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■ Should we welcome globalisation?

BY VILLY BERGSTRÖM

Villy Bergström is Deputy Governor of Sveriges Riksbank.

The rather vague term “globalisation” has become a politically charged concept in recent times. While political movements such as Attac mobilise against the phenomenon of globalisation, international organisations are doing what they can to develop the international regulatory system associated with globalisation in the belief that globalisation helps to promote economic growth and reduce world poverty.

Globalisation then and now

Globalisation is obviously all about increasing international trade in products and services; about greater mobility of capital investments across national borders, either as indirect investments and or as the international financing of capital formation in individual countries; and, finally, about the international mobility or migration of labour.

For the past 150 years – the industrial era – international trade in goods and services has been increasing more or less without interruption as a proportion of global economic production. In this sense, the process of globalisation has been around for a long time, despite brief interruptions during the two world wars and after the great depression of the thirties.

We can use developments in Sweden to illustrate the situation; foreign trade, by which we mean exports and imports, accounted for some 20 percent of Sweden's GDP between the 1870s and the end of World War II. During the post-war period, foreign trade began to rise as a share of GDP, and exports and imports each now amount to more than 40 per cent of the country's aggregate production. This means that Sweden has been, and still is, an unusually open economy and is thus exposed to competition in the world market.

In one respect, globalisation had progressed even further by the outbreak of the First World War than it has now. The upheavals that had occurred by then in transport and communications (e.g. railways and the telegraph) were more far-reaching than anything that has happened since

For the past 150 years international trade in goods and services has been increasing more or less uninterruptedly in relation to global production.

Before 1914, international direct investments were very high.

Sweden's industrialisation was accelerated and living standards improved by the importation of foreign capital.

then. Before 1914, the movement of capital across national borders was entirely free, and international direct investments were very high, which allowed the Swedish railway network to be built and Swedish hydroelectric capacity to be harnessed with the aid of foreign capital.

It has been estimated that Sweden's productive capital stock grew by 50 per cent more between 1870 and 1914 as a result of the importation of foreign capital than it would otherwise have done. Investments in railways tie up capital for generations and it was quite impossible to issue railway bonds on the Swedish market, as the supply of long-term saving in the country was far too limited. By 1857, the Swedish National Debt Office had already drawn upon the resources of foreign capital markets (in this case Germany) when it raised Sweden's first railway loan. This was followed by half a century of extensive capital imports into the country. Sweden's industrialisation was accelerated and living standards improved by the importation of foreign capital. This capital formation enlarged Sweden's productive capacity and enabled the country to pay interest and amortisation and still have something over.¹

Before World War I, the world experienced extensive migration. Sweden, for example, lost a quarter of its population through emigration.

Globalisation, therefore, is not exactly new. In another important respect it had progressed even further by the outbreak of World War I than it has now. In those days there were no restrictions on the international mobility of labour. Before World War I, the world experienced extensive migration mainly from Europe to the Americas. Sweden, for example, lost a quarter of its population through emigration. Between 1890 and 1910, 10 per cent of the world's population permanently left their own country to settle in another. During the last quarter of a century emigration only reached between 1 and 2 per cent.² Nowadays, however, it is increasingly common for students from developing countries to move to industrialised countries to study. Almost 60 per cent of all Ph.D.'s in engineering sciences, economics and natural sciences at American universities are taken by foreign students, mainly from Asia. Many then stay on after completing their studies and become part of what we know as the "brain drain".³

Free trade was introduced in Sweden in several stages through the dismantling of tariff barriers during the 1850s and 1860s. Controls over capital movements were abolished and Sweden joined the gold standard in 1873, which guaranteed security in connection with international transactions. Passports were no longer required, so that people could move freely across national borders. Trade, capital movements, migration and information networks led to the rapidly growing integration of markets

¹ See Schön (2000).

² See Dollar & Kraay (2002).

³ See Bahgwati (2003).

for products, capital and labour, which went even further in some respects than is currently the case.⁴

In the next sections, I will concentrate mainly on one particular aspect of globalisation, namely international capital movements in the financial sector. Finally, I will address the question of how developing countries are affected by globalisation.

Why is globalisation so controversial nowadays?

What people are generally referring to when they talk about globalisation – and what is new for the more recent post-war years in relation to the Bretton Woods System (but not in comparison with the economic system of the late 19th century) – is the growing international mobility on capital markets over the past 20 years, which is mainly due to the deregulation of these markets. In Sweden's case, the deregulation of the capital markets began in the middle of the 1980s, and this process reached its peak when the last remaining exchange regulations were abolished in 1989 and capital movements across our borders finally became free.

I believe that the deregulation of international capital movements is perceived by many to be something new and that this is one feature of the post-war period that has had most effect on the environment in which individual countries can conduct their economic policies. The phenomenon that people describe as globalisation is probably just this particular factor, in combination with the fact that the application of new information technology enables transactions to be made much faster than in the past. But in the eyes of the general public, the term also includes the involvement of more and more countries in international trade, the growth of multinational enterprises with production facilities in many different countries, and the free mobility of labour between certain countries (within the EU, for example).

When Sweden's exchange regulations were abolished, foreign investors could start buying Swedish government bonds and stocks. Swedes could also start saving in foreign banks, taking out pension insurance funds, and buying stocks abroad. In the past, even though there were serious obstacles to such transactions, they were not entirely impossible.

The foreign ownership of Swedish stocks and krona-denominated bonds rose from almost zero in 1980 to 1,350 billion kronor in 2001. One result of the abolition of the barriers to the free movement of capital was that Swedish economic policy became exposed to close scrutiny in a way

When talking about globalisation, people are generally referring to the increased mobility on capital markets over the past 20 years.

The deregulation of international capital movements is regarded as something new.

⁴ See Schön (2000).

Foreign ownership of Swedish stocks and krona-denominated bonds rose from almost zero in 1980 to 1,350 billion kronor in 2001.

that had hardly ever been seen before. There was a risk that the merest hint of the mismanagement of economic policy, such as a growing budget deficit, rising labour costs or inflationary tendencies, would cause foreign investors to sell their holdings of Swedish stocks and/or government bonds. Any sign of mismanagement could also have prompted Swedish consumers and corporations to invest their capital abroad. It was this mechanism that made it impossible to defend the fixed exchange rate in 1992. When it deregulated its capital market, Sweden did, after all, have a poor track record in terms of high inflation and other disequilibria. Doubts about the stability of the Swedish economy brought about an outflow of capital, sharply higher interest rates and dwindling currency reserves. Despite massive intervention in support of the currency, and interest at 500 per cent on overnight borrowing by the banks from the Riksbank, all attempts to defend the exchange rate were doomed to fail.

Fixed exchange rate: a lottery with only winners

Capital movements thus have a disciplinary effect on economic policy. Warning signs arrive early in the form of deteriorating conditions for borrowing, rising interest rates and a weakening currency. But financial capital is very volatile, not to say “edgy”. Consequently, liberalisation also has many critics, who cannot lightly be dismissed.

If a country loses investors’ confidence, it can trigger sudden major outflows of capital, a lesson that Sweden learnt in the early 1990s.

Although it is difficult to obtain reliable statistics on capital flows, the following observation can be made. The international trade in stocks and bonds in the USA more than doubled as a proportion of the country’s GDP between 1970 and 1993. During the same period, the corresponding volume rose from almost nothing to ten times GDP in Great Britain. The increase in capital flows we are looking at is therefore massive, but very little of it has anything whatsoever to do with trade financing.⁵ Large, sudden movements of capital can be triggered off if a country loses investor confidence, a lesson that Sweden learnt at the beginning of the 1990’s.

It is hard to reconcile the free mobility of capital with a fixed exchange rate.

As noted, it is difficult to reconcile the free mobility of capital with a fixed exchange rate. One country after another is therefore abandoning its fixed exchange rate as capital markets are liberalised or they join a currency union such as the euro-zone. There are exceptions, Denmark, for example, but Denmark is a member of the ERM2 exchange rate mechanism, which is very closely tied to the euro-zone.

If any signs emerge that a currency is overvalued, fixed exchange rates invite speculation without risk. This was the situation Sweden faced

⁵ See Eatwell & Taylor (2000).

at the beginning of the 1990s, when the fixed exchange rate regime was inviting speculation on a weakening of the exchange rate. Either the fixed exchange rate would hold and speculation against the Swedish krona would produce a break-even result, or the Riksbank would devalue. In the latter case, an investor who, say, had borrowed Swedish kronor and bought dollars for the amount of the loan would, after a devaluation, have a liability in the devalued krona and assets in dollars. The very purpose of the speculation is to force a country to devalue by depleting its currency reserves and thus generate the intended profit. Speculators are spurred into action by an unbalanced economy, in which the national debt, say, is too high, public finances are weak or the country is uncompetitive on account of high costs.

Fixed exchange rates invite risk-free speculation at any sign of a currency being overvalued.

There are numerous instances of speculation making it impossible to maintain a fixed exchange rate: as noted, Sweden was compelled to give up its defence of the krona in November 1992; the ERM mechanism within the EU, which allowed currencies to fluctuate with a very narrow range, collapsed in August 1993; Mexico was hit in 1994-95; South East Asia in 1997; Russia in 1998; Brazil in 1999; Turkey in 2001 and Argentina last year. All of these crises have one feature in common – the countries concerned have a fixed exchange rate.

There are both technical and economic factors behind the extensive process of deregulation in Sweden and many other countries. The first is the existence of multinational enterprises and new technology – IT, electronic money and new financial instruments – which make it hard, indeed impossible to maintain currency and capital market controls. “Leakages” through the regulatory barriers are becoming more and more serious. Moreover, economic policy had reached the end of the road, inflation had settled at 8–10 per cent a year in Sweden, economic growth was sluggish, and there was a tendency for unemployment to rise.

There are both technical and economic factors behind extensive deregulations in Sweden and many other countries.

Once the process of deregulating financial markets had started in Sweden everything went very quickly – in 25 years we had moved from having had one of the most tightly regulated financial systems in the western world to having one of the least regulated. However the process was not entirely painless. The repercussions of the economic disequilibria that had accumulated when the capital markets were controlled, coupled with the inability of the Swedish banking system to handle the risks associated with their lending when credit market controls were abolished, turned out to be dramatic, to say the least. A lesson we learned at the beginning of the 1990s after the banking crisis and after the fixed exchange rate had been abandoned.

Once the process of deregulating financial markets had started in Sweden everything went very quickly.

The crisis in the Swedish economy at the beginning of the 1990s could have led to the re-imposition of controls, but it didn't.

Globalisation in the sense I have been using it, namely as a consequence of the liberalisation of capital markets, triggered, then, a crisis in the Swedish economy at the beginning of the 1990s. This could have resulted in the re-imposition of controls, but it didn't. Sweden adhered to its new, open approach, an approach that may be compared with how the country reacted to the deep crisis in the real economy in the 1970s. Let me, therefore, quickly run through the crises we have had in the real economy on account of the country's lack of competitiveness and the fact that, despite this, Sweden remained an open economy. In the 1970s, Sweden was afflicted by crises in the iron and steel industry as well as in the pulp and paper industry, while the Swedish shipbuilding industry was more or less wiped out. This state of affairs caused by Sweden's high labour costs and the entry of new competitors operating out of low-cost countries onto the market.

How did we react to these crises? Far-reaching rationalisation, improvements to production efficiency, and company closures. Today, Sweden has one of the most efficient steel industries in the world. And its highly successful forest products industry is just as efficient. Sweden did not decide in favour of protectionism behind high tariff barriers, but went instead for efficiency through restructuring, and retained its open economy.

The handling of the financial crisis at the beginning of the 1990s appears to have left the Swedish banking system in far better shape than its counterparts in many other countries.

Sweden handled the problems that arose when the currency was overvalued around 1990 – in the sense that confidence in the fixed exchange rate collapsed – in broadly the same way. The country found itself going through a currency crisis that triggered a property crisis that in turn sparked off a banking crisis. Politicians set aside their differences and the parties worked in a spirit of mutual understanding to rescue the banks and to rehabilitate the government's finances. Sweden chose not to re-impose controls over the capital market, but decided, as it had in the real economic crisis of the 1970s, to keep the economy open. The handling of the financial crisis at the beginning of the 1990s appears to have left the Swedish banking system in far better shape than its counterparts in many other countries.

THE FINANCIAL MARKETS ARE IMPORTANT

The financial market's functions are developed as globalisation opens the door to more liquid and diversified markets.

The criticism of globalisation is focused, as mentioned above, on the financial system. It is not especially easy to spot the benefits of the modern financial system. But an efficient payments system is just as important to an advanced industrial and service economy as access to energy and a

well functioning transportation system. And the financial market's functions – financing, risk management and mediation of payments – are developed as globalisation opens the door to more liquid and diversified markets.

In advanced economies saving is largely divorced from investment activities. An important role of the financial sector is to match the demands of savers for income and liquidity with the demands of investors for long-term financing. Often the interval between when an investment is made and it generates results in the form of production is very lengthy. Consumers who save may, on the other hand, need their money quickly. This is made possible, as there is a ready market for their savings in the form of stocks and bonds on the market for secondary transactions in these securities. Take an example: a company in the forest industry needs long-term finance to build a new paper machine which the company may not be able to sell even after many years if it had to back out of the investment because its lenders want their money back. By issuing stock and/or bonds the company's funding acquires this long-term character as the securities can be sold on the secondary market without the company that issued them having to redeem them itself.

Another important task for the financial system is to reduce the risks to which savers and investors are all exposed. The fact that some businesses are inherently riskier than others can be offset by the savers' ability, on a well diversified financial market, to spread their saving among various types of investment, such as stocks, bonds and mutual fund units, which themselves provide diversification of risk, and/or placing some of their money on deposit with a bank.

Companies can protect themselves against fluctuations in exchange rates by entering into forward contracts that stipulate when and at what price future revenue is to be converted into kronor. It is also possible to buy and sell merchandise or commodities forward so that future costs and income are fixed.

In the case of small firms and individual consumers, the securities market is hardly an alternative to loan financing. Instead, therefore, banks and insurance companies provide services for small firms and consumers. Banks are known as intermediaries, which accept deposits that are liquid and transform them into long-term credits so that the need of savers for liquidity can be matched against the need of companies involved in investment projects for long-term financing.

The mediation of payments is a rapidly changing area. These days, less than 10 per cent of all payments in Sweden are now made with notes and coins, the rest being handled by a giro system of one kind or another. New technical methods are being developed, such as payment cards and

The role of the financial sector is to match the demands of savers for income and liquidity with the demands of investors for long-term financing.

Another important task for the financial system is to reduce risk for both savers and investors.

electronic cash, in which payment takes the form of bookkeeping transactions between various accounts without any physical cash ever being transferred.

Globalisation creates an environment in which financial systems can become more efficient.

Globalisation, in the sense of freedom for international financial transactions, creates an environment in which all the above mentioned functions of financial systems can become more efficient. It becomes easier to find high-yielding investments, the ability to spread risks improves, and on new, larger markets liquidity also improves.

It is for these reasons that the PPM (Premium Pension Authority) and AP Pension Funds invest some of our pension savings abroad. As Swedish pension fund managers can now invest in foreign stocks and bonds, the risk to which our pensions are exposed is reduced, as it makes us less dependent on Sweden as a country being economically successful. But it also makes us part-owners of assets that are highly mobile and that can quickly emigrate, should the country find itself in economic difficulties.

DO POOR COUNTRIES SUFFER FROM GLOBALISATION?

Globalisation has to be judged differently in the case of less developed economies.

As far as the free movement of capital is concerned, globalisation must be judged differently in the case of less developed economies. And it is the exposed position of poor countries in a globalised economy that today's protest movements are so actively concerned about. The populations of poor countries, such as certain countries in South East Asia, for example, are more vulnerable than the population of a highly developed welfare state.

Let me quickly run through the events in South East Asia in 1997. Domestic banks lent money – often with state guarantees – to long-term projects, such as shopping malls, hotel complexes, airports, and motorways. The banks and companies involved financed this by raising short-term loans on the international capital market, where rates of interest were lower than on the domestic market.

When these foreign investors grew nervous about the ability of those who had made the investments to pay interest, they called in the short loans, capital left the countries concerned and the domestic banks found themselves in a crisis. No interest rate was high enough to persuade these foreign investors to grant new loans. The currency reserves dwindled, and exchange rates came under pressure. Devaluation was the only way out. Bankruptcies, banking crises and mass unemployment were the result. The International Monetary Fund (IMF) was brought in and imposed strict conditions on these countries, including a restrictive fiscal policy, before it granted any financial support. A tight monetary policy would be needed to prevent the excessive depreciation of the currency.

The vast majority of the population, people who had had nothing whatsoever to do with the mismanagement that caused the crisis, were left utterly impoverished as the value of their incomes and savings had been wiped out. Countless members of the emerging middle classes in the worst hit countries in South East Asia were left penniless. The tight economic policies have since come under fire, since in South East Asia the countries involved were those that did not have a serious public finance deficit or high inflation. The IMF has admitted that its demands for tight economic policies were excessive and it has now improved its analysis of the financial system and developed lists of criteria that are based on these analyses and not, as in the past, merely on macroeconomic assessments.

The role of the BIS, IMF, World Bank and other international organisations should be to draw up rules and methods, firstly to protect innocent people from being left penniless, and secondly to place the risk for faulty investments on those who make them. As I have noted previously, measures of this kind are currently being taken within different international organisations. The rules in question would regulate banks' capital ratios and such areas as accounting standards, auditing standards, financial supervision, bankruptcy laws and transparency in the conduct of monetary and fiscal policy. One object is that those who lend money should, in the event of a crisis, be compelled, to a greater extent than at present, to cover the cost of solving the crisis, which would make them more cautious when making their investment decisions. Moreover, it is also important that the above-mentioned organisations and borrower countries start taking action to deal with corruption and to promote an open, democratic culture.

One proposal that has been put forward by Anne Kreuger, First Deputy Managing Director of the IMF, is that countries in a state of crisis should introduce procedures that are similar to bankruptcy proceedings for the corporate sector in a country, and that a government's repayment of its international debt should be deferrable for some time while renegotiations are held with the country's creditors. The Chapter 11 institution in the US bankruptcy law could serve as an international model, for when governments put their countries into debt. This institution could prevent uncontrolled outflows of capital by compelling governments to introduce collective action should tendencies for problems emerge, which would enable the country's finances to be reconstructed in an orderly manner.⁶

The proposal has some advantages. The moral hazard that arises when the IMF grants aid to a crisis-hit country would be reduced. Lenders would have to think carefully before granting any loans. The party grant-

The IMF has now expanded its analysis of the financial system and developed criteria lists based on this analysis.

The role of international organisations should be to draw up rules and methods for handling faulty investments.

One proposal is that states in a crisis should introduce procedures similar to bankruptcy proceedings for the corporate sector.

⁶ See survey in Melander (2002).

ing the credit would also have to accept the risk, and would be hit if a crisis occurred. But there is another side to this coin: the risk that sources of capital for poor developing countries might dry up. The fact is that the IMF has recently attempted to persuade lenders to cover their losses to a greater extent than in the past, financial aid for Brazil and Ecuador being cases in point. This new approach has already reduced the flow of capital to developing countries.⁷

The globalisation debate in recent years has focused on inequalities in global income distribution.

The globalisation debate of recent years has focused on a totally different question, namely the unfair distribution of incomes around the world. It is claimed that multinational enterprises relocate production to those countries that can offer the lowest production costs, have the lowest demands on the work environment, and enforce the least draconian regulations. The problems then boil down to direct investments by rich countries in poor countries, whereby the poor countries are seen to be exploited by the foreign capitalists.

The economies of those countries that have opened their doors to foreign direct investments have developed more successfully than those countries that have isolated their economies by adopting a policy of import substitution.

When it comes to the world's less developed countries it has, however, turned out that countries that have opened their economies to competition, to exports and imports and to foreign direct investments, have developed far faster than those that have "protected" their economies by adopting a policy of import substitution, that is to say, those that have attempted to build up their own industries to meet all their own needs. Economic research confirms this. South Korea, Singapore and, more recently, China are examples of more or less open economies that are now doing particularly well, whereas India's economic growth rate has been remarkably low because the country has isolated itself from the outside world. Other countries that have adopted the same approach, such as Nigeria, the Ukraine and Pakistan, are still in a state of degrading poverty. Countries that used to have open economies with high living standards can fall back into crises and poverty. Argentina, formerly one of the richest countries in the world, isolated itself from the world economy under Juan Péron's government in the 1950s; its people are still paying the price.

Participating in the international exchange of goods and services generates investments and access to new technology and methods, and spreads knowledge about business and modern management practices. Poor but well governed countries that open their economies to the rest of the world can achieve faster growth than the industrialised countries by a process known to economists as "catching up". Sooner or later even the poorest economies can achieve higher standards of living with a fairer distribution of income. This effect can be illustrated by certain areas in

⁷ See Cooper (2002), Soros (2002) and BIS (2002).

China, which have developed rapidly since the country's adoption of a more open approach and the liberalisation of its economy.⁸

There is no unambiguous evidence to show that developing countries can stimulate growth and reduce poverty by opening their economies to international trade. However, one fact is clear: there is nothing to indicate that introducing a more open economy tends to slow down economic growth. At the same time it would appear to be the case that faster economic growth is often associated with liberalisation and a more open trade policy. But it is difficult to distinguish between cause and effect. Perhaps it is the faster growth that results in a more open economy because liberalisation and a more open approach are more easily handled politically when a country's resources are growing. Having an open economy is perhaps not a sufficient condition for growth but it would appear to be a contributory factor, possibly a necessary one.⁹

A survey by the National Bureau investigated the effect of financial deregulation on economic growth rates. The study, which covered 95 countries, showed that the growth rate during a 5-year period was raised on average by 1 percentage point a year by deregulation. This effect emerges mainly in the form of an increase in the investment ratio as a result of capital being more readily available.¹⁰

But poverty can become even more serious, at least transitionally, among sections of the population in countries that open their doors to foreign trade because the poorest people in the country have little protection against restructuring and economic risks.¹¹ As far as direct investments in poor countries are concerned, therefore, it is important to ensure that the basic political and economic institutions and infrastructure are already in place to enable the country to protect itself against unholy alliances between rich domestic oligarchies and foreign multinational enterprises. One essential condition therefore is that measures are taken to combat corruption.

Some conclusions

In a fast-growing economy the production of goods and services is constantly being transformed. Steps are always being taken to cut costs, industries are restructured and companies close down, there is a constant stream of innovations and new production starts. When, to take one example, the costs a bank branch incurs are higher than its contribution

Having an open economy is perhaps not a sufficient condition for growth but it would appear to be a contributory factor, possibly a necessary one.

The effect of financial deregulation is to raise the growth rate.

⁸ See Hansson & Henrekson (1997)

⁹ See McCulloch, Winters & Cicera (2001), who discuss research results in this field.

¹⁰ See Bekaert, Harvey & Lundblad (2001).

¹¹ See Bourguignon (2002).

Globalisation accelerates the process of transformation in a market economy exposed to competition, a fact that can be turned to a country's advantage.

to revenue, the branch is closed, and the banking services have to be provided or handled in some other way, sometimes at higher cost to the customer, but always at lower cost to the bank. This is a fact of life in a free market economy. Globalisation accelerates this process by building up new competitive pressures; closures perhaps take place faster than they otherwise would have done, but the intensifying competitive pressures generate new services. Today, for example, we can sit at home in front of our computers and pay our bills online and make transfers between our salary accounts and bank loans; we can pay for goods with a debit or credit card. All of this makes going to the bank a less important event than it used to be. Globalisation accelerates these processes by transforming production and consumption patterns in a free market economy that is exposed to competition. There is little we can do to prevent this, and if we arrange our affairs properly we can turn it to our advantage. This has been demonstrated during the past few years.

Free capital movements make high demands on a country's economic policy. They bring advantages but also instability.

Let me conclude with a few thoughts. I have mentioned the advantages generated by the free movement of capital, but also the instability that has followed in the wake of deregulation and the crises that have occurred since the beginning of the 1990's. The free movement of capital makes high demands on a country's economic policy. If it turns out the crises occur more frequently and become more serious, demands for a return to a regulated economy could grow in strength, demands that are already being heard in a variety of international fora. History shows that periods of liberalisation are followed by periods of regulation. It is possible that the regulatory systems that the international organisations are working on will help to stabilise the foreign exchange and financial markets, but it is also possible that some sort of Tobin tax will gain political support. The story is not over yet.

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■ National stabilisation policy for Sweden in Stage Three of EMU

BY ROBERT BOIJE AND HOVICK SHAHNAZARIAN

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If Sweden were to be exposed to asymmetric shocks after moving to Stage Three of EMU, fiscal policy would be entirely responsible for the national stabilisation policy. It has been suggested in the economic literature that stabilisation policy could be delegated to a politically independent authority even if the policy instruments are of a fiscal nature. The arguments behind the delegation of monetary policy to independent central banks should presumably also apply to stabilisation policy in a fiscal policy regime. In this article we discuss the significance of a delegation of national stabilisation policy decisions with Sweden in Stage Three of EMU, as well as whether some stabilisation policy instruments are more suitable for delegation than others. An interesting question is whether fiscal policy instruments can be constructed that resemble the interest rate. We show that a cyclically dependent taxation of net interest earnings has similar effects to a change in the level of interest rates and that such an instrument may be of interest in a situation where an individual euro country wishes to influence its own real interest rate at a given nominal euro interest rate. We also discuss in more general terms the issue of when national stabilisation policy measures should be called for in a single euro country.

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Stabilisation policy – a matter for both monetary and fiscal policy

There is nothing to prevent the simultaneous use of fiscal and monetary policy for the purpose of stabilisation policy.

Most political decision-makers agree on that from the viewpoint of welfare policy there is value to be gained from stabilisation policy. Relevant questions are what is to be stabilised, *how* should it be stabilised, *who* should do the stabilisation and *when should* this be done.

In practical politics the objective of stabilisation policy is usually defined fairly pragmatically in terms of, for instance, the output gap (a mea-

sure of resource utilisation) or inflation.¹ The stabilisation policy objective can be achieved with the aid of either fiscal or monetary policy. In a fixed exchange rate regime, fiscal policy is generally considered to be more effective than monetary policy, while the reverse applies with a flexible exchange rate. There is, however, nothing that prevent the simultaneous use of fiscal and monetary policy for the purpose of stabilisation policy. On the contrary, in certain situations combining the two may be preferable.

A good deal has happened in the past decade regarding the question of who is to be responsible for stabilisation policy. Historically, the full responsibility has rested on elected institutions – in Sweden the government and the Riksdag (parliament). Experience has shown that stabilisation policy managed by the government and the parliament is not necessarily conducted in a way that stabilises cyclical fluctuations. An effective stabilisation policy is liable to be obstructed by various forms of political incentive and conflicting goals. Decision-making lags – the time that elapses between the detection of a problem and the implementation of a countermeasure – are liable to be long in that stabilisation policy decisions often tend to be subject to protracted political negotiations. As a result, measures may be introduced too late, with a risk of them acting in the “wrong” cyclical phase. This in turn means that in certain cases stabilisation policy is liable to be procyclical, that is, instead of stabilising the economy it tends to accentuate the cyclical fluctuations.² Moreover, political difficulties in making fiscal policy sufficiently tight in an upward phase may contribute to increased government debt. Taken together, there is a risk of these problems leading to low credibility for the long-term direction of stabilisation policy. These arguments have prompted many economists to recommend monetary policy and its delegation to an independent central bank that neither can nor needs to take short-term political considerations into account.³ As noted above, this conclusion should be conditioned by the choice of exchange rate regime.

During the 1990s central banks in many countries – including the Riksbank in Sweden – were given a clear political mandate to be independently accountable for monetary policy. One purpose was precisely to enhance the credibility of stabilisation policy. In Sweden the new regime was introduced in the aftermath of the stabilisation policy failures in the 1970s and 1980s. In the Bill (1997/98:40) that formally confirmed the

Stabilisation policy has often been subject to protracted political negotiations.

In the 1990s the Riksbank was given a clear political mandate to be independently accountable for monetary policy.

¹ In strictly theoretical models the choice of the optimal stabilisation policy objective depends on the occurrence of various market imperfections, for example imperfect competition and price and wage rigidities.

² These problems can apply to fiscal as well as monetary policy in cases where both are at the disposal of the government and parliament.

³ See e.g. Auerbach (2002) and Feldstein (2002a).

Riksbank's increased independence the Government stated: "By delegating the responsibility for the formation of monetary policy to an independent Riksbank with the clearly specified objective of price stability, policy can be given the long-term perspective that creates conditions for the object to be credible." The experience to date, in Sweden and elsewhere, of delegating monetary policy to an independent authority has been good.

The effectiveness of stabilisation policy presupposes that the policy is perceived as credible.

The effectiveness of stabilisation policy accordingly presupposes that the policy is perceived as credible. Besides the problem inherent in the political decision-making process, stabilisation policy in the 1970s and 1980s suffered from its lack of a clear framework. Put bluntly, it was unclear what *was* to be stabilised *how* and *when*. These questions have been important for the past decade's work of building up the credibility for monetary policy.⁴ With reference to these questions, we discuss how stabilisation policy could be constructed with Sweden in Stage Three of EMU.

The article is arranged as follows. The changes that stabilisation policy would undergo with Sweden in Stage Three of EMU are discussed briefly in the next two sections. The matters considered include the effect that a common nominal interest rate may have on the real interest rate in a single euro country that is subjected to an asymmetric shock relative to the rest of the euro area and how the objective for the national stabilisation policy can be formulated for Sweden as a full participant in EMU. This is followed by a section where, against the background of the introductory discussion of the credibility problem, we discuss the advantages of also delegating the stabilisation policy decisions in a fiscal policy regime to an independent authority. Then we consider whether some fiscal policy instruments are more suitable for delegation than others. In our opinion this issue should be approached in the light of a more general discussion about which fiscal policy instruments are appropriate for stabilisation. Our starting point is therefore the analysis of fiscal policy instruments that was presented in the report "Stabilisation policy in the monetary union" (SOU 2002:16). In the next section we consider whether there are fiscal policy instruments that can influence corporate and household behaviour in a similar way as interest rate adjustments. We show that a cyclically dependent taxation of net interest income has effects that broadly resemble those of a change in the interest rate and that such an instrument may be of interest in a situation where a single euro country wishes to influence its own real interest rate (after tax) at a given nominal euro interest rate.

⁴ See the Riksbank's statement (Dnr 02-773-DIR) regarding the report "Stabilisation policy in the monetary union" (SOU 2002:16); the statement and a summary of the report are available in English in *Sveriges Riksbank Economic Review* 2002:4, pp. 90–127.

We argue that such an instrument is also pertinent to the feasibility of delegating fiscal policy instruments to an independent authority. In the final section we discuss with reference to Blanchard (2000) and Calmfors *et al.* (2003) whether various types of asymmetric shocks ought to occasion stabilisation policy measures in a single euro country.

Sweden in Stage Three of EMU

The conditions for stabilisation policy would change again if Sweden were to move to Stage Three of EMU. An economic argument in favour of full participation in the monetary union is that with a single currency, that is valid in many countries, transaction costs are reduced for households and firms.⁵ A move to Stage Three of EMU would, however, deprive Sweden of its own monetary policy as an instrument for national stabilisation policy.⁶ The common monetary policy is the responsibility of the European Central Bank (ECB), which decides the level of the interest rate in the light of an assessment of the weighted average path of inflation in the euro area. When setting the interest rate the ECB is not concerned if inflation in a small euro country is deviating markedly from the euro area average.⁷ Individual countries may be exposed to asymmetric shocks of various kinds. With a common monetary policy this means that the economic activity and inflation in a single euro can deviate markedly from the rest of the euro area for a relatively long period.⁸ There is a risk, for instance, that the labour market organisations will show less restraint because they need not fear that high wage increases will lead to increased interest rates. This problem should be particularly pertinent for small member states where the welfare consequences may be substantial. In Sweden's case the problem might be handled within the framework of fiscal policy.⁹ This presupposes, however, that fiscal policy's framework for stabilisation policy is strengthened and clarified before a move to Stage Three of EMU.

Besides the problem of asymmetric shocks, there is another argument for having a national stabilisation policy readiness in Stage Three of EMU.

With Sweden in Stage Three of EMU, the conditions for stabilisation policy would change.

⁵ See Mundel (1961).

⁶ Sweden also relinquishes the flexible exchange rate, which can be seen as an automatic cyclical shock absorber.

⁷ Based on Eurostat's country weights for 2001, Sweden's weight in a (hypothetical) composite HICP (the price index that is used in EMU) would be 2.29 per cent (according to unofficial calculations at the Riksbank). If the United Kingdom and Denmark were also to be included, Sweden's weight would be 1.78 per cent. The rate of inflation in Sweden would therefore be of very limited importance for the ECB's interest rate decisions. When the new applicant countries join the monetary union, Sweden's weight would be even smaller.

⁸ Studies of inflation in the United States have shown that the rates of inflation in major American cities have diverged by more than 1 percentage point for periods of up to a decade. See Cecchetti *et al.* (2000).

⁹ Using a formal model, Cooper & Kemp (2002) show that if fiscal policy is used for stabilisation, participation in a monetary union can enhance welfare regardless of the extent to which the member states are hit by country-specific shocks. But this does assume that stabilisation policy is effective, that is, free from the type of problem in the political decision-making process that we described earlier in this article.

Japan and the United States are examples which show that fiscal stimuli may be called for in “low interest rate economies” where monetary policy has been rendered “impotent”.¹⁰ Situations may arise where the single monetary policy in the euro area is also at risk of becoming “impotent”. Since there is no common fiscal policy for the euro area, such a situation would require each euro country to conduct its own fiscal stimuli.

A successful participation in Stage Three of EMU will also accentuate the need for various kinds of structural reform in Sweden.

A successful participation in Stage Three of EMU will also accentuate the need for various kinds of structural reform in Sweden. The absence of an automatic shock-absorber in the form of a flexible nominal exchange rate will heighten the importance of increased nominal wage flexibility. Other reforms that strengthen the mobility and flexibility in the labour market will also be desirable. Our discussion in the article is confined to the need to supplement the single monetary policy with a national stabilisation policy. Some economists and debaters consider that focussing too strongly on the need for a national stabilisation policy is liable to undermine the discussion about the need for structural reforms. They also argue that one should rely in the first place on strengthening the function of the automatic stabilisers. Experience shows, however, that extensive structural reforms take time to achieve. As to the automatic stabilisers, they are a result of the construction of tax and subsidy systems and not created specifically to stabilise the economy. While a Swedish move to Stage Three would increase the need to strengthen the automatic stabilisers, it is doubtful whether this could be done to a major extent without exacerbating the distortionary effects of taxes and subsidies. A reduction of the large marginal effects of taxes and subsidies may in fact be desirable in order to improve labour market flexibility. That would have the paradoxical effect of diminishing the automatic stabilisers.

The starting point for this article is that we presuppose that structural reforms and a complementary national stabilisation policy will both be needed. The United States, where the labour market and wage formation are far more flexible than in Sweden and the rest of Europe, has performed an active stabilisation policy with monetary as well as fiscal elements.

What is to be stabilised?

Stabilisation policy is not to be used for cyclical “fine tuning”.

The primary aim of the national stabilisation policy should be to counter the occurrence of unduly large asymmetric cyclical fluctuations.¹¹ Thus, stabilisation policy is not to be used for cyclical “fine tuning”. The national stabilisation policy is to function in the first place as an *adjunct* to the

¹⁰ See also Feldstein (2002b).

¹¹ The question of which shocks ought to occasion national stabilisation policy measures in a single euro country is discussed more fully in a later section.

single monetary policy in that the latter will not always be optimal for each euro country. Active fiscal measures should be used as far as possible for preventive purposes. However, as a forward-looking stabilisation policy is obviously not easy, the policy must also include a readiness for cases where large shocks have already occurred.

One of the major issues when constructing the framework for the national stabilisation policy for Sweden in Stage Three in EMU is what the objective or target for the stabilisation policy should be. The "Committee for Stabilisation Policy for Full Employment with Sweden in Stage Three of EMU" proposed the output gap as the target for stabilisation policy.¹² In its statement on the Committee's report, the Riksbank argued that there may be reasons for considering whether an inflation target for fiscal policy would be preferable.¹³ Different targets have different advantages and drawbacks. The stabilisation policy decisions should presumably be based on an analysis of a variety of economic indicators. For credibility it is important that the motives and the forecasts behind the stabilisation policy decisions are presented in a clear and open fashion. In any event, a central indicator for stabilisation policy decisions ought to be the difference in inflation between Sweden and the rest of the euro area. A development of prices and wages in Sweden that matches the euro area will be crucial for achieving a stable development of output and employment in the longer run.

The common monetary policy implies that nominal interest rates will be broadly the same in every euro country. It follows that in countries, for example Ireland, where inflation is clearly above the euro area average at present the real interest rate is low, while it is high in countries, for example Germany, where inflation is below the euro area average. In so far as these differences in the rate of inflation reflect a necessary adjustment of the so-called real exchange rate, the differences in the real interest rate are motivated in real economic terms and therefore do not constitute a problem.^{14, 15} But to the extent that the difference in inflation stems from internal demand-driven or structurally generated price and wage increases, unduly large differences in real interest rates are likely to be a considerable problem. In Ireland, the low real interest rate is fuelling the over-

For credibility it is important that the motives and the forecasts behind stabilisation policy decisions are presented in a clear and open fashion.

The common monetary policy implies that nominal interest rates will be broadly the same in every euro country.

¹² "Stabilisation policy in the monetary union", SOU 2002:16.

¹³ See the Riksbank's statement (Dnr 02-773-DIR) on the report "Stabilisation policy in the monetary union", SOU 2002:16; see note 4.

¹⁴ The real exchange rate is defined as the amount of domestic goods that has to be provided in exchange for a given amount of goods from abroad. In a flexible exchange rate regime the real exchange rate is expressed as a ratio; the numerator is the product of the nominal exchange rate and a price index for foreign goods and the denominator is an equivalent domestic price index. With Sweden in Stage Three of EMU, the nominal exchange rate is locked but the real exchange rate can still vary if domestic inflation deviates from the average in the monetary union.

¹⁵ Identifying the situations where the real exchange rate ought to be adjusted may, however, be difficult in practice.

heating, while the high real interest rate in Germany is tending to accentuate the slowdown.

In the long run, the rate of inflation in a single euro country will be adjusted to the euro area average regardless of whether or not the country in question has a national stabilisation policy. Permanently higher inflation ultimately impairs a country's competitiveness and that in turn can generate unemployment and lead to lower inflation. The ECB's inflation target will therefore function as a nominal anchor for the Swedish economy too, at least in the long run. But an adjustment to lower inflation can take time and be associated with large social costs in the form of high unemployment. Discretionary fiscal measures can help to avoid a situation where economic activity in Sweden deviates excessively from the euro area. The national stabilisation policy will have the important task of recognising in time whether regional differences in inflation stem from necessary changes in the real exchange rate as opposed to unmotivated wage and price increases.

Fears have been expressed that a national stabilisation policy, as a complement to the ECB's policy, might blur the responsibility for stabilisation policy. The division of responsibility is not a problem. The ECB's monetary policy always has to be based on an assessment of the direction of fiscal policy in each member state, whether or not the fiscal policy has an explicit stabilisation policy objective. Of course the stabilisation policy conducted by an individual euro country has to be compatible with the ECB's inflation target as well as with the common rules for fiscal policy (the Maastricht Treaty and the Stability and Growth Pact).¹⁶

Who is to make the stabilisation policy decisions?

If Sweden moves to Stage Three of EMU, the Government and the Riksdag will be fully responsible for the national stabilisation policy.

If Sweden moves to Stage Three of EMU, the Government and the Riksdag will resume full responsibility for the national stabilisation policy. To some extent, the fiscal policy rules and targets that have been introduced in recent years, nationally as well as in the European Union, should have strengthened the long-term credibility of fiscal policy. They may also have reduced the risk of stabilisation policy failures of the type that occurred in the 1970s and 1980s. There is, however, a danger of non-compliance with such rules. That is evident not least from recent developments in certain euro countries. An important issue is how the credibility of the national stabilisation policy could be maintained as far as possible with Sweden in Stage Three of EMU.

¹⁶ At the same time, the provisions in the Maastricht Treaty and the Stability and Growth Pact limit the scope for stabilisation policy and this may cause problems in certain situations. For a discussion of these problems and conceivable solutions, see Calmfors et al. (2003).

There are a number of measures that to a varying extent should help to reduce the problem of credibility. The afore-mentioned "Committee for Stabilisation Policy ..." proposed the appointment of an *advisory* independent body of experts who would analyse economic developments and put forward stabilisation policy measures.¹⁷ Other important ways of maintaining stabilisation policy's credibility are increased transparency, improved evaluations, clear decision-making processes and a reinforcement of existing authorities.¹⁸

There have been suggestions in the economic literature that stabilisation policy could be delegated to a politically independent authority even if the policy instruments are of a fiscal nature.¹⁹ Such a far-reaching delegation of stabilisation policy decisions is clearly complicated, not least in political terms, but in our opinion the arguments put forward for the increased independence of the Riksbank and other central banks should also be relevant in a regime where fiscal policy is used for stabilisation.

Delegating fiscal instruments to an independent authority might perhaps be perceived as undemocratic, partly because of the difficulty in holding an independent authority responsible for a stabilisation policy failure.²⁰ A government that fails with this policy can always be dismissed. A decision to delegate fiscal instruments to an independent authority must, of course, have a democratic foundation in the same way as the decision to delegate monetary policy to the Riksbank.

If the Riksdag were to decide to delegate fiscal instruments to an independent authority, the decision would by definition be democratically founded. In the context of welfare policy, the credibility and effectiveness of stabilisation policy decisions are no doubt more important than whether or not the decisions are made by elected institutions.²¹ It is, however, important that these decisions are very transparent and that clear rules are set up for scrutiny and accountability.

Even when its instruments are of a fiscal nature, stabilisation policy could be managed by an independent authority.

Delegating fiscal instruments to an independent authority might perhaps be perceived as undemocratic.

If the Riksdag were to decide to delegate fiscal instruments to an independent authority, the decision would by definition be democratically founded.

¹⁷ See note 12.

¹⁸ See note 4. In its statement, the Riksbank also writes that a matter which should be considered is whether the government ought to be entitled to decide measures of stabilisation policy without recourse to the Riksdag; such a delegation could shorten the long decision lag. Furthermore, the Riksbank writes that a more far-reaching delegation to an independent authority should not be ruled out without further consideration. See also the Riksbank's press release no. 5 2003: Comments on an article on Dagens Nyheter's debate page.

¹⁹ See e.g. Ball (1997); also Blinder (1997), Gruen (1997, 2001), Hemming & Kell (2001) and Wyplosz (2002). This literature mainly discusses a delegation of fiscal policy instruments as an adjunct to a national monetary policy. In our opinion such a delegation should be even more interesting in a situation where the national monetary policy has been delegated to the ECB.

²⁰ The current regime specifies a procedure whereby the governor of the Riksbank attends hearings by the Parliamentary Finance Committee on the conduct of monetary policy. A similar construction could be employed if fiscal policy instruments were to be delegated to an independent authority.

²¹ For a fuller discussion of the democratic aspect, see Gruen (2001).

How is stabilisation policy's objective to be achieved?

Fiscal policy has a variety of instruments for stabilisation policy on both the revenue and the expenditure side of the government budget.

Thus there are arguments in favour of delegating stabilisation policy decisions to a politically independent authority. When it came to delegating monetary policy, the choice of stabilisation policy instrument was self-evident. Fiscal policy, on the other hand, has a broad spectrum of instruments for stabilisation policy on both the revenue and the expenditure side of the government budget. The question is whether some fiscal instruments are more suitable for delegation than others. We consider that the instruments which ought to be used in the first place for stabilisation policy are taxes. Decisions about public expenditures ought to be founded on long-term considerations.²²

The question of which fiscal policy instruments it could be appropriate to delegate to an independent authority must necessarily be approached via a more general discussion of which instruments are generally suitable for stabilisation purposes. The "Committee for Stabilisation Policy ..." considered that the instruments for stabilisation policy should have the following characteristics:²³ (i) The measures are to act as generally as possible, that is, the base for the change in taxes or expenditures should be so broad that the measures affect a large segment of the economy. (ii) The measures are to be used temporarily and symmetrically over time, that is, a tax increase in an upward phase is to occasion a corresponding decrease in a downward phase. (iii) Stabilisation policy is to be distinguished as far as possible from distribution and allocation policy.

Changes in taxes or expenditures that are temporary, symmetric and aimed at broad bases reduce the risk of generating long-term effects of a distributional and allocational nature. A symmetric application over a business cycle can be difficult in the case of measures that give rise to large distributional effects; cutting taxes and raising expenditures in a downward phase is politically easier than raising taxes and cutting expenditures in an expansionary phase.²⁴ The, in average, too expansionary fiscal policy in the 1970s and 1980s is an illustration of this problem.

The Committee also pointed out, that fiscal measures with a more general effect are a natural choice, since fiscal policy is to replace the

²² See also Ball (1997).

²³ See note 12.

²⁴ Note, however, that fiscal instruments with large distributional consequences may generate stronger stabilisation effects than those where the distributional consequences are small, given that they are used symmetrically over the business cycle. Private consumption and demand can be increased in a downward phase, for example, by a redistribution from high-income groups with a low marginal consumption propensity to low-income groups with a high marginal consumption propensity. A delegation to an independent authority would ensure that such measures could be implemented symmetrically over the business cycle.

national monetary policy, which the Committee sees as having general effects. Compared with an interest rate adjustment, fiscal instruments probably affect more sectors of the economy and their impact on demand probably comes sooner, given that the long political decision lags can be avoided.²⁵

In this context it should be noted that while monetary policy is general in the sense that it influences inflation expectations and inflation via a single instrument (the interest rate), it does also have certain (temporary) allocational and distributional effects. An interest rate adjustment affects particular sectors of demand, such as investment, foreign trade (via its effect on the exchange rate) and private consumption (via its effects on the provision of credit and asset prices).

While monetary policy is general in the sense that it influences inflation expectations and inflation via a single instrument, it does also have certain temporary allocational and distributional effects.

TAX POLICY INSTRUMENTS

Starting from the view that the impact of stabilisation policy is to be general, with small effects on distribution and allocation, the Committee identified a number of appropriate instruments on both the expenditure and the revenue side. Here, we have chosen to concentrate on the Committee's proposals on the revenue side; they comprise personal income taxes, value-added tax, payroll taxes and internal devaluation.²⁶

A change in personal income tax affects household disposable income, thereby having some impact on consumer demand.²⁷ In this way, demand can be stimulated in downward phases and subdued in upward.^{28, 29} However, there is a risk that income tax increases or decreases can be subject to protracted distribution policy discussions. This problem would be eliminated if such an instrument were delegated to an independent authority.

By varying the rate of value-added tax (VAT), the household's consumption can be redistributed over time. A temporary VAT increase can subdue private consumption in situations with economic overheating, just as a temporary reduction can help to increase private consumption when the economy is slackening. The effect on consumption comes through two

²⁵ The full effect of an interest rate adjustment is usually considered to materialise after one to two years.

²⁶ A stabilisation policy based on variable taxation is completely contrary to the theory of optimal taxation, which holds that taxes ought to vary as little as possible over time so as to minimise their effects on household and corporate behaviour. However, this notion is derived from models that ignore more general stabilisation policy objectives. One of the purposes of altering taxes over time for stabilisation policy is precisely to influence the behaviour of households and firms.

²⁷ Crucial matters for the pass-through to private consumption include the extent to which households are forward-looking and the degree to which the credit market enables households to redistribute consumption over time.

²⁸ Income tax adjustments can also have some effect on labour supply.

²⁹ Using a general equilibrium model, Duarte & Wolman (2002) show that small countries in a monetary union tend to have relatively higher inflation in connection with productivity shocks but that governments in such countries can check incipient inflation by varying the rate of income tax.

different channels; the temporary change in VAT alters the relative price of consumption in different periods but it also changes the general price level which in turn affects the households' real disposable income.^{30, 31} A major potential problem with varying the rate of VAT is that when the households become aware of a future VAT increase, they might step up consumption just before the increase is implemented. Similarly, they can postpone consumption just before an increase is cancelled.³² These problems can be minimised by making the tax change effective as soon as possible after it has been decided. If an independent authority were to be entitled to alter the VAT rate in the context of stabilisation policy, the change could in principle come into force on the same day as the decision is made.

A reduction of payroll taxes improves the competitiveness of export firms in much the same way as a depreciation or devaluation of the national currency.

A change in the rate of payroll taxes affects the firm's total wage costs provided it does not lead to an immediate and equivalent change in gross wages. Empirical research shows that nominal wages are comparatively rigid one to two years ahead, so a change in payroll taxes is capable of affecting wage costs and thereby employment and output in the short run. To some extent, at given nominal wages, the change would also affect aggregated demand; reducing payroll taxes tends to shift demand from imported goods to domestic products. Thus, a reduction of payroll taxes could be used to sustain employment in downward phases, just as increasing payroll taxes can serve to cool off employment when the economy is overheated. Moreover, a payroll tax adjustment can, to some extent, have the same function as a change in the nominal exchange rate. A payroll tax reduction improves the competitiveness of export firms in much the same way as a depreciation or devaluation of the national currency. Thus, with Sweden in Stage Three of EMU, varying payroll taxes could replace exchange rate movements, at least to some extent.

Frequent changes in payroll taxes are likely to encounter some opposition among Sweden's main competitor countries.

A reduction of payroll taxes can be financed by increasing other taxes or cutting public expenditures so that the government budget balance is unaffected. Such an arrangement, commonly referred to as an internal devaluation, may be preferable if the public finances are strained. However, internal devaluation is not without problems. Frequent changes in payroll taxes are likely to encounter some opposition among Sweden's main competitor countries, above all in the EU area. Another problem is

³⁰ In a formal model where rational households are assumed to maximise utility over time, it can be shown, given certain conditions, that a consumption tax adjustment and an interest rate adjustment affect the relative price of consumption in different periods in a similar way. However, changes in consumption tax do not directly affect corporate investment decisions or asset prices.

³¹ The effect on the consumer price index depends on how much of the tax change is shifted onto consumer prices. The shift in the short and long run is determined both by the elasticities of supply and demand and by potential price rigidities.

³² Variations in the rate of VAT are, however, also associated with other problems, such as increased border trade and additional administrative costs for re-marking prices.

the difficulty in arriving at the optimal combination of payroll tax reductions and the compensatory changes in other taxes and expenditures. The “Committee for Stabilisation Policy ...” pointed out that another central problem is the difficulty of achieving simultaneous political decisions to adjust payroll taxes and make compensatory changes of other taxes or expenditures. A delegation of stabilisation policy decisions to an independent authority would, however, eliminate this problem.³³

ECONOMIC ACTIVITY PARAMETER

It is difficult to find any clear economic arguments against the delegation to an independent authority of decisions to alter particular taxes temporarily in the context of stabilisation policy. Legislation on and decisions about tax changes are, however, traditionally a matter for the Riksdag, so a proposal to delegate the right to decide certain tax changes to an independent authority would probably encounter strong political resistance. An alternative would be to give the independent authority the right to adjust an economic activity parameter (measuring the state of the market in Sweden relative to the euro area) that instead temporarily affect the tax levy; the economic consequences would naturally be the same as if the tax rates had been changed.³⁴ Such a model is also more attractive pedagogically in that it makes the stabilisation policy decision clearer. Provided the activity parameter is raised and lowered symmetrically over a business cycle, the model would guarantee that the independent authority neither influences distribution and structural policy in the long term nor determines the long-term level of taxes and expenditures.³⁵ In such a regime, those functions would thus continue to belong to the Riksdag. Moreover, if the activity parameter affect all taxes, then stabilisation policy would not have a sizeable effect on the uniformity of the tax system, meaning that the problem of tax arbitrage would be minimised.³⁶

An independent authority could adjust an economic activity parameter that temporarily affects the total tax levy.

A TAX POLICY INSTRUMENT WITH EFFECTS THAT RESEMBLE AN INTEREST RATE ADJUSTMENT

An interesting question is whether there are fiscal instruments that have similar effects as the Riksbank’s current instrumental interest rate as regards their impact and their distributional and allocational effects. It has

³³ This would, however, require that more than one instrument is delegated to the independent authority.

³⁴ Such an arrangement has been proposed by Gruen (1997, 2001).

³⁵ The activity parameter could in principle also be used to influence the size of the non-taxable transfers to households and firms.

³⁶ We return to this problem later in this article.

Are there fiscal instruments with similar effects as an interest rate adjustment?

been politically feasible to delegate interest rate decisions to an independent authority since the interest rate is believed to be a general instrument in the sense that it influences major sectors in the economy. For the same reasons, there ought to be a case for some form of delegation of a fiscal instrument with similar effects. If such a fiscal instrument can be found and an institutional framework similar to that for monetary policy can be constructed, then much of the criticism that has been directed in the academic literature against stabilisation policy in a fiscal policy regime would be less valid. Moreover, a fiscal instrument that, with a given nominal interest rate in the euro area, can *directly* affect the real interest rate in a single euro country should be of interest in situations where the single monetary policy has led to a real interest rate that is suboptimal for that country.^{37, 38}

The transmission mechanism

Before considering whether there is a fiscal instrument that has similar effects as an interest rate adjustment, we need to briefly discuss the nature of the transmission mechanism for monetary policy. Transmission mechanism is a generic term for the channels through which monetary policy affects the economy. The simplest macro models assume that the central bank controls the money supply directly. With reference to the quantity theory of money, it is generally considered that in the long run inflation is determined by the growth of the money supply relative to output at a given velocity of circulation. This implies that, assuming a constant velocity of circulation, the central bank can steer inflation in the long run by managing the money supply.³⁹

In general, interest rate adjustments by the central bank primarily affect the interest rate for securities with short maturities.

In practice, however, the Riksbank, the ECB and many other central banks use an interest rate rather than a money supply instrument. The central bank is obliged to supply the amount of money demanded by the banks at the given interest rate. In other words, the money supply is determined by demand at the given interest rate.⁴⁰ In general, interest rate adjustments by the central bank primarily affect the market's rate of interest for securities with short maturities. The central bank's actions can

³⁷ All the instruments discussed in the previous section can also affect the real interest rate, albeit *indirectly* via the potential effect on inflation.

³⁸ We should underscore that even if a fiscal instrument that has similar effects as the interest rate can be found, it may not necessarily be the optimal instrument for stabilisation policy. This holds whether or not such an instrument is delegated. Different fiscal instruments may be appropriate for different types of shocks.

³⁹ It should be noted that there is considerable uncertainty about the nature of the transmission mechanism in practice. The quantity theory of money has been questioned by some researchers. An interesting issue is whether the money supply affects the economy in other ways than via the effect on the level of interest rates; opinions about this differ in the literature on monetary theory. See Nelson (2002).

⁴⁰ See also Mitlid & Vesterlund (2001).

also influence the market's long-term interest rates via their potential effects on long-term inflation expectations.⁴¹ The impact on market interest rates has effects in turn on the demand for money and credit.

The most common models for monetary policy analysis presuppose rigid prices and monopolistic competition. The argument behind the price rigidity assumption is that the cost of adjusting prices deters firms from changing their prices to match fluctuations in demand.⁴² Price rigidity enables the central bank to influence the real interest rate by altering the nominal interest rate. The real interest rate movements have effects in turn on, for example, investment and consumer demand. The theory holds that a higher real interest rate weakens demand for corporate investment.⁴³ Changes in the interest rate alter the relative price of consumption over time; a higher rate is assumed to encourage saving and decrease consumption, both by increasing the return on savings and by making it more costly to finance consumption with loans. It follows that, at least in the short run, monetary policy can affect real economic activity *directly* by altering the real interest rate. Real economic effects also arise in that monetary policy influences long-term inflation expectations. A credible inflation target leads, for instance, to lower wage demands.

In the short and medium term, inflation is affected by other factors than monetary policy, for example resource utilisation, wage formation and the direction of fiscal policy.⁴⁴ These factors are central indicators behind the Riksbank's Inflation Report and monetary policy decisions.

In the short and medium term, inflation is affected by other factors than monetary policy, for example resource utilisation, wage formation and the direction of fiscal policy.

Cyclically dependent taxation of net interest earnings

The models used in monetary theory usually disregard the fact that most countries, including Sweden, tax nominal capital incomes.⁴⁵ According to Feldstein (1980), the lack of an analysis of the interaction of the tax system with inflation and its significance for monetary policy led to unduly high inflation in the 1970s. Despite this insight, monetary policy research

⁴¹ The extent to which changes in the repo rate also affect the long-term interest rates is mirrored in the yield curve, which shows the interest rates that apply in the market for securities with different maturities. The slope of the yield curve is commonly interpreted as an expression of market expectations of future interest rates and future inflation.

⁴² The assumption of monopolistic competition means that an individual firm is not able to take over the market on its own by adjusting its prices to demand in contrast to other firms. This is, of course, not the only reason for assuming imperfect competition.

⁴³ The traditional view in economic literature is that interest rate changes lead to increased/decreased corporate investment. However, as a firm's financing structure ought to be a long-term decision, it will not necessarily be modified to meet an interest rate adjustment. If that is the case, firms may – to an extent that varies with supply and demand conditions for the firm's products and to menu costs – pass through the increased financing costs (for new as well as existing investments) to consumer prices. So in such situations an interest rate adjustment can give rise to effects on supply.

⁴⁴ There are theories where fiscal policy is shown to effect inflation even in the long run, at least under certain special conditions; see Sargent & Wallace (1981), Woodford (1995) and Kocherlakota & Phelan (1999).

⁴⁵ The models for monetary theory usually disregard taxes; alternatively, all taxes are assumed to be of the lump sum variety (taxes that do not influence economic decisions) but in practice there are no such taxes.

has largely continued to ignore the tax system's importance for monetary policy. A recent article by Røisland (2002) shows that taxation of nominal capital income can have important consequences for how monetary policy should be constructed.

Taxation of nominal capital income also has important implications in the search for a fiscal policy instrument that has similar effects as the interest rate. In an economy where nominal capital incomes are taxed, it is the interest rate after tax (not before) that should be relevant for decisions by households and firms. From their point of view, there seems to be little difference between an interest rate adjustment and a change in the tax on net interest earnings (at a given interest rate) if they have the same net economic effects. The tax rate on capital incomes can always be changed so that the effect on the post-tax interest rate is the same as that of an interest rate adjustment.⁴⁶

How can a cyclically dependent taxation of net interest earnings be constructed so that an individual euro country is able to affect its domestic after tax real interest rate?

In this section we show how a cyclically dependent taxation of the net interest earnings of households and firms might be constructed so that an individual euro country is able to affect its domestic real interest rate (after tax). The starting point for the analysis is that the value of an activity parameter (representing the state of the market in Sweden relative to the euro area as a whole) is varied so that, at a certain established nominal interest rate for the euro area, the effect on net interest earnings after tax will be the same as if the national level of the interest rate had been adjusted instead.

In the present regime a household's net interest earnings after tax can be written

$$(1) \quad i^{cr} (S - L)(1 - \tau)$$

where i^{cr} is the nominal interest rate in the current regime, S is savings in interest bearing assets, L is the stock of debt and τ is the tax rate on capital income when net interest earnings are positive or, alternatively, the value of the tax deduction for interest expenditure when net interest earnings are negative. An individual whose savings in interest bearing assets exceed liabilities will have positive net interest earnings that are taxed at the general rate for capital income (30 per cent with the current tax rules); if liabilities exceed assets, net interest earnings will be negative, which (subject to certain limitations) gives a general tax reduction of 30 per cent of the negative figure. An interest rate increase is advantageous

⁴⁶ The distortionary effects of altering the tax rate for capital income should therefore resemble those of a change in the nominal interest rate. It should be noted that if taxes are used for stabilisation policy, the distortionary effects will vary over time. Distortionary effects actually play an essential role in practical stabilisation policy – the aim of this policy is to influence the behaviour of households and firms.

for households and firms with a net interest surplus and disadvantageous for those with a deficit, while the opposite applies if the interest rate falls.

If, in Stage Three of EMU, Sweden were to be exposed to shocks that are asymmetric relative to the euro area, the Riksbank would not be in a position to alter the interest rate. At a given European level of interest rates it would, however, be possible to affect the taxation of net interest earnings in Sweden by adjusting the activity parameter so that the effect on net interest earnings after tax is similar to that of a change in the national level of interest rates. The problem then lies in setting the activity parameter (KP) so that the following expression holds:

$$(2) \quad i^{EMU} (S - L)(1 - KP\tau) = i(S - L)(1 - \tau)$$

where i^{EMU} is the established nominal market rate of interest in the euro area. This expression can be rewritten as

$$(3) \quad KP = 1 + \left(\frac{i^{EMU} - i}{i^{EMU}} \right) \left(\frac{1 - \tau}{\tau} \right).$$

This condition applies for the households. Corporate net interest earnings are declared in the profit and loss account and taxed at the rate for corporation tax. The corresponding expression for a cyclically dependent taxation of corporate net interest earnings is

$$(4) \quad KP^B = 1 + \left(\frac{i^{EMU} - i}{i^{EMU}} \right) \left(\frac{1 - \tau^B}{\tau^B} \right).$$

where τ^B is the rate of corporation tax.⁴⁷ If the corporate and capital income tax rates coincide, the activity parameter will be of the same magnitude for households and firms in all cyclical situations.⁴⁸

Equations (3) and (4) provide preliminary guidance for setting the activity parameter for households and firms, respectively. An adjustment of the parameter calls for an assessment of the level of interest rates (the value of i) that would have been optimal for the economic situation in Sweden.

A simple example will help to clarify the implications of the "reaction functions" (3) and (4). Take the equation for households and assume that there are two households, whose net interest earnings are positive and

⁴⁷ A derivation of this expression is presented in an appendix to this article. Under the current fiscal rules, a cyclically dependent taxation of corporate net interest earnings would need to take the form of so-called tax adjustments.

⁴⁸ The corporate tax rate in Sweden is 28 per cent and thus somewhat lower than the rate of 30 per cent for the general tax on capital income. In practice, allocations to untaxed reserves and tax adjustments result in an effective corporate tax that is considerably lower than the nominal capital income tax rate.

negative, respectively (assets exceed liabilities and vice versa). Table 1 shows how interest rate adjustments in the present regime affect net interest earnings after tax for these households. The “equilibrium interest rate” is assumed to be 5 per cent.⁴⁹ An interest rate increase from 5 to 7 per cent is assumed when economic activity is high and a reduction from 5 to 3 per cent when activity is low.⁵⁰

TABLE 1. EFFECTS ON POSITIVE AND NEGATIVE NET INTEREST EARNINGS OF DIFFERENT INTEREST RATES IN THE PRESENT REGIME

| Net assets | 100 | -100 |
|------------------------------|---------------------------------|--------------|
| Interest rate | Net interest earnings after tax | |
| 7 % (high activity) | 4.90* | -4.90 |
| 5 % (normal activity) | 3.50 | -3.50 |
| 3 % (low activity) | 2.10 | -2.10 |

* Example: $100 \times 0,07 \times (1-0,3) = 4,90$.

Table 2 show how the activity parameter would be set so that the effects on net interest earnings after tax (at a given interest rate for the euro area) are the same as those of an equivalent notional national interest rate adjustment.

TABLE 2. EFFECTS ON POSITIVE AND NEGATIVE NET INTEREST EARNINGS OF DIFFERENT VALUES OF THE ECONOMIC ACTIVITY PARAMETER (IN THE OUTLINED MODEL), GIVEN AN EMU INTEREST OF 5 PER CENT

| Net assets | | 100 | -100 |
|------------------------|--------------------|---------------------------------|-------|
| Activity parameter | Effective tax rate | Net interest earnings after tax | |
| 0.07* (high activity) | 0.02 | 4.90 | -4.90 |
| 1.00 (normal activity) | 0.30 | 3.50 | -3.50 |
| 1.93 (low activity) | 0.58 | 2.10 | -2.10 |

* Exempel: $KP = 1 + \left(\frac{i^{EMU} - i}{i^{EMU}} \right) \left(\frac{1 - \tau}{\tau} \right) = 1 + \left(\frac{0,05 - 0,07}{0,05} \right) \left(\frac{1 - 0,3}{0,3} \right) = 0,07$

To achieve the same effect as an interest rate adjustment, the taxation of net interest earnings may need to vary relatively strongly.

The results show that, to achieve the same effect as an interest rate adjustment, the activity parameter and thus the taxation of net interest earnings may need to vary relatively strongly. In the present example the effective tax rate would need to range from 2 to 58 per cent. In the extreme case with high economic activity, the value of the tax deduction can even be negative for households whose net interest earnings are negative. This problem could be avoided by setting a lower limit so that the value of the activity parameter does not fall below 0.

When economic activity is normal the value of the activity parameter

⁴⁹ The equilibrium interest rate is the level that applies when actual GDP coincides with potential output and inflation is stable and low.

⁵⁰ Note that this is a highly simplified example and thus does not describe all the criteria for repo rate adjustments in the present regime.

would thus be 1. In periods of overheating the value would be less than 1. This means that the net taxation of households whose liabilities exceed their assets would be heavier when activity is high (because the value of the tax deduction then falls). For households with positive net interest earnings, on the other hand, the measure would be advantageous, just like an interest rate increase in the present regime. In downward phases, the value of the activity parameter would move up above 1, thereby easing the net taxation of households with more liabilities than assets (in that the value of the tax deduction then rises), while households with positive net interest earnings would be at a disadvantage, just as they are when interest rates fall in the present regime.

At first sight it may seem remarkable that the effective tax rate for capital incomes is to be lowered when economic activity is high. A tightening of fiscal policy usually refers to an increase in total tax pressure that reduces household disposable income and thereby aggregated demand. However, a reduction of the effective tax rate on capital income affects the relative price of consumption over time in the same way as an interest rate adjustment. The lower effective tax rate and the decreased possibility to deduct interest expenditures both lead to increased saving and decreased consumption in that they increase the return on saving as well as the cost of consumption financed with loans. A change in the effective rate of corporation tax affects corporate costs for financing investments in much the same way as an interest rate adjustment. Lowering the effective corporate tax rate (which only applies to net interest earnings) reduces the tax value of corporate deductions for interest expenditure. This is accompanied by an increased return on investments in interest bearing assets. Lower demand for investment and consumption (and higher saving) reduces total demand in the economy. The effect on aggregated demand comes from the changes in the relative price of consumption in different periods.

Our argument so far has been that, in an economy where the existence of money is disregarded, a variable taxation of net interest earnings should affect the consumption and investment decisions of households and firms in much the same way as a change in the nominal interest rate. The next question is to what extent this instrument can also influence money demand, credit and inflation expectations in the short and medium term.

We have assumed that the money supply is driven by demand. Presumably it is not the nominal interest rate but this rate after tax that influences the demand for money. In that case, it should be possible to affect the alternative cost of holding money by adjusting either the effective tax rate or the nominal interest rate.

A reduction of the effective rate of the capital income tax affects the relative price of consumption over time in the same way as an interest rate adjustment.

Can a variable taxation of net interest earnings influence inflation expectations, money demand and credit in the short and medium term?

The significance of credit facilities for the transmission mechanism is still an open question in the literature on monetary theory. One of the issues here is the extent to which bank lending is determined by supply or demand. In the Riksbank's latest Financial Stability Report⁵¹ it is noted that under normal conditions supply factors do not seem to influence the provision of credit, which is mainly determined by demand. The activity parameter alters the post-tax cost of credit and should therefore influence demand for credit in much the same way as an interest rate adjustment.

In the absence of a national monetary policy, a change in the taxation of net interest earnings is likely to influence domestic supply and demand conditions in a similar way to a change in the level of interest rates and should therefore also affect the short-term inflation expectations in a similar way as an interest rate adjustment. However, this conclusion presupposes that the stabilisation policy is credible.

An advantage for stabilisation policy compared with an interest rate adjustment is that post-tax net interest earnings would be affected for loans and savings with fixed as well as flexible interest rates.

An advantage of this instrument for stabilisation policy – compared with the present interest rate adjustments – is that post-tax net interest earnings would be affected for loans and savings with fixed as well as flexible interest rates. Repo rate adjustments in the present regime only affect savings and loans with flexible interest rates, and the interest on new loans and savings with fixed rates to the extent that changes in the short-term interest rate have an impact on long-term interest rates. The stabilising effect of the changed activity parameter would therefore probably be greater than that of the present interest rate adjustments. In other words, the activity parameter (and thereby the effective tax rate) could be adjusted much less than indicated in Table 2 and still generate the same total stabilising effect as the interest rate adjustments in Table 1.⁵²

A problem with cyclically dependent taxation of net interest earnings is that the effect does not necessarily occur at the time when the tax is altered.

A potential problem with cyclically dependent taxation of net interest earnings is that the households might not adjust their tax adjustments for interest expenditure, when the activity parameter is changed. For these households, the cash effect of the altered activity parameter will occur, not during the current income year but in the following year (in connection with the tax assessment).^{53, 54} This potential problem could be solved if, for example, the provider of credit charged the borrower only the costs of the loan after tax deductions and the lender is regularly refunded for the remainder by the tax authorities (in much the same way that banks

⁵¹ *Sveriges Riksbank Financial Stability Report*, 2002:2 (November).

⁵² It can be deemed inappropriate that variations in the activity parameter hit borrowers with fixed-interest loans. This could perhaps be handled by forcing the credit institutions to provide information of whether savings and loans have fixed or flexible interest rates. However, such a solution would probably not be particularly practical.

⁵³ Although the cash effect is lagged one year, the whole or a part of the economic effect can still occur during the current income year in that households are presumably aware of the tax liability that will fall due when tax is assessed in the following year.

⁵⁴ There is a similar problem for firms.

already deliver preliminary tax on interest income on a monthly basis).⁵⁵ Such an arrangement would also make it possible to alter the activity parameter more frequently. Neither would tax adjustments have to be made for interest expenditure.⁵⁶

A point to note is that the model outlined here is associated with a number of potential tax arbitrage problems. If the taxation of net interest earnings varies cyclically, there will be periods when the norm of uniformity in the tax system from 1991 is partly negated in that the model creates incentives to switch between different categories of asset when economic activity is high and low, respectively.⁵⁷ The tighter taxation of interest bearing assets in a downward phase gives the households incentives to transfer capital from such assets to equity, for example. A non-uniform taxation of interest income and other capital income may also give rise to more extreme tax planning in the form of so-called “money machines”, which make it profitable for tax planners to borrow large sums and make forward contracts with the lender.⁵⁸ The first type of arbitrage problem exists already in the present regime but is caused by variations in the level of interest rates, whereas in the model outlined here the opportunity for arbitrage lies in taxation. The problem of money machines in a regime with variable taxation of net interest income would probably be smaller than in a tax system that is permanently non-uniform, particularly as the players who are in a position to make such forward contracts would not know when the activity parameter will be changed.^{59, 60}

In a globalised world where financial capital is readily transferred across borders, the model outlined here may also seem unpractical. The

A point to note is that the model outlined here is associated with a number of potential tax arbitrage problems.

⁵⁵ Such a solution ought to be technically feasible in that each individual and firm in Sweden has an interest-bearing tax account.

⁵⁶ Such a construction might perhaps be of interest in the existing tax system, irrespective of whether or not cyclically dependent taxation is introduced. The practical and legal aspects would, of course, have to be examined more closely.

⁵⁷ The norm of uniformity requires, for example, that all types of capital income are to be taxed at the same rate and this rate shall be the same as the value of deductions for interest expenditure.

⁵⁸ If the value of interest expenditure deductions exceeds that of, for example, the capital gains tax on equity, it will pay a tax planner to make a forward contract with a bank whereby the former obtains a loan and uses it to buy equity; the equity is deposited in the bank, which for a fee undertakes to buy it back for the equivalent of the initial purchase price plus the interest the tax planner has paid on the loan. In this way the tax planner and the bank can make a handsome profit, while the cost of the tax planner's interest deductions is carried by the state. An illustrative example of such a forward contract in practice is to be found, in Swedish, in the report “Our Taxes” (SOU 2002:47, pp. 219–220).

⁵⁹ To avoid situations where owners of closely held companies transform earned income into capital income, the Swedish tax system has so-called 3:12 rules, whereby a standard proportion of the earnings is taxed as capital income and any remainder as earned income. Cyclically dependent taxation of net interest earnings would affect only the amount of earnings that is taxed as either capital income or earned income. So as long as the 3:12 rules are retained in their present form, it seems that cyclically dependent taxation of net interest earnings would not increase the incentive to transform earned income into capital income or vice versa.

⁶⁰ Note that these kinds of arbitrage problem could be eliminated entirely if the activity parameter were constructed to apply to the taxation of all capital income, not just net interest earnings. In certain cyclical phases, however, this would create incentives to transform earned income into capital income and vice versa. This would also be the case, to some extent, with a cyclically dependent variable taxation of earned income. In both cases the 3:12 rules would probably have to be revised.

In a globalised world where financial capital is readily transferred across borders, the model outlined here may seem unpractical.

tighter taxation of interest bearing assets when activity is weak is an incentive to move capital to countries where the tax is lower.⁶¹ However, these incentives already exist in the present system, albeit with an exchange risk; when the Riksbank lowers the repo rate in a downward phase, holders of interest bearing assets have an incentive to move capital to countries where the return is higher.⁶²

The potential problem of capital flight should not be exaggerated.

However, the potential problem of capital flight should not be exaggerated. Capital investors must constantly make judgements about future changes in the activity parameter and the more frequently this parameter is adjusted, the harder it will be to use cross-border capital transfers to profit from arbitrage.⁶³

The potential tax planning problems have to be weighed against the advantages for stabilisation policy.

While a variable taxation of capital income can lead to some increase in tax planning, the incentive here should be weaker than in a tax system that is permanently non-uniform. Tax rules that permanently provide opportunities for tax arbitrage should, of course, be avoided. In the model outlined here, there would be no such opportunities in normal cyclical situations. Moreover, the potential tax planning problems have to be weighed against the advantages for stabilisation policy. In any event, there should be some scope for varying the taxation of capital income in the context of stabilisation policy.

In any event, there should be some scope for varying the taxation of net interest earnings in the context of stabilisation policy.

It should be emphasised that we do not claim that a cyclically variable taxation of net interest income can replace monetary policy as an instrument of stabilisation policy if Sweden chooses not to move to Stage Three of EMU. Such an instrument could possibly be used in certain situations as a complement to monetary policy, not least in that monetary policy acts primarily on the short-term interest rates while a variable taxation of net interest income affects both the short- and the long-term interest rates.

When should an individual euro country use national fiscal policy measures?

Earlier in this article, we argued that in certain situations there is a need for adjusting the real exchange rate. In a fixed exchange rate system, there are situations which motivate that inflation in Sweden deviates from the euro area average. In this final section we use an analysis by Blanchard (2000) and Calmfors *et al.* (2003) to identify shocks that ought

⁶¹ Note, however, that tax evasion of this type is illegal.

⁶² This is known in the economic literature as interest rate arbitrage.

⁶³ This potential problem would probably be considerably smaller if the EU Saving Directive for Interest-Bearing Assets is adopted.

to be countered with stabilisation policy and those that call for an adjustment of the real exchange rate.

MEASURES FOR DIFFERENT TYPES OF SHOCK

The question of whether (country-specific) shocks of various kinds ought to call for national stabilisation policy measures in a single euro country is not easy to analyse in simple terms. An initial starting-point for how shocks should be managed if Sweden moves to Stage Three of EMU is provided by an analysis in Blanchard (2000), the main features of which are as follows:⁶⁴

Assume the economy is in equilibrium initially, with both internal and external balance. Internal balance means that actual GDP is in line with potential output⁶⁵ and external balance refers to foreign trade, that is, that import and export demand are equal. Demand for imports is assumed to depend on GDP and the real exchange rate, export demand only on the latter.⁶⁶

Now assume that domestic demand grows for some reason, all else equal, so that the economy moves into a situation with overheating where actual GDP exceeds potential output; this leads to a trade *deficit* (an increase in GDP at a given real exchange rate leads to increased imports). One option for those responsible for stabilisation policy would be to do nothing at all; inflation would then rise, which would lead to an appreciation of the real exchange rate. Export demand would then weaken and the actual production will fall to its potential level, albeit at the price of an even larger trade deficit. Thus, letting the real exchange rate appreciate cannot be the optimal strategy in this case. A preferable alternative would be to restrict domestic demand with fiscal measures as this can lead to both internal and external balance without any real exchange rate adjustment.

Now assume instead that the economy is hit by greatly increased export demand, all else equal.⁶⁷ With an unchanged real exchange rate this leads to a situation with a trade *surplus*. A tightening of fiscal policy would lead to internal balance, as in the previous case, but not to external balance because neither the real exchange rate nor export demand would be affected. If the objective is both internal and external balance, the

How ought shocks of various kinds to be countered with Sweden in Stage Three of EMU?

⁶⁴ Readers looking for a more formal presentation are referred to Blanchard (2000).

⁶⁵ Potential output is the gross national product that results from using labour and capital at the normal intensity.

⁶⁶ Imports grow when GDP rises and the real exchange rate appreciates; an appreciation of the real exchange rate leads to decreased export demand.

⁶⁷ This would follow from, for instance, the assumption that preferences abroad for Swedish goods have risen.

A domestic demand shock ought to be countered with fiscal measures, while a shock to export demand ought to be managed by letting inflation in Sweden deviate from its level in the rest of the world.

If higher inflation in a euro country compared with the rest of the world can be identified as a Balassa-Samuelson effect, no active fiscal countermeasures should be taken.

optimal strategy in this case is to let the real exchange rate appreciate instead because that subdues export demand. The only way to appreciate the real exchange rate is to let inflation exceed its level in the euro area for a time.

The model in Blanchard's paper does not consider all the relevant problems but, given its conditions, it does point to two intuitive results, namely that a domestic demand shock ought to be countered with fiscal measures, while a shock to export demand ought to be managed by letting inflation in Sweden deviate from its level in the rest of the world, with the result that the real exchange rate changes.

A less self-evident result of Blanchard's analysis is that in certain cases a positive productivity shock both can and ought to be allowed to lead to higher inflation in Sweden compared with the rest of the world. In a model that does not differentiate between goods that are exposed to international competition and those that are not, the usual conclusion is that a positive productivity shock should tend to subdue inflation, at least in the short run. This, however, is not a self-evident conclusion in a model where the effect of the productivity shock is assumed to occur primarily in the exposed sector. Assume that productivity growth in the exposed sector (export production) is higher than in the rest of the economy (this seems reasonable for most countries) and that productivity growth in this sector is also higher (for a period) than in the rest of the world. At given world market prices, the exposed sector's productivity growth will generate higher real wages (via the higher marginal productivity) and an increase in the relative price of sheltered goods. This phenomenon, known as the Balassa-Samuelson effect, is perhaps more relevant, as Blanchard points out, for "catching-up" economies, for example Ireland.⁶⁸ In such economies a higher relative price for sheltered goods will lead to higher inflation that should be allowed to generate an appreciation of the real exchange rate.⁶⁹ In other words, if higher inflation in a euro country compared with the rest of the world can be identified as a Balassa-Samuelson effect, no active fiscal countermeasures should be taken.

Blanchard applies the above analysis in a study of why inflation in Ireland in recent years has been considerably above the euro area average. On the demand side the expansion is attributed in equal parts to domestic and export demand. From the conclusions in Blanchard's analysis it follows that the optimal policy mix should be one part fiscal contraction and one part inflation (a real appreciation). A certain amount of the

⁶⁸ The Balassa-Samuelson effect should be particularly relevant for the EU applicant countries; see Baldwin *et al.* (2001). The Balassa-Samuelson effect is also often used to explain why developing countries generally have lower price levels than developed countries.

⁶⁹ For a more formal account of the Balassa-Samuelson effect, see Obstfeld & Rogoff (1996).

inflation's deviation from the euro area can be explained as a Balassa-Samuelson effect.

NOMINAL WAGE RIGIDITY, TEMPORARY VERSUS PERMANENT SHOCKS, AND BOOM-AND-BUST CYCLES

Blanchard's analysis disregards the degree of nominal wage rigidity and its conceivable consequences for the need of stabilisation policy measures in the event of temporary or permanent shocks to export demand. Neither does the model consider fluctuations in asset prices.

Calmfors *et al.* (2003) write that in the case of *permanent* structural changes (for example a lasting increase in relative export demand or an increase in a euro country's relative productivity), the development of relative prices ought to be left to "do the job". In other words, such situations should be handled via an adjustment of the real exchange rate. Applying measures of stabilisation policy to permanent structural changes is simply liable to delay a necessary adjustment to permanently altered conditions.

Calmfors *et al.* argue, however, that this strategy is not appropriate if the shock is temporary and wages show downward rigidity. The reason is that increased inflation in connection with temporary overheating tends to lead to permanent wage increases that result in turn in an appreciation of the real exchange rate. Applying a discretionary fiscal policy in a subsequent slowdown then becomes more complicated in that the higher real exchange rate calls for larger fiscal measures and budget deficits than would otherwise have been required. It follows that even a large temporary increase in export demand may call for fiscal contractions if wage increases to compensate for inflation when activity is high are tending to become permanent.

Calmfors *et al.* also write that the risk of boom-bust cycles can motivate fiscal countermeasures to temporary shocks in foreign trade and productivity growth. Variations in asset prices tend to accentuate cyclical upswings and slowdowns. Calmfors *et al.* refer to a study by Bordo & Jeanne (2002), who show that boom-bust cycles tend to characterise real estate prices rather than equity prices and also tend to occur more frequently in small countries.⁷⁰ As shocks in real estate prices are likely to be more country-specific than shocks in equity prices, Calmfors and colleagues consider that the risk of boom-bust cycles should be a central feature of a discussion about the formation of a national stabilisation policy in small euro countries. In that context, a variable taxation of net interest earnings

Even a large temporary increase in export demand may call for fiscal restrictions if wage increases to compensate for inflation when activity is high are tending to become permanent.

The risk of boom-bust cycles can also motivate fiscal countermeasures to temporary shocks in foreign trade and productivity growth.

⁷⁰ This result is explained in Bordo & Jeanne (2002).

appears to be a conceivable stabilisation policy instrument in that its effect on real estate prices is presumably relatively strong.

Summary and concluding comments

In this article we have discussed the conditions for conducting stabilisation policy with fiscal instruments in the event of Sweden moving to Stage Three of EMU and thereby relinquishing an independent monetary policy. The following issues have been considered: (i) What should be the objective of the national stabilisation policy? (ii) What are the advantages of delegating the stabilisation policy decisions to a politically independent authority? (iii) Are some fiscal policy instruments more suitable for delegation than others? (iv) Are there fiscal instruments that have similar effects as the present interest rate adjustments in their effectiveness and their impact on distribution and allocation? (v) When should fiscal measures be taken in a single euro country?

The need for national stabilisation policy measures should be appraised by analysing a variety of indicators.

As regards the choice of objectives for a national stabilisation policy, what matters most in our opinion is that the analyses and forecasts behind the policy decisions are presented openly and stringently. An analysis of whether Sweden is moving towards a cyclical position that deviates markedly from the euro area as a whole and, if so, whether this ought to occasion national stabilisation policy measures should presumably be based on a variety of indicators.

To be effective, stabilisation policy must be credible.

To be effective, stabilisation policy must be credible. Experience shows that the nature of the political decision-making process can lead to a weakening of stabilisation policy's credibility. This was a decisive argument behind the decision to amend the Riksbank Act as of 1999 and delegate monetary policy to an independent authority. With Sweden in Stage Three of EMU, the problem of credibility becomes again important in that fiscal policy will then be entirely responsible for the national stabilisation policy. It has been suggested in the economic literature that stabilisation policy could be delegated to a politically independent authority even if the policy instruments are of a fiscal nature. The arguments for delegating monetary policy to independent central banks are presumably also relevant when stabilisation policy is placed in a fiscal policy regime.

The institution of independent central banks has played a central role in bringing inflation down in many countries.

Even if the idea of delegating certain fiscal instruments to an independent authority may seem radical, the criticism should not be exaggerated. In its day, the proposal to introduce independent central banks aroused a similar scepticism. Today, independent central banks are a reality. Most observers consider that the advent of an independent central bank, along with rules and targets that have improved budget discipline, has played a central role in bringing inflation down in many countries.

It has been asserted in the debate that a decision to delegate certain fiscal instruments to an independent authority would be undemocratic. Provided such a delegation were approved by a Riksdag majority, the decision would by definition be democratic, in the same way as the decision to delegate monetary policy to the Riksbank.

Fiscal policy has a broad spectrum of potential instruments for stabilisation policy on both the revenue and the expenditure side of the government budget. The question of which fiscal policy instruments could be appropriate to delegate to an independent authority must necessarily be approached via a more general discussion of which instruments are generally suitable for stabilisation purposes. We argue that many of the decision-making problems associated with adjustments to income tax, value-added tax and payroll taxes – problems that have been the basis for much of the academic criticism of fiscal policy stabilisation – could be minimised if an independent authority makes the stabilisation policy decisions.

There may be political reasons that make it inappropriate for an independent authority to change particular taxes, since this is and has always been a matter for the Riksdag. An alternative approach could be to allow the independent authority to temporarily affect the tax levy by adjusting an economic activity parameter (an indicator of the state of the market in Sweden relative to the euro area as a whole). Such a model would guarantee that the independent authority cannot either influence distribution and structural policy in the long run or determine the long-term level of taxes and expenditures. In such a regime these matters would still be reserved for the government and the Riksdag.

An interesting question is whether there are fiscal instruments that have similar effects as the present interest rate changes. It has been politically feasible to delegate interest rate decisions to an independent authority since the interest rate is believed to be a general instrument in the sense that it influences major sectors in the economy. For the same reasons, there ought to be a case for some form of delegation of a fiscal instrument with similar effects. We show that a cyclically dependent variation of the taxation of net interest earnings should be capable of affecting the economy in much the same way as an interest rate adjustment. A fiscal instrument that, with a given nominal interest rate in the euro area, can *directly* affect the real interest rate in a single euro country should be of interest in situations where the common monetary policy has led to a real interest rate that is suboptimal for that country. The implementation of this instrument does pose some potential problems, for instance in that there are periods when it provides incentives for tax arbitrage. However, we also show that to some extent these problems already exist when the interest rate is adjusted in the present monetary policy regime. These

If a Riksdag majority were to approve a delegation of stabilisation policy instruments to an independent authority, the decision would by definition be democratic.

Fiscal policy has a broad spectrum of instruments for stabilisation policy on both the revenue and the expenditure side of the government budget.

Fiscal instruments can be found that have similar effects as the present interest rate changes.

The need for fiscal measures in a single euro country depends on the type of shock.

potential problems should be weighed against the advantages for stabilisation policy.

The need for fiscal measures in a single euro country depends on the type of shock. Large domestic demand shocks should be countered with fiscal measures, whereas permanent shocks in foreign trade or in relative productivity growth ought not to occasion any countermeasures.

Countering permanent structural changes with measures of stabilisation policy would simply be liable to delay a necessary adjustment to permanently altered conditions. But in the event of temporary shocks in foreign trade or productivity growth, stabilisation policy might be warranted if there is downward wage rigidity or asset prices are fluctuating markedly.

Finally, it should be emphasised that the purpose of this paper is not to present complete solutions to the problem of how the framework for stabilisation policy ought to be shaped with Sweden in Stage Three of EMU. Our aim instead has been to add to the analysis and the debate in certain respects and highlight conceivable solutions that have not received much attention. Different institutional arrangements for the decision-making processes, the objectives for stabilisation policy and various stabilisation policy instruments have different advantages and drawbacks. Solutions that are economically motivated may not always be politically acceptable. But that should not be a reason for refraining from analysing and discussing them. Solutions that are regarded as politically inconceivable today may turn out to be politically correct in the future.

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Appendix

The starting point is to vary the value of an economic activity parameter (an indicator of the state of the market in Sweden relative to the euro area) so that, at a given European level of interest rates, the effect on the taxation of corporate net interest earnings will be the same as if the national interest rate had been adjusted instead. The tax rules state that the calculation of taxable income is based on earnings before taxes (*EBT*). Net business income (*NBI*) is defined as receipts less costs and depreciations with an addition/deduction for allocations to untaxed reserves and various tax adjustments.

For simplicity, we disregard depreciations as well as additions/deductions for allocations to untaxed reserves and various tax adjustments. For the time being we also disregard all receipts and costs apart from interest income ($i^{cr}S$) and interest expenditure ($i^{cr}L$). Given these conditions, earnings before taxes corresponds to the firm's net interest earnings

$$(A.1) \quad EBT = i^{cr} (S - L).$$

Business income after corporate tax in the present regime is then

$$(A.2) \quad NBI = (1 - \tau^B) EBT = i^{cr} (S - L)(1 - \tau^B).$$

where τ^B is the corporation tax rate. If savings in interest-bearing assets exceed liabilities, net interest earnings will show a surplus that is taxed at the general rate of corporation tax (28 per cent under the existing tax rules). If liabilities exceed assets, net interest earnings will show a loss that may be offset against future profits.⁷¹ This possibility is not open to households.

With Sweden in Stage Three of EMU, the Riksbank will not be in a position to influence the national level of interest rates. But with a given European level of interest rates, the taxation of net interest earnings in Sweden could be affected by varying the activity parameter so that the effect on net interest earnings after tax is the same as that of a change in the level of interest rates. To illustrate this, let us start with the firm's earnings before taxes

$$(A.3) \quad EBT = i^{EMU} (S - L).$$

⁷¹ However, the effective value of deducting this loss will be less than 28 per cent.

In accordance with the present taxation principles, the activity parameter would affect net interest earnings via the item tax adjustments (TA) in the tax return:

$$(A.4) \quad TA = -i^{EMU} (S - L) + KP i^{EMU} (S - L)(1 - \tau^B).$$

Business income after corporation tax would then be

$$(A.5) \quad NBI = i^{EMU} (S - L) + TA = i^{EMU} (S - L)(1 - KP\tau^B).$$

Thus, the problem is to set the activity parameter (KP) so that the following holds

$$(A.6) \quad i^{EMU} (S - L)(1 - KP\tau^B) = i(S - L)(1 - \tau^B).$$

where i^{EMU} is the European level of interest rates. This expression can be rewritten as

$$(A.7) \quad KP = 1 + \left(\frac{i^{EMU} - i}{i^{EMU}} \right) \left(\frac{1 - \tau^B}{\tau^B} \right).$$

■ How does the inflation target affect the economy?

BY MALIN ADOLFSON AND ULF SÖDERSTRÖM
Research Department.

We analyse three economic relationships: the persistence in inflation, the relation between inflation and the output gap, and the exchange rate pass-through to inflation. The introduction of an inflation target in Sweden in the mid 1990s is likely to have led to a weakening of all three relationships. It turns out to be difficult to verify such changes with statistical methods, using either actual data or a simulated theoretical model. Our results also have implications for the discussion about the new economy.

The authors are grateful for comments from Anders Vredin, Staffan Viotti, Kerstin Mitlid and many other colleagues at the Riksbank.

The inflation target and economic relationships

The introduction of an inflation target affects not just inflation but has consequences for other variables, too, and their co-variation with inflation.

During the first half of the 1990s the direction of monetary policy changed dramatically in Sweden, from a regime with a fixed exchange rate (and recurrent devaluations) to a regime with the overriding objective of stabilizing the general price level. How is the economy likely to be affected by such a shift in monetary policy? The change in monetary policy and the introduction of an inflation target presumably affect not just inflation but other variables, too, and their co-variation with inflation.

A central bank with primary emphasis on price stability will try to counter inflationary shocks in order to bring inflation back to the target. A monetary policy regime that attaches greater weight to price stability could therefore be expected to lead to inflation becoming less persistent and co-varying less with, for example, the output gap and the exchange rate.

We analyse three economic relationships: the persistence in inflation, the relation between inflation and the output gap, and the exchange rate pass-through to inflation.

The purpose of this article is to provide a closer analysis of three economic relationships: the persistence in inflation, the relation between inflation and the output gap, and the exchange rate pass-through to inflation. All these relationships have been discussed in popular terms as well as in the academic literature. Many contributors have noted that the

relationships appear to have weakened in recent years, both in Sweden and elsewhere.¹

In the analysis we systematically study whether these relationships have in fact changed after the monetary policy shift in Sweden. We begin with a detailed analysis of statistical evidence that the three relationships have changed. This is done in the form of simple correlations as well as regression analysis. We find that the signs of changes in all three relationships are weak and that any changes are typically not statistically significant.

A difficulty with the empirical analysis is the relatively short time interval since the inflation target was introduced. This may mean that shocks of various kinds and structural changes prevent us from obtaining reliable measurements of effects of the policy realignment. In order to clarify the analysis, in a second step we therefore use a theoretical model of a small open economy. This model shows us exactly how a realignment of monetary policy, towards greater emphasis on price stability, affects the relationships in which we are interested when other structural relationships are held constant. Simulations of the model show that the introduction of an inflation target is followed by a weakening of all three relationships. However, these changes are difficult to capture empirically because shocks of various kinds introduce noise in the statistical measurements.

Our analysis accordingly shows that the economic effects of the monetary policy realignment are difficult to demonstrate empirically. Presumably it is even harder with statistical methods to identify changes in other structural relationships, for instance the “new economy” – that increased competition has reduced the economy’s inflation propensity. We show that such a diminished inflation propensity may well be due to the new monetary policy (i.e., the adoption of an inflation target).

A difficulty with the empirical analysis is the relatively short time interval since the inflation target was introduced.

Our analysis shows that it is difficult to demonstrate the economic effects of the monetary policy realignment.

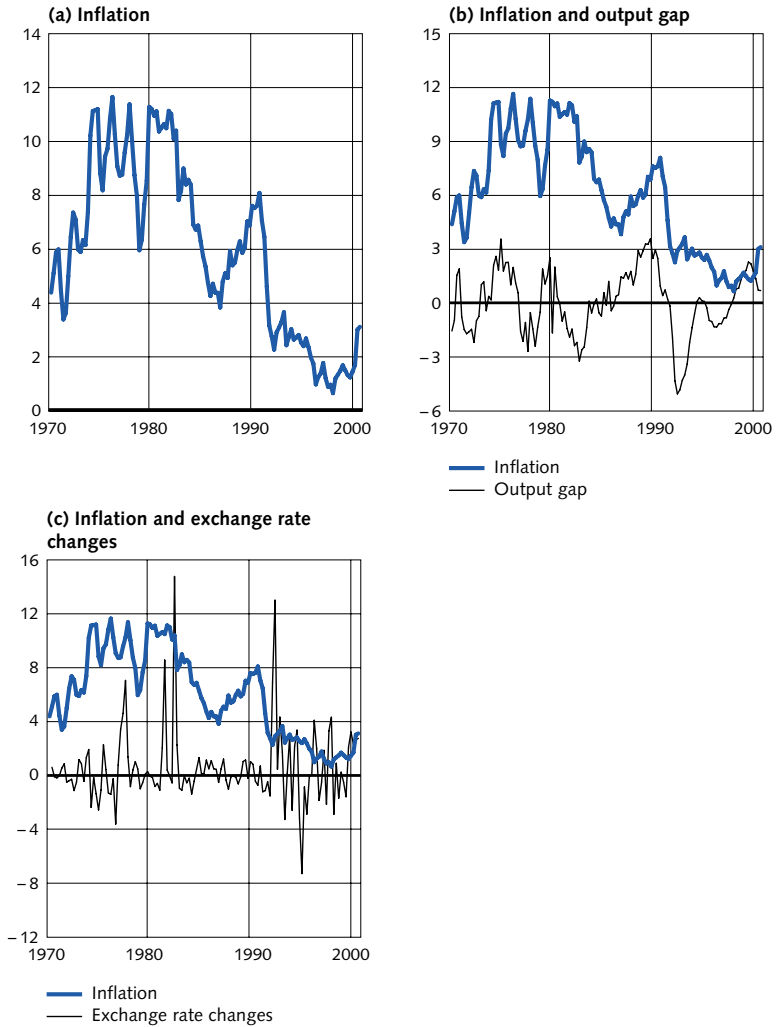
Empirical analysis: Have the economic relationships changed?

We begin with investigating whether changes in our three economic relationships can be identified with statistical methods. Figure 1 shows infla-

¹ Siklos (1999) shows that the persistence in inflation has decreased in Canada, Finland, New Zealand, Spain, Sweden and the United Kingdom. Beaudry & Doyle (2001) argue that the Phillips curve has become flatter in Canada and the United States. Gagnon & Ihrig (2001) and Campa & Goldberg (2002) find a reduced pass-through from exchange rate movements to inflation in a number of countries, including Sweden. The relations and their relevance for monetary policy have also been analysed in the Riksbank’s Inflation Reports; see Inflation Report 1999:3 “Has the relationship between the output gap and inflation changed?”, Inflation Report 2001:4 “The relationship between growth and inflation”, and Inflation Report 2001:3 “Exchange rate pass-through”. However, in all these studies it has proved difficult to find statistically significant changes over time.

tion, the output gap (the deviation of real GDP from trend), and quarterly changes in the nominal exchange rate from 1970 to 2001.²

Figure 1. Inflation, output gap and nominal exchange rate changes, 1970–2001
Per cent



There are certain signs in the figures that the introduction of the inflation target in the first half of the 1990s has been followed by a weakening of the persistence in inflation, of the relation between inflation and the output gap, and of the exchange rate pass-through to inflation. Inflation was

² Inflation is measured as the percentage annual change in UND1X (CPI excluding interest expenditure, taxes and subsidies), the output gap as the percentage deviation of real GDP from a trend calculated with a Hodrick-Prescott filter, and the exchange rate as the percentage quarterly change in the nominal trade-weighted exchange rate. All the statistical series are quarterly data.

high and volatile in both the 1970s and the 1980s, with persistent deviations from the long-run mean. Since 1993, on the other hand, inflation has been low and stable, with deviations from the mean that have been smaller and more short-lived. Thus, inflation seems to have become less persistent.

A positive but somewhat lagged relation between the output gap and inflation is discernible prior to 1990. A positive output gap has generally been followed by increased inflation one to two years later. This relation seems to have weakened in the 1990s. Neither the deep recession in the early 1990s nor the strong economic upswing at the end of the decade appears to have had any greater effect on inflation.

Finally, the effect on inflation from nominal exchange rate movements seems to have decreased after 1992. In the period with a fixed exchange rate (up to November 1992), a few large devaluations dominated the exchange rate movements; otherwise the exchange rate was relatively stable, while inflation was more volatile. Since 1992 the exchange rate has fluctuated considerably but the effects on inflation seem to have been small.

These simple observations need to be studied more closely before we can conclude that the economic relationships have in fact changed. One problem is, of course, that the period since the changeover to a flexible exchange rate at the end of 1993 or the introduction of the inflation target in 1995 is still relatively short. Until additional data become available it may therefore be hard to establish whether or not these changes have actually occurred.

In order to analyse our issue, we consider each relation separately, comparing the period before the inflation target (1970–1994) to the period with the inflation target (1995–2001).³ In each case the analysis begins with simple correlations in our data, followed by regression analysis. In this way we aim for a more methodical replication of our earlier analysis of the diagrams. Finally we adopt a comprehensive approach by including all three relationships in one and the same regression, based on economic theory. This approach serves to control for interactions between the different variables and to take the entire price setting behaviour of firms into account. We also try to avoid the statistical problems associated with the simple regressions. The resulting model is therefore better specified in a statistical sense.

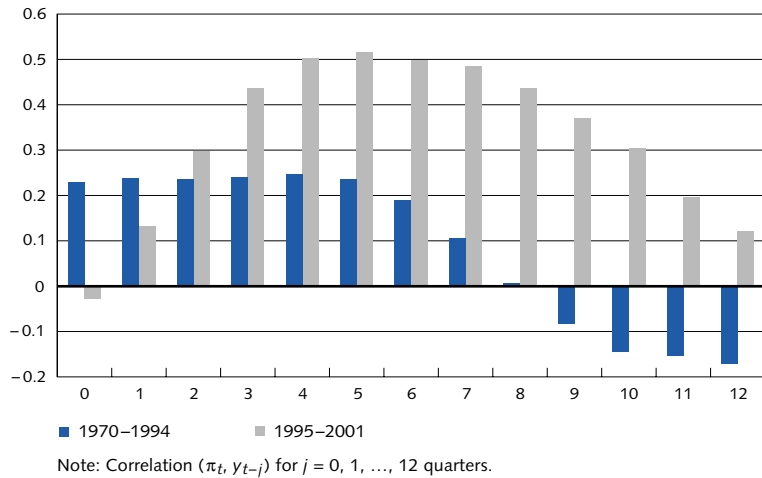
In order to analyse our issue, we consider each relation separately, comparing the period before the inflation target to the period with the inflation target.

³ In January 1993 the Governing Board of the Riksbank decided that the target for monetary policy is to limit the change in the consumer price index as of 1995 to 2 per cent, with a tolerance interval of ± 1 percentage point.

It is hard to find support for a weakening of the relation between inflation and the output gap since the mid 1990s.

Figure 2 shows how the correlation between inflation and the output gap in previous quarters has changed between the periods 1970–1994 and 1995–2001. In the former period there is a clear positive co-variation: all else equal, a positive output gap generally signals increased inflation both in the same quarter and during the next seven quarters. In the latter period it seems that a time shift has occurred in the relationship: the co-variation is now very weak (or even negative) in the short run but strongly positive in the somewhat longer term (two to twelve quarters). It is hard to find support in Figure 2 for the hypothesis that the relation has weakened; rather it seems to be the case that the co-variation has become slower and more prolonged.

Figure 2. Correlation between inflation and output gap



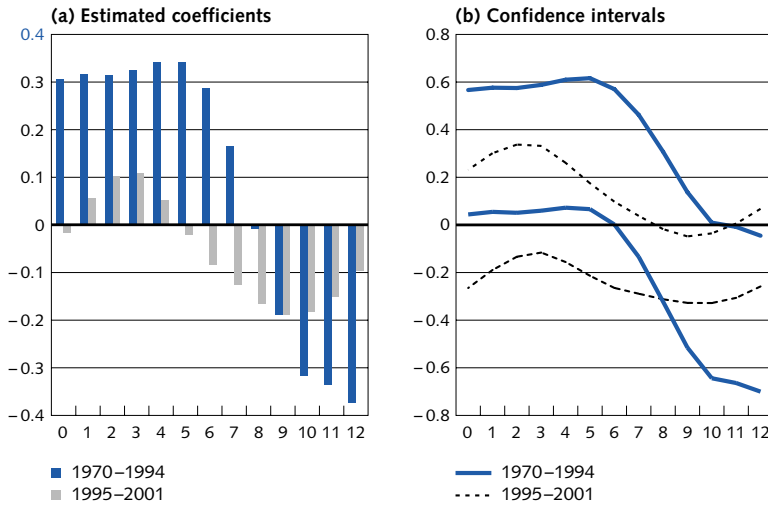
An alternative measure of the co-variation between inflation and the output gap is presented in Figure 3a, in terms of the estimated coefficients β_j in the regression

$$(1) \quad \pi_t = \alpha + \beta_j y_{t-j} + \varepsilon_t, \quad j = 0, 1, \dots, 12,$$

where π_t is the annual rate of inflation in quarter t and y_{t-j} is the output gap in quarter $t-j$. This gives a different picture from Figure 2, with a marked reduction of the estimated coefficients between the two periods. A conceivable interpretation is that the relationship has indeed weakened.

Figure 3b shows the 95 per cent confidence interval around the estimated regression coefficients (the solid lines represent the period 1970–1994 and the dashed lines the period 1995–2001). While the point

Figure 3. Estimated regression coefficients between inflation and output gap



Note: OLS estimation of β_j in equation (1), for $j = 0, 1, \dots, 12$ quarters.

estimates of the coefficients in Figure 3a decreased between these two periods, the fact that the confidence intervals overlap indicates that the changes are not statistically significant. From this simple analysis, the notion that a weakening of the relation between inflation and the output gap has been observed is understandable but it is hard to obtain statistically significant evidence that this has actually happened. Part of the explanation could be that important variables have not been included in our simple regression. We shall, therefore, be returning to this issue in a more complete analysis.

The correlations in Figure 2 and the estimated coefficients in Figure 3 give very different pictures of the relation between inflation and the output gap. Why is this so? These two measures are closely related in that both are based on the co-variance between inflation and the output gap. There is, however, a crucial difference, namely that the correlations take the variability in both inflation and the output gap into account, whereas the regression coefficients consider only the variability in the output gap.⁴ The observations of inflation and the output gap four quarters earlier are

⁴ The correlation between the two variables π and y is calculated as

$$\rho = \frac{\text{cov}(\pi, y)}{\sqrt{\text{var}(\pi) \text{var}(y)}},$$

where $\text{cov}(\pi, y)$ is the co-variance between the variables and $\text{var}(\pi)$ is the variance of π . The estimated coefficient from the regression

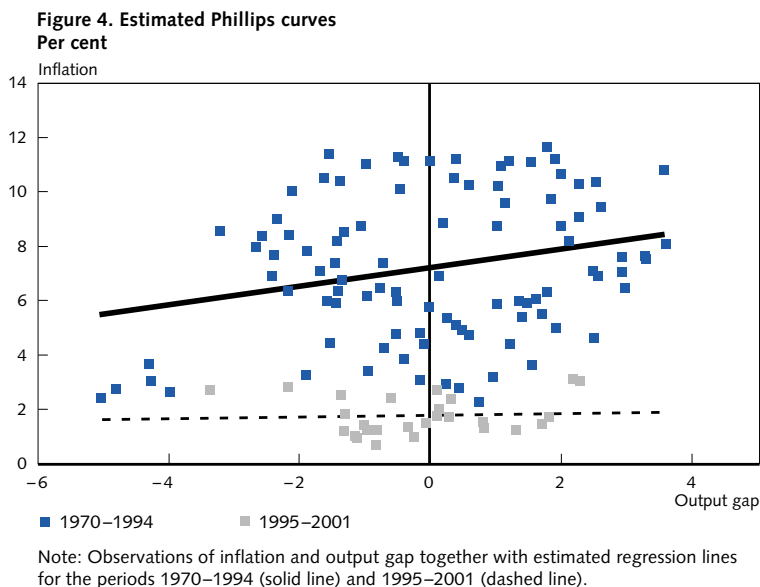
$$\pi = \alpha + \beta y + \varepsilon$$

is given by

$$\hat{\beta} = \frac{\text{cov}(\pi, y)}{\text{var}(y)},$$

and R^2 from the regression equals the square of the correlation coefficient.

presented, together with estimates of the regression (1), in Figure 4, which illustrates why the changes in the correlation differ from those in the regression coefficient.⁵ Inflation in the period 1995–2001 is less variable than before 1995, while the variability of the output gap is much the same in the two periods. This is accompanied by a decreased co-variance between the two variables. As inflation's reduced variability is not taken into account in the regression coefficient, this has decreased to the same extent as the co-variance (the lower regression line is flatter than the upper). The decreased variability of inflation has, on the other hand, affected the correlation between inflation and the output gap and this has therefore not decreased but actually risen between the two periods (from 0.25 to 0.50).



THE PERSISTENCE IN INFLATION

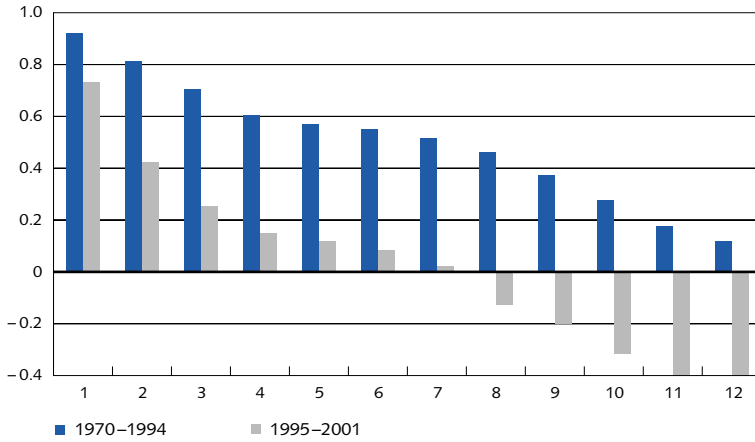
The change in the persistence in inflation between the periods 1970–1994 and 1995–2001 is presented in Figure 5 in terms of the auto-correlation in inflation, that is, the correlation between inflation in a particular quarter and its rate in earlier quarters. The figure suggests that inflation has become less persistent; the correlation between inflation in a par-

⁵ The two estimated regressions in Figure 4 are

$$\pi_t = 7.18 + 0.341 y_{t-4} + \varepsilon_t$$
for 1970–1994 and

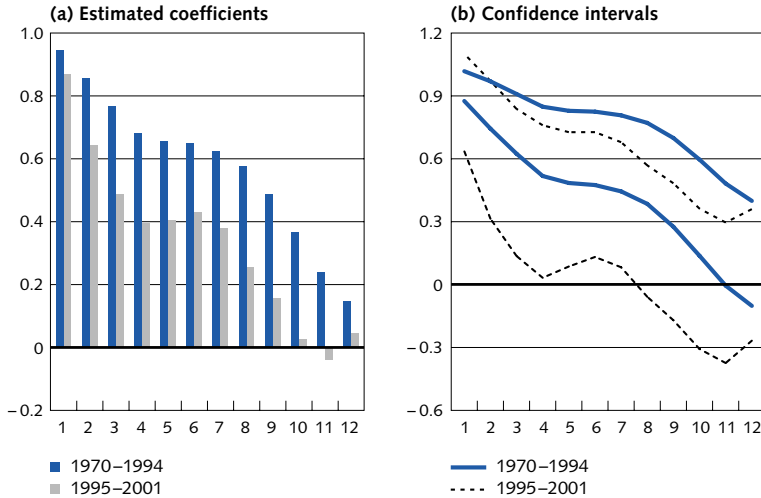
$$\pi_t = 1.77 + 0.0524 y_{t-4} + \varepsilon_t$$
for 1995–2001.

Figure 5. Inflation persistence (autocorrelation)



Note: Correlation (π_t, π_{t-j}) for $j = 1, 2, \dots, 12$ quarters.

Figure 6. Estimated regression coefficients between current and earlier inflation



Note: OLS estimation of β_j in equation (2), for $j = 1, 2, \dots, 12$ quarters.

ticular quarter and its rate four quarters earlier is 0.6 for the period 1970–1994 but only 0.15 for 1995–2001.

That inflation seems to have become less persistent is also evident in Figure 6a, which presents estimates of the coefficients β_j – in the regression

$$(2) \quad \pi_t = \alpha + \beta_j \pi_{t-j} + \varepsilon_t, \quad j = 1, 2, \dots, 12.$$

However, neither are these changes statistically significant; the 95 per cent confidence intervals around the parameter estimates for the two

The indications that inflation has become less persistent are too weak for us to be certain that this is actually the case.

periods overlap for all horizons (see Figure 6b). Here, too, the indications that inflation has become less persistent are too weak for us to be certain that this is actually the case.

EXCHANGE RATE PASS-THROUGH TO INFLATION

Figure 7 shows how the correlation between inflation and exchange rate changes in earlier quarters has changed between the periods 1970–1994 and 1995–2001. Figure 8 presents the estimated coefficients from the regression

$$(3) \quad \pi_t = \alpha + \beta_j \Delta s_{t-j} + \varepsilon_t, \quad j = 0, 1, \dots, 12,$$

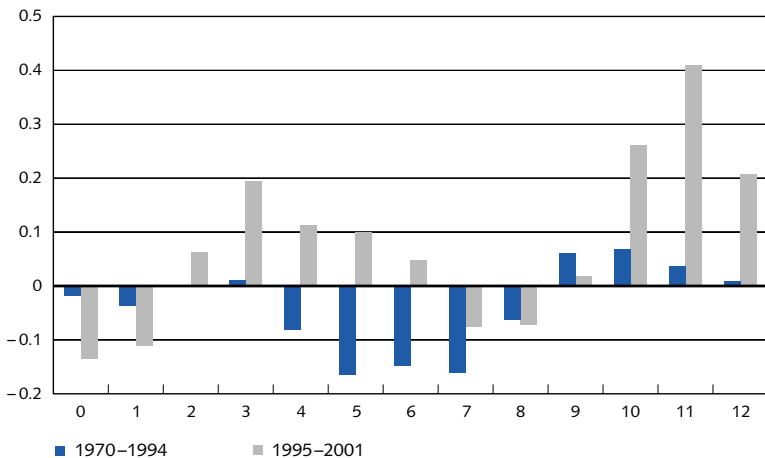
where Δs_t is the quarterly change in the nominal exchange rate. It is hard to detect any pattern at all in the figures. Both these measures of the exchange rate pass-through are frequently negative, even in the long run, which does not seem plausible.⁶

Studies of the exchange rate pass-through to inflation often include the price of foreign goods, which is a major component of importers' costs (see, e.g., Gagnon & Ihrig (2001)). Figure 9 therefore presents estimates of the regression

$$(4) \quad \pi_t = \alpha + \beta_j (\Delta s_{t-j} + \Delta p_{t-j}^f) + \varepsilon_t, \quad j = 0, 1, \dots, 12,$$

where Δp_t^f is the change in the foreign (trade-weighted) price level.

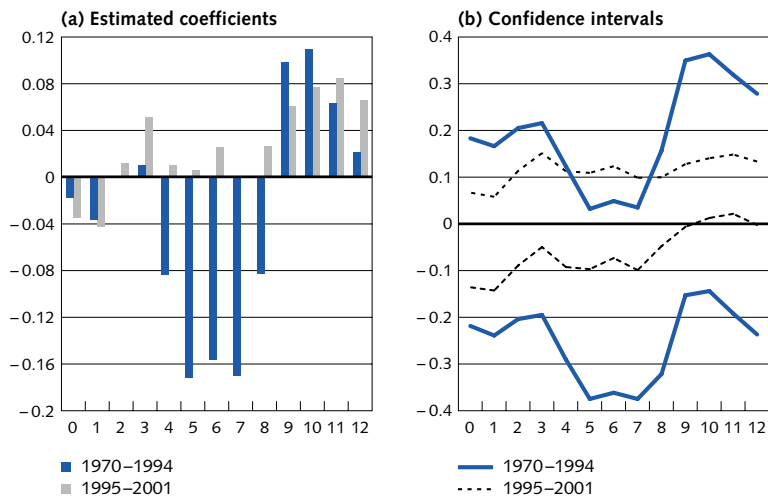
Figure 7. Correlation between inflation and exchange rate changes



Note: Correlation $(\pi_t, \Delta s_{t-j})$ for $j = 0, 1, \dots, 12$ quarters.

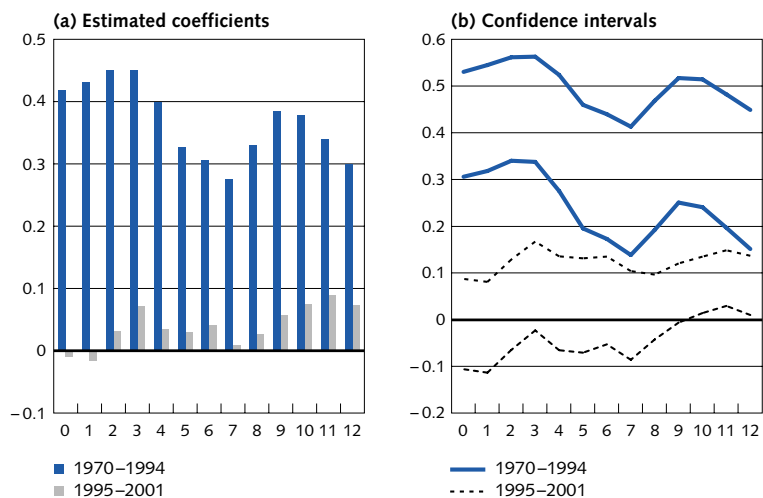
⁶ Note that this is the effect on consumer prices, which are also influenced by a variety of components that are not modelled here. A better estimate of the exchange rate pass-through is therefore obtained by measuring the direct effect on the import prices. For a discussion, see Adolfson (2003).

Figure 8. Estimated regression coefficients between inflation and exchange rate changes



Note: OLS estimation of β_j in equation (3) for $j = 0, 1, \dots, 12$ quarters.

Figure 9. Estimated regression coefficients between inflation and exchange rate changes adjusted for foreign inflation



Note: OLS estimation of β_j in equation (4) for $j = 0, 1, \dots, 12$ quarters.

Measured in this way, the pass-through from exchange rate changes to inflation seems to have decreased and as the confidence intervals do not overlap, the change is statistically significant. A strong positive pass-through in the earlier period has turned into an effect in the later period that is very weak and may even be zero.

Measured in this way, the pass-through from exchange rate changes to inflation seems to have decreased.

The regressions presented above are very simple and not a good description of reality.

The regressions presented above are very simple and not a good description of reality. In theoretical models of open economies (as well as in the model we use below), firms' price setting (and thereby the rate of inflation) is influenced by the output gap as well as by the exchange rate, and often also by the rate of inflation in the preceding period. Our simple relations do not take these economic interactions into account; the exclusion of many potentially important variables means that our results are not entirely reliable.

The extent to which a regression is a reasonable description of reality can be studied by analysing the model's error terms. A systematic pattern in the error term – for example that it is correlated over time, not normally distributed or does not show the same variance over the entire period – may indicate that important variables have not been included in the analysis. This means that the assumptions underlying the regression analysis have not been fulfilled, and reliable conclusions cannot be drawn from the econometric results.

As our simple models frequently show signs of being incorrectly specified, we estimate a more complete model.

Our simple models frequently show signs of being incorrectly specified. In order to construct a better description of the real relationships we therefore estimate a more complete model that is closer to theoretical models of the price setting behaviour of firms.

In a first step, the three variables that interest us are included in one and the same regression and we estimate

$$(5) \quad \pi_t = \alpha + \beta^\pi \pi_{t-1} + \beta^y y_{t-1} + \beta^s \Delta s_t + \varepsilon_t.$$

When the other variables are included, the relation between inflation and the output gap has not weakened at all.

The results of this regression are presented in Table 1 for the two periods combined as well as for each period separately. There are signs that the persistence of inflation (the coefficient β^π) and the exchange rate pass-through (β^s) have decreased but these changes do not appear to be significant. When the other variables are included there is no weakening of the relation between inflation and the output gap (β^y); if anything it has strengthened, though not significantly.

The lower section of the table shows the results of two specification tests and a so-called Chow test for a structural break in the first quarter of 1995. The specification tests suggest that we still have problems with

TABLE 1. ESTIMATION WITH ALL VARIABLES

| | 1970:1–2001:3 | 1970:1–1994:4 | 1995:1–2001:3 |
|------------------------|--------------------|--------------------|--------------------|
| α | 0.002 (0.002) | 0.004 (0.003) | 0.002 (0.002) |
| β^π | 0.967** (0.023) | 0.941** (0.036) | 0.887** (0.117) |
| β^y | 0.053 (0.042) | 0.064 (0.050) | 0.107 (0.068) |
| β^s | 0.056° (0.029) | 0.070° (0.036) | 0.002 (0.029) |
| \bar{R}^2 | 0.934 | 0.881 | 0.685 |
| Number of observations | 126 | 99 | 27 |
| Durbin-Watson | 1.446 | 1.393 | 1.823 |
| Jarque-Bera | 14.808 [0.001] | 4.199 [0.123] | 8.006 [0.018] |
| Chow-test 1995:1 | 0.596 [0.666] | | |

Note: OLS estimation of equation (5). Standard errors in parentheses, p -values in square brackets. **/*/* denote that the coefficient differs significantly from 0 at the 1, 5 and 10 per cent level, respectively.

autocorrelation and (to some extent) non-normality. The Chow test does not provide any support for the existence of a structural break in 1995.⁷

We try to deal with these specification problems by estimating a model that is somewhat more general and allows several types of time lags. To determine which variables to include in this model we begin with a version that includes many lags and then successively exclude the variables that are not significant. This leads to the specification

$$(6) \quad \pi_t = \alpha + \beta_1^\pi \pi_{t-1} + \beta_2^\pi \pi_{t-2} + \beta^y y_{t-1} + \beta^s \Delta s_t + \varepsilon_t$$

The estimation results from equation (6) are presented in Table 2. Once again we see that the persistence of inflation (measured as the sum of the coefficients β_1^π and β_2^π) and the exchange rate pass-through seem to have decreased, though not significantly. However, it again seems as though the relation between the output gap and inflation is somewhat stronger in the second period, though not significantly so.

Finally, we choose to estimate a model that includes the change in the foreign price level, since this most likely affects firms' costs. Thus, we estimate the regression

$$(7) \quad \pi_t = \alpha + \beta_1^\pi \pi_{t-1} + \beta_2^\pi \pi_{t-2} + \beta^y y_{t-1} + \beta^s (\Delta s_t + \Delta p_t^f) + \varepsilon_t$$

⁷ To detect signs of non-normality in the error term we use the Jarque-Bera statistic, which measures the deviation of the error term series from the bell-shaped normal distribution in terms of skewness (deviation from the mean) and kurtosis (whether too few or too many observations are close to the mean). The Durbin-Watson statistic detects if there is any first order autocorrelation in the error term, that is, whether there is a linear relationship between the error terms of the present and the previous period, respectively. If the autocorrelation is negligible, the statistic will be close to 2. The Chow statistic tests for a structural break in a given equation, that is, for the regression coefficients not being constant over the entire period. The model is estimated for the two periods combined as well as separately for the periods before and after the potential break. A sufficiently large deviation in the model's error terms between the two periods indicates that the relation between the variables has in fact changed.

TABLE 2. A MORE GENERAL ESTIMATION WITH ALL VARIABLES

| | 1970:1–2001:3 | 1970:1–1994:4 | 1995:1–2001:3 |
|-----------------------------|---------------------|---------------------|--------------------|
| α | 0.002 (0.002) | 0.005° (0.003) | 0.002 (0.002) |
| β_1^π | 1.238** (0.087) | 1.234** (0.098) | 0.966** (0.210) |
| β_2^π | -0.280** (0.087) | -0.310** (0.097) | -0.100 (0.221) |
| $\beta_1^\pi + \beta_2^\pi$ | 0.958** (0.022) | 0.924** (0.035) | 0.866** (0.129) |
| β^y | 0.039 (0.041) | 0.054 (0.048) | 0.095 (0.074) |
| β^s | 0.056* (0.028) | 0.072* (0.035) | -0.001 (0.030) |
| \bar{R}^2 | 0.940 | 0.892 | 0.673 |
| Number of observations | 125 | 98 | 27 |
| Durbin-Watson | 1.981 | 1.978 | 1.983 |
| Jarque-Bera | 9.938 [0.007] | 2.039 [0.361] | 8.102 [0.017] |
| Chow-test 1995:1 | 0.803 [0.550] | | |

Note: OLS estimation of equation (6). Standard errors in parentheses. p -values in square brackets. **/*/' denote that the coefficient differs significantly from 0 at the 1, 5 and 10 per cent level, respectively.

TABLE 3. A MORE GENERAL ESTIMATION WITH ALL VARIABLES, INCLUDING FOREIGN INFLATION

| | 1970:1–2001:3 | 1970:1–1994:4 | 1995:1–2001:3 |
|-----------------------------|---------------------|---------------------|--------------------|
| α | 0.001 (0.001) | 0.004° (0.003) | 0.002 (0.003) |
| β_1^π | 1.160** (0.084) | 1.137** (0.093) | 0.963** (0.210) |
| β_2^π | -0.276** (0.082) | -0.306** (0.091) | -0.095 (0.219) |
| $\beta_1^\pi + \beta_2^\pi$ | 0.884** (0.027) | 0.831** (0.039) | 0.868** (0.127) |
| β^y | 0.042 (0.038) | 0.059 (0.043) | 0.095 (0.074) |
| β^s | 0.093** (0.022) | 0.113** (0.026) | 0.003 (0.028) |
| \bar{R}^2 | 0.946 | 0.906 | 0.674 |
| Number of observations | 125 | 98 | 27 |
| Durbin-Watson | 2.055 | 2.074 | 1.994 |
| Jarque-Bera | 5.615 [0.060] | 1.161 [0.560] | 7.377 [0.025] |
| Chow-test 1995:1 | 1.412 [0.225] | | |

Note: OLS estimation of equation (7). Standard errors in parentheses, p -values in square brackets. **/*/' denote that the coefficient differs significantly from 0 at the 1, 5 and 10 per cent level, respectively.

It is hard to find strong evidence that the persistence of inflation, the relation between inflation and the output gap, and the exchange rate pass-through to inflation have weakened in recent years.

The results of this regression, presented in Table 3, resemble the earlier results. Here, however, there are no indications that inflation has become less persistent.

To sum up, it is hard to find strong evidence that the persistence of inflation, the relation between inflation and the output gap, and the exchange rate pass-through to inflation have weakened in recent years. Certain regressions provide weak support for some of these hypotheses

but the changes are typically not significant and there are even results that point in the opposite direction.

The difficulty in finding significant changes in the period after the adoption of the inflation target may of course have to do with this period still being relatively short (there are only 27 quarterly observations from the first quarter of 1995 to the third quarter of 2001). This leads, for example, to the standard errors of the estimated coefficients in column three in Tables 1–3 often being larger than those in columns one and two. Moreover, structural changes other than the shift in monetary policy may introduce noise into our estimates. In the next step we therefore refine the analysis by using a theoretical model that enables us to introduce a monetary policy realignment while keeping other structural relationships constant. In that way the realignment's effects on the economic relationships can be identified with greater certainty.

We refine the analysis by using a theoretical model that enables us to introduce a monetary policy realignment while keeping other structural relationships constant.

Theoretical analysis: How ought the economic relationships to change?

A MODEL OF AN OPEN ECONOMY

To analyse how the introduction of the inflation target ought to affect observed economic relationships we use a relatively simple model of a small open economy.⁸ The model consists of expressions for domestic inflation, domestic output gap, nominal and real exchange rates, inflation for imported goods and aggregate CPI inflation. For simplicity we disregard international influences other than those transmitted through movements in the exchange rate. The nominal interest rate is determined by a central bank that has an explicit inflation target but also attaches some importance to both real economic stability and stability on the financial markets. Thus, the changeover to an inflation targeting regime can be modelled as a shift in the central bank's preferences from a strong emphasis on real economic stability to a strong emphasis on price stability. Here the model is described only verbally; all equations and parameter values are presented in an appendix.

The changeover to an inflation targeting regime can be modelled as a shift in the central bank's preferences from a strong emphasis on real stability to a strong emphasis on price stability.

Inflation for domestic products is determined by a Phillips curve relation for an open economy. The domestic firms operate in a market with imperfect competition and set prices as a mark-up on their marginal costs, which in turn depend on the rate of resource utilisation in the economy as measured by an output gap.⁹ However, prices are assumed to be sticky, so that firms are unable to adjust them in every period. When firms do have

Inflation for domestic products is determined by a Phillips curve relation for an open economy.

⁸ The model is a simplified version of the one that is analysed in Leitimo & Söderström (2001).

⁹ An increase in the rate of resource utilisation is assumed to increase firms' input costs.

an opportunity to adjust prices they therefore take their expectations about future inflation into account. These expectations are assumed to be based to a certain degree on earlier inflation. As domestic firms use imported inputs, domestic inflation is also affected by the real exchange rate via the price of imported inputs. Finally, domestic inflation is influenced by supply shocks that mirror changes in costs which do not stem from changes in the resource utilisation.

The domestic output gap is determined by the households' consumption plans.

The *domestic output gap* is determined by the households' consumption plans. Households consume a basket of domestic and imported goods, and determine their consumption and saving based on the level of interest rates; a higher (real) interest rate induces households to save more and postpone a larger share of their consumption. Current consumption decisions are accordingly based to some extent on expectations about future consumption. However, as households become accustomed to a particular level of consumption, they want to avoid making sizeable adjustments. This leads to rigidities in the pattern of consumption and implies that current consumption also depends on consumption in previous periods. The real exchange rate determines the price of domestic relative to imported consumer goods and therefore affects the output gap. The output gap is also affected by random shocks that may have to do with changes in potential output.

The nominal exchange rate is determined by a parity condition in the currency market, modified to allow for the risk aversion of investors.

The *nominal exchange rate* is determined by a parity condition in the currency market (so-called uncovered interest parity), modified to allow for the risk aversion of investors. A domestic interest rate level that is higher than the rate abroad must mirror expectations of a future depreciation of the domestic exchange rate; otherwise it would be profitable for an investor to borrow abroad and invest in the domestic economy. The uncertainty about future exchange rate movements leads to a risk premium in the currency market that reflects the risk aversion of investors. This risk premium is assumed to be zero on average but may be either positive or negative for considerable periods.

Inflation for imported goods depends on the rate of foreign inflation adjusted for the change in the nominal exchange rate.

Inflation for imported goods depends on the rate of foreign inflation adjusted for the change in the nominal exchange rate. In line with empirical research, the adjustment of imported inflation to exchange rate movements is assumed to be slow, so that the exchange-rate pass-through is gradual.¹⁰ *Aggregate CPI inflation* is determined as a weighted average of domestic and imported inflation. The *real exchange rate* is given by the ratio of the foreign price level, measured in domestic currency, to the domestic price level.

¹⁰ The consequences for monetary policy of an incomplete exchange rate pass-through are analysed in detail in Adolfson (2001).

The *domestic nominal interest rate* is determined by a central bank that aims to minimise fluctuations in both inflation and the output gap but also wants to avoid large changes in the level of interest rates. As prices are sticky, the central bank can influence the real interest rate via changes in the nominal interest rate. Real interest rate movements affect the consumption choices of domestic agents as well as the nominal (and real) exchange rate, both of which affect inflation. It is, however, necessary to strike a balance between the different monetary policy objectives. A central bank that attaches greater weight to the inflation target will react more aggressively to inflationary impulses, which leads to more stable inflation but greater volatility in the real economy (and the interest rate). A central bank that attaches greater weight to real economic (or financial) stability, on the other hand, will be less aggressive when responding to inflationary shocks.

The domestic nominal interest rate is determined by a central bank that minimises fluctuations in both inflation and the output gap but also wants to avoid large changes in the level of interest rates.

In formal terms the central bank determines the level of the nominal interest rate by minimising a loss function based on the variance in inflation, the output gap and interest rate changes:

$$(8) \quad \min_{i_t} \alpha \text{var}(\bar{\pi}_t) + (1 - \alpha) \text{var}(y_t) + \nu \text{var}(i_t - i_{t-1}),$$

where $\bar{\pi}_t$ is annual CPI inflation, y_t is the output gap and i_t is the short-term nominal interest rate. The parameters α and ν determine the relative importance the central bank attaches to price stability compared with the stability on the money market. Throughout our analysis interest rate stability carries a weight of one-sixth.

The introduction of the inflation target is modelled by increasing the inflation target's weight in the central bank loss function from one-third to two-thirds. In other words, instead of previously attaching twice as much weight to real stability as to price stability, the central bank moves to the opposite and attaches twice as much weight to price stability as to real stability.¹¹ This interpretation of the monetary policy realignment is based on the tendency in the early 1990s for economic policy to tone

The introduction of the inflation target is modelled as a doubling of the target's weight in the central bank loss function.

¹¹ It might be thought that an inflation targeting regime would be modelled so that the central bank attaches importance only to price stability, that is, $\alpha = 1$, $\nu = 0$. It is generally accepted, however, that to some extent inflation-targeting central banks are also concerned about real economic stability (see, e.g., Heikensten (1999)). It is more controversial to suggest that, in addition, central banks attach importance to stabilising interest rate changes. Nevertheless, empirical studies indicate that in order to recreate patterns in the data, theoretical models need a relatively large weight on interest rate stability (see Söderström et al. (2002)). The motivation for this can be that the central bank attaches some importance to financial market stability.

down the employment objective. In the 1991 Budget Statement, for example, the Government wrote:¹²

“In order to safeguard employment and welfare, economic policy in the coming years will have to be focused with all its force on bringing inflation permanently down. This task must have precedence over other ambitions and demands.”

Thus, we interpret the changeover to an inflation targeting policy as a shift in monetary policy’s primary objective from real economic stability to price stability.

As the fundamental relations in the model are held constant, all observed changes will be due to the monetary policy realignment.

We then calculate how the relationships we analysed above are affected by this shift in monetary policy. As all other fundamental (or structural) relationships in the model are held constant, all observed changes (for instance in the relation between inflation and the output gap) will be due to the monetary policy realignment.

As mentioned above, the weights in the central bank loss function determine the policy maker’s reactions to different economic shocks.¹³ A central bank that attaches little importance to price stability compared with real stability (a low value of α) will not react vigorously to inflationary shocks but concentrate instead on reducing the real economic effects. Inflation will then return to the target gradually after a shock, while the output gap closes relatively quickly. In contrast, a central bank that is mainly concerned with stabilising inflation (a high value of α) will react forcefully to all shocks in order to bring inflation quickly back to the target, while the output gap is left to vary more.

Thus, we can expect that a monetary policy realignment to a larger weight on price stability will lead to lower variability in inflation but higher variability in the output gap. The correlations that interest us most are naturally also affected by these changes but it is difficult to say just how until the model has been analysed.

MODEL RESULTS

We simulate the model 1,000 times, using 100 observations each time. In each simulation we calculate correlations and estimate regressions in the same way as we presented earlier. The average correlations over all simulations are presented in Figures 10–12 and the regression coefficients estimated on simulated data are shown in Figures 13–15.

¹² Government Bill 1990/91:100, annex 1, p. 4.

¹³ For a simple account of monetary policy in similar models, see Apel et al. (1999).

Figure 10. Model correlation between inflation and output gap

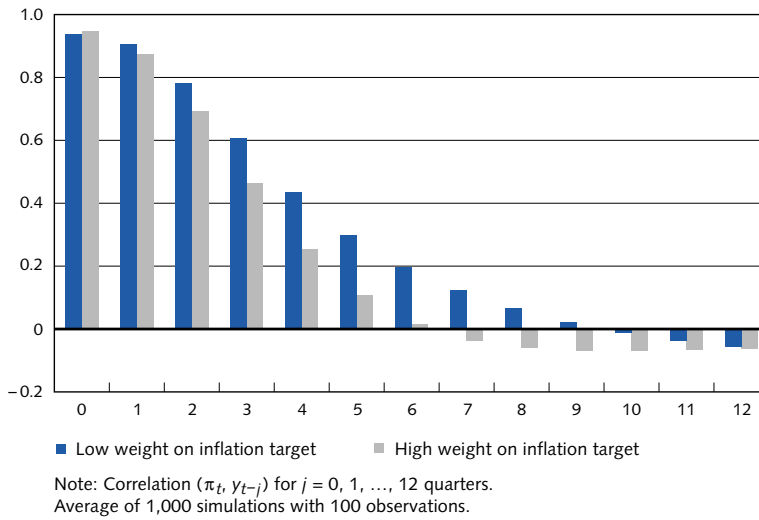
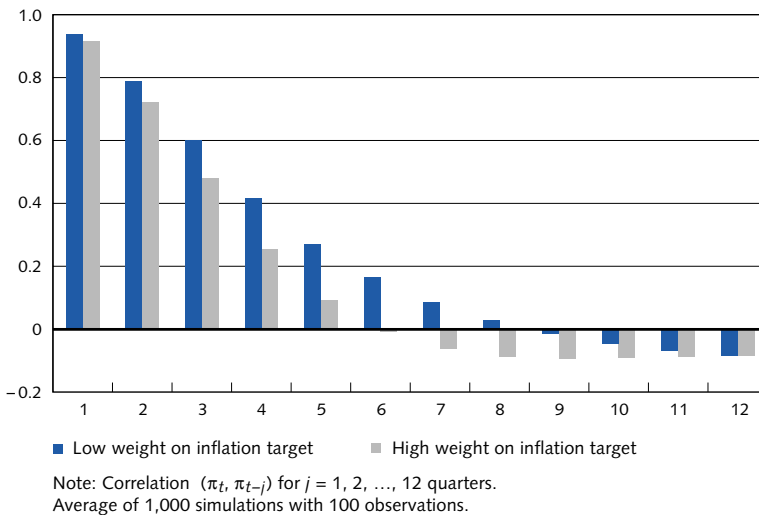


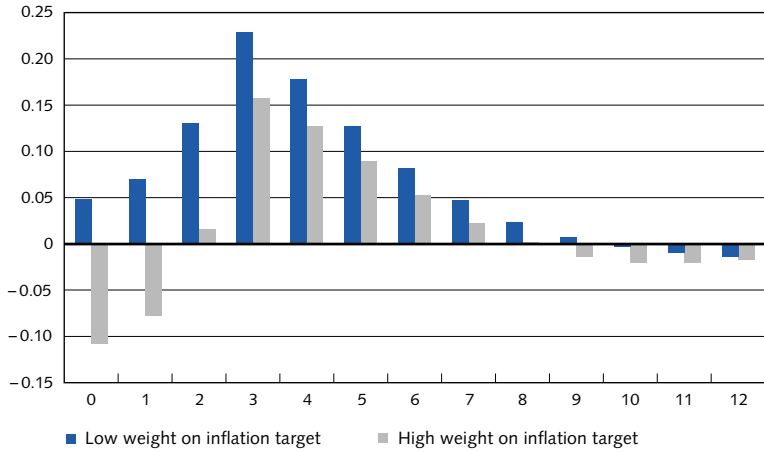
Figure 11. Inflation persistence in the model



It turns out that a realignment of monetary policy to a greater weight on price stability leads to a tendency for inflation to be less persistent, a weakening of the relation between inflation and the output gap and a decline in the exchange rate pass-through. However, the regressions on simulated data show that the changes in the persistence in inflation and the exchange rate pass-through are not statistically significant, though the weakening of the relationship between the output gap and inflation is significant. Although we have now tried to refine the analysis so that it is confined to the effects of a monetary policy realignment, the signs of

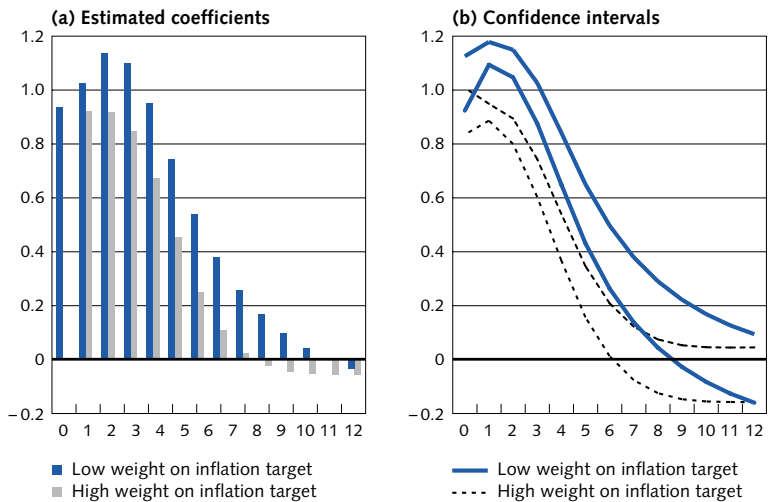
Although we have now tried to refine the analysis so that it is confined to the effects of a monetary policy realignment, the signs of changes are not strong.

Figure 12. Model correlation between inflation and exchange rate changes



Note: Correlation $(\pi_t, \Delta s_{t-j})$ for $j = 0, 1, \dots, 12$ quarters.
Average of 1,000 simulations with 100 observations.

Figure 13. Estimated regression coefficients between inflation and output gap in the model



Note: OLS estimation of β_j in equation (1) for $j = 0, 1, \dots, 12$ quarters.
Average of 1,000 simulations with 100 observations.

changes are not strong. Statistical methods do not provide grounds for concluding that the changes have actually occurred.

New economy or new monetary policy?

We have tried to elucidate whether the realignment of Swedish monetary policy in the first half of the 1990s has had the effects we might expect on economic relationships. Our empirical analysis shows that it is hard to find

Figure 14. Estimated regression coefficients between current and earlier inflation in the model

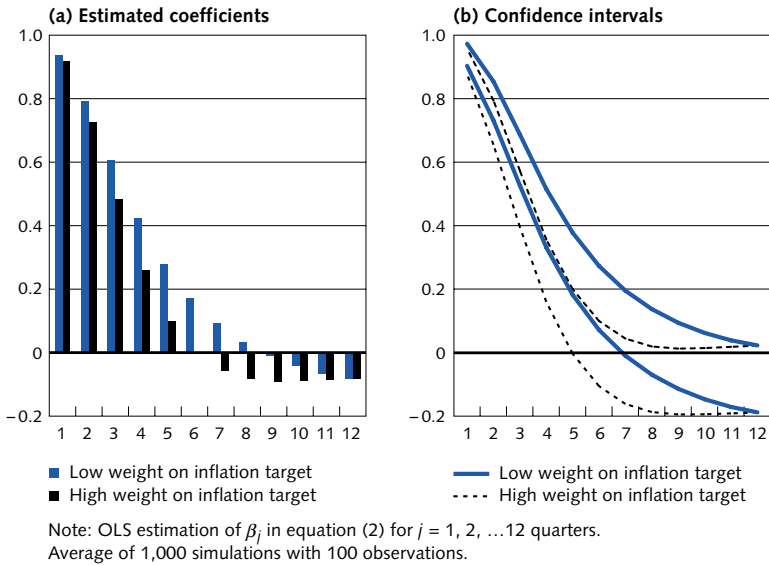
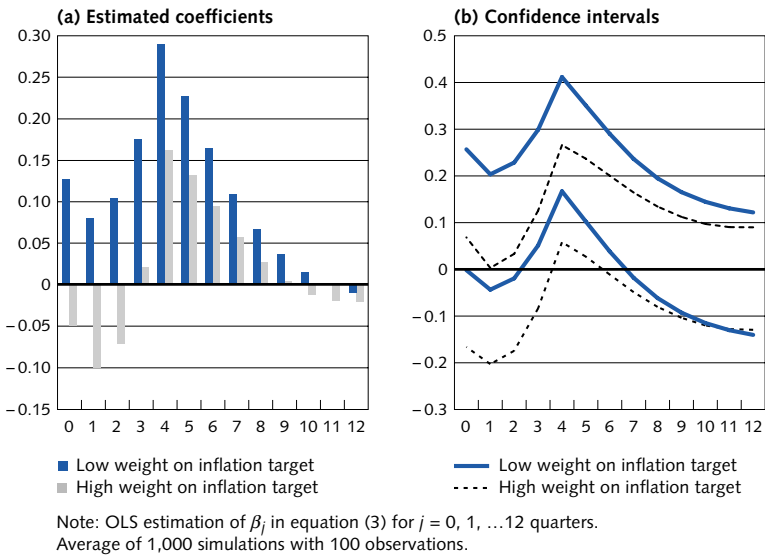


Figure 15. Estimated regression coefficients between inflation and exchange rate changes in the model



statistically significant evidence that any such changes in the observed economic relations have actually occurred. Weak signs are discernible in certain regressions but most of the changes are not statistically significant.

However, the simulation results from the theoretical model do show that a monetary policy realignment to a regime that places greater emphasis on price stability will in fact affect economic relationships. A

Our results suggest that the introduction of an inflation target in Sweden induced changes in observed relationships, although these changes may be hard to capture empirically.

central bank that attaches greater weight to stabilising inflation will be more active in countering inflationary shocks. These shocks then have less lasting effects on inflation, which becomes less persistent. At the same time, inflation is less affected by shocks to the output gap or the exchange rate. Thus, the relation between the output gap and inflation seems to weaken and the exchange rate pass-through to inflation appears to decrease. These three changes can be demonstrated even though the structure of the economy has not changed; in our model simulations we consistently held constant the structural relationships between inflation on the one hand and, on the other, earlier inflation, the output gap and the exchange rate. Our results from the theoretical model are, of course, only numerical examples but they do suggest that the introduction of an inflation target in Sweden entails changes in observed economic relationships, though these changes may be hard to capture empirically.

Our results demonstrate that simple economic relationships should be interpreted with caution.

It is, of course, conceivable that there have also been other types of structural change in the economy that may affect the correlations we studied in the empirical analysis. In order to identify such changes, however, we need a more sophisticated empirical study. The present results merely demonstrate that simple economic relationships should be interpreted with caution. We show that it is hard to find statistical evidence of changes in the relationships even though monetary policy has actually been realigned. It is therefore probably even more difficult to demonstrate from statistical data and simple economic relations that the way the economy functions has changed in a fundamental way. A possible approach would be to estimate a structural model and make a formal test of whether some of its parameters have changed. It could then be shown whether there have been any changes in the fundamental workings of the economy apart from the introduction of an inflation target. Such an analysis, however, is beyond the scope of this article.

Finally we note that our results have further consequences for the debate about the "new economy"; the notion that increased competition has reduced the economy's inflation propensity and that a given output gap would therefore have less effect on inflation than before. Our simulations show that just the monetary policy realignment is likely to weaken the independent relation between the output gap and inflation. Thus, the decreased inflation propensity may very well be a consequence of the new monetary policy rather than the "new economy".

Appendix: the model

We use a simplified New Keynesian model of an open economy where a period is assumed to correspond to a quarter. For simplicity we entirely disregard foreign influences.¹⁴

Domestic inflation π_t^d is given by a simple Phillips curve relation for an open economy:

$$(9) \quad \pi_t^d = \varphi_\pi E_t \pi_{t+1}^d + (1 - \varphi_\pi) \pi_{t-1}^d + \alpha_y y_t + \alpha_q q_t + \varepsilon_t^\pi,$$

where y_t is the output gap, q_t is the real exchange rate (in logarithmic form), and ε_t^π is a supply shock that is assumed to be white noise with variance σ_π^2 . Aggregate demand is modelled in terms of the output gap y_t :

$$(10) \quad y_t = \varphi_y E_t y_{t+1} + (1 - \varphi_y) y_{t-1} - \beta_r (i_t - 4 E_t \pi_{t+1}^d) + \beta_q q_t + \varepsilon_t^y,$$

where i_t is the nominal interest rate, and the demand shock ε_t^y is white noise with variance σ_y^2 .

The nominal exchange rate s_t (in logarithmic form) is determined by an interest rate parity condition:

$$(11) \quad s_t = E_t s_{t+1} - \frac{1}{4} i_t + u_t^s,$$

with a risk premium u_t^s that follows

$$(12) \quad u_t^s = \rho_s u_{t-1}^s + \varepsilon_t^s,$$

where ε_t^s is white noise with variance σ_s^2 . The real exchange rate q_t is defined as

$$(13) \quad q_t = s_t - p_t^d,$$

where p_t^d is the domestic price level (in logarithmic form).

Inflation for imported goods π_t^m is affected by exchange rate movements but only gradually:

$$(14) \quad \pi_t^m = (1 - \kappa) \pi_{t-1}^m + \kappa (s_t - s_{t-1}),$$

¹⁴ For a theoretical derivation of a similar model, see, for example, Svensson (2000).

where κ determines the degree of exchange rate pass-through. A value of $\kappa < 1$ implies that the impact of exchange rate movements on imported inflation is limited. CPI inflation π_t is a weighted average of domestic and imported inflation:

$$(15) \quad \pi_t = (1 - \eta) \pi_t^d + \eta \pi_t^m,$$

where η measures the share of imported goods in the CPI basket.

Finally, monetary policy is assumed to be determined by a central bank with the objective function

$$(16) \quad \min_{i_t} \alpha \text{var}(\bar{\pi}_t) + (1 - \alpha) \text{var}(y_t) + \nu \text{var}(i_t - i_{t-1}),$$

where $\bar{\pi}_t$ is annual CPI inflation (over four quarters). The parameter α measures the weight the central bank attaches to price stability (relative to real stability) and ν measures the weight on interest rate stability.

TABLE 4. VALUES OF THE PARAMETERS IN THE MODEL

| Inflation | | Output gap | | Exchange rate | | Monetary policy | |
|----------------|------|--------------|------|---------------|------|-----------------|------------|
| φ_π | 0.3 | φ_y | 0.1 | ρ_s | 0.5 | α | {1/3, 2/3} |
| α_y | 0.05 | β_r | 0.1 | σ_s^2 | 0.85 | ν | 1/6 |
| α_q | 0.05 | β_q | 0.02 | κ | 0.25 | | |
| σ_π^2 | 0.4 | σ_y^2 | 0.65 | | | | |
| η | 0.35 | | | | | | |

Table 4 presents the values we use for the parameters in the model. Many of these values are uncontroversial but some may call for a justification.

We have chosen to model both domestic inflation and the output gap as predominantly backward-looking processes: $\varphi_\pi = 0.3$, $\varphi_y = 0.1$. It has frequently been noted that a high degree of backward-looking behaviour is needed if New Keynesian models are to recreate the patterns that are found in real-life economies (see, e.g., Estrella & Fuhrer (2002)). These parameter values resemble those used by, for example, Rudebusch (2002).

The pass-through of exchange rate movements to imported inflation (κ) has been set to 25 per cent per quarter, which is close to the estimate presented by Naug & Nymoen (1996).

In the central bank's objective function we use two values for the weight on the inflation target. The period before the introduction of the inflation target is characterised by the weight for real economic stability being twice that for price stability ($\alpha = 1/3$). In the period with the infla-

tion target we assume that the central bank attaches twice as much weight to price stability as to real stability ($\alpha = 2/3$). Moreover, we assume throughout that the central bank also has preferences for a smooth path for its interest rate, for instance because sizeable interest rate adjustments can generate financial market instability. Empirical studies suggest that the New Keynesian models need a relatively large weight on interest rate smoothing in order to recreate the patterns in data (see Söderström et al. (2002)) and we choose to set this weight to $\nu = 1/6$.

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■ Notices

The Riksbank issues commemorative coin in memory of Astrid Lindgren

To commemorate the occasion of the 95th anniversary of the birth of Astrid Lindgren, the Riksbank has issued a commemorative coin. The coin has the denomination 50 kronor. The price of the coin has been set at SEK 60. For every coin sold, Nordic Coin AB Svenska myntverket will donate SEK 10 to the foundation for the Astrid Lindgren children's hospital.

The artist is Erja Tielinen, who has earlier designed a number of medals and commemorative coins. The coin is minted by Nordic Coin AB Svenska myntverket in Eskilstuna.

Per Jansson new Deputy Head of Monetary Policy Department

The Executive Board of the Riksbank has appointed Per Jansson Deputy Head of the Monetary Policy Department. He took up his appointment on 1 February 2003.

Mr Jansson is an associate professor in economics and was previously employed as Deputy Head of the forecasting department at the National Institute of Economic Research. Prior to that, he was Deputy Head of the Monetary Policy Department at the Riksbank. Per Jansson has also worked as researcher at the Trade Union Institute for Economic Research and at the National Institute of Economic Research. During 1995 and 1996 he was also secretary of the Economic Council of Sweden and a consultant at the Riksbank

Start of the new organisation for cash management postponed

The Executive Board of the Riksbank has postponed the start of the new organisation for cash management to 17 February 2003.

It was in April 2002 that the Riksbank decided to concentrate its function in cash management to four strategic delivery points for the distribution and collection of bank notes and coin. The activities are undertaken by Svensk Kontantförsörjning AB (SKAB), a fully-owned subsidiary of the Riksbank.

Swedish portfolio holdings 2001 – foreign shares and debt securities

The value of Swedish investors' holdings of foreign securities amounted to SEK 1,494 billion at the end of 2001. Holdings of foreign shares and

mutual funds corresponded to SEK 1,062 billion, while the value of debt securities amounted to SEK 432 billion. This information is obtained from a survey which has been carried out by the Riksbank for the second time and which is part of an international survey led by the International Monetary Fund. This survey will in future be carried out annually.

The complete report can be downloaded from the Riksbank's website (www.riksbank.se).

Tor Jacobson new Head of Research Department

The Executive Board of the Riksbank has appointed Tor Jacobson Head of the Research Department. He succeeded Anders Vredin, who took up the post of Head of the Monetary Policy Department at the Riksbank with effect from 1 January 2003.

Tor Jacobson is an associate professor in statistics and has worked at the Riksbank since 1997. Mr Jacobson has previously worked at Uppsala University and at the Stockholm School of Economics.

Swedish direct investment assets abroad SEK 1,277 billion

The value of Swedish direct investments assets abroad amounted to SEK 1,277 billion at the end of 2001. Foreign-owned direct investment assets in Sweden totalled SEK 981 billion for the same period. This is the result of the Riksbank's annual direct investment survey.

More detailed information is available on the Riksbank's website ([www.riksbank.se/Statistics/Balance of Payments/Surveys](http://www.riksbank.se/Statistics/Balance%20of%20Payments/Surveys)).

Irma Rosenberg new Deputy Governor

The General Council of the Riksbank has appointed Irma Rosenberg as Deputy Governor and new member of the Riksbank's Executive Board. She was elected for a period of six years with effect from 1 January 2003. Mrs Rosenberg is responsible for the preparation of the Executive Board's monetary policy decisions.

Mrs Rosenberg is 57 years old and has a PhD in economics. She was previously chief economist at the state-owned mortgage institution SBAB. During the period 1995–2000 she worked as chief economist for Sweden Post and Postgirot Bank, prior to that she had been head of research and head of forecasting at the National Institute of Economic Research 1986–95, as well as head of the economic analysis group at the Riksbank 1976–86.

The Executive Board of the Riksbank consists of six members, who are elected for a period of six years. Urban Bäckström left the post of Governor at the end of 2002. He was then succeeded by Lars Heikensten, who became Governor, while Eva Srejber became First Deputy Governor. The other members of the board and deputy governors are Villy Bergström, Lars Nyberg and Kristina Persson.

Ulrika Bergelv new Head of Internal Auditing Department

The Executive Board of the Riksbank has appointed Ulrika Bergelv Head of the Internal Auditing Department with effect from 1 February 2003. Ms Bergelv succeeded Marie Rudberg, who was appointed Head of the IT Department at the Riksbank.

Ulrika Bergelv was previously auditor in the Internal Auditing Department and, prior to the Riksbank, her posts included working at KF (Swedish Coop).

■ Monetary policy calendar

- 1999-01-04** The *reference* (official discount) *rate* is confirmed by the Riksbank at 1.5 per cent as of 5 January 1999.
- 02-12 The *fixed repo rate* is lowered by the Riksbank to 3.15 per cent as of 17 February 1999. The Riksbank also lowers its *deposit* and *lending rates*, in each case by 0.5 percentage points. The deposit rate is set at 2.75 per cent and the lending rate at 4.25 per cent. The decision takes effect on 17 February 1999.
- 03-25 The *fixed repo rate* is lowered by the Riksbank from 3.15 per cent to 2.90 per cent as of 31 March 1999.
- 04-01 The *reference* (official discount) *rate* is confirmed by the Riksbank at 1.0 per cent as of 6 April 1999.
- 07-01 The *reference* (official discount) *rate* is confirmed by the Riksbank at 1.0 per cent (unchanged).
- 10-01 The *reference* (official discount) *rate* is confirmed by the Riksbank at 1.5 per cent as of 4 October 1999.
- 11-11 The *repo rate* is increased by the Riksbank from 2.90 per cent to 3.25 as of 17 November 1999.
- 2000-01-03** The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.0 per cent as of 4 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 adjusted to 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 adjusted to 3.0 per cent and the *lending rate* to 4.5 per cent.
- 2003-01-01** The Riksbank set the *reference rate* for the period 1 January 2003–30 June 2003 at 4.00 per cent.
- 03-18 The *repo rate* is lowered by the Riksbank from 3.75 per cent to 3.5 per cent as of 19 March 2003. The *deposit rate* is accordingly adjusted to 2.75 per and the *lending rate* to 4.25 per cent.

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

1 Riksbank's assets and liabilities

ASSETS. PERIOD-END STOCK FIGURES. SEK MILLION

| | | Gold | Government securities | Lending to bank | Fixed assets | Other | Total |
|------|-------|--------|-----------------------|-----------------|--------------|--------|---------|
| 2002 | Jan | 17 436 | – | 59 249 | 153 172 | 3 008 | 232 865 |
| | Feb | 17 436 | – | 56 564 | 154 218 | 3 266 | 231 484 |
| | March | 17 436 | – | 55 400 | 157 307 | 1 749 | 231 892 |
| | April | 17 436 | – | 53 522 | 151 943 | 3 902 | 226 803 |
| | May | 17 436 | – | 35 455 | 165 959 | 2 881 | 221 731 |
| | June | 17 436 | – | 21 635 | 161 820 | 2 233 | 203 124 |
| | 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 |

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 | Jan | 98 571 | 70 890 | 402 | 10 203 | 52 799 | 232 865 |
| | Feb | 97 395 | 70 890 | 89 | 11 090 | 52 020 | 231 484 |
| | March | 98 790 | 70 890 | 59 | 10 991 | 51 162 | 231 892 |
| | April | 97 023 | 70 890 | 525 | 7 823 | 50 542 | 226 803 |
| | May | 97 140 | 82 943 | 204 | 9 666 | 31 778 | 221 731 |
| | June | 97 931 | 62 943 | 52 | 9 640 | 32 558 | 203 124 |
| | 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 |

2 Money supply

END-OF-MONTH STOCK

| | SEK million | | Percentage 12-month change | | |
|----------|-------------|-----------|----------------------------|------|------|
| | M0 | M3 | M0 | M3 | |
| 2000 Jan | 82 276 | 949 834 | Jan | 10.2 | 8.5 |
| Feb | 81 072 | 951 449 | Feb | 9.0 | 8.9 |
| March | 81 105 | 944 846 | March | 8.0 | 8.1 |
| April | 81 606 | 966 643 | April | 8.4 | 9.5 |
| May | 81 866 | 984 906 | May | 7.3 | 10.7 |
| June | 81 399 | 953 349 | June | 6.9 | 5.9 |
| July | 81 370 | 944 491 | July | 6.0 | 5.7 |
| Aug | 82 232 | 949 502 | Aug | 5.7 | 4.3 |
| Sept | 82 947 | 966 556 | Sept | 6.0 | 4.9 |
| Oct | 82 758 | 970 565 | Oct | 4.5 | 2.0 |
| Nov | 84 004 | 975 144 | Nov | 4.4 | 4.1 |
| Dec | 88 881 | 974 091 | Dec | 2.0 | 2.8 |
| 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 | 96 197 | 1 082 379 | Dec | -0.6 | 4.2 |
| 2003 Jan | 90 122 | 1 085 916 | Jan | 0.4 | 5.2 |

3 Interest rates set by the Riksbank

PER CENT

| | Date | Repo rate | Deposit rate | Lending rate | Period | Reference rate ¹ |
|------|-------|-----------|--------------|--------------|------------------|-----------------------------|
| 2000 | 02-09 | 3.75 | 2.75 | 4.25 | 2002:2 half-year | 4.50 |
| | 12-13 | 4.00 | 3.25 | 4.75 | 2003:1 half-year | 4.00 |
| 2001 | 07-11 | 4.25 | 3.50 | 5.00 | | |
| | 09-19 | 3.75 | 3.00 | 4.50 | | |
| 2002 | 03-20 | 4.00 | 3.25 | 4.75 | | |
| | 05-02 | 4.25 | 3.50 | 5.00 | | |
| | 11-20 | 4.00 | 3.25 | 4.75 | | |
| 2003 | 12-11 | 3.75 | 3.00 | 4.50 | | |
| | 03-19 | 3.50 | 2.75 | 4.25 | | |

¹ 1 July 2002 the official discount rate was replaced by a reference rate, which, at the end of each half calendar-year (end of June and end of December, respectively) is set by the Riksbank.

4 Capital market interest rates

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

| | | Bond issued by: | | | | | |
|------|-------|--------------------|---------|---------|------------|---------|---------|
| | | Central government | | | | Housing | |
| | | 3 years | 5 years | 7 years | 9-10 years | 2 years | 5 years |
| 2001 | Jan | 4.22 | 4.51 | 4.72 | 4.89 | 4.51 | 5.08 |
| | Feb | 4.15 | 4.51 | 4.71 | 4.86 | 4.41 | 5.04 |
| | March | 4.01 | 4.33 | 4.59 | 4.75 | 4.28 | 4.87 |
| | April | 4.12 | 4.51 | 4.78 | 4.93 | 4.36 | 5.03 |
| | May | 4.43 | 4.82 | 5.12 | 5.27 | 4.63 | 5.33 |
| | June | 4.75 | 5.03 | 5.26 | 5.38 | 4.98 | 5.59 |
| | July | 4.78 | 5.08 | 5.30 | 5.42 | 5.20 | 5.76 |
| | Aug | 4.49 | 4.77 | 5.01 | 5.16 | 4.88 | 5.39 |
| | Sept | 4.23 | 4.74 | 5.04 | 5.26 | 4.65 | 5.39 |
| | Oct | 3.98 | 4.60 | 4.92 | 5.17 | 4.41 | 5.25 |
| | Nov | 3.92 | 4.49 | 4.76 | 4.96 | 4.34 | 5.13 |
| | Dec | 4.21 | 4.90 | 5.09 | 5.24 | 4.67 | 5.49 |
| 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 |

5 Overnight and money market interest rates

MONTHLY AVERAGE. PER CENT

| | | Repo rate | Interbank rate | SSVX | | | Company certificates | |
|------|-------|-----------|----------------|----------|----------|-----------|----------------------|----------|
| | | | | 3 months | 6 months | 12 months | 3 months | 6 months |
| 2000 | Jan | 3.25 | 3.35 | 3.57 | 3.86 | | 3.77 | 4.05 |
| | Feb | 3.61 | 3.71 | 3.90 | 4.22 | | 4.11 | 4.43 |
| | March | 3.75 | 3.85 | 4.06 | 4.29 | 4.74 | 4.27 | 4.53 |
| | April | 3.75 | 3.85 | 3.99 | 4.16 | | 4.21 | 4.45 |
| | May | 3.75 | 3.85 | 3.96 | 4.09 | 4.57 | 4.21 | 4.43 |
| | June | 3.75 | 3.85 | 3.94 | 4.04 | 4.56 | 4.15 | 4.44 |
| | July | 3.75 | 3.85 | 4.03 | 4.21 | | 4.31 | 4.66 |
| | Aug | 3.75 | 3.85 | 4.00 | 4.21 | 4.59 | 4.23 | 4.50 |
| | Sept | 3.75 | 3.85 | 3.94 | 4.04 | 4.51 | 4.14 | 4.36 |
| | Oct | 3.75 | 3.85 | 3.99 | 4.09 | | 4.15 | 4.31 |
| | Nov | 3.75 | 3.85 | 4.00 | 4.09 | 4.50 | 4.14 | 4.26 |
| | Dec | 3.89 | 3.99 | 4.07 | 4.22 | 4.37 | 4.19 | 4.38 |
| 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 | 3.93 | 4.09 | 4.29 | 4.64 | 4.27 | 4.43 |
| | April | 4.00 | 4.10 | 4.25 | 4.41 | | 4.52 | 4.69 |
| | May | 4.25 | 4.35 | 4.29 | 4.48 | 4.79 | 4.64 | 4.79 |
| | June | 4.25 | 4.35 | 4.28 | 4.42 | 4.71 | 4.88 | 5.00 |
| | July | 4.25 | 4.35 | 4.26 | 4.37 | | 4.89 | 4.95 |
| | Aug | 4.25 | 4.35 | 4.19 | 4.29 | 4.43 | 4.83 | 4.87 |
| | Sept | 4.25 | 4.35 | 4.17 | 4.21 | 4.29 | 4.82 | 4.84 |
| | Oct | 4.25 | 4.35 | 4.07 | | 4.14 | 4.67 | 4.64 |
| | Nov | 4.15 | 4.25 | 3.91 | 3.84 | 3.93 | 4.20 | 4.19 |
| | Dec | 3.85 | 3.95 | 3.66 | 3.68 | 3.77 | 3.97 | 3.95 |
| 2003 | Jan | 3.75 | 3.85 | 3.65 | | | 3.90 | 3.88 |
| | Feb | 3.75 | 3.85 | 3.61 | 3.40 | 3.35 | 3.85 | 3.74 |
| | March | 3.64 | 3.74 | 3.41 | 3.36 | 3.35 | 3.64 | 3.57 |

6 Treasury bills and selected international rates

MONTHLY AVERAGE. PER CENT

| | | 3-months deposits | | | | 6-months deposits | | | |
|------|-------|-------------------|------|------|------|-------------------|------|------|------|
| | | USD | EUR | GBP | SSVX | USD | EUR | GBP | SSVX |
| 2000 | Jan | 5.93 | 3.28 | 6.00 | 3.57 | 6.14 | 3.50 | 6.25 | 3.86 |
| | Feb | 5.99 | 3.47 | 6.09 | 3.90 | 6.24 | 3.67 | 6.27 | 4.22 |
| | March | 6.12 | 3.70 | 6.10 | 4.06 | 6.34 | 3.89 | 6.29 | 4.29 |
| | April | 6.24 | 3.88 | 6.16 | 3.99 | 6.48 | 4.02 | 6.32 | 4.16 |
| | May | 6.66 | 4.29 | 6.16 | 3.96 | 6.93 | 4.48 | 6.31 | 4.09 |
| | June | 6.70 | 4.43 | 6.09 | 3.94 | 6.87 | 4.61 | 6.20 | 4.04 |
| | July | 6.63 | 4.52 | 6.05 | 4.03 | 6.83 | 4.76 | 6.16 | 4.21 |
| | Aug | 6.59 | 4.72 | 6.08 | 4.00 | 6.74 | 4.95 | 6.20 | 4.21 |
| | Sept | 6.58 | 4.78 | 6.05 | 3.94 | 6.67 | 4.96 | 6.15 | 4.04 |
| | Oct | 6.65 | 4.98 | 6.01 | 3.99 | 6.63 | 5.04 | 6.12 | 4.09 |
| | Nov | 6.64 | 5.03 | 5.95 | 4.00 | 6.61 | 5.06 | 5.97 | 4.09 |
| | Dec | 6.41 | 4.85 | 5.83 | 4.07 | 6.26 | 4.85 | 5.80 | 4.22 |
| 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 | 3.41 | 1.17 | 2.39 | 3.50 | 3.36 |

7 Krona exchange rate: TCW-index and selected exchange rates

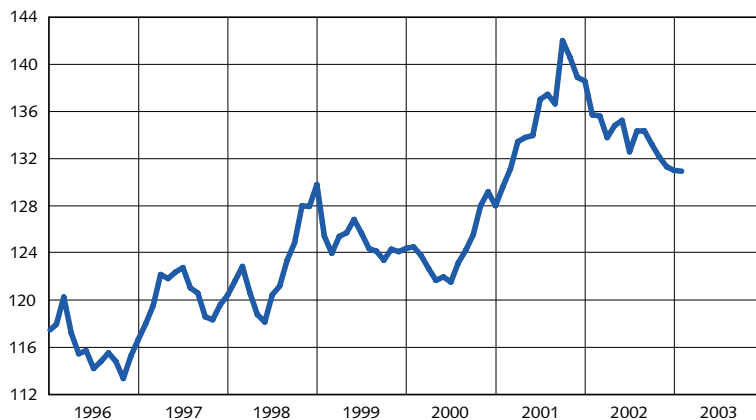
MONTHLY AVERAGE

| | | SEK | | | | | |
|------|-------|-----------|---------|--------|---------|--------|--------|
| | | TCW-index | USD | EUR | GBP | CHF | JPY |
| 2000 | Jan | 124.5383 | 8.4725 | 8.5956 | 13.8900 | 5.3370 | 0.0807 |
| | Feb | 123.8107 | 8.6462 | 8.5112 | 13.8519 | 5.2965 | 0.0791 |
| | March | 122.7089 | 8.6946 | 8.3950 | 13.7382 | 5.2317 | 0.0816 |
| | April | 121.6993 | 8.7208 | 8.2700 | 13.8088 | 5.2545 | 0.0828 |
| | May | 122.0044 | 9.0894 | 8.2388 | 13.7098 | 5.2930 | 0.0841 |
| | June | 121.5567 | 8.7433 | 8.3118 | 13.1997 | 5.3268 | 0.0824 |
| | July | 123.2005 | 8.9346 | 8.4080 | 13.4783 | 5.4206 | 0.0828 |
| | Aug | 124.2636 | 9.2702 | 8.3962 | 13.8107 | 5.4137 | 0.0858 |
| | Sept | 125.5703 | 9.6569 | 8.4121 | 13.8431 | 5.4968 | 0.0905 |
| | Oct | 128.0479 | 9.9618 | 8.5266 | 14.4711 | 5.6348 | 0.0919 |
| | Nov | 129.2156 | 10.0780 | 8.6271 | 14.3730 | 5.6705 | 0.0925 |
| | Dec | 128.0290 | 9.6607 | 8.6629 | 14.1196 | 5.7238 | 0.0862 |
| 2001 | Jan | 129.6612 | 9.4669 | 8.8963 | 14.0052 | 5.8170 | 0.0811 |
| | Feb | 131.1553 | 9.7350 | 8.9736 | 14.1555 | 5.8438 | 0.0838 |
| | March | 133.4701 | 10.0316 | 9.1254 | 14.4988 | 5.9416 | 0.0828 |
| | April | 133.8280 | 10.1987 | 9.1103 | 14.6320 | 5.9593 | 0.0824 |
| | May | 133.9895 | 10.3333 | 9.0536 | 14.7412 | 5.9019 | 0.0848 |
| | June | 137.0501 | 10.7753 | 9.2010 | 15.0876 | 6.0421 | 0.0882 |
| | July | 137.4779 | 10.7666 | 9.2557 | 15.2105 | 6.1150 | 0.0864 |
| | Aug | 136.6723 | 10.3343 | 9.3036 | 14.8466 | 6.1433 | 0.0851 |
| | Sept | 142.0389 | 10.6089 | 9.6670 | 15.5179 | 6.4799 | 0.0894 |
| | Oct | 140.6226 | 10.5630 | 9.5798 | 15.3446 | 6.4725 | 0.0871 |
| | Nov | 138.9180 | 10.5965 | 9.4131 | 15.2278 | 6.4196 | 0.0866 |
| | Dec | 138.6116 | 10.5594 | 9.4436 | 15.2024 | 6.4006 | 0.0832 |
| 2002 | Jan | 135.7390 | 10.4398 | 9.2292 | 14.9642 | 6.2594 | 0.0788 |
| | Feb | 135.6543 | 10.5603 | 9.1869 | 15.0223 | 6.2179 | 0.0791 |
| | March | 133.8096 | 10.3396 | 9.0600 | 14.7064 | 6.1690 | 0.0789 |
| | April | 134.8265 | 10.3105 | 9.1331 | 14.8742 | 6.2300 | 0.0788 |
| | May | 135.2764 | 10.0519 | 9.2236 | 14.6763 | 6.3300 | 0.0796 |
| | June | 132.6093 | 9.5591 | 9.1190 | 14.1612 | 6.1959 | 0.0774 |
| | July | 134.3652 | 9.3400 | 9.2705 | 14.5199 | 6.3380 | 0.0791 |
| | Aug | 134.3777 | 9.4641 | 9.2524 | 14.5486 | 6.3235 | 0.0795 |
| | Sept | 133.2278 | 9.3504 | 9.1735 | 14.5449 | 6.2617 | 0.0775 |
| | Oct | 132.1625 | 9.2793 | 9.1053 | 14.4489 | 6.2156 | 0.0749 |
| | Nov | 131.3311 | 9.0655 | 9.0785 | 14.2485 | 6.1869 | 0.0746 |
| | Dec | 131.0292 | 8.9458 | 9.0931 | 14.1771 | 6.1861 | 0.0732 |
| 2003 | Jan | 130.9609 | 8.6386 | 9.1775 | 13.9590 | 6.2767 | 0.0727 |
| | Feb | 129.7272 | 8.4930 | 9.1499 | 13.6813 | 6.2358 | 0.0711 |
| | March | 130.3167 | 8.5298 | 9.2221 | 13.5031 | 6.2777 | 0.0720 |

Note. The base for 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 of processed goods for 21 countries. The weight include exports and imports as well as "third country" effects.

9 Forward foreign exchange market. Forward net position with authorized currency dealers

END OF PERIOD. SEK MILLION

| | | Non-bank public | | Bank abroad | The Riksbank | Total (1+2+3+4) |
|------|-------|-----------------|------------------|-------------|--------------|--------------------|
| | | Resident (1) | Non-resident (2) | Net (3) | Net (4) | |
| 2001 | Jan | -465 225 | -16 547 | 317 823 | 0 | -163 949 |
| | Feb | -503 678 | -12 293 | 278 249 | 0 | -237 722 |
| | March | -493 323 | -17 304 | 350 014 | 0 | -160 613 |
| | April | -495 192 | -15 971 | 293 878 | 0 | -217 285 |
| | May | -483 697 | -14 993 | 238 561 | 0 | -260 129 |
| | June | -473 712 | -28 931 | 326 895 | 0 | -175 748 |
| | July | -341 744 | -30 030 | 190 190 | 0 | -181 584 |
| | Aug | -451 257 | -25 654 | 221 546 | 0 | -255 365 |
| | Sept | -455 862 | -18 079 | 244 130 | 0 | -229 811 |
| | Oct | -308 376 | -18 025 | 170 595 | 0 | -155 806 |
| | Nov | -404 895 | -16 742 | 196 365 | 0 | -225 272 |
| | Dec | -390 156 | -16 763 | 198 322 | 0 | -208 597 |
| 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 |

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

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