence of a significant financial accelerator effect. It should also be borne in mind that corporate risk premiums are susceptible to other factors besides balance sheets and the central bank's instrumental rate. An international financial crisis, for instance, can lead to temporarily higher risk premiums for Swedish firms even though fundamental factors in Sweden have not changed all that much.

Finance premium occasioned by information costs

The prime cause of the financial accelerator is a premium on external compared to internal financing.

The financial accelerator's prime cause according to the theoretical literature is a *premium on external financing* compared to internal. This finance premium arises because potential creditors and borrowers are differently (asymmetrically) informed about the projects for which the funds are intended. The firm is assumed to know more about the risks connected with loans, partly because it is in a position to influence them through its behaviour. For creditors, keeping informed entails certain costs that are reflected in what they charge for loans. Alternatively, creditors are aware that the less they are informed, the greater is the risk in their loans. Such costs to creditors on account of borrowers' risks (agency costs) result in the premium on external compared to internal financing. Agency costs of this type can be motivated on various grounds.⁵

Adverse selection is liable to occur if creditors have difficulty in determining the risks in borrowers' projects.

Difficulties for creditors in determining the risks in borrowers' projects are liable to result in adverse selection. Firms with high-risk projects are more prone to finance them with loans because they foresee a high return if things go well, while if the project fails they can avoid having to repay the loan by defaulting. Rising interest rates can lead to a growing proportion of risk-prone borrowers; this accentuates adverse selection because low-risk borrowers have to carry the interest expenditure in full and therefore refrain from borrowing.

Another problem with loan financing can arise if borrowers behave fraudulently (moral hazard).

Another problem connected with loan financing is if borrowers treat their creditors fraudulently (moral hazard). As a borrower's investment risk is limited to the loss of equity, an increased proportion of loan financing creates incentives for borrowers to take more risks. Rising interest rates

⁵ For a review of the literature on financial intermediaries see e.g. Gorton & Winton (2003).

may induce borrowers to raise the level of risks in their investments even more.

Creditors may therefore incur information costs (monitoring costs) for verifying how loans are being used and for ensuring, for example, that borrowers do not report a worse outcome than is actually the case.

The need to monitor borrowers and the associated costs vary inversely with (i) the size of the assets with which the loan is collateralised, and (ii) the borrower's debt burden. This means that the higher the value of the *borrower's net assets*, the lower the finance premium. The value of net assets is determined by the borrower's cash flow and asset prices.

Taken together, these credit market imperfections mean that the expected profit on lending does not rise automatically with an increase in the lending rate.⁶ On the contrary, above a certain threshold a higher lending rate may contribute to lower profits for the creditor because it may result in an increased proportion of risk-prone borrowers or high-risk projects. Creditors may therefore require a finance premium even before the threshold has been reached; they seek compensation for the risk involved in not knowing enough about a project they are financing and/or having limited possibilities of controlling the risks. An alternative for creditors is to refrain from lending to certain potential borrowers (credit rationing).

Due to these credit market imperfections, the expected profit on lending does not rise automatically with an increase in the lending rate.

The analysis in Gertler (1988), Bernanke & Gertler (1989) and Bernanke (1983) suggests that the premium for external financing will be smallest during a cyclical upswing and largest in a slowdown. Carlstrom & Fuerst (1997) study how this may have to do with cyclical fluctuations in information costs that affect changes in a firm's net wealth. In a general equilibrium model developed by Kiyotaki & Moore (1997), the central factor for variations in net wealth and output are endogenous variations in asset prices.

An influential model with a financial accelerator, developed by Bernanke, Gertler & Gilchrist (1999), is a neo-Keynesian construction with rational households and firms. On account of an assumption about monopolistic competition and adjustment costs, there are lags before prices and wages adapt. Corporate investment expenditure in the model is proportional to the owners' net wealth. If the expected return to capital from an investment rises, the probability of default decreases and the owners can borrow to finance growth. At the same time, however, the increased ratio of debt to net wealth raises the expected cost of default. In equilibrium, the return on a real investment equals the marginal cost of financing debt.

⁶ See e.g. Stiglitz & Weiss (1981).

In this model, a monetary tightening leads to decreased investment on account of a lower q and generally subdued demand. In addition, the price of real capital falls and this lowers the value of the firm's capital stock and its net wealth, which tends to result in creditors requiring a higher finance premium. That dampens corporate investment demand even more. This mechanism is an example of the financial accelerator in that the contribution from the finance premium reinforces the effect of the original tightening of monetary policy.⁷ As a result, cyclical fluctuations are accentuated because – all else equal – it costs more to borrow and invest in a cyclical low and is cheaper in a high.

In practice, however, cyclical developments also depend on the central bank's monetary policy objectives. The more the central bank emphasises demand stabilisation, the less will be the financial accelerator's effect on economic activity. If the central bank targets inflation, chooses to stabilise demand in order to achieve its target one to two years ahead, for example, and allows for the accelerator effect, then it will not need to adjust the interest rate as markedly as if the accelerator did not exist.

Empirical experience of the broad credit channel and the financial accelerator

Studies of corporate investment in the USA in particular confirm that the broad credit channel can be empirically relevant.

A number of studies of corporate investment, particularly in the United States, confirm that the broad credit channel can be empirically relevant. Their findings indicate that balance sheets and finance premiums are of importance for monetary policy's influence on firms.⁸

As the information costs associated with lending probably vary with the size of the firm, much of the empirical analysis has focused on how balance sheets and the financial accelerator affect investment decisions in small as opposed to large firms. As large firms tend to have a longer history, they are assumed to be more transparent and easier for external creditors to assess. Of course there are small firms that have also been established for a long time; when such a firm suddenly enters a phase of rapid expansion, problems may arise, as is evident from several recent cases, e.g. Enron.

⁷ As pointed out by Fisher (1933) in his debt-deflation analysis of the US depression in the 1930s, changes in asset values due to changes in asset prices can also play a dramatic part in accentuating a business cycle. For a review see Dillén & Sellin (2003).

⁸ See e.g. Kashyap, Lamon & Stein (1994), Bernanke, Gertler & Gilchrist (1996) and Oliner & Rudebusch (1996).

The empirical results suggest that, on average, small firms in the United States are more sensitive to business fluctuations than large firms.⁹ Large firms are generally more able to borrow directly in the market and are less affected than small firms by credit rationing in the banks. In a study of turnover and inventory investment in large compared with small firms, Gertler & Gilchrist (1994) find that the ratio of cash flow to interest expenditure is significant in the regression for small firms but not for large.

The empirical results suggest that, on average, small firms in USA are more sensitive to business fluctuations than large firms.

There are also indications in the United States that the return on equity differs systematically between small and large firms. Over the business cycle the return develops more asymmetrically for small compared with large firms. In a slowdown, impaired credit market conditions have a greater impact on the risk (variations in the return) for small firms. As the value of net assets falls, the investment risk rises. Investors require higher risk premiums for investment in small firms.¹⁰

A stronger effect of monetary policy in period with low compared to high business activity is empirically supported in analyses of panel data from the United States.¹¹ After a monetary tightening, moreover, the cash flow becomes more important for investment by small – but not large – firms. After an easing of monetary policy, the corresponding changes do not seem to apply in either small or large firms.¹²

The impact of monetary policy can be greater in periods with low compared to high business activity.

An analysis in the euro area shows that, on average, monetary policy's impact on GDP growth is greater in cyclical lows compared with highs.¹³ In a cyclical low, monetary policy adjustments affect output to a greater extent in small firms than in large. Differences between industries are related to the financial situation: interest rate adjustments in a cyclical low have a greater impact on industries with a comparatively large proportion of short-term borrowing, a low cash flow ratio to interest expenditure and high indebtedness.¹⁴

An analysis in the euro area shows that, on average, monetary policy's impact on GDP growth is greater in cyclical lows compared with highs.

There is also empirical evidence that in open economies, the real exchange rate and foreign currency debt can play an important part in reinforcing the financial accelerator. Tornell & Westermann (2003) analyse VAR models for 37 middle-income countries (GDP/capita: USD 1,000–18,000) plus Sweden and Finland. Each economy is assumed to consist of two sectors, tradeable and nontradeable. In middle-income

In open economies, the real exchange rate and foreign currency debt can play an important part in reinforcing the financial accelerator.

⁹ See e.g. Gertler & Hubbard (1988) and Gertler & Gilchrist (1994).

¹⁰ See Perez-Quiros & Timmermann (2000).

¹¹ See e.g. Gertler & Hubbard (1988) and Kashyap, Lamont & Stein (1994).

¹² See Oliner & Rudebush (1994).

¹³ See Peersman & Smets (2001); the countries in the analysis are Belgium, France, Germany, Italy, the Netherlands and Spain.

¹⁴ Note, however, that these results are dependent on how business activity is measured. They are significant when low activity is defined as falling industrial output; when the definition is a negative output gap, on the other hand, the asymmetric effects of monetary policy are less evident.

countries, firms in the tradeable sector have access to international capital markets whereas those in the nontradeable sector are more exposed to banks and credit restrictions. The notion is that the difference between large and small firms in high-income countries has its counterpart in a difference between firms in the tradeable as opposed to the nontradeable sector in middle-income countries. That is why the real exchange rate might tend to reinforce the accelerator mechanism in these countries. The results suggest that a widening of the spread between domestic and foreign interest rates has a sizeable effect on GDP and bank lending. The volume of credit is strongly related to investment, the real exchange rate and the ratio of tradeable sector to nontradeable sector output.

A central issue is the extent to which corporate investment is liable to be affected by balance sheets and finance premiums in addition to the traditional interest rate channel and Tobin's q . In addition to q and demand, some studies include debt as a financial explanatory variable. Cuthbertson & Gasparro (1995) find that the debt variable helps to explain UK manufacturing investment. Another study, in which Swedish corporate investment is analysed with annual data, shows that debt is important for investment only indirectly, via its effects on output and q .¹⁵ However, the analysis in these studies did not include the effect of either the financial accelerator or finance premiums.

A number of empirical studies accordingly indicate that balance sheets, risk premiums and the financial investment accelerator are potentially important for the business cycle. There is evidence that corporate balance sheets in the United States and a number of countries in Europe are more important for investment when activity is low than in an upward phase. Small firms seem to be more sensitive to cyclical variations than large firms and are more susceptible to balance-sheet movements in a slowdown. The results also suggest that monetary policy's impact on investment may be stronger when activity is slack than when it is high.¹⁶ But it should also be noted that monetary policy's overall effect on cyclical variations depends on the extent to which the central bank chooses to stabilise inflation and aggregate demand; this in turn is subject to many more factors than just investment.

Balance sheets, risk premiums and the financial investment accelerator are potentially important in the business cycle.

¹⁵ See Assarsson, Berg & Jansson (2004).

¹⁶ Research to date in this field has mainly used disaggregated (micro) data. It is only recently that models have been developed for more aggregated simulations that can explore the role of the credit channel for the economy as a whole. There are major measurement problems on account of structural changes in the financial markets. Another problem, particularly in the case of countries in the euro area, is the supply of suitable data. An ambitious ECB project notes that while the traditional interest rate channel seems to be most important for the transmission mechanism in the euro area, there are clear indications that the credit channel is important in certain countries (Austria, Belgium, France, Germany and Italy) For other countries the lack of data makes it difficult to draw any conclusions. See Angeloni, Kashyap, Mojon & Terlizzese (2003).

Empirical analysis of the financial accelerator in Sweden

In order to draw conclusions about the importance of the broad credit channel and the financial accelerator in the Swedish economy it is necessary to analyse their effects on corporate investment. In this section we study the part that balance sheets and finance premiums play in addition to the variables that are normally used to explain the development of corporate investment in Sweden. First we use simple statistical methods to analyse some measures of corporate balance sheets and finance premiums. Then we estimate a macro model of investment that includes corporate finance premiums.

CORPORATE BALANCE SHEETS AND FINANCE PREMIUMS

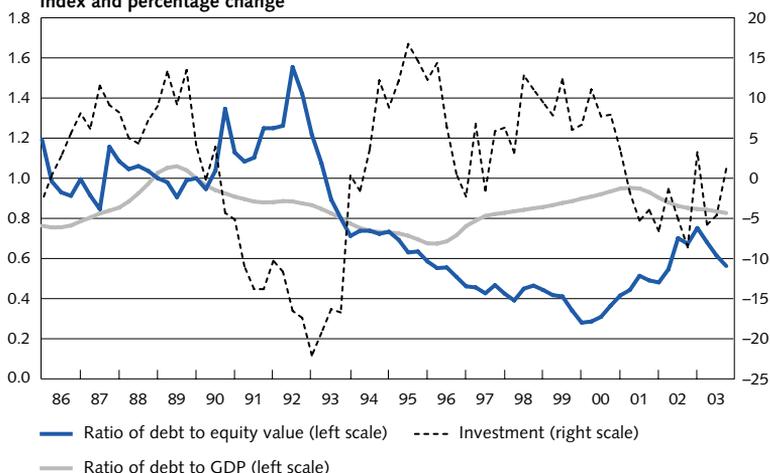
Alternative measures of Swedish corporate debt and finance premiums are discussed below, with an account of their development in recent decades.

Corporate debt should preferably be considered in relation to the market value of corporate assets. As an approximation of the market value, the stock-exchange value has the advantage over book values of also reflecting the value of expected future output, which is the firm's chief asset when it comes to borrowing. On the other hand, a potential drawback with this measure is that there may be periods when stock markets are driven by non-fundamental forces. This argues for relating debt instead to GDP, as share prices can be expected to follow economic growth in the longer run.

The two corporate debt ratios are shown in Figure 1 together with corporate investment. They indicate a marked weakening of corporate balance sheets in connection with the crisis in the early 1990s and a subsequent recovery. During the second half of the 1990s, falling interest rates and rising equity prices again contributed to some build-up of debt relative to GDP. In relation to the market value of assets, on the other hand, debt went on falling until the stock market turned downwards early in 2000. A declining stock market in recent years has entailed higher corporate debt in relation to a broad equity price index; after the long period of rising stock markets in the second half of the 1990s, however, this debt ratio is currently well below the level in the early 1990s. Moreover, corporate debt has fallen relative to GDP in the past year. The figure suggests that investment is negatively correlated with the debt ratios, particularly when debt is shown in relation to stock-market values.

There seems to be a negative correlation between debt and investment activity.

Figure 1. Corporate sector debt ratios and investment Index and percentage change



Sources: Statistics Sweden and the Riksbank.

However, a closer statistical analysis reveals that the debt ratios do not add to the explanation of investment that is provided by demand and Tobin's q (approximated with real equity prices).

Three alternative measures of the finance premium are analysed.

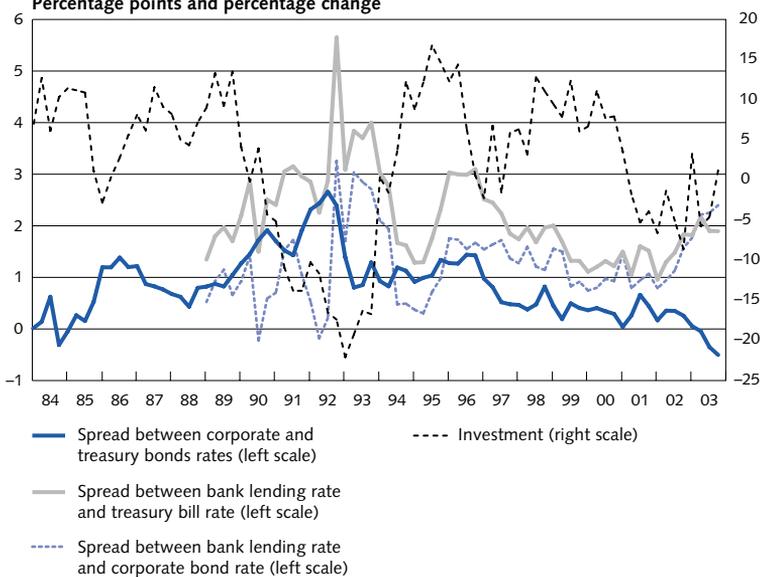
In theory, the effect of balance sheets as a contribution to the financial accelerator is best caught by the premium for external financing. In the empirical world, however, it is difficult to find an exact counterpart to the theoretically motivated premium. One reason is that empirical measurements of finance premiums are liable to include effects of factors that the theory does not recognise. We therefore analyse three alternative measures of the finance premium (see Figure 2):

- (1) FP1 = the spread between the variable bank lending rate to non-financial companies and the three-month treasury bill rate,
- (2) FP2 = the spread between the five-year corporate bond rate and the five-year treasury bond rate, and
- (3) FP3 = the spread between the variable bank lending rate to non-financial companies and the five-year corporate bond rate.

The third measure is relevant if the problem of information is greater for bank loans than for lending against bonds.

For the first two measures of the risk premium the standards for comparison are treasury bill and bond rates, respectively. These spreads therefore need to mirror the risks that are judged to exist in the corporate sector compared with investing in safe treasury papers. It is conceivable, however, that these measures are also influenced by considerations which the theory of a broad credit channel does not take into account, for example

Figure 2. Corporate sector risk premiums and investment
Percentage points and percentage change



Sources: Datastream, Statistics Sweden and the Riksbank.

other types of risk premium. In that firms in general are associated with greater risks than a sovereign, these measures may also catch effects that are not a reflection of problems with agency costs and asymmetric information. They may reflect premiums for credit risks that do not relate solely to balance sheets. In the period studied here, moreover, there were sizeable variations in the credibility of both monetary and fiscal policy, which also makes it uncertain whether these measures exclusively measure what we are interested in. We therefore include the third measure, which compares the bank and corporate bond rates. This is relevant if, as seems probable, the problem of information is greater for bank loans than for lending against bonds (which is broadly confined to transparent firms).

Bank borrowing is the largest single source of funds for non-financial companies in Sweden.¹⁷ Using the bank lending rate (in FP1 and FP3) has the potential drawback that it may be misleading if, instead of pricing credit risk, Swedish banks to some extent ration credit. Two circumstances in bank lending should therefore be taken into account in this context.

One is that if a firm utilises the bank for other services, payments for example, it may be in a position to negotiate the interest rate. Although banks may charge an individual risk premium on corporate credits, they are not normally prepared to raise the interest rate for a high-risk customer. In such cases they often prefer not to grant credit at all.

As the measures may be misleading, it is important to allow for two different approaches in bank lending.

¹⁷ As a share of total corporate funding, bank loans have declined from 54 per cent in 1990 to approximately 44 per cent in 2003.

The other circumstance is that under normal conditions the provision of credit seems to be governed by demand and to be uninfluenced by supply-side restrictions. It is only when banks encounter serious funding problems that the supply of capital acts as a restriction on lending. Note, however, that this applies to the four major Swedish banks, which account for about 80 per cent of the corporate loan stock.¹⁸ The smaller banks that provide the remaining corporate loans are more prone to consider supply-side restrictions even when conditions are normal. This is because the asymmetry in information between a bank and its finances as regards the quality of the bank's assets seems to be more pronounced for small banks.

Another problem with the bank lending rate is that it represents an average of the interest terms for all borrowers at quarter ends, not the rate a bank offers new borrowers.

Using the corporate bond rate (as in FP2 and FP3) entails the potential problem that at times, particularly in the early part of the period, bond market liquidity has been poor. Pricing has accordingly been affected by a liquidity premium that varies over time.

All three measures appear to be inter-correlated and to co-vary with investment.

However, Figure 2 does suggest that the three measures are inter-correlated and co-vary with investment. They all rise in connection with the economic crisis in the early 1990s. Subsequently, the finance premiums that relate to the bank rate (FP1 and FP3) take somewhat longer to fall back, possibly due to a combination of insufficient competition and a need to consolidate bank balance sheets. All three measures then rise again in the mid 1990s, probably owing to a combination of the economic slowdown and a persistent lack of confidence in economic policy. In connection with growing confidence in Sweden's inflation target, an economic recovery and an improvement in corporate balance sheets, all three measures of the finance premium improve from 1996 to 2000. Since then, the bank-rate related premiums (FP1 and FP3) have risen again whereas the spread between corporate and treasury bond rates has continued to narrow. The increase in FP1 and FP3 has to do with the banks refraining from lowering their lending rate to match the fall in both treasury and corporate bond rates. This increase in these measures of the finance premium is probably a sign of insufficient competition in the bank market. The banks were able to benefit from the marked fall in bond rates in connection with the international economic slowdown and the unusually low inflation in many countries, which contributed to exceptionally large interest rate cuts by, for instance, the Federal Reserve. The low risk-free interest rate contributed to strong demand for corporate bonds

¹⁸ See Sveriges Riksbank (2002).

but this, on the other hand, exerted downward pressure on the risk premium measured as the spread between corporate and treasury bonds. Although there are certain differences, the three measures give relatively similar results in the estimations that are presented in the next section.

In order to examine the potential role of finance premiums in the monetary policy transmission mechanism, we have also analysed the correlation at different time horizons between these premiums and the real short-term interest rate as well as the output gap. The correlation between the finance premiums and the output gap is negative for most time horizons but is strongest for concurrent gaps and premiums. This points to a negative output gap being related to a high finance premium. The correlation between the finance premiums and the real short-term (three-month) interest rate is positive for most time horizons and strongest for the current premium and the real interest rate almost twelve months earlier. Thus, a rising real interest rate preceded a high finance premium, which indicates that a monetary policy adjustment can affect the finance premium, which in turn may be of importance for the development of the output gap.¹⁹

Monetary policy adjustments seem to be capable of affecting the finance premium, which in turn can be of importance for changes in the output gap.

To sum up, this introductory analysis suggests that it is worth making an econometric analysis to determine the explanatory value that the three measures of the finance premium may have for the development of investment in addition to the variables that normally feature in investment functions. It seems, on the other hand, that the measures of corporate debt do not have any such statistical explanatory power. But there are grounds for an econometric analysis of how the finance premium is affected both by corporate debt and, via the short-term interest rate, by monetary policy.

FINANCIAL ACCELERATOR EFFECTS ON INVESTMENT

The issue analysed in this section is whether the measures of the external finance premium that were discussed above have any power to explain gross capital formation in the corporate sector. We also aim to identify the variables that influence the finance premium as measured in these ways. The starting point is a simple model of investment along the lines in Assarsson, Berg & Jansson (2004), where investment is explained by Tobin's q and demand. Those authors show that a real equity price index

¹⁹ The fact that the variable bank lending rate does not represent the rate banks offer new borrowers (an average rate instead of the marginal rate) may help to explain why the finance premium (FP1) rises during a cyclical slowdown but falls during an upswing. Moreover, if banks' adjustment of their "marginal rate" to the rate that is steered by monetary policy occurs with a longer lag in downward phases than in upward, the increase in the finance premium in downward phases will be larger than the decrease in upward phases.

is an excellent approximation of q , so we use such an index, too. Demand is represented by the change in real GDP, which according to the same authors has a good ability to explain investment. We then augment this basic model with a measure of the external finance premium. Each of the three measures we discussed earlier is tested in turn in order to check the sensitivity of the results to the form of measurement.

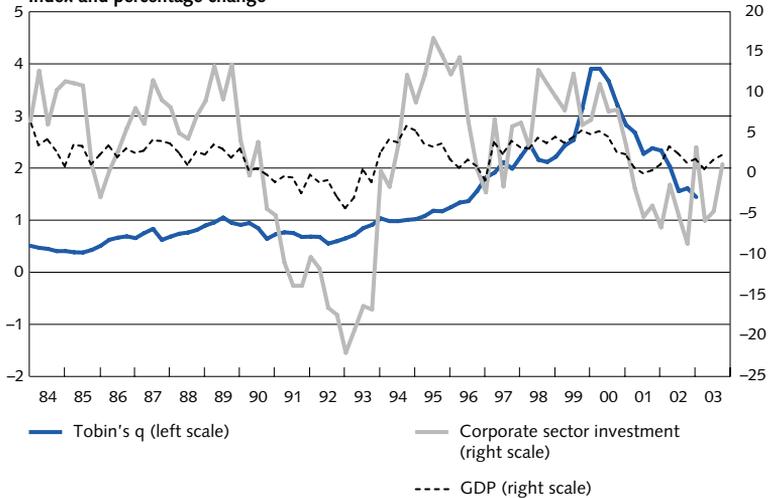
The investment function we estimate can be written

$$I = f(\text{Tobin's } q, \text{ demand, finance premium})$$

The estimations show that in addition to Tobin's q and demand, all measures of the finance premium are significantly negatively correlated with investment.

We use this model with a view to explaining the development of gross fixed capital formation in the corporate sector from 1989 Q1 through 2003 Q3. The variables we use for this purpose are shown in Figure 3 and the results of the estimations are presented in Table 1 in Appendix 1. The estimations show that in addition to Tobin's q and demand, all our measures of the finance premium are significantly negatively correlated with investment.

Figure 3. Tobin's q (real equity prices), corporate sector investment and GDP Index and percentage change



Sources: Statistics Sweden and the Riksbank.

The econometric estimations indicate that there is a financial accelerator effect behind investment.

As expected, Tobin's q (approximated with real equity prices) plays an important role for investment. An increase in q leads to higher investment. Demand (measured as the change in GDP) is of significance for investment only when the model includes a finance premium. Increased demand then has a positive effect on investment in the way described in Assarsson, Berg & Jansson (2004). In our model, however, the finance premium measured in all three ways is both a statistically significant and a

quantitatively important determinant of investment. The function that includes the finance premium explains a larger proportion of the fluctuation in investment. The real interest rate, on the other hand, has no effect on investment in addition to the contributions from Tobin's q , the change in GDP and the finance premiums. We also estimated the model with a measure of the output gap instead of the change in GDP. The finance premiums are still significant and the size of the coefficients is much the same. All in all, the econometric estimations indicate that there is a financial accelerator effect behind investment.

The econometric analysis also confirms that the finance premium is more important in a slowdown.²⁰ Regardless of how it is measured, the finance premium is significantly negative in a cyclical low but not significant in other phases. This further supports the hypothesis that a financial accelerator exists.

It is also worth noting that notwithstanding the individual shortcomings (discussed earlier) with each way of measuring the finance premium, the results with all three in the estimated investment models are significant and very similar. However, when the premium is measured as the spread between the corporate and the five-year treasury bond rates, the additional explanatory power is smaller. This may be a sign that the problem of information that underlies the finance premium is not as great in the bond market.

The effects on the finance premium from monetary policy (via the short-term real interest rate) and debt (measured as the ratio of debt to the value of equity) is analysed in Table 2 in Appendix 1. The short-term real interest rate appears to have had an effect on the finance premium, particularly during cyclical lows. This can be interpreted as an effect on the external finance premium from monetary policy. The level of debt, on the other hand, does not seem to have affected the premium even though the theory prescribes a positive relationship. The explanation could be that our assumed linear relationship is unduly simple.

To sum up, the results suggest that, in addition to the impact of aggregate demand and q (approximated with real equity prices), the corporate finance premium as measured empirically helps to explain variations in investment in Sweden's corporate sector.

Moreover, the finance premium as measured here appears to be particularly important for investment in an economic slowdown. The results also suggest that a higher (lower) real interest rate contributes to a higher (lower) finance premium in the way the theory predicts. This seems to be

The results suggest that the corporate finance premium as measured empirically helps to explain variations in investment in Sweden's corporate sector.

²⁰ We analyse this by inserting a dummy variable, D_t^{sg} , that is set to 1 when the output gap (calculated with the UC method) is negative and otherwise to 0.

a potentially important empirical finding that should lead to further analyses of how corporate investment conditions are affected by monetary policy via the financial accelerator.

Conclusions

Balance sheets and finance premiums appear to be capable of accentuating the variations in investment.

In this article we have studied how changes in financial conditions for firms can accentuate the variations in economic activity. The theory is that the level of debt or net wealth influences mortgaging possibilities and the size of the premium a borrower pays on top of the risk-free interest rate. According to the theory, since deteriorating balance sheets lead to an increase in creditors' costs for information, the risk premium rises in an economic slowdown and may thereby accentuate this. The opposite course can reinforce a cyclical recovery.

Empirical studies from the United States and a number of countries in Europe suggest that balance sheets and finance premiums may be capable of accentuating the variations in investment in accordance with the theory. Small firms seem to be more susceptible to balance-sheet effects than large enterprises. This may be because small firms entail higher information costs for creditors and higher finance premiums. International studies also suggest that the part played by corporate balance sheets is greater during a slowdown than when economic activity is more normal. This could indicate that the financial accelerator has a stronger effect in a cyclical low as opposed to a high.

We have also presented econometric estimations on macro data of how finance premiums for firms in Sweden may have affected the development of corporate investment here. The results suggest that, in addition to Tobin's q (equity prices) and the development of demand, corporate finance premiums help to explain the path of investment, which may indicate that a financial accelerator effect exists. Another result that is consistent with the theory is that the importance of corporate finance premiums for investment in Sweden seems to be greater in a cyclical low than when activity is high. Furthermore, the results point to the finance premium for investment being influenced by the short-term real interest rate in approximately the way the theory predicts.

Forecasts of investment in Sweden should allow for the financial accelerator.

What are the conclusions that these results warrant for monetary policy? First it should be noted that provided the financial accelerator is taken into account by a central bank that targets inflation and incorporates financial and real economic developments in its forecasts of inflation and growth, asymmetric effects of monetary policy adjustments should not occur systematically in the total economy during the business cycle. This does not rule out the possibility of asymmetric effects on individual

firms or industries that are particularly exposed to credit restrictions. Neither does it rule out asymmetric shocks from other causes that are unpredictable or beyond the control of the central bank. The conclusion from the econometric analysis in this article is that forecasts of investment in Sweden's corporate sector ought to include an assessment of the financial accelerator.

At the same time it should be underscored that knowledge about the transmission of monetary policy is deficient. Exact empirical counterparts of the theoretical concepts are hard to come by. One difficulty lies in clearly distinguishing between the effects of the different monetary policy channels the theory proposes. Moreover, it is not only monetary policy adjustments that affect corporate balance sheets and finance premiums. Fiscal policy influences demand as well as the credibility of economic policy and thereby the level of interest rates. In the period analysed here, moreover, risk premiums in Sweden have been affected by international financial crises.

It follows that the empirical results are dependent on the choice of data and time period. A time series analysis with macro data has the drawback that certain variables, such as balance sheets and finance premiums, may be of importance only at certain times and have no impact on average when examining longer time periods. Another problem with macro data is that the theory of the balance-sheet channel and the financial accelerator assumes that firms are heterogeneous. This makes it important to analyse micro data as well, that is, to use data bases with observations on individual firms and households.

In a forthcoming working paper from the Riksbank, such a data base for Swedish firms is used in a macroeconomic framework to analyse a microeconomic model of corporate risk.²¹ That makes it possible to analyse how the aggregate effect of individual firms' balance sheets influence and are influenced by inflation and growth, for instance. Using both company-specific and macro variables increases the chances of explaining the development of Swedish corporate defaults, for example. The study confirms that compared with the deep recession in the early 1990s, corporate balance sheets have been less important for the macro economy in recent years.

It can also be worth studying factors where balance sheets play a part and which, after a time and taken together, lead to crises. A high co-variation between private sector borrowing, house prices and investment

It should be underscored that knowledge about the transmission of monetary policy is deficient.

Compared with the deep recession in the early 1990s, corporate balance sheets have been less important for the macro economy in recent years.

²¹ Carling, Jacobson, Lindé & Roszbach (2004).

is reported in Hansen (2003).²² The empirical results indicate that the development of borrowing and house prices relative to GDP is a strong predictor of the number of defaults in the economy. This means that a period with a combined increase in lending and house prices relative to GDP is followed by a rising number of defaults, as happened in connection with the profound crisis in the early 1990s. House prices seem to play a particularly important part in such financial cycles.

²² Borio & Lowe (2002) hypothesise that strong simultaneous increases in private sector borrowing, asset prices and, in certain cases, investment considerably heighten the risk of a bank crisis. An empirical study of 34 countries in the period 1960–99 provided evidence that taking the combined development of lending, house prices and possibly investment into account can improve predictions of future problems in the financial system.

Appendix 1

TABLE 1. ESTIMATED MODELS OF INVESTMENT. DEPENDENT VARIABLE: $\Delta \ln I_t$

	Basic model	FP 1	FP 2	FP 3	FP 1a	FP 2a	FP 3a
$\ln I_{t-1}$	-0.084 (0.00)	-0.144 (0.00)	-0.091 (0.00)	-0.112 (0.00)	-0.206 (0.00)	-0.137 (0.00)	-0.169 (0.00)
$\ln Q_{t-1}$	0.024 (0.04)	0.023 (0.04)	0.012 (0.40)	0.032 (0.01)	0.043 (0.00)	0.032 (0.07)	0.041 (0.00)
FP_{t-1}		-0.025 (0.00)	-0.021 (0.07)	-0.013 (0.07)	-0.010 (0.25)	-0.001 (0.97)	0.010 (0.32)
$D_{t-1}^{gap} FP_{t-1}$					-0.014 (0.01)	-0.018 (0.06)	-0.027 (0.00)
ΔFP_t		-0.011 (0.07)	0.010 (0.54)	-0.008 (0.19)	0.001 (0.92)	-0.001 (0.98)	0.008 (0.46)
$D_t^{gap} \Delta FP_{t-1}$					-0.013 (0.29)	0.020 (0.54)	-0.020 (0.11)
$\Delta \ln Q_t$	0.041 (0.21)	0.066 (0.03)	0.054 (0.12)	0.056 (0.09)	0.085 (0.01)	0.060 (0.09)	0.083 (0.01)
$\Delta \ln Y_t$	2.525 (0.00)	1.575 (0.01)	1.874 (0.01)	2.328 (0.00)	1.353 (0.04)	1.709 (0.01)	2.194 (0.00)
\bar{R}^2	0.70	0.76	0.72	0.71	0.78	0.73	0.76
L-B Q(5)	5.207 (0.39)	3.718 (0.59)	2.961 (0.71)	5.220 (0.39)	3.846 (0.57)	4.682 (0.46)	5.482 (0.36)

Due to a lack of earlier data on the bank lending rate, the models are estimated for the period from 1989 Q2 through 2003 Q1. The level of significance is shown in parentheses under the estimated coefficient (a value of 0.01 signifies that the probability of the coefficient not being zero by chance is 1 per cent, while 0.00 signifies a probability of less than 0.5 per cent). We use the following variables: I is gross fixed capital formation in the corporate sector, Q is Tobin's q (approximated with a broad equity price index), Y is real GDP and FP is the finance premium, which is measured in model FP 1 as the bank lending rate to non-financial firms less the three-month treasury bill rate, in model FP 2 as the corporate bond rate less the five-year treasury bond rate and in model FP 3 as the bank lending rate to non-financial firms less the corporate bond rate. D^{gap} is set to 1 when the output gap (calculated with the UC method) is negative, otherwise to 0; this variable is used to test for any asymmetric effect of different cyclical phases in models FP 1a-3a. An intercept and a dummy variable for 1993 Q1 are not shown here. \bar{R}^2 shows the proportion of the variation in investment the model explains, given the number of estimated parameters (for the basic model without the dummy variable for 1993 Q1, $\bar{R}^2 = 0.41$ instead of 0.70). L-B Q(5) is a Ljung-Box Q-test for autocorrelation (with a time lag up to five quarters).

TABLE 2. ESTIMATED MODELS FOR THE FINANCE PREMIUM. DEPENDENT VARIABLE: ΔFP_t

	FP 1	FP 2	FP 3	FP 1a	FP 2a	FP 3a
Intercept	0.566 (0.41)	-0.289 (0.09)	0.588 (0.55)	0.957 (0.17)	-0.199 (0.21)	0.330 (0.74)
FP_{t-1}	-0.445 (0.00)	-0.263 (0.00)	-0.489 (0.00)	-0.583 (0.00)	-0.432 (0.00)	-0.455 (0.01)
RR_t	0.074 (0.18)	0.068 (0.00)	0.037 (0.71)	0.044 (0.43)	0.070 (0.00)	0.030 (0.76)
$D_t^{gap}RR_t$				0.042 (0.09)	0.027 (0.00)	0.050 (0.28)
$\ln(S/A)_t$	0.199 (0.66)	-0.185 (0.16)	0.863 (0.30)	0.312 (0.52)	-0.048 (0.72)	0.382 (0.67)
$D_t^{gap}\ln(S/A)_t$				0.115 (0.69)	-0.119 (0.22)	0.342 (0.56)
ΔFP_{t-1}	-0.369 (0.01)	0.188 (0.07)	-0.092 (0.48)	-0.334 (0.02)	0.281 (0.00)	-0.139 (0.29)
ΔRR_t	-0.110 (0.12)	0.057 (0.02)	0.336 (0.01)	0.030 (0.77)	0.015 (0.64)	0.034 (0.87)
$D_t^{gap}\Delta RR_t$				-0.225 (0.09)	0.052 (0.22)	0.450 (0.10)
$\Delta \ln(S/A)_t$	-0.428 (0.59)	0.421 (0.12)	2.416 (0.13)	-0.337 (0.78)	0.516 (0.12)	1.222 (0.60)
$D_t^{gap}\Delta \ln(S/A)_t$				-0.146 (0.93)	0.457 (0.38)	2.244 (0.51)
\bar{R}^2	0.35	0.32	0.41	0.39	0.44	0.43
L-B Q(5)	0.619 (0.99)	2.435 (0.79)	1.786 (0.88)	2.322 (0.80)	4.061 (0.54)	0.937 (0.97)

The models are estimated for the period from 1989 Q3 through 2003 Q1. RR_t is a real three-month interest rate, D_t^{gap} is a dummy variable that is set to 1 when the output gap (calculated with UC method) is negative, otherwise to 0, $\Delta \ln(S/A)_t$ is the percentage change in the debt ratio (debt relative to the value of equity), FP_t is the finance premium (calculated for the three alternative models as in Table 1), and \bar{R}^2 shows the proportion of the variance in the change in the finance premium that is explained by the model; the figures in parentheses under L-B Q(5) statistics denote the level of significance at which the null hypothesis that the residuals are not autocorrelated in the first five time lags can be rejected.

Appendix 2

Data have been obtained from the following sources:

Total corporate debt	The Riksbank
Stock exchange index (Generalindex)	<i>Affärsvärlden</i>
Corporate sector gross fixed capital formation	Statistics Sweden
Gross domestic product	Statistics Sweden
Consumer price index	Statistics Sweden
Output gap	The Riksbank
Bank lending rate, non-financial companies	Statistics Sweden and the Riksbank
Corporate bond rate (five -year)	<i>The Economist</i>
Treasury bill rate (three-month)	International Monetary Fund
Treasury bond rate (five-year)	International Monetary Fund

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■ Swedish monetary policy

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In 2003 Sweden adopted an inflation target regime for monetary policy. Today this regime is well established and Sveriges Riksbank, the Swedish central bank, which is responsible for monetary policy, has developed an elaborate framework for its implementation. The aim of this article is to give an overview of both the analytical framework of the inflation target regime and the actual implementation of this policy. The focus is naturally on how monetary policy works today, especially the period after the Riksbank gained formal independence in 1999. To really put the recent development in perspective we need, however, to take a brief look into the past.

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Regulatory credit policy¹

To those who are accustomed to the environment in which the Riksbank conducts monetary policy today, the conditions that prevailed as recently as the late 1970s would be very unfamiliar. At that time there was neither a money nor a bond market in which interest rates could be formed on market terms. Consequently, today's possibility of conducting monetary policy in conformity with the market did not exist. This possibility amounts in principle to the central bank exerting an influence – via operations in the fixed-income market – on the level of interest rates and the money supply and hence on inflation and the general level of economic activity. So no such policy was feasible. Since the 1960s the fixed-income market had been successively bypassed by a comprehensive regulatory system that was primarily designed to channel saving on inexpensive, non-market terms to “priority purposes” such as the financing of large-scale housing programmes or sizeable budget deficits. The Riksbank's task was to implement this credit policy system in which banks, insurance companies and other financial institutions were obliged to purchase treas-

Earlier, the Riksbank's task was to implement credit policy as a comprehensive regulatory system.

¹ For a more detailed description of the regulatory system's construction and subsequent demolition, see e.g. Hörngren et al. (1987).

ury and housing bonds. As a result, even the supply of “non-priority” credit, that is, the part that was not required to finance a budget deficit or residential construction, had to be regulated, too. One of the instruments for this was a ceiling on bank lending. Quantitative controls of this kind could also be used to influence the business cycle.

Attempts to find a fixed exchange rate that would serve as an anchor for macro policy left their mark on the 1970s and 1980s.

The Riksbank also adjusted the official discount rate as a stabilising measure but in the virtual absence of a fixed-income market the effect was rather limited. The potential for monetary policy was, moreover, greatly restricted by foreign exchange policy. Following the collapse of the Bretton Woods system in the early 1970s, the rest of that decade and the 1980s were characterised by attempts to find a fixed exchange rate that would serve as an anchor for macro policy. The Swedish krona was first pegged to the German mark and later to a variety of currency baskets. This meant that monetary policy was essentially reserved for the defence of a fixed exchange rate, leaving very little scope for price stabilisation or cyclical smoothing.

Exchange-rate targeting monetary policy with market conformity

Changes occurred in the first half of the 1980s that drastically altered conditions for the Riksbank’s policy. For one thing, a thorough deregulation of financial markets in Sweden led, for example, to the emergence of effective fixed-income markets. The conditions this provided for a monetary policy with market conformity were utilised by the Riksbank from the middle of the 1980s. For another, serious efforts were made to restore confidence in the fixed exchange rate policy. A major devaluation in 1982 was presented as the definitive adjustment of the exchange rate. In future, market players could rest assured that the external value of the krona (measured in terms of a currency basket) would not be changed. The fixed exchange rate became the Riksbank’s *direct* monetary policy target but indirectly, the policy aimed at keeping inflation in line with the average level in the countries represented in the currency basket to which the krona was pegged. In other words, the exchange rate target was an intermediate goal.

During the 1980s the rule-based credit policy was replaced by a monetary policy with market conformity.

For the Riksbank, during the 1980s the rule-based credit policy was accordingly replaced by a monetary policy with market conformity. Market operations were used to steer the level of interest rates with a view to achieving a stable exchange rate. An interest rate hike in Sweden, for instance, would generate a currency inflow and thereby strengthen the krona.

Thus, the new monetary policy with market conformity focused entirely on maintaining the exchange rate. However, the long-term success of a fixed exchange rate policy presupposes that economic developments in general match those in the country or countries that provide the anchor for the domestic currency. This means, for example, that costs in the sector exposed to international competition must follow the trend for those countries. The economic policy that this required was the responsibility, not of the Riksbank but primarily of fiscal policy, which for a number of reasons did not function properly in this respect. When exchange rates in Europe became generally turbulent in the early 1990s, the krona was exposed to such strong speculative pressure that the fixed exchange rate could not be upheld, despite great efforts in the autumn of 1992 in particular. The peak of 500 per cent that the Riksbank's instrumental rate reached at that time can be said to have gained a heroic reputation. On 19 November 1992, the defence of Sweden's fixed exchange rate regime had to be abandoned and the krona was allowed to float without a specific guideline.² The decision was immediately followed by a depreciation of approximately 15 per cent.

The defence of Sweden's fixed exchange rate regime was abandoned on 19 November 1992 and the krona was allowed to float.

An inflation targeting policy

Shortly afterwards, in January 1993, the Riksbank's Governing Board established the target for the new monetary policy in the flexible exchange rate regime: as of 1995 the annual change in the consumer price index was to be limited to 2 per cent, with a tolerance interval of ± 1 percentage point. In the meantime, the policy would be to check any inflationary impulses from the krona's depreciation and thereby lay a foundation for a policy of price stabilisation.

In January 1993 the target for the new monetary policy was established as being to hold the change in the CPI, as of 1995, to 2 per cent, with a tolerance interval of ± 1 percentage point.

Thus, the new monetary policy amounted to a clear focus on stabilising the general price level. In a way, the new formulation of the Riksbank's task can be seen as a clarification of one of the primary functions that led to the creation of central banks in the 19th century.³ When the rapid pace of economic developments in the era of industrialisation called for more efficient payment systems, central banks had been assigned the task of providing generally accepted means of payment with a stable value.

² For detailed accounts of these dramatic events, see the contributions in Jonung (2003) and, in English, Bäckström (2003) and Heikensten (2003).

³ Sveriges Riksbank is admittedly considered to date back to 1668, making it the world's oldest central bank, but it was not until late in the 19th century that it can be said to have developed the functions we now associate with a modern central bank. For an account of this development, see Brisman (1931). A more principled discussion of the functions of a modern central bank will be found in the paper by Santomero et al. in Santomero et al. (2001).

The new thinking in stabilisation policy amounted to keeping the general price level as stable as possible.

During the first decades after the Second World War stabilization policy in Sweden, like in other countries, came to be dominated by Keynesian-type fiscal policy. Central banks were assigned a supportive but somewhat peripheral role in this policy. During the 1950s and 1960s inflation was low and considered a minor problem for policy.

When inflation increased in the 1970s the so-called Phillips curve had given rise to the belief that there was a trade-off between inflation and real activity in the economy, where unemployment could be kept down permanently at the price of higher inflation.

This view that there was a trade-off between inflation and growth was put to a serious test during the 1970s, when the world experienced decreasing growth, higher unemployment and rising inflation. A reconsideration of the policy implications of the Phillips curve led to the view in the late 1980s that central banks should refocus on the original goal; to stabilize the general price level. The Phillips curve relation had appeared to be unstable and to shift with inflationary expectations. Attempts at exploiting the relation between inflation and employment that seemed empirically verified, for instance through stimulating aggregate demand and increasing employment at the cost of higher inflation, were only temporarily successful. Once the higher inflation was established and was included in economic decision-makers' forecasts, the economy returned to the previous level of activity but with no lowering of inflation. In the long run the Phillips curve seemed rather to be vertical, i.e. no trade-off between inflation and unemployment seemed to exist in a longer perspective. Exploiting this short-run relation for economic policy purposes could certainly be successful in the short run, but at the cost of higher inflation tending to become permanent even when the effects on employment had tapered off.

Thus inflation in a longer perspective does not seem to be determined by factors in the real economy, such as employment and real growth. Rather the general price level is determined by *monetary* factors, such as the supply of money. An increase in the money supply should *ceteris paribus* sooner or later lead to higher prices. In a longer perspective a given development of the real economy seems to be compatible with a number of different inflation paths.

Although moderate inflation is not all that deleterious for the payment system and accordingly does not entail sizeable social costs, it is still considered preferable to keep the general price level as stable as possible. Alan Greenspan, head of the Federal Reserve Board, has said that inflation should be kept so low that in principle it can be ignored when people make economic decisions.

With these basic insights into the determinants of inflation, ideas about the central bank's functions in economic policy were revised in a number of countries in the 1980s and 1990s. As the central bank is responsible for the payment system and therefore entitled to steer liquidity in the economy, one of its primary tasks is to ensure that the general price level remains stable. Central bank responsibility for price stability should be clearly delegated by law. This is seen as important so that politicians are not tempted to use the possibility of stimulating the economy in order to boost employment in the short run at the cost of rising inflation. A clear delegation of monetary policy to the central bank would enhance the credibility of the inflation targeting policy.⁴

Ideas about the central bank's functions in economic policy were revised in a number of countries in the 1980s and 1990s.

In many ways, this view was already influencing the construction of monetary policy in Sweden at the time of the 1992 changeover to a flexible exchange rate regime and the policy of targeting inflation. However, the rules did not guarantee that the Riksbank would be in a position to conduct policy independently. The Governing Board, at that time the Bank's supreme decision-making body, was appointed along party lines (apart from the chairman). Even so, in that the Governing Board came to adopt this view, monetary policy can be said to have already adhered to the principles of an inflation targeting policy before the Riksbank reform.⁵

THE RIKSBANK'S NEW REGULATIONS

A combination of Maastricht Treaty requirements and the successful implementation of the new policy led in the late 1990s to the approval of a basic reform of the Riksbank legislation to ensure the Bank's independent status, above all as regards monetary policy. As this involved constitutional amendments, it required two parliamentary votes with an intervening general election. The decisions, first in March 1998 and then in November that year, were supported by all the parties in the Riksdag except the Left and the Green parties. The gist of the new laws⁶ as of 1999 is as follows:

A basic reform of the Riksbank legislation was approved in the late 1990s to ensure the Bank's independent status.

⁴ For a fuller discussion of why the central bank should have an independent status, see Apel & Viotti (1998).

⁵ A penetrating account of this development will be found in Bäckström (2003).

⁶ The provisions for the Riksbank are accompanied by provisions for exchange rate policy whereby the exchange rate regime is chosen by the Government and, in the event of a fixed-rate regime, the Riksbank sets the benchmark rate for the krona and undertakes operations relating to exchange rate policy. This arrangement is intended to enable the Riksbank to fulfil its price stability target even with a different exchange rate regime.

- The Riksbank is managed by an executive board with six members, who are appointed by a governing council (appointed in turn by the Riksdag) for six-year terms, staggered so that each year one of their number is reappointed or replaced by a new appointment.
- Constitutional provisions decree that members of the executive board may neither seek nor take outside instructions and are to act on their professional knowledge to fulfil the Riksbank's statutory objectives.
- The Riksbank's objective shall be to safeguard the value of money. The Bank shall also promote a safe and efficient payment system.

Like the previous Governing Board, the Executive Board of the Riksbank has chosen to define the objective of price stability as being a CPI inflation rate of 2 per cent on an annual basis,⁷ with a tolerance interval of ± 1 percentage point. This formulation has been accompanied by extensive development work at the Riksbank on monetary policy's implementation. An important aim of this process has been to make monetary policy clearer and more transparent. There are in principle two reasons for this. One is the need – not least for evaluations of the independent Riksbank – to provide outsiders with a clear picture of how monetary policy is conducted. Market players likewise need to understand how the Riksbank acts. If they feel that a thorough analysis of the Riksbank's intentions and policy set-up will furnish them with a soundly based opinion about the direction of monetary policy, then their actions will be all the more likely to harmonise with the Bank's policy, which facilitates monetary policy's implementation. The other reason is the *internal* need for an analytical framework with which monetary policy can be systematised and made more instructive.

⁷ The choice of an inflation target and indicator is discussed more fully in the box "Why choose the CPI as the target variable?"

Why choose the CPI as the target variable?

The reason is basically simple: the consumer price index (CPI) is well-established as an indicator, defined by Statistics Sweden, of the development of the cost of living, that is, the price in kronor of an average basket of articles of consumption in Sweden. In other words, it is an index produced outside the Riksbank which should provide a good picture of the general price level. In the absence of a developed theory for the optimal measurement of the price level, the CPI would seem to be a fully acceptable indicator of inflation.

In various contexts the Riksbank's monetary policy assessments have also included supplementary indicators of inflation. One of these in particular, known as UND1X, has attracted attention that has perhaps been misleading. UND1X is defined as the CPI excluding house mortgage interest expenditure as well as indirect taxes and subsidies. Adhering strictly to the CPI as monetary policy's guide would evidently have odd effects in connection with interest rate cuts. The construction of the CPI is such that the falling house mortgage expenditure which is inherent in the successive renewal of housing loans at current, lower interest rates leads to the forecast level of the CPI being clearly below target. Allowing this to occasion cuts in the instrumental rate would be tantamount to what has been described as "the Riksbank chasing its tail". It was therefore considered reasonable to state clearly that in such cases the Riksbank, instead of basing monetary policy directly on the CPI forecasts, uses the CPI *excluding* the lower house mortgage expenditure which is a result of the interest rate cuts. In time it came to be seen at the Riksbank that adjusting forecast inflation for altered housing costs as a result of interest rate movements was *always* reasonable and that the same applied to changes in indirect taxes and subsidies. The basic argument was that the effect on inflation from changes of both these types is only *transitory* and therefore ought not to influence monetary policy. Consequently, the CPI should be adjusted continuously, *at least* until such transitory effects have disappeared. For this reason, an initial adjustment of the CPI on each forecasting occasion should result in a calculation of UND1X. From time to time, moreover, there may well be *other* changes that, provided their effects are judged to be transitory, should also be disregarded in the monetary policy assessments. A good illustration is a price rise for energy, e.g. electricity, if the *change in the price level* is judged to be transitory. The initial upward effect on the CPI is followed by a *downward* effect when electricity prices fall back, as assumed, to their earlier level. The downward shift, which is simply a reversal of the earlier rise, will affect the path of CPI inflation over the forecast horizon. As this is a clear transitory effect, it should not be hard to accept that it ought not to call for an interest rate cut. It was therefore concluded that from case to case the Riksbank must assess which effects on inflation over the forecasting horizon can be perceived as transitory and should therefore be disregarded in the context of monetary policy.

Why 2 per cent annual inflation as monetary policy's target?

The Riksbank is required to achieve price stability, so why is the target not zero inflation, that is, an unchanged price level? There are two main reasons for choosing instead to target moderate inflation. The first is that like other price indexes, the CPI does not properly mirror changes in the quality of the goods and services it covers. Price increases that stem from improvements in quality ought not to be treated as something that erodes the value of money. Central banks around the world judge that approximately 1 to 2 percentage points of an annual increase in a consumer price index can be attributed to improvements in quality and should therefore not be regarded as jeopardising the value of money.

The other reason is the risk of deflation. If central banks were to aim on average for zero inflation, the price level would be very likely to fall at times. If expectations of falling prices were to be established, a deflationary trend could become self-generating and cause major macroeconomic problems. Deflation entails a risk of the instrumental rate being impotent because it cannot go below zero. So deflation can lead to high real interest rates that the central bank is unable to influence. For this reason the Riksbank, like other central banks that target inflation, has chosen to focus on paths for inflation where the risk of landing in a deflationary process is judged to be small.

Monetary policy's analytical framework

The inflation targeting policy is now firmly established and the Riksbank has built up an extensive analytical apparatus to aid the implementation of monetary policy. The construction of monetary policy is such that it impinges directly on the formation of interest rates. Anyone with an interest in the development of interest rates is obliged to get acquainted with how monetary policy is conducted by the Riksbank.

If forecast inflation one to two years ahead is above (below) the 2 per cent target, the instrumental rate is normally raised (lowered).

Briefly, the Riksbank's monetary policy functions as follows. The Riksbank assesses the path of inflation in the coming twelve to twenty-four months and if forecast inflation with this time horizon is above (below) the 2 per cent target, the instrumental rate is normally raised (lowered). In practice, the instrumental rate,⁸ which is the Bank's policy instrument for bringing forecast inflation onto the target, determines what the banks pay to borrow overnight from the Riksbank and its maturity is thus very short. The process or transmission mechanism whereby an adjustment of the instrumental rate actually affects inflation consists in its first step of an effect on interest rates with a longer maturity.⁹

There is an appreciable time lag before monetary policy exerts its main effect on inflation.

What is the case for such a comparatively simple rule of action? The first point to consider is the choice of forecasting horizon – why aim to hit the inflation target so far into the future? Why not try to be on target sooner if the forecast points to a deviation further ahead? The answer lies in what is now the well-known fact that there is an appreciable time lag before monetary policy exerts its main effect on inflation. Although scientifically exact evidence is difficult to come by, research does suggest that it takes one to two years for a monetary policy measure in the form of an interest rate adjustment to elicit its full effect. An appreciably quicker effect on inflation would require very large interest rate adjustments that would also have undesirable real economic effects on output and employment. Implemented in that way, an inflation-targeting policy would thus lead to marked fluctuations in interest rates and thereby in production and employment.

There is a trade-off between variations in inflation and in real economic activity.

To borrow a phrase from Mervyn King, now Governor of the Bank of England, no inflation-targeting central bank behaves like an “inflation nutter” and attempts to bring inflation onto the target at any cost. There is a trade-off resembling the Phillips curve between *variations* in inflation and in real economic activity. The smaller the deviations from the inflation target that are tolerated over a given time horizon, the larger the varia-

⁸ It is the repo rate that is usually regarded as the Riksbank's instrumental rate. The repo rate and how it relates to the terms for overnight bank borrowing from the Riksbank are considered further on pages 71-74.

⁹ The original formulation of the Riksbank's rule of action will be found in Heikensten (1999). Other relevant insights into how the Riksbank has developed the analytical framework are provided by e.g. Heikensten & Vredin (2002), Berg (1999), Bäckström (2003) and Heikensten (2003).

tions that have to be accepted in output and employment. In the academic literature on central bank policy, this trade-off is usually formulated in terms of an explicit target function for the central bank where deviations from full resource utilisation or trend growth are included as arguments along with deviations from targeted inflation.

As noted earlier, the Riksbank and most other inflation-targeting central banks have resolved the “inflation nutter” problem by choosing what in a way is a simpler approach. Thus, the Riksbank has actually taken an implicit stand on this trade-off by stating that the steering horizon is *normally* one to two years. If forecast inflation in the coming twelve months is above the target, for example, this will not normally lead to an interest rate increase if the forecast simultaneously points to inflation being close to the target one to two years ahead, that is, over the steering horizon. The interpretation of this is that the Riksbank chose not to act on a forecast deviation from the target over the short horizon and judged that the impulses which seem to be affecting inflation in the short run are of a transitory nature and should fade over the steering horizon. Similarly, a forecast deviation from the target *beyond* the steering horizon does not normally lead to any monetary policy measure. There may be occasions, however, when the Riksbank judges that the steering horizon should be extended (or shortened). Take, for example, a supply shock in the form of a large oil price increase that seems to be pushing inflation above the target over the steering horizon. If the interest rate increase that would be needed to bring inflation back on target is judged to have excessively negative consequences for the real economy, there may be a case for extending the steering horizon beyond two years. Thus, the simple rule of action in monetary policy is not followed in this case and the reasons should be stated so clearly that there is no room for doubt about the Riksbank’s inflation-targeting ambitions.

The Riksbank has taken an implicit stand by stating that the steering horizon is normally one to two years.

INFLATION FORECASTS

The Riksbank’s inflation forecasts, which as we have seen are highly important for monetary policy, are presented in the Inflation Report, which is published four times a year. The Inflation Reports¹⁰ and the Riksbank’s intervening inflation assessments serve as a foundation for the monetary policy decisions.

The Riksbank’s inflation forecasts can be said to rest on an assessment of three relevant components: the development of *aggregate*

¹⁰ Leeper (2003) makes an interesting comparison of the inflation reports from the Bank of England, the Reserve Bank of New Zealand and Sveriges Riksbank.

The inflation forecasts are based on the development of aggregate demand, people's inflation expectations and exchange rate tendencies.

demand in the Swedish economy, people's *inflation expectations* and *exchange rate* tendencies. In addition, there is an assessment of price tendencies for goods and services for which prices are formed by political or administrative decisions rather than in a market.

The principles behind this construction of the inflation forecast are simple. When aggregate demand for goods and services produced in Sweden for domestic consumption, investment or export is excessively strong in relation to total productive resources (labour and capital) in the Swedish economy, the general price level will tend to rise. Conversely, a negative output gap (a level of demand that involves less resource utilisation than the production apparatus could cope with) will tend to dampen price developments. The expectations of firms and households about future prices affect the actual development of prices and wages and thereby inflation. If, for some reason, people consider that inflation will be above the Riksbank's target, there is a risk of their expectations being fulfilled if the Riksbank does not act via monetary policy. The development of the exchange rate plays a part in the assessment of inflation. A depreciating currency, for example, affects inflation indirectly via total demand; a weaker krona stimulates exports and dampens imports, leading to higher domestic resource utilisation. A depreciation also affects inflation directly in that imported goods and services cost more in the domestic currency. In this context it should be noted that in principle the Riksbank's inflation targeting regime leaves the krona free to float without the Riksbank exerting any direct influence in the form of currency market interventions. In other words, the Riksbank does not target the exchange rate.

Aggregate demand is forecast with a conventional economic assessment with predictions of the various components.

The inflation forecasts in the Inflation Report follow this notional structure. Most of the work on assessments of the output gap as defined above is devoted to the production of a general economic forecast. For monetary policy, the most relevant time horizon for an economic assessment is the coming twelve months because it is a rule of thumb that interest rate policy's main effect on GDP occurs about twelve months after an interest rate decision. Inflation is subsequently affected with a time lag of up to another twelve months. Total demand is therefore forecast by making a conventional economic assessment with predictions of the various components, e.g. private consumption, investment and exports. For Sweden as a small open economy, economic developments abroad, particularly in Western Europe and North America, are naturally of importance in this assessment. Determining the output gap calls for a supply-side assessment as well. The analytical apparatus for this is considerably slighter than for demand. The theoretical and empirical foundations for concepts such as potential growth and full resource utilisation are

less well-developed. The calculation of potential growth is usually based on projections of historical trends. Assessments of how the path of inflation is affected by a positive or negative output gap are likewise uncertain, partly because this relationship is difficult to estimate at all precisely.

Inflation expectations are measured for the Inflation Report via different kinds of survey data as well as from price formation in fixed-income markets. In the latter case, nominal interest rates for different maturities are compared with the corresponding rates for real-interest bonds, for example. The spread between nominal and real rates should correspond to market assessments of future inflation. Now that the Riksbank's inflation targeting policy has been established and acquired credibility, expectations of inflation twelve to eighteen months ahead have tended to lie around 2 per cent, that is, around the Riksbank's target. This implies that people generally believe the Riksbank will implement the monetary policy that is most likely to result in the target being fulfilled. It would be an important signal for monetary policy if the measurements of inflation expectations were to suggest that the general public does not believe that the Riksbank is able or willing to fulfil the inflation target over the relevant time horizon.

As mentioned earlier, the exchange rate is of importance for the prices of imported goods and services. The assessment of inflation therefore needs to include forecasts of the krona's future value and the effect of this on consumer prices. The difficulties forecasters face in this respect are particularly great. For one thing, forecasting the exchange rate at all precisely over the Riksbank's time horizon has proved notoriously hard. Theoretical as well as empirical knowledge about determinants of the exchange rate in the short and medium term is simply under-developed. For another thing, it is not clear to what extent exchange rate movements are passed through to consumer prices. The size of the pass-through may vary with the perceived duration of a depreciation, for instance. If a depreciation is judged to be temporary, importers will probably prefer to postpone a price increase and accept a lower profit margin instead. But if the depreciation is permanent, sooner or later the firm will have to obtain compensation by raising prices.

In addition to the exchange rate, there are international prices that can affect import prices and the CPI. In this context it is particularly important to assess the future price of oil and its consequences for energy costs in the Swedish economy and ultimately for consumer prices.

Inflation expectations are measured via different kinds of survey data as well as from price formation in fixed-interest markets.

Knowledge about determinants of the exchange rate is poorly developed and it is not clear to what extent exchange rate movements are passed through to consumer prices.

The Riksbank's assessment of future inflation is presented in a main scenario, with uncertainty intervals.

When all the components discussed above have been analysed and assessed, they are combined in the Inflation Report to give a forecast of future inflation. The Riksbank's assessment of future inflation is presented in a main scenario, where the various components are quantified to obtain a numerical identification of inflation's "most probable" path in the coming years. This is accompanied by uncertainty intervals for these point estimates of inflation, derived from approximate estimations of alternative scenarios and the probabilities of them occurring.

On those occasions when the interest-rate decision coincides with the publication of the Inflation Report, the basis for the decision is evident from the Report. As mentioned above, the monetary policy decision normally follows the simple rule of action: if forecast inflation one to two years ahead is above (below) the target, the repo rate should be raised (lowered).

The point forecast of inflation in the main scenario does not invariably serve as the basis for deciding the interest rate.

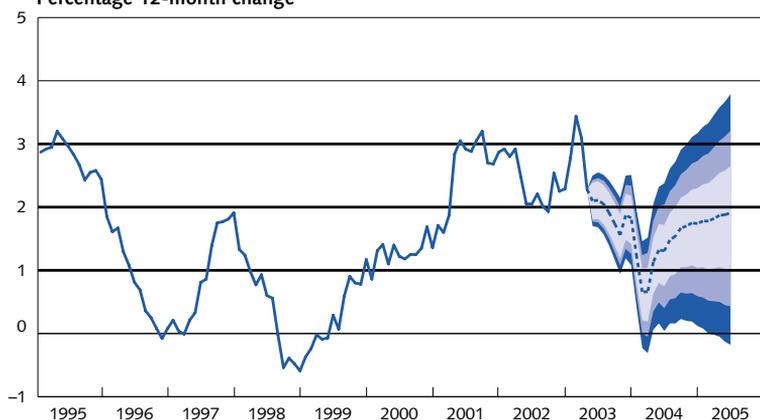
However, the point forecast of inflation in the main scenario does not invariably serve as the basis for deciding the interest rate. The decision may also be influenced by the assessment of alternative scenarios. If the probability of inflation being higher than in the main scenario is approximately the same as the probability of lower inflation, the assessment of risks will have little effect on the inflation forecast on which the decision is based. If the forecast in accordance with the main scenario points to a rate of 2 per cent, the repo rate would then be left unchanged. If, on the other hand, the Riksbank finds that the upside risk (the risk of higher inflation than in the main scenario) is greater than the downside risk (the risk of inflation being lower than in the main scenario), the inflation forecast for the decision would be adjusted upwards and vice versa. In other words, the repo rate may be adjusted even though the inflation forecast with the main scenario is on the target.¹¹

The Riksbank uses fan charts to illustrate its assessments of risk scenarios in the Inflation Report. These charts (see Figure 1) indicate the degree of uncertainty in the inflation forecast and show how it grows with the length of the forecasting horizon.¹²

¹¹ In statistical terms the forecast based on the main scenario corresponds to the mode, that is, the most probable outcome, while the forecast on which the decision is based corresponds to the expected value. For forecasting purposes the expected value is the natural starting point for point forecasts; over time the forecasts would then, at least on average, be accurate, given that the probability distribution is correct.

¹² For an account of how the Riksbank makes the risk assessments on which the fan charts are based, see Blix & Sellin (1999).

Figure 1. CPI with uncertainty intervals
Percentage 12-month change



Note. The uncertainty intervals show the 50, 75 and 90 per cent chances of CPI inflation being within the respective range. The broken line represents the main scenario's forecast. The horizontal lines at 1, 2 and 3 per cent are the Riksbank's inflation target and the tolerance interval for the annual change in the CPI.

Sources: Statistics Sweden and the Riksbank.

The transmission mechanism

The basis for the model of monetary policy decision-making presented here is that the Riksbank's instrumental rate, whether or not it is adjusted, affects GDP and the path of inflation. However, the workings of this *transmission mechanism* are by no means fully understood. There is considerable uncertainty both about the channels through which a monetary policy measure affects the target (inflation) and about the likely time profile of such effects. Like so much else in economic policy, monetary policy is more art than science. Today there is little trace of the optimism that can be said to have prevailed among macroeconomists in the early 1970s concerning the possibility of economic fine tuning over time, not least with the aid of large macroeconomic models. Fundamental aspects of the Keynesian approach on which post-war stabilisation policy was based have been subjected to serious scientific criticism. While this process has definitely enriched macrotheoretical knowledge, it cannot be said to have resulted in a "new" macro theory with (apparently) self-evident policy implications to rival its Keynesian predecessor. This means that policy makers, in central banks as well as finance ministries, cannot count on the possibility of basing decisions entirely on clear-cut, scientifically developed relationships.

So notwithstanding these problems, in its interest rate decisions the Riksbank has to act on an assessment of how and to what extent a repo rate adjustment will affect inflation (and GDP). This assessment will inevitably involve a mixture of theoretical reasoning from models, econo-

The workings of the transmission mechanism are by no means fully understood.

metric estimations and common-sense considerations in which intuition can play a part. Here we can only outline some features of the process, which tends to be rather complex.

One issue is how longer-term interest rates are affected.

As the repo rate represents the very shortest section of the yield curve, in the context of the transmission mechanism it can first be asked how it affects interest rates with longer maturities. Here it should be emphasised that market assessments of monetary policy's future direction play an essential role in the structure of interest rates. If a repo rate increase is perceived as the first in a series of increases, for instance, its impact on the longer-term rates should be greater than if the market finds it more likely that it will be followed by no further change.

It is the real rather than the nominal interest rates that are relevant for the real economy.

For the impact on the real economy (production and employment), what matters is not the nominal so much as the *real* interest rates. The real rate equals the nominal rate less the expected rate of inflation up to the given maturity. So what happens to inflation expectations in connection with a repo rate decision plays a part in the impact on real interest rates.

Movements in real interest rates should affect private investment and consumption and thereby total demand. Investment is affected in that higher real interest rates, for instance, lead to fewer profitable investment projects because financing becomes more costly. Moreover, for funds obtained via the banking system, the higher interest rates can affect asset values and thereby reduce eligible loan collateral and make financing more difficult as well as more costly. Private consumption is affected by higher interest rates directly, in that households then have less to spend after paying interest expenditure, as well as indirectly, both because asset values (shares, for example) fall and with them consumption and because it pays households to postpone consumption.

An interest rate adjustment can also have effects via the exchange rate.

An interest rate adjustment can also have effects via the exchange rate. At least with all else equal, an interest rate increase should tend to strengthen the nominal exchange rate because it makes domestic interest-bearing assets relatively more attractive than assets abroad. As mentioned above, the development of exchange rates in general has been notoriously difficult to assess. It is no exaggeration to say that academic and central bank economists agree that very little is known about the determinants of exchange rates in the short and medium term, at least when it comes to forecasting exchange rate developments.

In any event, an appreciation of the krona as a consequence of a repo rate increase would affect demand by tending to slow exports as

well as enterprises that compete with imports. Inflation is also affected directly in that imported goods become cheaper.¹³

The prevailing view among central banks is that an instrumental rate adjustment affects GDP most in the first year. The extent to which a given change in GDP subsequently influences inflation is difficult to tell for a number of reasons. The problem of measuring the output gap at all exactly has already been mentioned. Potential GDP is hard to measure because it cannot be observed directly. The impact on inflation of a given (predicted) output gap is equally hard to gauge, depending as it does on the complex mechanisms involved in setting prices and wages. The effect of stronger demand on pricing by firms depends in part on how much they rely on the Riksbank's ability to keep inflation close to the targeted level. The greater the Riksbank's credibility, the less likely it probably will be that tendencies to overheating quickly generate price and wage increases.

To sum up, the lack of knowledge about the transmission mechanism means that in the final analysis, rules of thumb and intuition may also be required for monetary policy decisions, hopefully in the light of earlier assessments and experiences.

The prevailing view is that an instrumental rate adjustment affects GDP most in the first year.

Rules of thumb and intuition may also be required for monetary policy decisions.

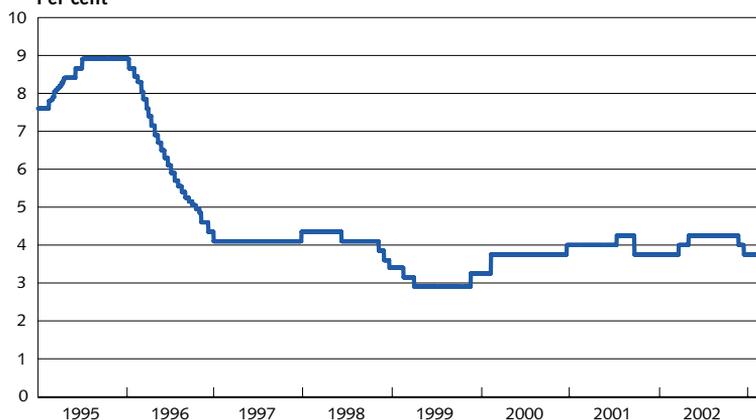
FINE TUNING IN MONETARY POLICY?

Since the time when the inflation targeting regime became firmly established and expectations were attuned to the Riksbank fulfilling its target, the variations in the instrumental rate have stayed inside a fairly narrow range (see Figure 2). These interest rate adjustments have usually been motivated by rather small forecast deviations from the 2 per cent inflation target. To a critical observer the Riksbank's monetary policy actions may easily be perceived as a form of fine tuning that is rendered pointless by the lack of knowledge about the transmission mechanism. Still, the Riksbank's actions can be motivated by the importance of regularly demonstrating that the Bank is prepared to follow its guidelines. This can convince market players that, if necessary, the Riksbank will not hesitate to make sizeable adjustments to the interest rate. Moreover, as long as inflation expectations do not deviate markedly from the Riksbank's target, credibility can no doubt be maintained without large interest rate adjustments. If, on the other hand, the Riksbank were to defer an adjustment

The Riksbank needs to regularly demonstrate that it is prepared to follow its guidelines.

¹³ This applies in the first place to import firms. It has proved considerably harder to assess the extent to which it also shows up in consumer prices and thereby affects the Riksbank's target variable. An important factor here seems to be firms' perceptions of the likely duration of an exchange rate shift. For instance, a weakening of the exchange rate that is judged to be followed after a time by a recovery may prompt firms to refrain from raising consumer prices to compensate for the increased cost of imports; instead they accept a (temporarily) lower profit margin. Cf. the reasoning on page 57.

Figure 2. The Riksbank's repo rate
Per cent



Source: The Riksbank.

until the forecast deviation was so large that, for example, it moved outside the tolerance interval, an adjustment might be needed so infrequently that doubts could arise about the Riksbank's determination to fight inflation.

Monetary policy in practice 1999–2001

The new monetary policy legislation came into force on 1 January 1999.

Although the foundation for the policy of targeting inflation was already in place at the beginning of 1993, it took some years to arrive at the practical arrangements that apply today. An important milestone in this process was, of course, the new monetary policy legislation that came into force at the beginning of 1999. This was a major constitutional change even though its practical consequences for the general organization of monetary policy were not all that great. Ever since the autumn of 1994 a majority of the political parties has agreed that the direct political influence on monetary policy should be restricted. This gave the Riksbank a further incentive to develop and deepen analyses and decision-making processes for the consistent fulfilment of the specified inflation target. An illustrative example of this work is the development of the Inflation Report from a rather vaguely formulated analytical document, for which the monetary policy staff were responsible without any backing from the Bank's governor, to a well-developed analytical policy document for which the Governor (and now the Executive Board) are ultimately responsible and with direct consequences for monetary policy decisions.

Besides the codification of a decision-making process that was already largely established, the new monetary policy regulations made this process clearer and more transparent. The independent status of the

Riksbank meant that the six members of the new Executive Board would unquestionably be jointly responsible for monetary policy decisions. At its first meeting the Board decided that such decisions are to be taken in accordance with a given agenda with eight meetings a year, of which four in connection with the publication of the Inflation Report.¹⁴ Minutes of these meetings would be taken and published as soon as circumstances permit. Another decision at the first meeting was to publish a document detailing the basic principles for the monetary policy decision-making process: the inflation target, policy and steering horizons, instrumental variables and decision-making rules with “provisions for exceptions”. All this meant that the monetary policy decision-making process could be followed (with a short time lag) in considerable detail by observers outside the Riksbank. This also represented a further improvement in the conditions for a thorough scrutiny and evaluation of the Riksbank’s monetary policy function.

The new monetary policy regulations made the decision-making process clearer and more transparent.

Monetary policy in Sweden has focused on targeting inflation ever since the fixed exchange rate regime was abandoned in November 1992. The purpose of this section is to indicate how the principles for monetary policy that were outlined above have been applied in practice in monetary policy in the period 1999–2001.¹⁵ The dates and content of the interest-rate decisions in this period are listed in Table 1, which also shows the GDP and inflation forecasts that were made on the occasions when the decisions were based on explicit forecasts in an Inflation Report.

MONETARY POLICY DURING 1999

At the new Executive Board’s first monetary policy meetings in February and March 1999, inflation prospects were considered to motivate a repo rate cut of 0.25 percentage points on each occasion. Forecast inflation one to two years ahead was somewhat below the targeted rate. At the meetings from April to October 1999 the Board found that the path of inflation was in line with the target.

The Executive Board lowered the repo rate 0.25 percentage points in February as well as in March 1999 and raised it 0.35 points in November.

The monetary policy meeting in November 1999 concluded that new information pointed to inflation being marginally higher than forecast in the October Inflation Report, where the main scenario had suggested that inflation two years ahead would be 2.1 per cent; with the risk spectrum taken into account, the mean value was judged to be 0.1 percentage point higher. The upside risk had to do with labour market shortages that were liable to lead to higher wage increases and thereby higher inflation than in

¹⁴ See Heikensten (1999) again.

¹⁵ This account is taken from Inflation Report 2002:1 and 2003:1.

TABLE 1. THE RIKSBANK'S MONETARY POLICY DECISIONS AND CERTAIN FORECASTS

Date of decision	Forecast inflation. Main scenario (12-month figure) one or two years ahead	Forecast GDP growth. Main scenario (1999, 2000 and 2001 respectively)	Uncertainty in inflation forecast	Adjusted forecast for inflation (12-month figure) one or two years ahead	Repo rate level	Repo rate change
1999-02-11					3.15	-0.25
1999-03-24	1.7; 1.8	2.1; 2.5; -	Somewhat bigger than normal	1.7; 1.6	2.90	-0.25
1999-04-22					2.90	0
1999-06-02	1.9; 2.0	2.5; 3.0; 3.0	Somewhat bigger than normal	1.8; 2.0	2.90	0
1999-08-12					2.90	0
1999-10-05	1.8; 2.1	3.6; 3.8; 3.0	Normal	1.9; 2.2	2.90	0
1999-11-11					3.25	0.35
1999-12-08	1.8; 2.2	3.4; 3.7; 3.3	Normal	1.9; 2.3	3.25	0
2000-02-03					3.75	0.50
2000-03-22	1.6; 2.1	-; 4.0; 3.5	Normal	1.6; 2.1	3.75	0
2000-05-04					3.75	0
2000-06-07	1.5; 1.9	-; 4.3; 3.5	Normal	1.5; 2.0	3.75	0
2000-07-06					3.75	0
2000-08-16					3.75	0
2000-10-09	1.5; 1.9	-; 4.0; 3.7	Normal	1.6; 2.1	3.75	0
2000-12-06	1.8; 1.9	-; 3.9; 3.4	Somewhat bigger than normal	2.0; 2.3	4.00	0.25
2001-02-01					4.0	0
2001-03-26	1.9; 1.9	2.4; 2.4	Bigger than normal	1.8; 1.8	4.0	0
2001-04-26					4.0	0
2001-05-30	1.8; 2.1	2.2; 2.5	Normal	1.8; 2.1	4.0	0
2001-07-05					4.25	0.25
2001-08-23					4.25	0
2001-09-17					3.75	-0.50
2001-10-15	1.7; 2.0	1.3; 2.2	Normal	1.7; 2.0	3.75	0
2001-12-04	2.0; 1.9	1.2; 1.8	Normal	2.0; 1.9	3.75	0

Source: The Riksbank.

the main scenario. The Executive Board considered that the Swedish economy was in a broad upward phase with successively rising resource utilisation and this was judged to imply that inflation would be higher than had been foreseen in the latest Inflation Report. Against this background the Board decided to raise the repo rate 0.35 percentage points. This was accompanied by a statement that there would probably be no interest rate adjustment at the next monetary policy meeting; the Riksbank wished to

avoid adding to the financial market uncertainty about IT systems, for example, in connection with the millennium transition.

MONETARY POLICY DURING 2000

At the new millennium's first monetary policy meeting, in February 2000, the Board noted that the development of oil prices in the past year had contributed to a successive increase in inflation. This raised the question of whether this was a case of supply shocks rather than a result of higher international demand. The Board concluded that the oil price's impact on general price developments could not be entirely disregarded. Moreover, monetary policy was considered to be so expansionary that in time it was liable to contribute to a rate of inflation above the target. The Board therefore raised the repo rate 0.5 percentage points.

The Executive Board raised the repo rate 0.5 percentage points in February and by another 0.25 points in December.

In the light of the current inflation forecasts, at the monetary policy meetings from March to October 2002 the Board left the repo rate unchanged. On these occasions a majority of the members concurred with the picture of a stable, strong upward phase in the Swedish economy that was bringing more and more unutilised resources into production. A number of members underscored that this pointed to a future need to raise the repo rate. The July minutes noted that the wage trend was in line with the assessment in the latest Inflation Report. The minutes of the August meeting noted that while new information since the Inflation Report supported the picture of a strong upward phase, growth in the current year could turn out to be somewhat lower than envisaged earlier, partly in view of a somewhat weaker first-half outcome and the Stockholm stock exchange's poor Q2 performance. The October minutes again underscored the impression of a strong domestic upswing; however, higher inflation was not foreseen because the Board found that the degree of unutilised resources seemed to be somewhat greater than allowed for earlier.

Financial market instability and subdued international prospects left their mark on autumn 2000. At the December monetary policy meeting the Board noted that new information pointed to a slowdown in global economic activity. At the same time, however, oil prices and exchange rates were now considered to constitute increasingly clear upside risks for future inflation. All in all, the Board judged that inflation two years ahead would be somewhat above the target. Against this background the repo rate was raised 0.25 percentage points.

The Board left the repo rate unchanged in the first half of 2001

Monetary policy considerations were also complex in spring 2001 but their nature was different. Registered inflation above the target raised the question of the causes of this and the relevant conclusions for monetary policy. The Riksbank's analysis indicated that the increase in inflation was transitory but that it might also include a more permanent element connected with demand. Furthermore, the exchange rate was weak. However, the inflationary pressure from the supply shocks and the exchange rate was countered to some extent by unexpectedly weak economic activity in the rest of the world. The Executive Board chose to leave the repo rate unchanged in the first half of 2001 even though the overall inflation forecast (i.e. taking the risk spectrum into account) did indicate that a cut could have been made in March as well as May (see Table 1). The large element of uncertainty, not least about the inflation propensity in the Swedish economy, left its mark on the assessment and was seen as a reason for continuing to await developments.

In July the Board raised the repo rate 0.25 percentage points.

At the July meeting¹⁶ the Board raised the repo rate 0.25 percentage points. This had to do with the weak exchange rate as well as signs that high resource utilisation would lead to rising inflation even after the transitory effects of the supply shocks had waned. The repo rate increase was followed by a stronger exchange rate and lower inflation expectations. Three Board members entered a reservation and maintained that the repo rate ought to have been left unchanged; they found the increase inappropriate given the tendency to an economic slowdown.

In September an extraordinary monetary policy meeting decided to lower the repo rate 0.50 percentage points.

The terrorist attacks in the United States led to autumn 2001 being characterised by great uncertainty about global economic developments. At an extraordinary monetary policy meeting in September on account of the events in the United States, the Board lowered the repo rate 0.50 percentage points. This was done concurrently with interest rate cuts in the United States, the euro area and a number of other countries.

In the rest of 2001 the Board left the repo rate unchanged.

In the months after the terrorist attacks, weak economic activity abroad was balanced by persistently high inflationary pressure in Sweden. Against this background, at the remaining monetary policy meetings in 2001 the repo rate was left unchanged. On these occasions there was still a large element of uncertainty about the permanence of the increase in inflation and this was considered to warrant a cautious implementation of monetary policy. One Board member entered a reservation against the

¹⁶ In June 2001 the Riksbank intervened in the foreign exchange market, partly in the context of monetary policy. As the intervention had little effect on the exchange rate and must be seen as an unusual feature of monetary policy under the new regime, the minuted discussion of the decision to intervene is not included here. The principles for the Riksbank's foreign exchange intervention policy can be studied in Heikensten & Borg (2002).

December decision to leave the repo rate unchanged and contended that unutilised resources were somewhat larger than the majority assumed, which could have motivated a repo rate cut of 0.25 percentage points.

HAS THE RIKSBANK ADHERED TO ITS RULES?

Does this account of the Riksbank's implementation of monetary policy in the period 1999–2001 warrant the conclusion that the principles set up for this were clearly followed? It will be recalled that the Riksbank's rule for monetary policy decisions is that the repo rate should normally be raised (lowered) if inflation one to two years ahead is forecast to be above (below) the targeted rate of 2 per cent. If circumstances motivate departures from the rule of action, this is to be stated clearly so that no misunderstanding need arise about monetary policy's implementation. There are mainly two reasons for departing from the rule that should be considered. One is if the Swedish economy is exposed to a supply or cost shock that is judged to affect inflation over the steering horizon to such an extent that bringing inflation onto the target within this period would require interest rate adjustments that are excessively large. A longer steering horizon is accordingly needed to avoid unduly drastic real economic effects of the higher interest rate. The second reason concerns the Riksbank's other primary function of promoting a safe and efficient payment system. In certain situations the Riksbank may have cause to use the instrumental rate for this purpose, too. For example, the Riksbank might choose a larger interest cut than the inflation outlook requires because for some reason the banking system is either in or threatened by a crisis and in need of support in the form of a markedly lower instrumental rate. This example illustrates that a conflict may arise, though it seldom does, between the Riksbank's two primary objectives.¹⁷

Circumstances that motivate departures from the rule of action are to be stated clearly.

A scrutiny of the Riksbank's monetary policy actions in the period considered here shows that the decisions (whether or not the repo rate was adjusted) generally followed the simple rule of action fairly closely. The only exception is the repo rate cut of 50 basis points one week after the terrorist attacks in the United States on 11 September 2001. The main reason for this cut was consideration for the payment system. The minutes do not mention any new inflation assessment that might have also motivated the decision.

The only exception is the repo rate cut of 50 basis points a week after the terrorist attacks in USA on 11 September 2001.

The other repo rate decisions followed the rule of action fairly closely. This is most evident in the case of the decisions (four a year) that coincid-

¹⁷ Goal conflicts are rare in an inflation targeting regime and more common when the exchange rate is fixed. A dramatic illustration of this occurred during the bank crisis in Sweden, when the Riksbank had to raise the instrumental rate to unprecedented heights even though the banks were in a precarious situation.

The other repo rate decisions followed the rule of action fairly closely.

ed with a new Inflation Report. As the Report contains fairly precise paths for inflation in the coming one to two years, collating the decisions with the rule of action and forecasts in the Report is fairly straightforward. It can then be noted in the first place that forecast inflation in the period in question was either virtually on target or did not deviate much. Secondly, when the repo rate was adjusted even though forecast inflation did not clearly deviate from the target, support for the decision is often to be found in the minuted discussion.

In the case of interest rate decisions that do not coincide with a new Inflation Report it is somewhat harder to tell how the rule of action affected the decision. The available documents for this are the press notice in which the decision is published and the minutes of the meeting, which are available two to three weeks later.¹⁸ The press notice is fairly concise (not more than two pages) but does give quite a fairly good picture of the inflation assessment on which the decision was based. For decisions in the intervals between the Inflation Report, staff at the Riksbank naturally do not produce completely new forecasts of economic developments and inflation. Still, the (unpublished) material that is produced as a basis for the Executive Board's meeting is fairly extensive. It ties in closely with the latest Inflation Report and the policy decision at that time. Relevant information obtained since then is evaluated and a revised inflation assessment is made. The press notice and the minutes provide quite a good picture of how this material is used as a basis for the interest rate decision. A closer inspection does not indicate any clear departures from the Riksbank's rule of action in the intervening decisions.

All in all, the Riksbank's monetary policy in these years seems to have followed the inflation targeting strategy described above, which the Riksbank has also officially declared that it intends to follow.

Monetary policy's target fulfilment

The Riksbank is required by law to safeguard the value of money and, according to the preparatory documents, also contribute to a stable real economic development.

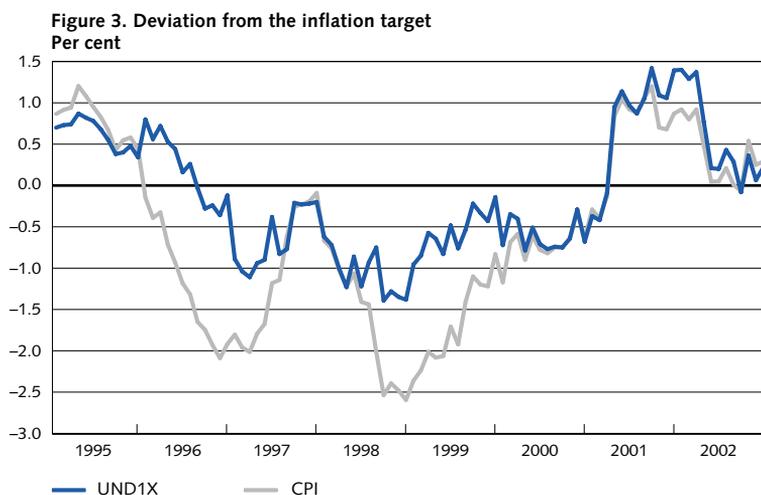
Let us now take a closer look at how well the Riksbank has managed to comply with its monetary policy objective. But first, what is this objective? The Riksbank is required by law to safeguard the value of money and, according to the preparatory documents, also contribute to a stable real economic development. As we have seen, ever since 1993 the Riksbank has interpreted this objective in operative terms as being to hold CPI inflation at 2 per cent (on an annual basis), with a tolerance interval of ± 1 percentage points. The real economy has been taken into account in the first

¹⁸ Interest rate decisions that coincide with the publication of an Inflation Report are also presented in a press notice.

place by choosing a monetary policy horizon of one to two years. This is intended to avoid precisely the unduly large effects on the real economy that might occur if monetary policy aimed to steer future inflation over a shorter period. In the second place the Riksbank's clarification of monetary policy in 1999 states that departures from the rule of action may be made under certain circumstances that, as we have seen, include real economic considerations.

Compliance with the inflation target is evident from Figure 3, which shows inflation's actual path throughout the period of inflation targeting in terms of the CPI as well as UND1X.¹⁹ The latter index is an alternative indicator of inflation that consists of the CPI excluding changes in housing costs that are a direct consequence of interest rate movements as well as changes in indirect taxes and subsidies. The tolerance interval is shown from the earliest date for target fulfilment (specified in statements in connection with the introduction of the new monetary policy regime at the beginning of 1993). It will be seen that from 1996 to 2000 both CPI and UND1X inflation were clearly below the target, after which there has been more of a tendency to exceed the target. In the first period, UND1X was continuously above the CPI and mostly inside the tolerance interval, which the CPI was outside for most of the time. The main explanation for the marked dips in the CPI in this period is the two series of major repo rate cuts and their effect on the CPI via house mortgage interest expendi-

Inflation was clearly below the target from 1996 to 2000, since when there has been more of a tendency to exceed the target.



Source: Statistics Sweden.

¹⁹ For a fuller discussion of the relationship between the CPI and UND1X, see the box on page 53.

ture. Once an inflation targeting regime has been established and interest rate formation mirrors inflation expectations that are in line with the central bank's target, it should not be necessary to vary the instrumental rate as much. Moreover, upward and downward adjustments should more or less cancel out over a business cycle. Early in the inflation targeting regime there were doubts about how quickly the interest rate could be lowered without this leading to overheating; moreover, market players were uncertain about the Riksbank's ability or determination to bring inflation down towards the target. The sharp interest rate reduction in the course of 1996 – from almost 9 per cent at the beginning of the year to just over 4 per cent at the end – stemmed from the Riksbank's assessment that the inflation targeting policy had acquired greater credibility, so the interest rate could be brought down to levels that were more attuned to inflation expectations in line with the target. As a result, the CPI dropped markedly on account of the lower housing costs. An indicator of inflation that excludes this type of transitory effect is clearly more appropriate in this case as a basis for an evaluation. It will be seen that in this phase UND1X was in fact inside the tolerance interval.

Even in terms of UND1X, inflation was consistently below the 2 per cent target. Is this acceptable, considering that this indicator remained inside the tolerance interval? The original purpose of the tolerance interval was to cope with the fact that inflation is continuously affected by more or less transitory factors that are unpredictable and have an effect on inflation that ought not to last. Deviations inside the tolerance interval should therefore not be grounds for criticising the Riksbank's compliance with the target provided they are considered to be due to just such unpredictable, transitory factors.

In practice it is naturally difficult to tell with any precision whether a higher degree of target fulfilment would have been feasible. An indication that this was perhaps possible in the period up to 2000 is that inflation was consistently below the target. If the factors behind the deviations were genuinely random, one might have expected less systematic deviations from the target. The question lacks a definite answer but it is relevant to note both that the deviations occasioned external criticism of the Riksbank, for example from the Finance Committee, for keeping monetary policy unnecessarily tight in the late 1990s and that the Riksbank has worked internally to see whether faulty assessments, primarily of resource utilisation's impact on inflation, are a systematic feature of its forecasts. As we have seen, the transmission mechanism is notoriously hard to quantify at all precisely, so the Riksbank must always be prepared for the occurrence of deviations from the target on account of these types of faulty assessment. There is a potential here for improving forecasts.

The deviations from the target have led to criticism of the Riksbank for keeping monetary policy unnecessarily tight in the late 1990s.

Disregarding the problems connected with the steep interest rate reductions, the discussion about the Riksbank's compliance with the target in the period 2001–03 follows much the same lines. One difference is that in these years registered inflation was consistently *above* the forecast level. In the review above of the Riksbank's policy discussions in these years we noted that the underestimation of inflation occasioned an analysis of whether the inflation propensity at a given level of resource utilisation had been underestimated, that is, the opposite of earlier deliberations. In the latter part of the period, assessments show that the degree of target compliance was much more clearly related to random factors that could not have been predicted at the time when forecasts were being produced for the interest rate decisions. A typical example is mad cow disease, the effects of which on prices coincided, moreover, with price increases that had to do with unusual climatic conditions. Still, the basic problem of distinguishing factors that are purely random from those which the Riksbank ought to be able to allow for when forecasting inflation will not go away and means that it is always hard to determine the extent to which deviations from the target might have been avoided.

In the latter part of the period, compliance with the target is related much more clearly to random factors.

A more rigorous evaluation of whether interest rate policy's real economic impact has been allowed for in an appropriate way by the Riksbank is also difficult. One could take the easy way out and note that at least in the period that was studied more closely above (1999–2001) there do not seem to have been grounds for departing from the simple rule of action out of consideration for the real economy; neither was this done. The more profound issue of whether the Riksbank's normal rules of action represent a reasonable trade-off between the variability of inflation and the real economy, respectively – a trade-off that, as has been pointed out, can in fact be made in economic policy – has hardly been studied in evaluations of the Riksbank's policy. One reason lies in the difficulty of arriving *a priori* at the likely preferences for this trade-off.

Monetary policy's operative application

As we have seen, the Riksbank uses the repo rate as an instrument in monetary policy. This section takes a closer look at what the repo rate is, how monetary policy operations are carried out in practice and why monetary policy is implemented in this way.²⁰ An appropriate starting point is the Riksbank's balance sheet, which in a stylised form is as follows.

The Riksbank uses the repo rate as an instrument in monetary policy.

²⁰ For a more detailed account, see Mitlid & Vesterlund (2002).

The Riksbank's balance sheet

Foreign reserves	Banknotes and coins
Domestic securities	Deposits from banks
Repo positions	Equity capital
Lending to banks	

Equity capital is given in the short run, neither does the domestic securities portfolio change except via more long-term decisions. The same applies to foreign reserves as long as the exchange rate is floating and foreign exchange interventions by the central bank are infrequent. Disregarding repo positions for the time being, it is variations in the amount of banknotes and coins in circulation that determines the banking system's position in relation to the central bank. Assume that for some reason the general public wishes to hold more banknotes and coins. All changes in the amount of banknotes and coins in circulation occur via the banks, which at any time can order (or return) the desired quantity of notes and coins from (to) the Riksbank. In this way, the general public's increased requirement prompts the banks to order more notes from the Riksbank and the banks are debited for this on their accounts with the Riksbank (the RIX system). If the accounts in the banking system as a whole did not initially add up to a net deposit in the Riksbank, the banks will need to borrow from the Riksbank.

The banks do what they can to avoid having to borrow overnight from the Riksbank.

So what are the terms for bank loans from and deposits with the Riksbank?²¹ In Sweden and most other countries, this is a matter of overnight maturities. The spread between the deposit and borrowing rates (known in the context of monetary policy as the interest rate corridor) is very large for the money market, at present 150 basis points.²² Consequently the banks naturally do what they can to avoid having to borrow from the Riksbank. This means that a bank which foresees in the course of a particular day that its incoming and outgoing payment flows seem to be leading to a large borrowing requirement at the end of the day will endeavour to arrange this borrowing at more favourable terms. At the same time there are other banks which anticipate having a surplus of liquid funds that they want to deposit on better terms than the Riksbank offers. The overnight market is organised to handle these liquidity transactions and the overnight interest rate is the price for overnight loans that is established in this trading.

²¹ The banks' access to deposits in and loans from the Riksbank is often referred to as standing facilities.

²² One basis point is a hundredth part of one percentage point.

It is naturally desirable that banks with surplus liquidity can match those with a borrowing requirement so that trading in the overnight market enables the banking system as a whole to avoid deposits with or loans from the Riksbank.

This is where the Riksbank's repo transactions and the associated repo rate come in. A repo transaction (repo stands for repurchase agreement) amounts to an agreement between the Riksbank and a bank whereby the latter sells securities with a high credit rating (mainly treasury and housing paper) to the former with an undertaking to buy them back at a specified time and interest rate (price). In principle the transaction is a fixed-interest (the repo rate) loan to the bank up to the repurchase date, with the securities as collateral.

If the Riksbank judges, for example, that the banking system as a whole will be obliged to borrow extensively from the Riksbank, this will be parried by the Riksbank offering loans to the banks against government securities as collateral. This takes the form of the banks concluding repo agreements with the Riksbank. The aim is that, provided the inter-bank overnight market functions properly, the total banking system will be in a position where no bank will need to resort to the Riksbank's standing facilities.

In principle the repos could have a variety of maturities and be offered on demand but in practice they are administered in a highly standardised manner. Briefly, repos are allocated once a week (on Tuesdays) by a tendering procedure whereby each bank²³ indicates the amount it wants to borrow at the repo rate, which is set by the Riksbank. Repos normally have a maturity of one week, so the repo rate is a one-week rate. The total allocation²⁴ is determined by the Riksbank in the light of its assessment of how large the balance-sheet item *Repo positions* needs to be to result in the total banking system's net borrowing or deposit requirement being zero during the coming week, that is, for the duration of the repo. The repo rate is regarded as the Riksbank's instrumental rate (together with the interest rate corridor) for monetary policy and therefore naturally attracts a lot of attention. Note, however, that at other times (between the repo transactions) there is less interest in the one-week interest rate. Instead it is the overnight rate that is in focus. It is meant to stabilise in the vicinity of the repo rate as long as the market judges that the latter will be unchanged.

The banks make repo agreements with the Riksbank to create a situation where no bank will need to use the standing facilities.

²³ To be more precise, seven banks (the four major Swedish banks and three foreign banks) participate in repos in their capacity as primary monetary policy counterparts (formerly known as primary dealers).

²⁴ The banks' tenders, which are thus confined to the quantity, are based on their individual assessments of borrowing during the week; the allocation is then made on a pro rata basis.

The Riksbank's monetary policy operations aim to stabilise the overnight interest rate around the repo rate.

For the purpose of stabilising the overnight rate close to the repo rate the Riksbank is not prepared to rely solely on the overnight borrowing market. The bank has therefore extended its arsenal to include fine-tuning transactions; these are offered to the banks on a daily basis with a spread of ± 10 basis points around the repo rate if the Riksbank judges that otherwise the banking system as a whole would be obliged to borrow from it or make deposits. This ensures that the overnight interest rate stays close to the repo rate.

Thus the Riksbank's monetary policy operations aim to stabilise the overnight interest rate around monetary policy's declared instrumental rate, that is, the repo rate. This naturally raises the question of why the Riksbank steers the overnight rate even though it is clear that it is interest rates with longer maturities that directly affect GDP and inflation. There is, unfortunately, no simple answer, though it may be worth noting that in every country where monetary policy targets inflation, the process focuses on steering the shortest interest rates in much the same way as in Sweden. One explanation may be that the unique position of central banks in the payment system puts them in a better position to exert direct control over the overnight rate than over rates with longer maturities.

A look into the future

The current conduct of monetary policy in Sweden has now been described fairly fully. The main features are the focus on price stability as the policy's objective and the clear mandate for the Riksbank to fulfil this objective independently of the quotidian views of politicians. It is also considered important that the Riksbank implements the policy in a clear and transparent manner as regards the monetary policy decisions as well as the underlying analysis.

On the whole, the inflation targeting policy seems to have worked satisfactorily. Inflation has been largely inside the tolerance interval in the vicinity of the target. The Riksbank has established a monetary policy process that enables outsiders to find out how and why monetary policy decisions are made. The policy's analytical framework, as reflected for example in the Inflation Report, can be said to compare well with established inflation targeting regimes in other countries²⁵ such as the United Kingdom, New Zealand and Euroland. At the same time, the history of inflation targeting policy with an independent central bank, in Sweden as well as in other countries, is certainly rather short and perhaps the policy has not yet been severely tested.

²⁵ See Leeper (2003).

Let us therefore finally deliberate about monetary policy's future. In Sweden's case, future full participation in EMU would naturally entail major changes. After the referendum, this is not topical but that does not mean that the issue has been struck off the agenda for ever.

A broader view of inflation targeting regimes with independent central banks and of their future shows, as noted in this article, that there is much to be said for them in an economic analysis. They involve a concentration of central bank functions to much the same core tasks that were originally performed. Moreover, the clear mandate and independent status of these central banks seem to be good examples of how a division of responsibilities between political institutions and expert institutions should be arranged in order to enhance efficiency in economic policy. Taken together, this implies that inflation targeting policy with an independent central bank has a good analytical foundation, which per se may mean that such regimes should have a good chance of becoming established even in the future.

It should be recognised, however, that conditions for the future of inflation targeting regimes cannot be discussed without considering other components of economic policy. The stabilisation of the Swedish economy in the 1990s owed much to the evolution of a new and credible framework for budget policy.²⁶ Without that, it would probably have been much harder for the Riksbank to gain acceptance for and introduce the inflation targeting policy. This illustrates the important point that the Riksbank, however formally independent it may be, is heavily dependent on a sustainable direction of economic policy in other respects. If economic policy for various reasons were to create major imbalances and economic tensions, in time the Riksbank could have considerable difficulties in performing its monetary policy functions. A loss of credibility for the Riksbank with its present mandate would also make it more likely that politicians and the electorate – the Bank's ultimate principals – would want to test a different economic policy regime, perhaps with very different tasks and roles for the central bank.

In Sweden's case, future full participation in EMU would entail major changes.

The Riksbank, however formally independent it may be, is heavily dependent on a sustainable direction of economic policy in other respects.

²⁶ For a look at the new fiscal policy regime, see also the box on pages 40–45 in Inflation Report 2003:4.

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Decision on capital injection during the winding up of the Riksbank's company

In February 2004 the Riksbank signed an agreement with Securitas Värde AB according to which Securitas will take over the greater part of the assets in the Riksbank's wholly-owned subsidiary, Pengar i Sverige AB, and offer employment to the majority of the company's employees. The acquisition by Securitas Värde has been notified to the Swedish Competition Authority. The parties are now awaiting the Competition Authority's decision. The activities in Pengar i Sverige AB, which comprise cash-in-transit and counting services, are being wound up in parallel with this. As part of the winding up process, all customer agreements have been cancelled. At the same time the company's costs will be largely unchanged while its earnings will gradually decrease, thus weakening the financial result.

In order to ensure Pengar i Sverige's financing during the winding up process, the Executive Board of the Riksbank decided at its meeting on 31 March 2004 to guarantee capital cover of up to SEK 75 million. At the same time the Riksbank provided a capital injection of SEK 10 million to its wholly-owned subsidiary Svensk Kontantförsörjning AB (SKAB). SKAB is responsible for central bank-related tasks in the area of cash management, such as stock-keeping and the receipt and distribution of banknotes and coins to and from these stocks. An investigation of the future organisation of the activities in SKAB is in progress at the Riksbank and the conclusions are expected to be presented during spring 2004. The final winding up of Pengar i Sverige AB may require additional capital injections. The aim of converting the cash management operations into an independent company has been to streamline the Riksbank's activities and create a more rational structure in the area.

Anders Kragsterman new deputy head of Financial Stability Department

The Executive Board of the Riksbank decided at its meeting on 28 April 2004 to appoint Anders Kragsterman deputy head of the Financial Stability Department. He will take up this post during the autumn. Anders Kragsterman is currently employed at the Group Credits division within SEB. Since the mid-1990s he has played a leading role in method development and implementation of SEB's quantitative risk models.

The Riksbank cuts number of departments

The Executive Board of the Riksbank decided at its meeting on 28 April 2004 to propose to the General Council that areas of the Bank's operations be reorganised. The General Council is expected to make a decision on the proposal at its meeting on 13 May.

The Executive Board's proposal entails three departments – the International Department, the Communications Department and the Secretariat of the Executive Board – being merged into one general secretariat. In addition, it is proposed that the Research Department be incorporated into the Monetary Policy Department and that the Risk Management Department be incorporated into the Financial Stability Department. The reduction in the number of departments is aimed at improving efficiency and facilitating management of the Bank.

The Executive Board intends to appoint Mats Galvenius, currently Head of the Market Operations Department, head of the new general secretariat. A new head of department for the Market Operations Department will be appointed shortly. The present head of the Secretariat of the Executive Board, Björn Hasselgren, will remain a head of department with responsibility for matters pertaining to the Bank's subsidiaries and the secretariat of the General Council. It is proposed that the new organisation should come into force on 1 June 2004.

■ Monetary policy calendar

- 2000-01-03** The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.0 per cent as of 4 January 2000.
- 02-03 The *repo rate* is increased by the Riksbank from 3.25 per cent to 3.75 as of 9 February 2000.
- 04-03 The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.5 per cent as of 4 April 2000.
- 12-07 The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 13 December 2000. The Riksbank also increases its *deposit* and *lending rates* in each case by 0,5 percentage points. The deposit rate is set at 3.25 per cent and the lending rate at 4.75 per cent. The decision takes effect on 13 December 2000.
- 2001-07-05** The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 11 July 2001. The Riksbank also increases its *deposit* and *lending rates* in each case by 0.25 percentage points. The deposit rate is set at 3.5 per cent and the lending rate at 5.0 per cent. The decision takes effect on 11 July 2001.
- 09-17 The *repo rate* is lowered by the Riksbank from 4.25 per cent to 3.75 per cent as of 19 September 2001. The Riksbank also lowers its *deposit* and *lending rates* in each case by 0.50 percentage points. The deposit rate is set at 3.0 per cent and the lending rate at 4.5 per cent. The decision takes effect on 19 September 2001.
- 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.

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.

■ Statistical appendix

- 1 Riksbank's assets and liabilities **83**
- 2 Money supply **84**
- 3 Interest rates set by the Riksbank **85**
- 4 Capital market interest rates **85**
- 5 Overnight and money market interest rates **86**
- 6 Treasury bill and selected international rates **87**
- 7 Krona exchange rate: TCW index and selected exchange rates **88**
- 8 Nominal effective TCW exchange rate **89**
- 9 Forward net position on the foreign-exchange market with authorized currency dealers **89**

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
2002	July	17 436	21 631	159 602	2 381	201 050
	Aug	17 436	23 176	163 286	2 360	206 258
	Sept	17 436	22 393	157 865	2 280	199 974
	Oct	17 436	22 233	157 437	2 234	199 340
	Nov	17 436	23 582	157 993	2 369	201 380
	Dec	17 436	30 714	159 791	2 806	210 747
2003	Jan	18 210	22 849	153 407	11 021	205 488
	Feb	18 210	23 405	155 029	6 759	203 403
	March	18 210	22 619	151 184	11 678	203 691
	April	18 210	23 276	156 777	3 306	201 569
	May	18 210	15 938	157 470	7 006	198 624
	June	18 210	15 674	159 341	2 259	195 484
	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

LIABILITIES. PERIOD-END STOCK FIGURES. SEK MILLION

		Notes and coins in circulation	Capital liabilities	Debts to monetary policy counterparts	Debts in foreign currency	Other	Total
2002	July	96 728	62 943	413	8 085	32 881	201 050
	Aug	98 367	62 943	133	10 450	34 365	206 258
	Sept	97 648	62 943	79	4 699	34 605	199 974
	Oct	97 411	62 943	117	3 675	35 194	199 340
	Nov	99 061	62 943	17	3 673	35 686	201 380
	Dec	107 439	62 943	87	3 664	36 614	210 747
2003	Jan	99 614	62 943	58	3 674	39 199	205 488
	Feb	100 475	62 943	33	3 327	36 625	203 403
	March	99 701	62 943	33	3 300	37 714	203 691
	April	100 318	62 943	98	4 135	34 075	201 569
	May	100 483	50 556	22	3 323	44 240	198 624
	June	100 142	50 556	123	4 173	40 490	195 484
	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

2 Money supply

END-OF-MONTH STOCK

		SEK million		Percentage 12-month change		
		M0	M3	MO	M3	
2001	Jan	84 327	960 545	Jan	2.5	1.1
	Feb	84 282	947 276	Feb	4.0	-0.4
	March	85 188	969 559	March	5.0	2.6
	April	86 379	975 366	April	5.8	0.9
	May	86 711	983 764	May	5.9	-0.1
	June	87 288	1 012 094	June	7.2	6.2
	July	86 705	977 812	July	6.6	3.5
	Aug	87 693	985 811	Aug	6.6	3.8
	Sept	87 892	1 008 439	Sept	6.0	4.3
	Oct	88 809	1 022 639	Oct	7.3	5.4
	Nov	89 947	1 039 646	Nov	7.1	6.6
	Dec	96 743	1 038 972	Dec	8.8	6.7
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

3 Interest rates set by the Riksbank

PER CENT

	Date of announcement	Effective from	Repo rate	Deposit rate	Lending rate	Period	Reference rate ¹
2000	02-04	02-09	3.75			2002:2 half-year	4.50
	12-07	12-13	4.00	3.25	4.75	2003:1 half-year	4.00
2001	07-06	07-11	4.25	3.50	5.00	2003:2 half-year	3.00
	09-17	09-19	3.75	3.00	4.50	2004:1 half-year	3.00
2002	03-19	03-20	4.00	3.25	4.75	2004:2 half-year	2.00
	04-26	05-02	4.25	3.50	5.00		
	11-15	11-20	4.00	3.25	4.75		
	12-05	12-11	3.75	3.00	4.50		
2003	03-18	03-19	3.50	2.75	4.25		
	06-05	06-11	3.00	2.25	3.75		
	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
2002	Jan	4.53	5.01	5.17	5.27	4.71	5.40
	Feb	4.76	5.18	5.28	5.36	4.94	5.57
	March	5.05	5.46	5.55	5.63	5.22	5.83
	April	5.10	5.46	5.56	5.69	5.28	5.85
	May	5.10	5.45	5.56	5.69	5.25	5.85
	June	4.94	5.27	5.39	5.52	5.09	5.65
	July	4.73	5.06	5.20	5.37	5.08	5.45
	Aug	4.52	4.83	4.96	5.13	4.86	5.21
	Sept	4.42	4.62	4.77	4.97	4.69	5.03
	Oct	4.29	4.62	4.80	5.07	4.52	5.07
	Nov	4.15	4.54	4.75	5.05	4.36	4.96
	Dec	3.99	4.39	4.59	4.89	4.16	4.79
2003	Jan	3.79	4.23	4.36	4.70	3.99	4.54
	Feb	3.56	3.97	4.11	4.47	3.77	4.27
	March	3.53	4.03	4.17	4.57	3.86	4.34
	April	3.59	4.17	4.30	4.72	3.93	4.57
	May	3.25	3.77	3.90	4.37	3.56	4.16
	June	2.97	3.53	3.79	4.20	3.11	3.80
	July	3.22	3.85	4.20	4.51	3.21	4.06
	Aug	3.58	4.18	4.45	4.70	3.55	4.42
	Sept	3.54	4.18	4.48	4.73	3.50	4.42
	Oct	3.62	4.31	4.60	4.85	3.53	4.54
	Nov	3.76	4.45	4.74	4.98	3.58	4.67
	Dec	3.55	4.30	4.60	4.86	3.38	4.51
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

5 Overnight and money market interest rates

MONTHLY AVERAGE. PER CENT

	Repo rate	Interbank rate	Treasury bills			Company certificates		
			3-month	6-month	12-month	3-month	6-month	
2001	Jan	4.00	4.10	4.07	4.12		4.17	4.26
	Feb	4.00	4.10	4.01	4.07		4.14	4.23
	March	4.00	4.10	4.06	4.02	4.11	4.24	4.23
	April	4.00	4.10	3.94	3.98	4.01	4.12	4.11
	May	4.00	4.10	4.01	4.06	4.28	4.16	4.20
	June	4.00	4.10	4.17	4.27	4.48	4.39	4.46
	July	4.17	4.27	4.31	4.42		4.50	4.58
	Aug	4.25	4.35	4.28	4.31	4.37	4.45	4.48
	Sept	4.05	4.15	4.01	4.06	4.15	4.18	4.22
	Oct	3.75	3.85	3.70	3.72		3.90	3.91
	Nov	3.75	3.85	3.71	3.74	3.91	3.89	3.87
	Dec	3.75	3.85	3.71	3.76	3.97	3.96	3.96
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	4.07	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

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
2001	Jan	5.62	4.71	5.69	4.07	5.47	4.62	5.59	4.12
	Feb	5.25	4.70	5.61	4.01	5.11	4.61	5.53	4.07
	March	4.87	4.64	5.41	4.06	4.72	4.51	5.31	4.02
	April	4.53	4.64	5.25	3.94	4.40	4.53	5.14	3.99
	May	3.99	4.58	5.09	4.01	3.99	4.50	5.07	4.06
	June	3.74	4.40	5.10	4.17	3.74	4.28	5.18	4.27
	July	3.66	4.41	5.11	4.31	3.69	4.33	5.18	4.41
	Aug	3.48	4.30	4.87	4.28	3.49	4.17	4.88	4.35
	Sept	2.92	3.91	4.56	4.01	2.89	3.78	4.49	4.06
	Oct	2.31	3.54	4.27	3.70	2.25	3.39	4.25	3.72
	Nov	2.01	3.32	3.88	3.71	2.02	3.20	3.86	3.74
	Dec	1.84	3.27	3.94	3.71	1.90	3.19	3.96	3.76
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

¹ Treasury bills.

7 Krona exchange rate: TCW index and selected exchange rates

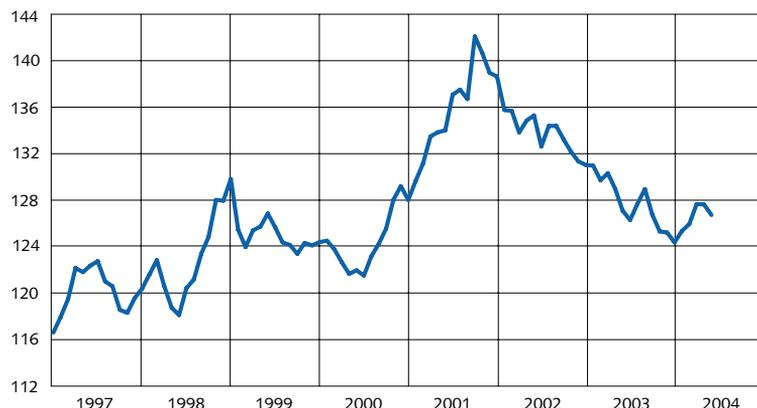
MONTHLY AVERAGE

		SEK					
		TCW-index	EUR	GBP	USD	JPY	CHF
2001	Jan	129.6612	8.8963	14.0052	9.4669	0.0811	5.8170
	Feb	131.1553	8.9736	14.1555	9.7350	0.0838	5.8438
	March	133.4701	9.1254	14.4988	10.0316	0.0828	5.9416
	April	133.8280	9.1103	14.6320	10.1987	0.0824	5.9593
	May	133.9895	9.0536	14.7412	10.3333	0.0848	5.9019
	June	137.0501	9.2010	15.0876	10.7753	0.0882	6.0421
	July	137.4779	9.2557	15.2105	10.7666	0.0864	6.1150
	Aug	136.6723	9.3036	14.8466	10.3343	0.0851	6.1433
	Sept	142.0389	9.6670	15.5179	10.6089	0.0894	6.4799
	Oct	140.6226	9.5798	15.3446	10.5630	0.0871	6.4725
	Nov	138.9180	9.4131	15.2278	10.5965	0.0866	6.4196
	Dec	138.6116	9.4436	15.2024	10.5594	0.0832	6.4006
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

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 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.

9 Forward net position on the foreign-exchange market with authorized currency dealers

REPORTING PERIOD. SEK MILLION

		Non-bank public		Banks abroad	The Riksbank	Total
		Resident (1)	Non-resident (2)	Net (3)	Net (4)	(1+2+3+4)
2002	Jan	-380 368	-29 553	229 071	-5 753	-186 603
	Feb	-378 895	-20 566	197 130	-4 226	-206 557
	March	-364 779	-14 558	170 705	-3 144	-211 776
	April	-357 495	-23 805	173 232	0	-208 068
	May	-359 267	-20 295	192 173	0	-187 389
	June	-360 494	-10 409	194 312	0	-176 591
	July	-358 252	-10 076	136 339	0	-231 989
	Aug	-313 551	-13 862	153 001	-5 161	-179 573
	Sept	-360 149	- 5 411	160 670	-5 143	-210 033
	Oct	-342 143	- 5 719	216 218	-4 924	-136 568
	Nov	-348 617	-2 260	228 042	-5 089	-127 924
	Dec	-368 834	-5 810	209 273	-5 215	-170 586
2003	Jan	-325 302	2 280	221 587	-8 275	-109 710
	Feb	-321 149	6 386	231 208	-5 113	- 88 668
	March	-327 225	5 877	205 840	-5 112	-120 620
	April	-365 842	18 728	231 999	-5 113	-120 228
	May	-360 584	19 146	250 712	-5 064	- 95 790
	June	-351 974	25 664	197 708	-5 108	-133 710
	July	-341 819	17 016	205 349	-5 091	-124 545
	Aug	-359 475	11 041	156 955	-5 129	-196 608
	Sept	-324 385	17 034	228 887	-5 481	- 78 469
	Oct	-340 545	19 206	239 319	-5 463	- 82 025
	Nov	-309 229	6 781	214 104	-5 447	-88 349
	Dec	-252 394	- 4 626	233 988	-5 463	- 28 495
2004	Jan	-289 407	- 9 472	238 287	-8 892	- 69 484

Note. A positive position indicates that purchases of foreign currencies exceed sales. A negative position indicates that sales of foreign currencies exceed purchases.

■ Articles in earlier issues

Swedish krona loans on international markets	<i>Loulou Wallman</i>	1990:1
Foreign exchange markets in April 1989 – a global study	<i>Robert Bergqvist</i>	1990:1
The balance of payments	<i>Gunnar Blomberg</i>	1990:2
Reinvested earnings and direct investment assets	<i>Fredrika Röckert</i>	1990:2
Foreign ownership – the law and current proposals	<i>Per Arne Ström</i>	1990:2
The international foreign exchange market in 1989 and 1990	<i>Robert Bergqvist</i>	1990:3
Exchange deregulation – short and long-run effects	<i>Christina Lindenius</i>	1990:3
The Swedish credit market, January through September 1990	<i>Marianne Biljer and Per Arne Ström</i>	1990:4
Fewer loans and larger mortgage payments – the Riksbank's household survey, January–June 1990	<i>Anna Thoursie</i>	1990:4
New data on outflow of travel allowance	<i>Fredrika Röckert</i>	1990:4
Competition and regulation: trends in financial systems	<i>David T. Llewellyn</i>	1990:4
Foreign bank branches and Riksbank loan facilities	<i>Loulou Wallman</i>	1991:1
The EMU process in 1990 – a résumé	<i>Gustaf Adlercreutz</i>	1991:1
The Norwegian krone to Ecu	<i>Christina Lindenius</i>	1991:1
The 1990 balance of payments	<i>Fredrika Röckert</i>	1991:2
Swedish holdings of foreign portfolio shares	<i>Martin Falk</i>	1991:2
Profits in commercial banking	<i>Bo Dalheim, Peter Lagerlöf and Per Arne Ström</i>	1991:2
International capital adequacy rules – the work continues	<i>Göran Lind and Åke Törnqvist</i>	1991:2
Safeguard the monetary role of the IMF	<i>Margareta Kylberg</i>	1991:2
Finance companies – structural changes	<i>Marianne Biljer</i>	1991:3
The Swedish krona pegged to the Ecu	<i>Hans Lindberg and Christina Lindenius</i>	1991:3
The private Ecu – characteristics and tendencies	<i>Jonny Nilsson</i>	1991:3
The international foreign exchange market in 1990 and 1991 – expanding EMS block	<i>Robert Bergqvist and Leif Johansson</i>	1991:4
The EEA agreement and the Riksbank	<i>Jan Nipstad</i>	1991:4
Household borrowing in 1991:1	<i>Siw Stjernborg</i>	1991:4
The Riksbank and primary dealers	<i>Robert Bergqvist and Ann Westman Mårtensson</i>	1992:1
Economic and monetary union – Maastricht points the way	<i>Gustaf Adlercreutz</i>	1992:1
European monetary union – convergence criteria and adjustment	<i>Christian Nilsson</i>	1992:1
Bank results in Sweden and other Nordic countries	<i>Bo Dalheim, Göran Lind and Anna-Karin Nedersjö</i>	1992:2
Market deregulation for krona certificates and bonds	<i>Loulou Wallman</i>	1992:2
Foreign acquisitions of shares in Swedish companies	<i>Rolf Skog</i>	1992:2
The EEA agreement and financial markets	<i>Jan Nipstad</i>	1992:2
The budget deficit and fiscal policy	<i>Krister Andersson</i>	1992:3
Foreign investment in Swedish interest-bearing securities	<i>Martin Falk and Tomas Niemelä</i>	1992:3

The performance of banks in the UK and Scandinavia: a case study in competition and deregulation	<i>David T. Llewellyn</i>	1992:3
The foreign exchange market in April 1992	<i>Robert Bergqvist</i>	1992:4
The interest rate scale	<i>Ann Westman Mårtensson</i>	1992:4
The local government economy	<i>Maude Svensson</i>	1992:4
Monetary policy indicators	<i>Yngve Lindh</i>	1993:1
Payment systems in transition	<i>Hans Bäckström</i>	1993:1
Annus horribilis for EMU	<i>Gustaf Adlercreutz</i>	1993:1
The 1992 balance of payments	<i>Martin Falk and Anders Lindström</i>	1993:2
The Swedish credit market in 1992	<i>Marianne Biljer and Johanna Jonsson</i>	1993:2
The banking sector in 1992	<i>Bo Dalheim, Göran Lind and Anna-Karin Nedersjö</i>	1993:2
Structural saving deficiency – a long-standing problem	<i>Annika Alexius and Gunnar Blomberg</i>	1993:2
Capital cover for market risk	<i>Robert Bergqvist and Mats Ericsson</i>	1993:3
Securitisation on the Swedish credit market	<i>Willem van der Hoeven</i>	1993:3
Government indexed bonds	<i>Kerstin Hallsten</i>	1993:3
Estimating forward interest rates	<i>Lars E.O. Svensson</i>	1993:3
Debt consolidation in progress	<i>Daniel Barr and Kurt Gustavsson</i>	1993:4
Will Sweden follow Finland's path?	<i>Maria Landell</i>	1993:4
Monetary policy instruments in EMU	<i>Kari Lotsberg and Ann Westman</i>	1993:4
Monetary policy effects on interest rate formation	<i>Annika Alexius</i>	1994:1
The economic role of asset prices	<i>Claes Berg and Mats Galvenius</i>	1994:1
Stage two in the EMU process	<i>Louise Lundberg</i>	1994:1
The 1993 balance of payments with a flexible exchange rate	<i>Anders Lindström and Tomas Lundberg</i>	1994:2
Nonresident holdings of Swedish securities	<i>Mattias Croneborg and Johan Östberg</i>	1994:2
The Swedish credit market in 1993	<i>Johanna Jonsson</i>	1994:2
The banking sector in 1993	<i>Göran Lind and Anna-Karin Nedersjö</i>	1994:2
The Riksbank sets reserve requirements to zero	<i>Kari Lotsberg</i>	1994:2
The Riksbank's new interest rate management system	<i>Lars Hörngren</i>	1994:2
The 1993 household survey	<i>Eeva Seppälä</i>	1994:2
Central government debt, interest rates and the behaviour of foreign investors	<i>Thomas Franzén</i>	1994:3
Monetary conditions index – a monetary policy indicator	<i>Bengt Hansson and Hans Lindberg</i>	1994:3
Sweden's net external debt	<i>Robert Bergqvist and Anders Lindström</i>	1994:3
The Riksbank, the RIX system and systemic risks	<i>Daniel Barr</i>	1994:3
RIX – the Riksbank's system for clearing and settlement	<i>Bertil Persson</i>	1994:3
The international foreign exchange market in 1994	<i>Martin Edlund and Kerstin Mitlid</i>	1994:4
The yield curve and investment behaviour	<i>Lars Hörngren and Fredrika Lindsjö</i>	1994:4
Direct investment – interpretations and implications	<i>Johan Östberg</i>	1994:4
Price stability and monetary policy	<i>Urban Bäckström</i>	1995:1
The coordination of economic policy in the European Union	<i>Christina Lindenius</i>	1995:1
The bank's deposit monopoly and competition for savings	<i>Daniel Barr and Lars Hörngren</i>	1995:1

The Riksbank and primary dealers in the currency market	<i>Robert Bergqvist and Ann Westman</i>	1995:1
The 1994 balance of payments – capital flows and exchange rate	<i>Robert Bergqvist and Mattias Croneborg</i>	1995:2
Output gap and inflation in a historical perspective	<i>Mikael Apel</i>	1995:2
The Swedish credit market in 1994 – continued consolidation	<i>Felice Marlor</i>	1995:2
Banks and housing institutions in 1994	<i>Björn Hasselgren and Anna-Karin Nedersjö</i>	1995:2
The 1994 household survey – increased financial saving	<i>Hans Dillén</i>	1995:2
Monetary policy in theory and practice	<i>Lars Hörngren</i>	1995:3
Estimating forward interest rates with the extended Nelson and Siegel method	<i>Lars E.O. Svensson</i>	1995:3
Household saving in private bonds	<i>Lotte Schou and Marianne Wolfbrandt</i>	1995:3
Tourism dominates the travel item	<i>Fredrika Röckert</i>	1995:3
The Riksbank and european monetary cooperation	<i>Urban Bäckström</i>	1995:4
Strategy and instruments in EMU's third stage	<i>Claes Berg</i>	1995:4
EMU and employment	<i>Krister Andersson and Anatoli Annenkov</i>	1995:4
EMU's final objective – a single currency	<i>Stefan Ingves and Agneta Brandimarti</i>	1995:4
EU, EMU and the payment system	<i>Hans Bäckström</i>	1995:4
The management of the bank crisis – in retrospect	<i>Stefan Ingves and Göran Lind</i>	1996:1
The krona's equilibrium real exchange rate	<i>Annika Alexius and Hans Lindberg</i>	1996:1
Sharp swings in international capital flows	<i>Fredrika Röckert and Karin Stillerud</i>	1996:1
Swedish derivatives market dominated by a few agents	<i>Antti Koivisto and Marianne Wolfbrandt</i>	1996:1
"Herstatt risk" and the international banking system	<i>Hans Bäckström</i>	1996:1
Monetary policy strategies for the European Central Bank	<i>Claes Berg</i>	1996:2
Producer and import prices and the CPI – weak aggregated relationship	<i>Hans Dellmo</i>	1996:2
The 1995 household survey	<i>Peter Lundkvist</i>	1996:2
Monetary policy, inflation and unemployment	<i>Mikael Apel and Lars Heikensten</i>	1996:3
Potential output and output gap	<i>Mikael Apel, Jan Hansen and Hans Lindberg</i>	1996:3
Government's altered role in financial markets	<i>Martin Blåvarg and Stefan Ingves</i>	1996:3
Aspects of Sweden's external debt	<i>Robert Bergqvist and Tomas Lundberg</i>	1996:4
The Riksbank's management of short-term interest rates	<i>Karolina Holmberg</i>	1996:4
Government's finance in a structural perspective	<i>Johan Fall</i>	1996:4
Monetary policy and unemployment	<i>Urban Bäckström</i>	1997:1
Macroeconomic indicators of system risk	<i>Felice Marlor</i>	1997:1
Structural change and price formation	<i>Tor Borg and Mattias Croneborg</i>	1997:1
Electronic money – risk, questions, potential	<i>Hans Bäckström and Peter Stenkula</i>	1997:1
Has the inflation process changed?	<i>Claes Berg and Peter Lundqvist</i>	1997:2
EMU expectations and interest rates	<i>Hans Dillén and Martin Edlund</i>	1997:2
EMU 1999 – the current situation	<i>Jonas Eriksson and Loulou Wallman</i>	1997:2
The 1996 household survey – renewed upswing in new borrowing	<i>Peter Lundqvist</i>	1997:2
The Swedish repo market	<i>Christian Ragnartz and Johan Östberg</i>	1997:3/4

Payment system float	<i>Johanna Lybeck</i>	1997:3/4
Lessons of the Dutch model	<i>Jonas A. Eriksson and Eva Uddén-Jondal</i>	1997:3/4
The krona's role outside the EMU	<i>Kerstin Mitlid</i>	1998:1
EMU soon a reality – how is monetary policy affected?	<i>Lars Heikensten and Fredrika Lindsjö</i>	1998:1
Five years with the price stability target	<i>Urban Bäckström</i>	1998:1
Co-ordination for financial stability	<i>Göran Lind</i>	1998:1
Why is an independent central bank a good idea?	<i>Mikael Apel and Staffan Viotti</i>	1998:2
Should Sveriges Riksbank concern itself with share prices?	<i>Ossian Ekdahl, Jonas A Eriksson and Felice Marlor</i>	1998:2
Exchange rates and currency options as EMU indicators	<i>Javiera Aguilar and Peter Hördahl</i>	1998:2
Value at Risk	<i>Lina El Jahel, William Perraudin and Peter Sellin</i>	1998:2
Efficiency in the payment system – a network perspective	<i>Gabriela Guibourg</i>	1998:3
Securitisation – a future form of financing?	<i>Martin Blåvarg and Per Lilja</i>	1998:3
Links between competition and inflation	<i>Marcus Asplund and Richard Friberg</i>	1998:3
Inflation targeting and Swedish monetary policy – experience and problems	<i>Lars Heikensten and Anders Vredin</i>	1998:4
Can we create a global payments network?	<i>Hans Bäckström and Stefan Ingves</i>	1998:4
Why use bond indexes?	<i>Christian Ragnartz</i>	1998:4
Development and financial structure of the International Monetary Fund	<i>Maria Götherström</i>	1998:4
The Riksbank's inflation target – clarifications and evaluation	<i>Lars Heikensten</i>	1999:1
Hedge funds – trouble-makers?	<i>Per Walter and Pär Krause</i>	1999:1
Option prices and market expectations	<i>Javiera Aguilar and Peter Hördahl</i>	1999:1
Managing and preventing financial crises	<i>Martin Andersson and Staffan Viotti</i>	1999:1
The current situation for monetary policy	<i>Urban Bäckström</i>	1999:2
Inflation forecasts with uncertainty intervals	<i>Mårten Blix and Peter Sellin</i>	1999:2
Market valuation of external position	<i>Gunnar Blomberg and Johan Östberg</i>	1999:2
Why Sweden has changed its stabilisation policy regime	<i>Villy Bergström</i>	1999:2
Towards new national and international banking regulations	<i>Göran Lind and Johan Molin</i>	1999:3
Interest rate risk in the foreign exchange reserve	<i>Christian Ragnartz</i>	1999:3
Inflation forecast targeting	<i>Claes Berg</i>	1999:3
The current situation for monetary policy	<i>Urban Bäckström</i>	1999:4
Different ways of conducting inflation targeting – theory and practice	<i>Mikael Apel, Marianne Nessén, Ulf Söderström and Anders Vredin</i>	1999:4
Structural changes in the banking sector – driving forces and consequences	<i>Per Lilja</i>	1999:4
Economic policy coordination in the EU/euro area	<i>Lars Heikensten and Tomas Ernhagen</i>	2000:1
Is there a “new economy” and is it coming to Europe?	<i>Jonas A Eriksson and Martin Ådahl</i>	2000:1
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