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*Lars Heikensten*

On 14 October 2004 the Governor of the Riksbank, Lars Heikensten, addressed the Riksdag's Finance Committee. The Governor does this regularly twice a year when the Riksbank's written monetary policy report is handed over to the Committee. On these occasions the Governor generally speaks in broad terms about monetary policy and the Riksbank's deliberations in this respect. This time, the second in 2004, particular attention was paid to issues to do with employment.

## ■ Households' inflation opinions – a tale of two surveys 23

*Stefan Palmqvist and Lena Strömberg*

Statistics Sweden (SCB) has earlier asked households for their perspectives on current and future price developments. As of 2002 the survey has been taken over by Growth from Knowledge (GfK), an international market research company. Before the changeover, in November and December 2001, GfK undertook surveys alongside SCB's regular surveys. Despite nearly identical questions, the average inflation perceptions and expectations were considerably higher according to GfK.

## ■ Price-setting behaviour in Swedish firms 43

*Mikael Apel, Richard Friberg and Kerstin Hallsten*

An English version of this article is forthcoming in *Journal of Money, Credit and Banking*.

A survey on price-setting behaviour shows that the median firm adjusts the price once a year and that state-dependent and time-dependent price setting are about equally important. For the rigidity of prices the results point to the importance of long-term relations with customers, implicit contracts, sluggish costs, explicit contracts and the kinked demand curve.

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# ■ A decade of inflation targeting

BY LARS HEIKENSTEN

Lars Heikensten is Governor of Sveriges Riksbank. This is a translation of his opening address at the Finance Committee's hearing on 14 October 2004.

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*On 14 October 2004 the Governor of the Riksbank, Lars Heikensten, addressed the Riksdag's Finance Committee. The Governor does this regularly twice a year when the Riksbank's written monetary policy report is handed over to the Committee. On these occasions the Governor generally speaks in broad terms about monetary policy and the Riksbank's deliberations in this respect. This time, the second in 2004, particular attention was paid to issues to do with employment. The address is presented here.*

## Introduction

I am pleased to be invited to come here and describe our view of the economic situation, of inflation prospects and of my appraisal of monetary policy.

Today I intend to start by reviewing the past. While we were preparing this address we noted that it is actually a decade since a Riksbank Governor first took part in this form of open hearing. So I thought I would take a quick look at those ten years.

This shows that much has in fact gone well in the Swedish economy but that things are clearly troublesome in one respect, namely employment. Consequently I shall take a somewhat closer look at matters to do with monetary policy's ability to influence employment. Questions about this were put to me on my previous appearance here last spring and it seems pertinent to return to these issues.

Finally I shall, as I said, review how we see the current situation.

# A decade of low inflation

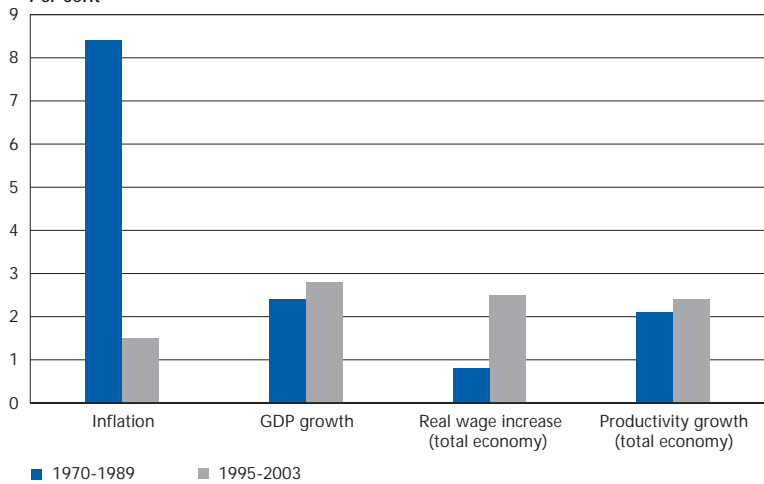
## NEW POLICY

The task of monetary policy with a floating exchange rate is to concentrate on meeting an inflation target.

Starting with the look at the past, it can be said that the crisis in the early 1990s led to a realignment of stabilisation policy, a new monetary policy regime in Sweden with a clearer division of responsibilities between fiscal and monetary policy. Now that we had a floating exchange rate, the task of monetary policy was spelled out as being to concentrate on fulfilling an inflation target, while fiscal policy focused more on establishing long-term stability in the government finances.

Figure 1 gives an indication of what ensued from this policy.

Figure 1. Average rates for 1970-1989 and 1995-2003  
Per cent



Source: Statistics Sweden.

The major shift in inflation is – I was tempted to say – natural, since our policy is now aimed at keeping it low. It is perhaps more remarkable that in this period (which begins with 1995 so as to exclude the first post-crisis years which were rather turbulent) GDP growth has been higher. But above all and possibly even more interestingly, real wages in Sweden have developed very much better than under the earlier arrangement. Productivity growth, finally, has been notably stronger as well.

The realignment of stabilisation policy has been followed by a marked change for the better.

Of course I do not mean to imply that these achievements are solely due to the realignment of stabilisation policy; other factors have obviously contributed, too. International economic developments in this period have been basically favourable. The revolution in IT and communication technology has undoubtedly played a part for some of these figures. The public sector in relation to the total economy has contracted and this in itself tends to result in higher real wage increases, for example. There have also

been a number of deregulations, expanding foreign trade and increased competition. Some of this is connected with our EU membership. So the favourable outcome has many conceivable explanations. But I still think it is important to note that there has been a marked change for the better.

Another interesting point is that Sweden's performance has also changed appreciably in relation to other countries. In the two preceding decades we did worse in general than other countries in Europe. Now we have had almost a decade in which we have done better than other countries in many respects.

But as I said earlier, the result for employment is perhaps not quite what one might have hoped. It is only occasionally that open unemployment has been brought down to an annual rate of 4 per cent and the level is currently about 5 1/2 per cent. The number of persons employed is actually lower than before the crisis. Some 1.2 million people of working age are not participating in the labour force.

For employment, however, the result is perhaps not quite what one might have hoped.

#### THE REGIME SHIFT AND EMPLOYMENT

Against this background it is hardly surprising that there is a lively discussion about unemployment and what can be done about it. Such a discussion is extremely important. Perhaps it is somewhat more surprising that it is still being suggested that it is the realignment of stabilisation policy which lies behind the troubles we have. The implication is that most things could have been better if only we had been prepared to resume the high-inflation policy from the 1970s and 1980s.

There is much to be said about this. First and foremost, it is rather difficult to see how a more stable economic development could in itself be bad for employment. On the contrary, greater economic stability definitely means that the development of employment in the long run is also more favourable.

Another point is that simple comparisons of unemployment rates before and after the realignment are misleading. This is primarily because the earlier policy was not sustainable in the longer run. That is partly why the realignment was unavoidable.

A basic feature of the earlier policy was that when inflation had accelerated to a certain point and manufacturing costs became excessively high, the krona was devalued, which adjusted the level of costs. But as we were in a process in which wages and prices chased each other, the solution only worked for a time. The situation soon repeated itself and necessitated another devaluation. This meant that people in Sweden experienced falling real wages.

A basic feature of the earlier policy was the use of devaluations to adjust the level of costs.

Another feature was the continuous expansion of the public sector.

Another feature was the continuous expansion of the public sector.

From about 15–20 per cent of the total labour force in the 1960s, public sector employment had risen by the end of the 1980s to over 30 per cent. This, of course, was not sustainable either in the longer run because these activities have to be paid for with taxes on the working population.

It could be said that with the devaluations and the expansion of public sector employment, we put off having to deal with the employment problems in this period.

A loose monetary policy cannot achieve a lasting increase in the level of employment.

In a discussion of unemployment and jobs, a crucial insight – firmly rooted in recent decades’ economic research and practical experience in many countries – is that a loose monetary policy cannot achieve a lasting increase in a country’s level of employment. The best monetary policy can do is reduce the fluctuations in unemployment’s cyclical component.

Permanent increases in employment cannot be created by systematically keeping interest rates down, weakening the exchange rate or allowing inflation to rise. It follows that targeting inflation at a level most central banks now aim for is not at odds with a policy for high employment.

To achieve a permanent reduction of unemployment, measures are needed that affect how the labour market functions.

In order to reduce unemployment permanently, it is necessary instead to implement measures directed at unemployment’s structural component, that is, the unemployment that does not come from variations in the demand for goods and services. That calls for measures that have nothing to do with monetary policy. In the first place it needs measures that affect how the labour market functions.

To demonstrate this, let me briefly comment on two charts that I believe I also showed you last time I was here (Figures 2 and 3). One shows how open unemployment is spread over different occupations and the other how it is spread over Sweden’s counties. The charts convey a clear picture of very large differences and their tendency to persist. The differences appear to be immune to cyclical activity; the cyclical change in unemployment is much the same everywhere. Here we have an indication of what might be achieved if the labour market functioned more efficiently.

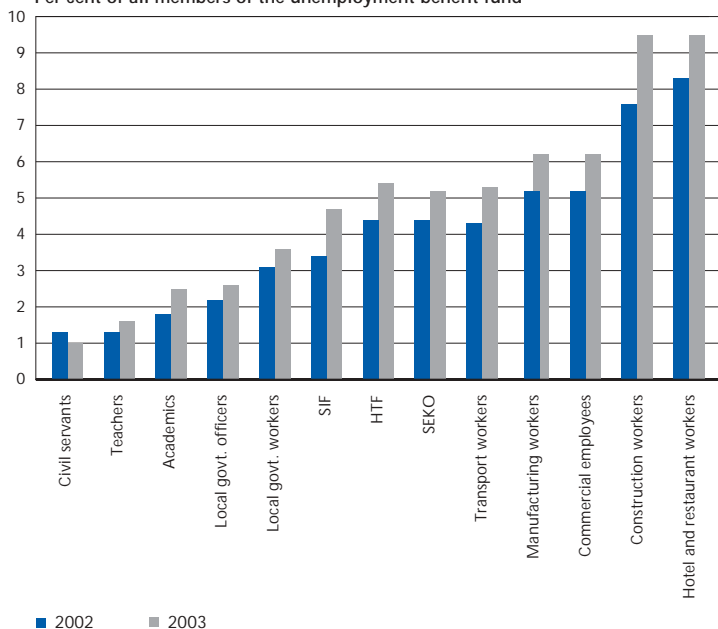
The problems in the labour market are also evident from the fact that even in the years in the late 1990s and early 2000s when resource utilisation was highest, open unemployment barely came down to 4 per cent.

## TARGET DEVIATIONS AND EMPLOYMENT

Although monetary policy cannot affect employment appreciably in the long term, it can have an impact in the short term. This is because an inflation targeting policy may require interest rate adjustments that affect employment temporarily, causing it to rise or fall depending on how the



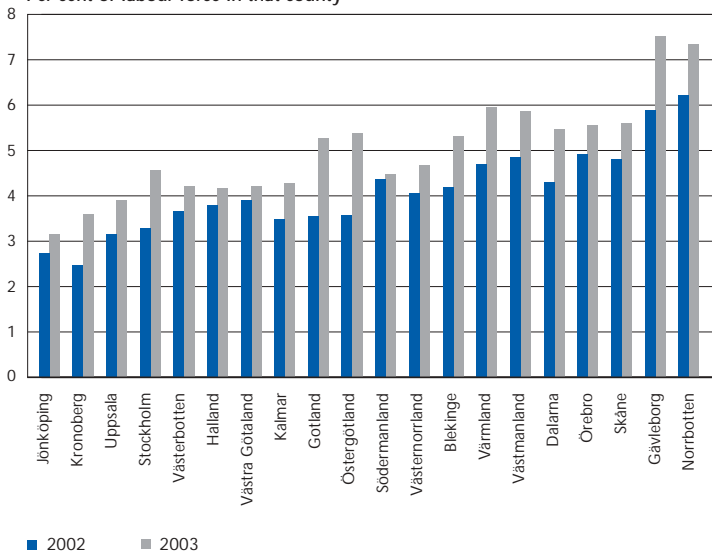
**Figure 2. Open unemployment by occupational categories**  
Per cent of all members of the unemployment benefit fund



Note. SIF = professional employees' union for IT, manufacturing, construction, etc. HTF = salaried employees' union for commerce, transport and service industries. SEKO = service and communication employees' union. Construction workers include the fund for painters. Manufacturing workers represent the funds for the manufacturing, metalworking, forestry and wood products, food, paper and printing industries. In 2003 the members of the unemployment benefit funds included in the chart represented about 88 per cent of the total membership of all such funds in Sweden.

Source: National Labour Market Board.

**Figure 3. Open unemployment by counties**  
Per cent of labour force in that county



Source: Statistics Sweden.

interest rate is changed. The degree to which monetary policy can raise employment is determined by the economy's long-term growth potential and that in turn is partly dependent on how well the labour market functions.

An inflation-targeting monetary policy helps to stabilise economic growth around the sustainable path.

Under normal circumstances, an inflation-targeting monetary policy helps to stabilise growth around the path that the economy can sustain in the long run. But this requires that all economic agents – firms and households – are confident that the Riksbank will adhere to the inflation target. That is a very clear lesson from the 1970s and 1980s, when repeated efforts were made to stimulate the economy but everyone was convinced that the efforts were not sustainable in the longer run.

Events sometimes affect inflation rather strongly at very short notice.

As you know, our principal instrument for achieving the inflation target is the repo rate. Matters are complicated by the fact that we have to set the repo rate in the light of forecasts of the coming two years. Naturally, many things may change in the space of two years and upset our initial forecasts. To some extent we can handle this by continuously adjusting the interest rate in the light of new information. But that is not always possible. Events sometimes affect inflation rather strongly at very short notice. There have been a number of instances of this in recent years. Perhaps the best example is the sharp hike in electricity prices. Another is the equity price bubble that burst; although many had expected it would burst, no one knew just when that would happen and when it did, it immediately had tangible effects. A third is a war that could not be foreseen and heightens unease in the world. Demand is then subdued.

In such situations, inflation cannot be prevented from deviating from the target.

In such situations, inflation cannot be prevented from deviating from the target. And even though it sometimes might be possible to reduce the deviations, the radical upward or downward interest rate adjustments may be judged to be too high a price to pay. It is better to accept some deviation from the target in exchange for a somewhat more stable path for interest rates and for the economy as a whole.

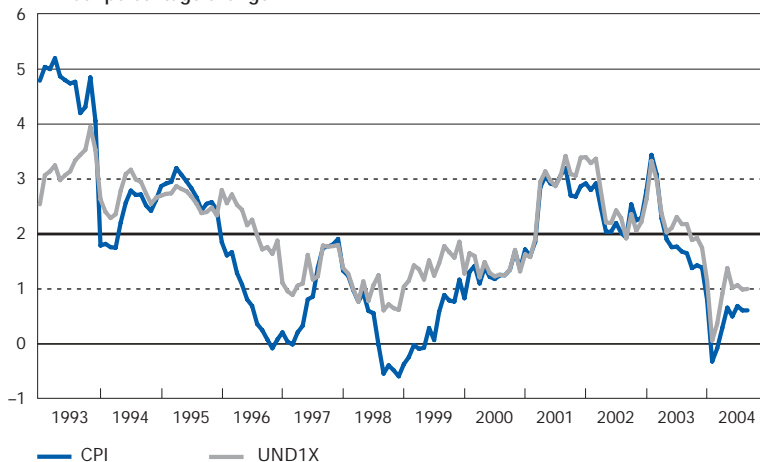
When Sweden chose, as one of the first countries, to formulate monetary policy's objective in terms of a specific number, the reasons had to do with making the policy easier to understand: it would provide an anchor for expectations and permit meaningful discussions about whether or not the objective has been fulfilled. We were well aware that inflation would not be exactly on target all the time. But we still believed it would contribute to a more satisfactory discussion of monetary policy.

## INFLATION AND INFLATION EXPECTATIONS

So how successful have we been in targeting inflation? Let us first look at historical averages. They show that in the period since the introduction of the inflation target in 1993, annual CPI inflation has averaged 1.8 per cent while the measure of underlying inflation that has been used in our analysis for much of the period has averaged 2.1 per cent. Calculated instead from 1995, the year in which the policy applied in full, the corresponding averages are 1.4 and 1.9 per cent.

Since the inflation target was introduced in 1993, CPI inflation has averaged 1.8 per cent and underlying inflation 2.1 per cent.

Figure 4. Alternative indicators of inflation  
Annual percentage change



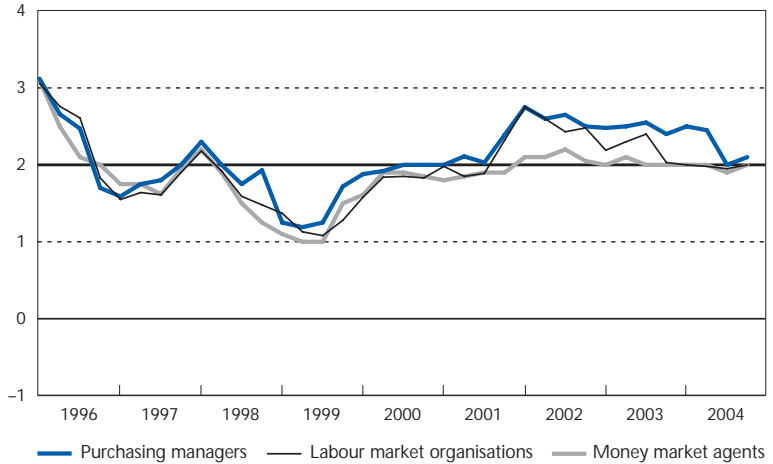
Source: Statistics Sweden.

Having said that, it can be noted that even with a policy that has led to inflation being relatively close to the target – which I think one can say that these figures indicate – it is of course conceivable that from time to time the deviations from the target will be fairly large. That has been the case in this period.

In this context perhaps it is also relevant to look at inflation expectations. To what extent have they been affected, you may ask, by the ups and downs in inflation and the fact that we have sometimes missed the target? The answer is: very little. The overall picture of inflation expectations, even though they can be measured in various ways, is clear: since 1996–97 they have been fairly well in line with the target. Figure 5 shows the inflation expectations of various groups: purchasing managers, labour market organisations and money market agents. We undertake these surveys on a regular basis. The picture they show is very much better than I believe most had expected when the new monetary policy regime was introduced.

The picture of inflation expectations is clear: since 1996–97 they have been fairly well in line with the target.

Figure 5. Different groups' expectations of inflation two years ahead  
Per cent



Source: Prospera.

I should like to add a marginal comment here. It is sometimes argued that the Riksbank acts asymmetrically, meaning to say that we prefer lower to higher inflation. It is interesting that the surveys do not support that notion. The notion is not shared by people in general; they consider that we strive for 2 per cent inflation, which is exactly what we do.

## Reasons for target deviations

So what caused the deviations from the target that I have just mentioned? As a starting point, let us return to Figure 4. I think one can say that four factors have been particularly important.

Target deviations have been due to four factors: (1) an orderly economy,

Inflation dropped very markedly in the early part of the period. In terms of the CPI, this primarily mirrored the transition from very high interest rates in Sweden to rates that were fairly low; that had to do with the fact that after the crisis we at last achieved an *orderly economy*. In that house mortgage expenditure was a major factor behind the price fall, this is why the CPI deviated so much.

(2) rising energy prices,

Then there are a couple of episodes with rapidly *rising energy prices*. In the first of these there was also upward pressure from food prices, in the second it was mainly the price of electricity that rose. These price increases were essentially related to supply conditions. That was how we saw them and as we judged that they would be transient, we found no grounds for countering them at all markedly with interest rate policy. We were proven right.

In certain periods, not least in recent years but also in the late 1990s, inflation was markedly affected by lower *international inflation* (lower

imported inflation) than we had anticipated. Moreover, in these periods – the late 1990s and early 2000s – *productivity* growth was more favourable than we and others had foreseen.

(3) low international inflation, and (4) unexpectedly strong productivity.

When discussing matters to do with monetary policy and employment I find it relevant to note that in the periods 1996–2000 and 2004, when inflation has been below target, monetary policy (however measured) was very expansionary. Moreover, GDP growth at these times was very strong. Even so, inflation, as we have seen, remained low. What has happened is that changes have occurred on the supply side. They have occurred in Sweden and we have also been affected by similar changes abroad. To a large extent, this has been a global phenomenon, which is another point worth noting.

Changes have occurred on the supply side – a global phenomenon.

## Developments in recent years

With hindsight, over these ten years the Riksbank has not always managed to predict inflation exactly, which means that monetary policy could have been conducted slightly differently. This applies, for example, to 1995 and perhaps also to 1999–2000, though the latter case was not a problem because events took a different turn from what we had foreseen in that the economic upswing was broken when the equity price bubble burst. Economic activity actually weakened, whereas the earlier discussion had been about the need for a further increase in the interest rate.

Recently – since the second half of 2003 – inflation has again been below the targeted rate. Our assessments indicate that this will continue to be the case for another six months or so, which suggests that the interest rate could have been lower earlier, in the first place during 2002 and 2003.

Inflation has recently been below the target.

For our part, I can only conclude that we shall naturally do what we can to deepen our understanding of productivity and of how the international price situation develops. Developments in Asia and suchlike are probably driving forces but so, for example, is the deregulation of trade.

In this respect we are in essentially the same situation as other observers. No Swedish observer has presented an appreciably different view of these matters in recent years. In recent discussions with colleagues abroad, moreover, I have found that they have all been surprised by the low global rate of inflation and many for that matter also by the improved productivity growth, though the latter does not apply to central Europe.

Everyone has been surprised at the low global rate of inflation and many also at the productivity growth.

Another common denominator, for that matter, seems to be that many have also been surprised by the development of wages, which has

been lower than indicated by historical statistical relationships. Part of the reason presumably lies in the cross-border integration of labour markets.

When shocks of this type occur – when the forecast picture suddenly changes, be it to higher inflation or lower – it is also reasonable, as I mentioned earlier and as has been the case in this period, to consider whether to allow the effects to dissipate gradually or to act forcefully with the interest rate to counter the deviations that arise.

A feature of the debate we have had is the varying fanciful assessments of how much higher employment could have been if the Riksbank had acted more prudently. The figures I have seen have ranged from 20,000 till 75,000 additional jobs. Counterfactual estimates of this type are admittedly difficult – they call for some rather bold assumptions. They presuppose not just that the Riksbank would have been appreciably more successful than most other observers in predicting where the economy was heading but also that we would have managed to convince the outside world that our predictions were reasonable. In this context it is relevant to note that in the period in question inflation was around 3 per cent.

We in turn have done some experiments to gauge how a different interest rate policy might have affected employment. The results indicate that even cutting the repo rate a full percentage point more in the past year would have hardly generated more than 10,000 additional jobs. To put this figure in perspective, it can be noted that around 200,000 people in Sweden are openly unemployed and almost 400,000 are on sick leave. As a precaution against misunderstandings, perhaps I should emphasise that it is not a question of losing jobs for good but of a shift over time; on this occasion it is taking a little longer for employment to recover.

To round off this discussion, let me say that the shift to low inflation seems to have worked well on the whole and better than was generally expected. Of course this does not mean that our policy at various times does not warrant criticism. That is really the type of discussion I want to encourage by raising these matters here. As I mentioned earlier, we have undershot the 2 per cent target. For our part, this spurs us to an even deeper analysis and understanding. But I do feel that some of the criticism of the Riksbank has been out of proportion and not particularly well founded. The problem of unemployment is so serious that it deserves a better and more serious discussion.

## The current assessment

Having said that, I shall now take up our assessment of the current situation. My starting point here is the October Inflation Report, which I assume has reached you.

Employment effects above 10,000 jobs would have been difficult to obtain even by cutting the repo rate a full percentage point more over the past year.

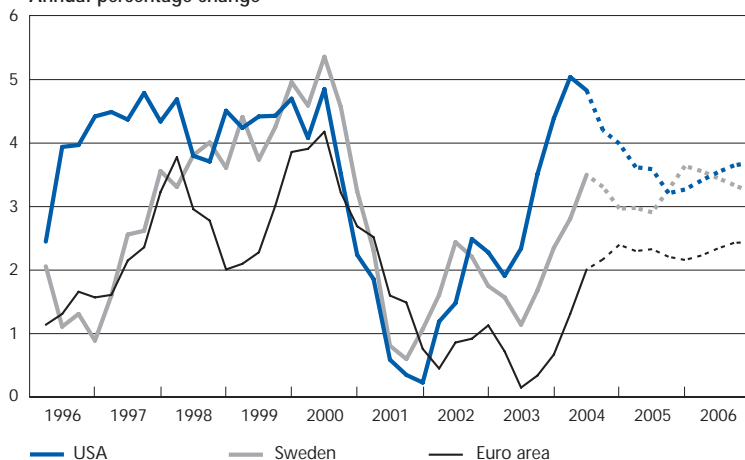
The shift to low inflation has worked well on the whole and better than was generally believed.

Perhaps I should start by saying that we have not made any dramatic changes from the May Report. That seldom happens. But certain shifts in the picture are worth noting. I shall begin with some comments on the international developments.

The Riksbank believes that international economic activity will continue to rise (Figure 6). Growth has now picked up properly in the United States, the euro area and Sweden and we count on it remaining high but not quite as strong as earlier. That is the normal pattern in economic upswings – growth accelerates to start with and then lands at a rate that is still high but perhaps not quite as strong as before.

The Riksbank believes that international economic activity will continue to rise, so that international price pressure becomes somewhat stronger.

Figure 6. GDP growth in the United States, Sweden and the euro area  
Annual percentage change



Note. Day-corrected data for Sweden.

Sources: US Department of Commerce, NIESR, Eurostat, Statistics Sweden and the Riksbank.

The upswing has been something of a surprise, to a large extent on account of developments in Asia, Latin America and eastern Europe. It has been better than we and most others foresaw. This offsets our present slight downward revision of the outlook for the United States, about which it can be said there has been some concern in the public discussion. It is also a risk that we include in our future discussion.

The combination of slightly stronger growth and a somewhat higher oil price brings us to believe that international price pressure will be somewhat higher than we counted on earlier.

The revision of our growth assessment for Sweden is somewhat more marked. We now expect growth rates of 3.6 per cent in 2004 and 3.2 per cent in 2005 and 2006.

For Sweden we now expect growth rates of 3.6 per cent in 2004 and 3.2 per cent in 2005 and 2006.

TABLE 1. GDP BY EXPENDITURE IN THE MAIN SCENARIO  
PERCENTAGE ANNUAL CHANGE

	2003	2004	2005	2006
Household consumption	1.9	2.5 (2.6)	2.9 (2.4)	3.0 (2.6)
General government consumption	0.6	1.0 (1.1)	1.3 (0.7)	1.4 (1.3)
Gross fixed capital formation	-2.0	3.5 (3.2)	8.0 (7.7)	6.3 (6.4)
Change in inventories	0.2	-0.1 (-0.1)	0.0 (0.0)	0.0 (0.0)
Exports	5.5	9.6 (7.0)	6.3 (6.1)	6.5 (6.5)
Imports	5.0	6.8 (5.7)	7.2 (6.6)	6.9 (6.8)
GDP at market prices	1.6	3.6 (2.9)	3.2 (2.8)	3.2 (3.1)

The figures in the May Inflation Report are given in parentheses in Table 1.

The upward revision of estimated growth, besides reflecting the prospect of international demand being slightly stronger than we counted on earlier, also has to do with higher exports than we foresaw in relation to international demand. This is partly a consequence of the industrial composition of exports; IT and telecom exports have picked up, for example.

Figures that were not available in May now show that investment has turned upwards. We expected this would happen but as it was not yet visible in the statistics, we were a little uncertain.

We count on a stable increase in private consumption, with no dramatic changes. Consumption is, as you know, being driven by a comparatively expansionary policy.

As for fiscal policy, there is the new information in the Budget Bill from September. This affects growth and can be said to be the principal explanation for the slight upward adjustment of growth in 2005, besides having some impact on 2006. This indicates somewhat higher resource utilisation. Together with the somewhat higher international prices, it is then calculated that inflationary pressure in the Swedish economy will be a little stronger.

However, the picture of resource utilisation is not entirely clear-cut. It seldom is. It continues to be unusually splintered. The figures for the labour market are still rather weak but other indicators suggest that resource utilisation is nevertheless on the way up (see Figure 7).

Our overall assessment is that even with this upward revision, inflation at the end of the forecast period will be in line with our target.

## Some questions

I shall now spend a little more time on two matters I believe to be particularly important to consider in this context.

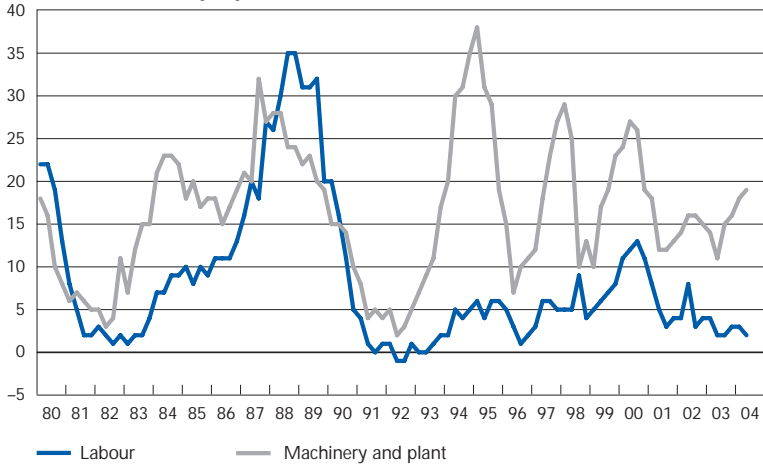
One of them concerns *oil prices*. Developments here have been dramatic in the past year, not least in the summer. We believe – as do most observers as well as the market for oil futures – that in the years ahead

The principal explanation for the upward revision of growth lies in the Budget Bill.

The first question concerns oil prices.



Figure 7. Proportion of manufacturing firms reporting labour or machinery and plant as the primary limiting factor  
Per cent, seasonally adjusted

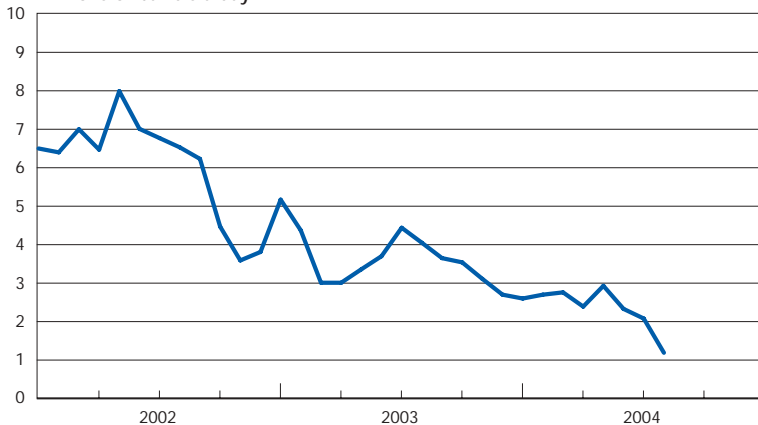


Source: National Institute of Economic Research.

the price of oil will fall back. Even so, the path we foresee has been revised upwards and we count on a higher oil price at the end of the period. This, too, is in line with the general opinion among those who work on this full-time.

The present oil price rise seems to be driven mainly by increased demand for oil. The fall in OPEC’s unutilised capacity is one indication of this (see Figure 8). The increase is naturally explained by the acceleration of global economic growth, which has been higher this year than anyone can remember. Much of the growth is occurring in the new emerging

Figure 8. OPEC’s unutilised capacity  
Millions of barrels a day



Source: International Energy Agency.

market economies, where output requires a higher proportion of oil than in the older industrialised countries. That also affects the picture.

By itself, an oil price rise on account of strong economic activity suggests that the cyclical impact should be smaller than if it comes from shocks to supply.

In recent years there has also been growing concern that terrorist attacks have driven prices up. I believe that many people count on prices falling back again if that concern subsides. There are also expectations of a price fall for the simple reason that there is a great deal of oil that it now pays to extract, whereas that was not the case when prices were lower. The latter is a major reason why we and others count on the oil price falling back. It will take a couple of years before production can get under way.

It is gratifying to us and directly related to what I said initially that with the low-inflation policy in the West in the past decade, it has been possible so far to limit the impact of oil price increases on overall inflation. Figure 9 gives a fairly clear picture of this; one can see how, in the 1970s and 1980s, oil price increases exerted a considerable upward pull on inflation in general.

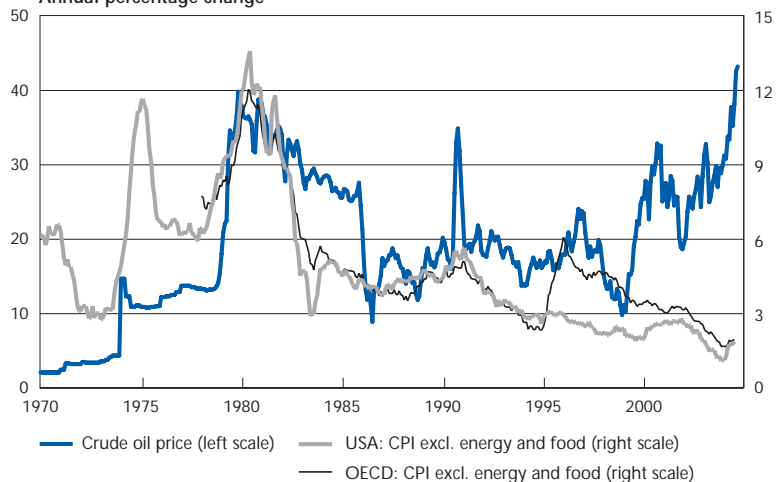
This will not necessarily continue to apply for ever. If oil prices were to remain high and our ability to manage inflation were to be questioned in some way, the situation could change. However, we are basically optimistic about this.

This, you will understand, has been a leading topic at all the international meetings I have had reason to attend in recent months, for instance in Washington and Basel. Our picture and those of my colleagues in the

The low-inflation policy in the West in the past decade has so far made it possible to limit the impact of oil price increases on inflation.

There are very few signs that inflation expectations have been affected so far.

Figure 9. Oil price; United States and OECD area inflation 1970–2004  
Annual percentage change



Sources: International Petroleum Exchange and OECD.

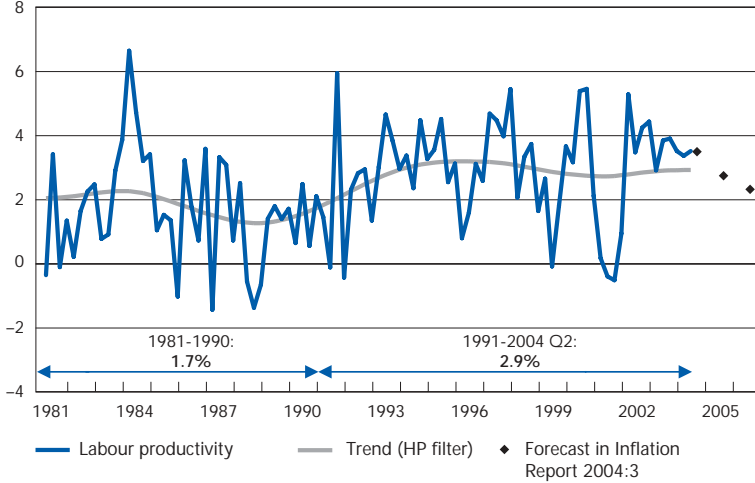
large industrialised countries are much the same. There are very few signs that inflation expectations have been affected so far.

The other question I would like to raise here is how *inflation could be so low to date when growth has been comparatively strong*. I touched on this earlier in my account of deviations from the inflation target.

One of the important features here is the development of productivity. Figure 10 gives an idea of how things have changed. Annual productivity growth from 1981 to 1990 averaged 1.7 per cent, whereas the average rate from 1991 to 2004 Q2 was 2.9 per cent.

The other question is how inflation could be so low to date when growth has been comparatively strong.

Figure 10. Corporate sector productivity growth and trend (HP filter)  
Annual percentage change



Sources: Statistics Sweden and the Riksbank.

Of course the picture does vary to some extent with the choice of periods. But even when we tried all kinds of breakdown, there was no escaping the conclusion that something has changed. Things have been rather different in recent years.

Although our experience from the late 1990s had made us slightly more optimistic about productivity growth, during the economic slow-down it was better than we had expected. It seemed to us that much of the stronger productivity in the late 1990s had to do with IT and the like – the IT and telecom industry, where productivity growth was high, was then expanding rapidly. But that cannot be the explanation in 2002, 2003 and into 2004, when this industry had contracted as much as it had in Sweden. There must be other explanations.

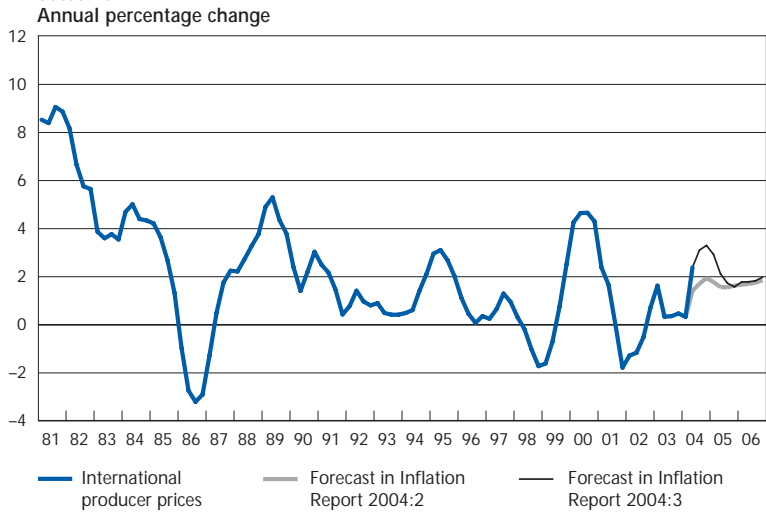
Wage increases have been comparatively low, roughly in line with what we had counted on. That also contributed to lower pressure from costs in the Swedish economy.

I talked about imported inflation earlier (see Figure 11). It should be

The path of productivity has changed in recent years.

Wage increases have been comparatively low.

Figure 11. International producer prices for manufactured products: forecast and outcome



Sources: OECD and the Riksbank.

International prices have fallen.

mentioned here that the statistics have major shortcomings, which adds to the forecasting difficulties in this respect. But it does look as though international prices have fallen, perhaps with an element of a downward trend.

How long this will last is another matter. One can envisage periods in which trade is deregulated and new industrialised countries emerge, which tends to push prices down. Perhaps various forms of support are discontinued, regulations are removed, and so on. But of course this cannot go on for ever; the time comes when it has all been done, so to say. But while it is in progress, which may be for quite a long time, this type of downward effect can be at work.

These questions tie in with another one, namely how we can count on future inflation remaining relatively low even though our growth forecast has been revised upwards.

Our assessment would no doubt have pointed to slightly higher inflation if we had not been influenced by the new information, for example on productivity.

The primary explanation is that we have allowed ourselves to be influenced by the new figures on productivity, the lower wage outcome and the persistently weak labour market. In our current assessment, inflation would presumably have been slightly higher – one or two tenths of a percentage point – if we had not taken the new information into account.

To sum up, the forecast I mentioned in the main scenario is that GDP growth in Sweden in the coming years will be around 3 or 3 1/2 per cent. Inflation is expected to be 1.4 per cent one year ahead and 2 per cent after two years. The corresponding figures for CPI inflation are judged to be 1.6 and 2.5 per cent.

## THE BALANCE OF RISKS

As usual, we also present a spectrum of risks, which on this occasion is judged to be balanced. We see risks in Sweden as well as internationally that could pull the present forecast up or down. Internationally, perhaps the main upside risk has to do with oil, that is, if oil prices were to remain high and if they were to have contagious effects. There is thus a risk that the picture, which still exists, of no substantial increase in inflation would be altered in some way.

The possibility of a weaker international trend, with consequences for inflation, relates in the first place to various problems with financial imbalances in the global economy. There is a potential risk above all in the combination of the federal deficit and large current-account deficits in the United States, with their counterpart in large surpluses in Asia. Moreover, the tendency for house prices to rise rapidly in many countries could conceivably have an effect together with insufficient household saving.

Turning now to Sweden, there is the question of productivity. It is simply the case that neither we nor others know enough about what is happening to be able to produce forecasts that are at all reliable. I can see opportunities or risks with a growth of productivity that is either higher or lower than we count on. I bring this up here because productivity is such a central variable. Its development is crucial for the assessment of inflation.

Even including the spectrum of risks, the main scenario I recently outlined for inflation still applies.

## Monetary policy

This brings me back to what I said early on, namely our assessment that inflation in the latter part of the period will be approximately in line with the target. Against that background, at yesterday's meeting we decided to leave the repo rate unchanged.

As the economic upturn continues and resource utilisation goes on rising, it is reasonable to expect a need for a gradual tightening of monetary policy. Policy needs to be less expansionary.

It is important to underscore that there is nothing dramatic about this. It is, in fact, an entirely natural requirement for meeting the inflation target in an upward phase of the business cycle. It is what is needed to achieve a favourable, stable economic development in Sweden. It is also what most observers who follow us expect.

It should be noted, however, that at present it is not possible to tell exactly when the time will have come for a first interest rate adjustment.

The spectrum of risks is judged to be balanced.

We judge that inflation will be approximately in line with the target.

It is reasonable to count on a need for a gradual tightening of monetary policy.

As usual, that will depend on how the Riksbank assesses the outlook for inflation and that in turn depends on the new information that we obtain in the future.

# ■ Households' inflation opinions – a tale of two surveys

BY STEFAN PALMQVIST AND LENA STRÖMBERG

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*From the late 1970s up to the end of 2001, households' perspectives on current and future price developments were surveyed by Statistics Sweden (SCB, the Swedish acronym). As of 2002 the survey has been taken over by Growth from Knowledge (GfK), an international market research company. Before the changeover, in November and December 2001, GfK undertook surveys alongside SCB's regular surveys. Despite nearly identical questions, the average inflation perceptions and expectations were considerably higher according to GfK. Our examination of the responses shows that a part of the discrepancies is due to different ways of handling responses implying that prices were "about the same": GfK probed such responders to be more precise. Moreover, GfK picked up a greater proportion of low-income households, with higher inflation perceptions and expectations. These two factors account for up to a third of the discrepancy between SCB's and GfK's results. The remaining discrepancy comes mainly from GfK's surveys having more responders who believe in virtual price stability, that is, unchanged prices.*

The authors wish to thank Jesper Hansson, Staffan Viotti, Kerstin Wallmark and Klas-Göran Warginger for comments and helpful suggestions, Ylva Hedén for STATA assistance, Anita Olsson-Malmberg of Statistics Sweden and Richard Hansson of Growth from Knowledge for data and answers to queries about the surveys, and Petter Lundberg of Statistics Sweden for information about the distribution of household income.

## The survey – past and present

A survey called *Hushållens inköpsplaner* (HIP, Households' purchasing plans) has been undertaken in Sweden ever since 1973. The survey, collected quarterly up to 1992 and monthly since then, asks households for their opinions about both their own and Sweden's economic development. Other questions relate more directly to households' purchasing plans, for example whether they intend to buy (or exchange) a car or a house in the coming two years. From 1979, when responsibility for the survey was transferred to *Konjunkturinstitutet* (KI, the National Institute of Economic Research), households have been asked for their perspectives

on current and future price developments.<sup>1</sup> One reason for including these questions was to assess whether the price controls in the 1970s were having the desired effect.<sup>2</sup>

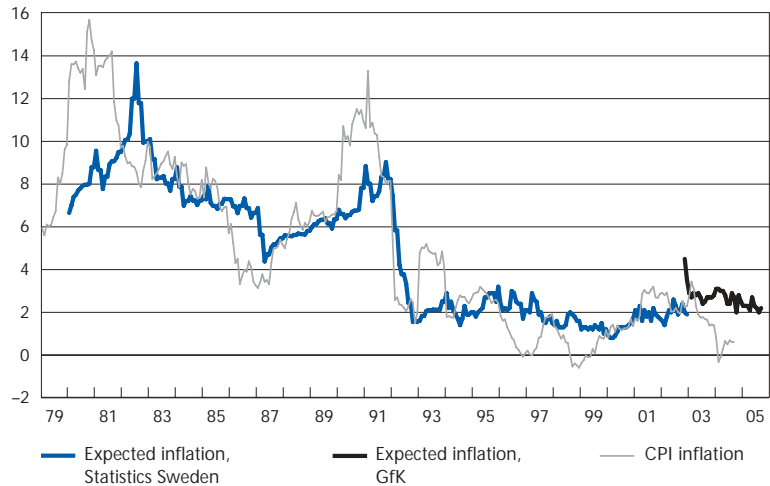
Since 1979 the HIP survey contains questions about current and future price developments.

Inflation expectations of the type that the HIP survey is intended to measure also play an important role in Sweden's present monetary policy regime. Since 1993 the Riksbank targets CPI inflation at an annual rate of 2 per cent (with a tolerance interval around this level of  $\pm 1$  percentage point). Due to the time lag in the transmission of monetary policy, decisions are based on forecasts of the future path of inflation and other factors.<sup>3</sup> For the forecast of future wage outcomes, which in turn affects the inflation forecast, one of the determinants is inflation expectations. Consequently, the Riksbank continuously follows the development of inflation expectations and publishes it regularly in the Inflation Report.

The survey was conducted by SCB until it was taken over by GfK in January 2002.

From 1973 to 2001 the survey was conducted by Statistics Sweden (SCB, the Swedish acronym). In 2002 it was taken over by Growth from Knowledge (GfK)<sup>4</sup>. To be able to study whether the two procedures yielded similar results, surveys in November and December 2001 were carried out by both SCB and GfK. Their pictures of households' inflation expectations are presented in Figure 1 together with the actual rate of inflation.

Figure 1. Households' inflation expectations and CPI inflation, 1979-2005  
Per cent



Note. To facilitate comparisons, the inflation expectations have been shifted 12 months into the future so that they coincide with the actual rate of inflation to which they refer.

Sources: GfK and Statistics Sweden.

<sup>1</sup> The questions about price developments were also included in the first survey of 1978.

<sup>2</sup> See the account in Jonung (1981), footnote 7.

<sup>3</sup> For an account of how the Riksbank works to fulfill the inflation target, see Heikensten (1999) and Heikensten & Vredin (2002).

<sup>4</sup> GfK is an international market research company.



**TABLE 1. HOUSEHOLDS' INFLATION OPINIONS ACCORDING TO GfK'S AND SCB'S SURVEYS PER CENT AND PERCENTAGE POINTS**

	GfK	SCB	Difference
<i>Perceived inflation</i>			
November 2001	3.32	2.04	1.28***
December 2001	3.40	2.44	0.96***
<i>Expected inflation</i>			
November 2001	4.53	2.03	2.50***
December 2001	3.49	1.93	1.56***

Note. \*\*\* denotes significance at the 1 per cent level. The standard error in the difference is calculated on the assumption that the two measurements are mutually independent.

Sources: GfK, SCB and own calculations.

It will be seen from Figure 1 and Table 1 that both inflation perceptions and expectations are higher in GfK's surveys than in SCB's. The discrepancies are statistically significant, which means that the explanation for them cannot be that the samples for the two surveys happen to be composed differently in terms of inflation opinions.<sup>5</sup>

Thus, although the two surveys refer to the same months, their results differ significantly. Moreover, the measured discrepancies are economically significant because for monetary policy, the implications of future inflation being expected to be 3.5 per cent may be entirely different from those of expectations around 2 per cent.

This article aims to clarify why the two surveys yield such different results. One conceivable explanation is that the surveys differ in their representativity; another is that they differ in the treatment of responses from households that believe that prices are (will be) about the same as twelve months ago (twelve months ahead). How much of the difference can we understand and explain retrospectively and, if we cannot understand it all, is there some way of adjusting the series so that they are comparable over time?

## A description of the survey

The two surveys use almost identical questionnaires. This account therefore applies to them both unless stated otherwise.<sup>6</sup> The questionnaire includes two categories of questions about price developments.<sup>7</sup> One of them is designed to measure how households see prices today in relation to prices a year ago, that is, their perceived inflation. Figure 2 presents a chart of the questions about households' inflation perceptions.

Perceived and expected inflation are higher in GfK's surveys than in SCB's.

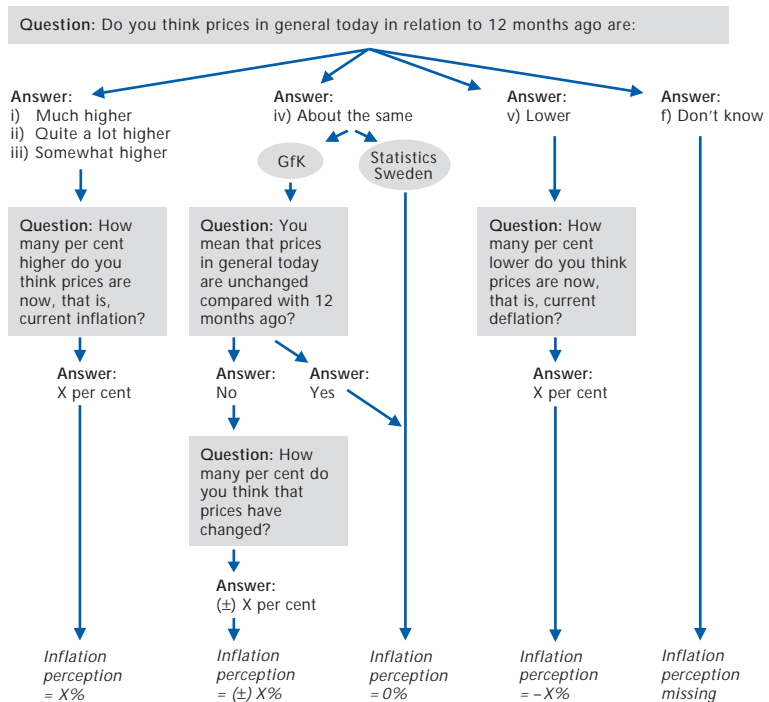
Inflation perceptions measure households' impressions of prices today compared with prices a year ago.

<sup>5</sup> The term inflation opinions is used here as an umbrella term for both perceived and expected inflation.

<sup>6</sup> Some of the questions have been changed over the years; this account refers in the first place to the questions used from October 1995 onwards.

<sup>7</sup> GfK's surveys have three categories; the third concerns prices two years ahead and is not considered here.

Figure 2. Chart of the questions about households' inflation perceptions



First the respondent is asked to assess what has happened to prices in general over the past twelve months in qualitative terms. This involves a choice between whether prices in general today are *much higher*, *quite a lot higher*, *somewhat higher*, *about the same* or *lower* than twelve months ago. Then the respondent is asked to state how many per cent higher or lower he/she considers that prices are today compared with twelve months ago.

Inflation expectations measure how households believe prices will change in the coming year.

The other category is designed to measure how households believe prices will change in the coming year, that is, their inflation expectations. This is likewise done first in qualitative terms: the respondent is asked whether in the coming twelve months prices in general will *rise at a faster rate*, *rise at the same rate*, *rise at a slower rate*, *be largely unchanged* or *fall somewhat*.<sup>8</sup> Then the respondent is asked to state how many per cent higher or lower he/she considers that prices will be in twelve months time compared with today.

The questionnaire also includes a number of background items, such as questions about age, gender, income and region. A stratified sampling

<sup>8</sup> These alternatives are offered to the 52 per cent or so whose response to the question about perceived inflation implies that prices today are higher than twelve months ago. The 48 per cent or so who respond that prices today are either *about the same* or *lower* are offered the alternatives *rise*, *be largely unchanged* or *fall* when asked about expected inflation.

procedure is used, which involves dividing the population (individuals aged 16–84 years)<sup>9</sup> into a number of strata in terms of age, gender and region. A random sample of individuals is then drawn from each stratum. To make the sample representative of the population in terms of age, gender and region, inflation opinions are calculated as weighted averages of the different responses. For example, if the sample includes too few men, the responses of all men are weighted upwards to match the population's gender structure.

The chief difference between the two surveys lies in the sampling procedure. SCB drew individuals from the Register of the Total Population (RTB), phoned the selected persons and tried to get as many as possible to respond. During 2000 and 2001, responses were obtained from approximately 1,400 persons (out of a sample of about 2,100) for each monthly survey. GfK, on the other hand, phones to a random selection of telephone numbers and persists until responses have been obtained from 1,500 persons.

## Inflation expectations and socioeconomic factors

Inflation opinions are liable to differ between households in different socioeconomic groups. Jonung (1981) and Bryan & Venkatu (2001a and 2001b), for example, have shown that men usually hold lower inflation opinions than women do and that assessments of inflation vary inversely with income. So if more women or more low-income households respond to GfK's surveys than was the case in SCB's surveys, that could help to explain why inflation is considered to be higher on average in GfK's surveys. Table 2 shows how inflation opinions have varied with socioeconomic factors in GfK's surveys since November 2001.

Table 2 presents each socioeconomic group's inflation perception in the first column and the group's inflation expectation in the second column. On average in this period, men, for instance, perceived inflation to be 2.15 per cent and expected it would be 2.25 per cent, while the corresponding figures for women are 3.16 and 3.23 per cent. The results for different groups in terms of income, education and so on are also shown. CPI inflation in this period averaged 1.93 per cent and underlying (UND1X) inflation 2.21 per cent, that is, somewhat below the averages for most of the groups in the table.<sup>10</sup>

The results in Table 2 largely confirm earlier studies. In keeping with Bryan & Venkatu (2001a), who studied inflation opinions among U.S.

<sup>9</sup> SCB has no upper age limit for the survey population.

<sup>10</sup> UND1X inflation is measured as CPI inflation excluding house mortgage interest expenditure and direct effects of changes in indirect taxes and subsidies.

TABLE 2. HOUSEHOLDS' INFLATION OPINIONS FROM NOVEMBER 2001 TO MAY 2004, DECOMPOSED BY SOCIOECONOMIC FACTORS FROM GfK'S SURVEY DATA

PER CENT

Socioeconomic factor	Perceived inflation	Expected inflation	Proportion in survey	Weighted proportion	Proportion in population
Total	2.64	2.72	100	100	100
<i>Gender</i>					
Male	2.15	2.25	47.9	49.5	49.5 <sup>a)</sup>
Female	3.16	3.23	52.1	50.5	50.5 <sup>a)</sup>
<i>Marital status</i>					
Single	2.72	2.79	38.9	39.2	34.3 <sup>b)</sup>
Married/cohabiting	2.55	2.67	56.3	56.0	65.7 <sup>b)</sup>
Other type of household	3.08	2.81	4.9	4.8	–
<i>Children in household</i>					
No	2.59	2.68	69.9	70.2	69.0 <sup>b)</sup>
Yes	2.70	2.81	30.1	29.8	31.0 <sup>b)</sup>
<i>Education</i>					
Basic	3.22	3.07	18.6	19.4	25.5 <sup>c)</sup>
Upper secondary	2.91	2.96	41.8	41.7	46.0 <sup>c)</sup>
Tertiary	2.08	2.31	39.5	38.8	28.6 <sup>c)</sup>
<i>Annual income</i>					
Up to 180,000 SEK	3.44	3.18	21.6	22.1	33.2 <sup>d)</sup>
180,001–285,000 SEK	2.85	2.89	27.9	28.0	23.6 <sup>d)</sup>
285,001–440,000 SEK	2.30	2.54	25.6	25.2	21.6 <sup>d)</sup>
More than 440,000 SEK	1.87	2.19	24.9	24.7	21.4 <sup>d)</sup>
<i>Age</i>					
16–24	3.03	3.13	13.4	13.6	13.3 <sup>a)</sup>
25–34	2.16	2.43	19.2	18.1	17.2 <sup>a)</sup>
35–49	2.51	2.70	25.8	25.8	26.1 <sup>a)</sup>
50–64	2.54	2.70	24.8	23.2	24.4 <sup>a)</sup>
65–84	3.17	2.80	16.9	19.4	19.0 <sup>a)</sup>
<i>Region</i>					
Göteborg	2.39	2.64	47.5	47.1	48.0 <sup>a)</sup>
Svealand	2.34	2.70	19.6	19.7	18.4 <sup>a)</sup>
Norrland	2.29	2.66	13.8	14.2	13.0 <sup>a)</sup>
Stockholm	2.23	2.40	19.2	19.1	20.6 <sup>a)</sup>
<i>Work</i>					
Employed	2.35	2.58	62.2	60.5	60.8 <sup>e)</sup>
Unemployed	3.11	3.30	3.5	3.4	2.5 <sup>e)</sup>
Not in labour force	3.12	2.92	34.3	36.1	36.7 <sup>e)</sup>
<i>Housing</i>					
Rented	3.03	3.01	34.1	33.9	41.5 <sup>f)</sup>
Tenant owned	2.35	2.51	18.1	18.2	17.5 <sup>f)</sup>
Detached, semidetached	2.48	2.60	47.5	47.6	41.0 <sup>f)</sup>
Other type	3.49	3.42	0.3	0.3	–

Note. a) SCB's demographic data (*Befolkningsstatistik år 2001*), b) SCB's living standard surveys (*Undersökningarna av levnadsförhållanden, 2000–2000*), c) SCB's education register (*Befolkningens utbildning, version 2004-01-01*), d) SCB's household financial data (*Hushållens ekonomi, 2001*), e) calculated from SCB's labour force and demographic data (*AKU och Befolkningsstatistik år 2001*); the proportions in the table are calculated in relation to the total population aged 16–84 years, f) SCB's housing and rent survey (*Bostads- och hyresundersökningen 2000*).

Sources: GfK, SCB and own calculations.

Inflation opinions are lower among male, more-educated and high-income respondents than among female, less-educated and low-income groups.

households, we find that in Sweden, too, inflation opinions are lower among male, more-educated and high-income respondents than among female, less-educated and low-income groups. We likewise find a U-shaped relationship between inflation opinions and age: the picture of inflation is highest in the youngest group (16–24 years), lowest among those aged 25–34 years and then rises with age. We also find higher inflation opinions among single compared with married persons.

A look at some additional socioeconomic factors shows that inflation opinions are higher in households with children, among those with no gainful employment and those who rent their homes compared with households without children, the employed and home-owners. We can also note that inflation opinions do not differ appreciably between the regions.<sup>11</sup>

The third column in Table 2 shows the composition of the different categories. For example, men made up 47.9 per cent and women 52.1 per cent of those who answered the questionnaire. The fourth column lists the weighted proportions, that is, the proportion in each socioeconomic group when this has been weighted to make it representative in terms of gender, age and region. To take the same example, the weighted proportions are 49.5 per cent men and 50.5 per cent women. The actual proportion in the population, derived from other sources, is given in the fifth column; it will be seen that these figures were, in fact, precisely 49.5 per cent men and 50.5 per cent women. Thus, too few men were selected to participate in the survey and their responses were therefore weighted upwards to make them more representative of the population's gender structure. There is also relatively good agreement between the survey and the population in the structures by age and region – the two factors that, together with gender, are used for stratification. The agreement is less good for education and income; the proportions in the survey are too small for basic education only and for low income.

Some of these socioeconomic factors may, of course, be correlated. People with a tertiary education, for example, tend to have a higher income than those with only an upper secondary education, just as women tend to have lower incomes than men. In order to separate the different socioeconomic factors and to quantify effects of differences between the two surveys in terms of socioeconomic structures, the following regression-equation was estimated:

$$\pi_{i,t} = \alpha + \sum_j \beta_j D_j + \varepsilon_{i,t}, \quad (1)$$

where  $\pi_{i,t}$  is the perceived and expected inflation, respectively, of individual  $i$  in period  $t$  and  $D_j$  is a set of dummy variables for each socioeconomic

<sup>11</sup> The question why inflation opinions may differ between socioeconomic groups is discussed by Bryan & Venkatu (2001a). A common hypothesis is that different groups actually do experience inflation differently because their patterns of consumption differ. Empirical data suggest, however, that the surveyed differences in inflation opinions are considerably greater than the actual differences in inflation between the groups; see e.g. Kokoski (2000). For this article, the causes of the differences in inflation opinions are of no consequence; it suffices to note that such differences exist.

TABLE 3. HOUSEHOLDS' INFLATION OPINIONS FROM NOVEMBER 2001 TO MAY 2004 AS A FUNCTION OF SOCIOECONOMIC FACTORS FROM GfK'S SURVEY DATA

	Perceived inflation	Expected inflation
Constant	2.90***	3.08***
<i>Gender</i>	[F=206.89***]	[F=303.73***]
Male	r	r
Female	0.84***	0.91***
<i>Marital status</i>	[F=34.64***]	[F=11.00***]
Single	r	r
Married/cohabiting	0.47***	0.23***
<i>Children in household</i>	[F=38.70***]	[F=11.40***]
No	r	r
Yes	0.51***	0.25***
<i>Education</i>	[F=65.80***]	[F=57.29***]
Basic	r	r
Upper secondary	- 0.02	- 0.07
Tertiary	- 0.67***	- 0.62***
<i>Annual income</i>	[F=46.22***]	[F=21.04***]
Up to 180,000 SEK	r	r
180,001–285,000 SEK	- 0.53***	- 0.23**
285,001–440,000 SEK	- 1.12***	- 0.54***
More than 440,000 SEK	- 1.46***	- 0.79***
<i>Age</i>	[F=15.94***]	[F=6.71***]
16–24	r	r
25–34	- 0.19	- 0.37***
35–49	0.20	- 0.10
50–64	0.46***	0.00
65–84	0.54***	- 0.18
<i>Work</i>	[F=0.83]	[F=1.00]
Employed	r	r
Unemployed	0.14	0.26
Not in labour force	0.12	0.00
<i>Housing</i>	[F=17.38***]	[F=9.76***]
Rented	r	r
Tenant owned	- 0.54***	- 0.36***
Detached, semidetached	- 0.46***	- 0.33***
Other	- 0.15	0.45
R <sup>2</sup>	0.03	0.02

Note. r denotes the response that is the category's reference group. The value of F from the test that all dummy variables in a category are zero is given in squared brackets; \*, \*\* and \*\*\* denote significance at the 10-, 5- and 1 per cent level, respectively.

Sources: GfK and own calculations.

factor (e.g. one dummy variable for gender and three for income).<sup>12</sup> The results are given in Table 3.

The first column in the table shows the results of estimations with inflation perceptions as the dependent variable, while the second column does the same with inflation expectations as the dependent variable. The constant denotes the reference individual (a single man with no children, a basic education, an annual income of less than 180,000 SEK, aged 16–24 years, in work and living in a rented dwelling), whose inflation perceptions

<sup>12</sup> In formal terms, this means that the equation is estimated as a pooled panel; put more simply, we ignore the fact that the observations refer to different points in time and treat them as though they had all been measured on the same occasion.

averaged 2.90 per cent and whose inflation expectations averaged 3.08 per cent during the period. The coefficients on the dummy variable for gender indicates that the average inflation perception and expectation of a woman with the same background as this man is 0.84 and 0.91 percentage points higher, that is, 3.74 and 3.99 per cent, respectively. Together with gender, the greatest significant differences in inflation opinions can be found between income groups. All else equal, an individual in the highest income group perceives and expects inflation on average as being 1.46 and 0.79 percentage points lower than an individual in the lowest income group.

Taken separately, most of the dummy variables differ significantly from zero. A test of whether the coefficients for every dummy variable in a particular category are zero shows that all but one of the socioeconomic factors are significant. The exception is *work*, where there is no significant difference in either perceived or expected inflation between the employed, the unemployed and persons outside the labour force.<sup>13</sup>

Having established how inflation opinions vary with socioeconomic factors, we can use the results to gauge the extent to which the discrepancy between the two surveys can be explained by differences in socioeconomic structures. As mentioned earlier, the largest significant differences in inflation opinions are between income groups and between men and women. GfK and SCB both stratify for gender, so the survey discrepancy cannot be attributed to differences in the gender structure. We can therefore concentrate on the effects of differences between the two surveys in the structure of income (see Table 4).

All else equal, inflation opinions differ most between income groups and between men and women.

TABLE 4. EFFECTS OF DIFFERENCES BETWEEN THE TWO SURVEYS IN THE STRUCTURE OF INCOME  
PER CENT AND PERCENTAGE POINTS

Income	Proportion, GfK	Proportion, SCB	Contribution to perception	Contribution to expectation
Up to 180,000 SEK	22.1	16.1	0.00	0.00
180,001–285,000 SEK	28.0	23.1	0.03	0.01
285,001–440,000 SEK	25.2	31.6	-0.07	-0.03
More than 440,000 SEK	24.7	29.2	-0.07	-0.04
Total	100.0	100.0	-0.11	-0.06

Note. The income groups are somewhat lower in SCB's survey, so these figures represent an upper limit to the effects of differences in the structure of income.

Sources: GfK, SCB and own calculations.

<sup>13</sup> We have excluded *region* as an explanatory variable in the regression because when *region* was included, inflation opinions did not vary systematically between the regions. Moreover, as data on *region* were not available for either November 2001 or for the period January 2002–January 2003, excluding *region* enabled us to use considerably more observations in the regression.

The first two columns in Table 4 show the proportions of the four income groups in GfK's and SCB's survey, respectively, in 2001.<sup>14</sup> The third and fourth columns show how the differences in the structure of income affect inflation perceptions and expectations, respectively. These effects are calculated as the difference in the proportion multiplied by the relevant coefficient from Table 3.

Differences in income structure can explain only a negligible part of the discrepancy between GfK's and SCB's inflation opinions.

These figures show that the proportion of low-income individuals (with higher inflation opinions) is larger in GfK's surveys than in SCB's. However, the bottom line shows that the effect of the differences in the structure of income is rather small. If GfK's income structure had matched SCB's, both perceived and expected inflation would have been about 0.1 percentage point lower on average than GfK's survey actually measured.<sup>15</sup> So, differences in income structure are not particularly important when it comes to explaining why the two surveys produced such different results in November and December 2001.

## Are prices unchanged or just about the same?

Responses to the effect that prices are "about the same" are treated differently in the two surveys; GfK probes respondents to get more precise responses.

Another difference between the two surveys is more technical. As shown in Figure 2, the surveys differ as regards respondents who consider that prices today are *about the same* as twelve months ago.<sup>16</sup> In SCB's surveys, respondents choosing this alternative are automatically assigned an inflation perception of 0 per cent, whereas GfK probes these respondents and reserves 0 per cent for those who then also consider that prices today are unchanged from twelve months ago.<sup>17</sup> Those who do not consider that prices have been unchanged are asked to state by how much they have changed. GfK but not SCB also uses a similar probing procedure about inflation expectations.

To assess the quantitative effect of probing on inflation opinions, GfK's responses can be re-coded so that all respondents who consider that prices today are *about the same* as a year ago are assigned an inflation perception of 0 per cent. It is not possible, however, to tell exactly

<sup>14</sup> The income groups in SCB's surveys in 2001 were: up to 160,000 SEK, 160,001–265,000 SEK, 265,001–420,000 SEK and more than 420,000 SEK. As these income groups are somewhat lower than those used by GfK, the calculations should be seen as indicating an upper bound to the effect of different income structures.

<sup>15</sup> An alternative approach is to post-stratify the responses, that is, create a new set of weights so that the surveys have a more similar income structure. We did that and obtained much the same quantitative result, that is, when GfK's survey was post-stratified to match SCB's income structure, average inflation opinions were not quite 0.1 percentage point lower.

<sup>16</sup> With respect to inflation expectations, probing is used on respondents who chose the alternative that prices will be *largely unchanged*. To simplify this account, in the context of inflation expectations we use *about the same* as a synonym for *largely unchanged*.

<sup>17</sup> The probing is intended to distinguish those who believe that prices today are *about the same* as twelve months ago, e.g. that they are 1 per cent higher today, from those who believe that prices today are *unchanged*.



what the response about expected inflation would have been if GfK had used SCB's method because the questions about expected inflation are put after those on perceived inflation. Consequently, a responder may have already been probed about perceived inflation and this in itself may influence the choice of alternative when it comes to expected inflation. We therefore try to arrive at an upper and a lower bound to the effects.

The lower bound is determined by re-coding all respondents who consider that prices twelve months ahead will be *about the same* as today and assigning them to 0 per cent expected inflation (as we did for perceived inflation). The lower bound accordingly answers the question: "Given that there is probing about perceived inflation, what would expected inflation have been without probing about this?"

To get some idea of the upper bound to the combined effects of probing on inflation expectations, we start from the lower bound and also re-code the respondents who chose *no* when probed about perceived inflation and assign them an inflation expectation of 0 per cent. The notion behind this additional adjustment can be illustrated with the following example. Assume that an individual believes that prices today are 1 per cent higher than a year ago and will be another 1 per cent higher a year ahead. Assume also that this individual thinks that a price increase of 1 per cent is so small that prices are about the same. When asked about prices today, perhaps this person chooses the alternative *about the same* but responds to the probing by stating that prices are not unchanged but 1 per cent higher. When asked about future prices, the person – aware that the response *about the same* will result in a probing to which the response will be *no* – may then chose the alternative *rise at the same rate*. Thus, the existence of probing about perceived inflation may influence the choice of response to the qualitative question about expected inflation. The upper bound aims to eliminate this effect of probing by assigning 0 per cent expected inflation even to respondents who consider that prices today are *about the same* as a year ago but nevertheless qualify their inflation perception with a percentage. The upper bound is accordingly intended to answer the question: "What would inflation expectations have been if there had been no probing at all?" The results of these re-codings to adjust for the effects of probing are shown in Table 5.

The first two columns reproduce the original inflation opinions from Table 1. The third column gives the results when respondents are re-coded so that a perception and an expectation, respectively, of 0 per cent inflation is assigned to those who consider that prices are and will be *about the same*. The fourth column gives the upper bound to the effects of probing on inflation expectations. Thus, probing those who consider that prices today are *about the same* as a year ago tends to raise per-

The effects of probing can be studied by applying SCB's method to GfK's surveys.

Probing raises GfK's perceived inflation by around 0.1 and expected inflation by up to 0.4 percentage points.

TABLE 5. INFLATION OPINIONS ACCORDING TO GfK'S AND SCB'S SURVEYS, BEFORE AND AFTER RECODING

PER CENT	GfK	SCB	GfK, lower bound	GfK, upper bound
Perceived inflation				
<i>November 2001</i>	3.32	2.04	3.23 (-0.09)	
<i>December 2001</i>	3.40	2.44	3.28 (-0.12)	
Expected inflation				
<i>November 2001</i>	4.53	2.03	4.51 (-0.02)	4.36 (-0.18)
<i>December 2001</i>	3.49	1.93	3.19 (-0.30)	3.11 (-0.38)

Note. The difference from GfK's reported figures in column 1 is given in parentheses. There is no lower or upper bound for perceived inflation; the actual affect is shown here.

Sources: GfK, SCB and own calculations.

ceived inflation by around 0.1 percentage point. For those who consider that prices twelve months ahead will be *about the same* as today, the probing on expectations raises expected inflation by up to 0.3 percentage points, while the combined effects of probing on perceptions and expectations raises expected inflation by up to 0.4 percentage points.

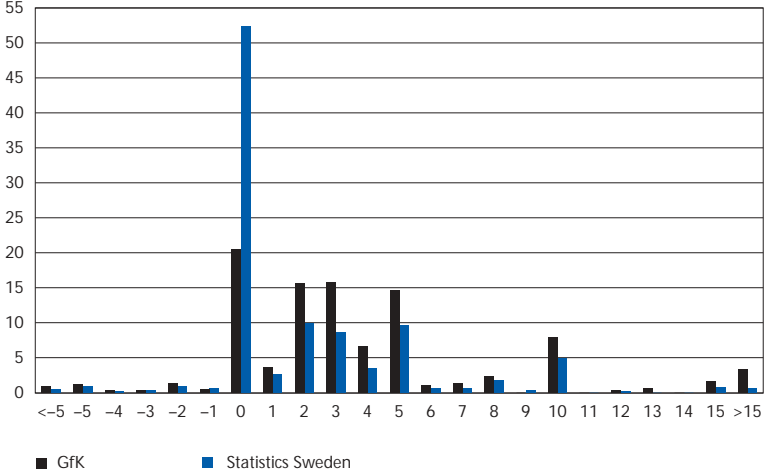
Of the two explanations, it seems that the introduction of probing is the main reason why the results of the two surveys differ so much. A point worth noting is that SCB used a similar probing procedure from October 1995 to October 2000. However, considerably fewer respondents in SCB's surveys chose the *no* alternative to the supplementary questions. This alternative was admittedly chosen by half of the respondents in November 1995 but the proportion then fell rapidly, so that from February 1996 the *no* response was used by fewer than 10 persons a month. This was, in fact, why SCB stopped probing the respondents. Perhaps it takes some time for the interviewers to learn the best way of putting the questions. In the next section we take a closer look at such learning effects.

## Learning by the interviewers

Between them, the differences in socioeconomic structure and the effects of probing accordingly explain up to 0.5 percentage points of the total discrepancy between the two surveys' inflation opinions. While this is not a negligible fraction of the total discrepancy, the greater part remains unexplained. We cannot explain why the discrepancy arose but some progress can be made by trying to understand how the discrepancy shows up in the responses. For example, is the proportion of "extreme responses", such as expectations of over 15 per cent inflation, larger in GfK's surveys? If so, we can study whether this proportion declines over time, which could be an indication that the interviewers have improved their ability to obtain reasonable responses. Or does the discrepancy come

mainly from SCB's surveys having more 0 per cent responses? In that case we can create a series that is comparable over time by adjusting for the differences in the proportion of zero responses. Figure 3 shows the distribution of households' inflation expectations in November and December 2001.

Figure 3. Distribution of inflation expectations, November-December 2001  
Per cent



Note. Responses in decimals have been rounded to the nearest whole number.

Sources: GfK, Statistics Sweden and own calculations.

There are two bars for each expected rate of inflation in Figure 3; the black bar represents the proportion that chose that rate in GfK's surveys and the blue bar the proportion in SCB's surveys. It will be seen that SCB's surveys have a considerably larger proportion of respondents who expect 0 per cent inflation, while the corollary of this is the higher proportions that expect some other rate in GfK's surveys. Besides the difference in the proportion of households expecting 0 per cent inflation, the discrepancy between the two surveys may have to do with the difference in the proportion of households expecting over 15 per cent inflation.

Table 6 therefore presents average inflation expectations just for the households that foresee a positive rate of inflation as well as for those that expect inflation to be between 0 and 15 per cent.

The first and third columns show the average inflation opinions of those who believe in a positive rate of inflation according to GfK and SCB, respectively, while the second and fourth columns do likewise for those who believe in inflation between 0 and 15 per cent.

When we confine the study to the households that perceive a positive rate of inflation, the discrepancy in perceived inflation accordingly

The remaining difference mainly comes from GfK's surveys having a considerably smaller proportion of individuals who expect 0 per cent inflation.

**TABLE 6. AVERAGES FOR THE INDIVIDUALS WHOSE RESPONSES IN NOVEMBER–DECEMBER 2001 WERE ABOVE 0 PER CENT AND BETWEEN 0 AND 15 PER CENT, RESPECTIVELY PER CENT**

	GfK>0	0<GfK≤15	SCB>0	0<SCB≤15
Perceived inflation				
<i>November 2001</i>	6.59	5.15	6.02	5.27
<i>December 2001</i>	6.45	5.04	6.57	5.64
Expected inflation				
<i>November 2001</i>	5.89	4.91	4.71	4.47
<i>December 2001</i>	5.23	4.29	4.89	4.56

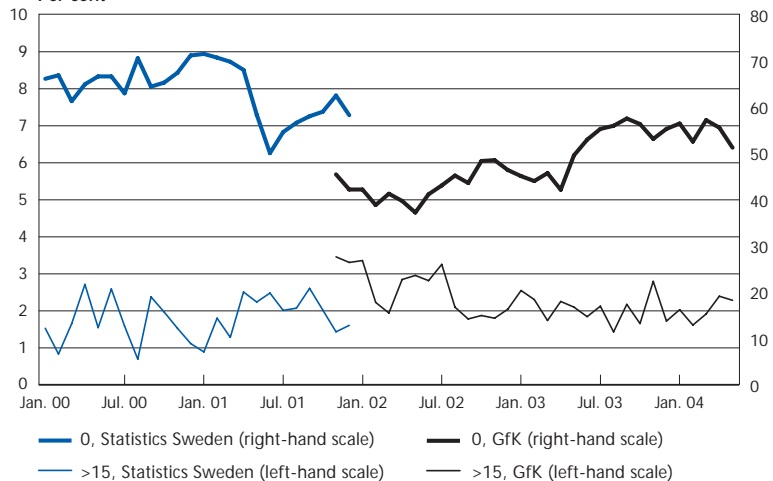
Sources: GfK, SCB and own calculations.

shrinks from aggregate figures of 1.28 and 0.96 percentage points in November and December 2001, respectively, to 0.57 and –0.12 percentage points. When we also exclude extreme responses in the form of perceived inflation above 15 per cent, the inflation perceptions in GfK’s surveys are actually lower than in SCB’s (0.12 and 0.60 percentage points lower).

For respondents with opinions between 0 and 15 per cent, the inflation opinions in the two surveys are approximately the same.

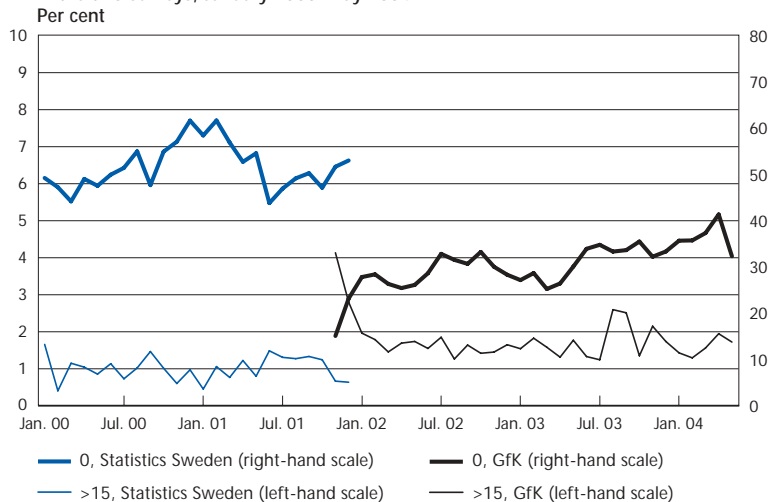
For expected inflation, the aggregated discrepancies between the surveys were 2.50 and 1.56 percentage points. These figures shrink to 1.18 and 0.34 percentage points when we include only those respondents who foresee a positive rate of inflation. When we also ignore households who believe inflation will exceed 15 per cent, GfK gives an expected rate of inflation that is 0.44 percentage points higher than SCB in November and 0.27 percentage points lower in December. So the differences in the proportions of zero responses and of responses above 15 per cent are important for understanding why the surveys give such different results. A picture of these proportions over time is presented in Figures 4 and 5.

**Figure 4. Proportion of persons who perceive inflation as 0 and at least 15 per cent in the two surveys, January 2000–May 2004**



Sources: GfK, Statistics Sweden and own calculations.

Figure 5. Proportion of persons who expect inflation to be 0 and at least 15 per cent in the two surveys, January 2000-May 2004



Sources: GfK, Statistics Sweden and own calculations.

For perceived inflation in Figure 4, the major difference is thus that SCB has a considerably larger proportion of zero responses. When GfK takes over the survey, the proportion of households that perceive 0 per cent inflation drops from around 60 to just over 40 per cent; after that the proportion rises over time to levels in line with SCB's surveys towards the end of the period. Another difference is the larger proportion of responses over 15 per cent when GfK takes over but this discrepancy is considerably smaller and disappears relatively soon.

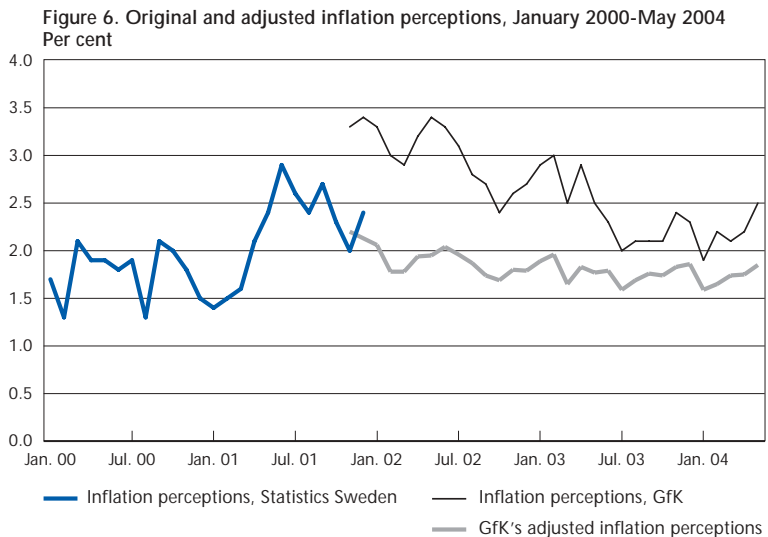
For expected inflation, the proportion for over 15 per cent inflation is almost 4 percentage points larger for GfK in November but then decreases relatively quickly and is already down around 2 per cent in January 2002. The latter figure is about 1 percentage point higher than the average for SCB's earlier surveys. The high level to start with and the subsequent decline may be a sign that it takes time for the interviewers to learn how to get households to express reasonable inflation expectations. On the other hand, GfK has consistently had a considerably smaller proportion of zero responses; the level has admittedly risen over time but is currently just under 40 per cent. In SCB's surveys the proportion of zero responses rose sharply when the Riksbank introduced an inflation target and then remained around 50 per cent.<sup>18</sup>

All in all, the most important difference between SCB's and GfK's series seems to be that GfK picks up a considerably smaller proportion of

<sup>18</sup> Bryan & Palmqvist (2004) discuss why so many households expect stable prices when an inflation target is introduced.

Consistent time series can be created by adjusting GfK's series so that the proportion of households with 0 per cent inflation opinions is the same as in SCB's.

individuals with 0 per cent inflation opinions. But this is only partly because GfK has reintroduced probing. We do not know the full explanation but by controlling for the differences in the proportion of zero responses, we can create a series that is consistent over time. When GfK's surveys are "corrected" so that the proportion of respondents who perceive 0 per cent inflation is around 64 per cent (the average level in SCB's surveys in 2000–01), the two surveys give inflation perceptions that are more or less consistent. Similarly, GfK's inflation expectations can be "corrected" so that the proportion of 0 per cent expectations is 52 per cent. These adjusted series are presented in Figures 6 and 7.



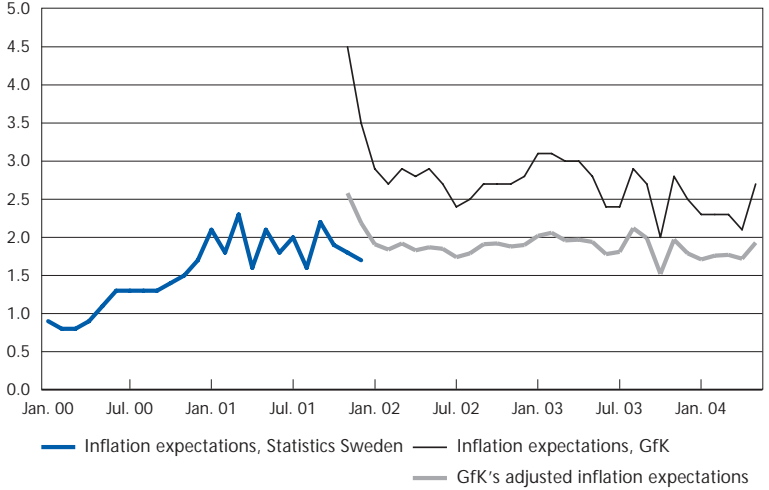
Note. In the adjusted series for GfK, the proportion perceiving 0 per cent inflation is set to 64 per cent.

Sources: GfK, Statistics Sweden and own calculations.

It will be seen from the figures that adjusting for the proportion of zero responses gives time series that are fairly consistent on the whole but not for just November and December 2001, when the proportion of extreme responses also contributed to the discrepancy.<sup>19</sup> The adjusted series naturally give a different picture of households' average inflation opinions. The profiles of the series are also somewhat different, however. For example, the original series indicates that households' inflation perceptions have fallen over time, while the adjusted series shows that this is mainly due to

<sup>19</sup> We have also created series in which both the proportion of zero responses and the proportion above 15 per cent are matched. These series deviate by about 0.2 percentage points from the adjusted series in Figures 6 and 7. As a large part of the variations in average inflation opinions is due to variations in the proportions, we prefer to leave the proportions alone as far as possible and therefore only present series in which we match zero responses.

Figure 7. Original and adjusted inflation expectations, January 2000-May 2004  
Per cent



Note. In the adjusted series for GfK, the proportion expecting 0 per cent inflation is set to 52 per cent.

Sources: GfK, Statistics Sweden and own calculations.

a growing proportion of zero responses. It is also a falling proportion of zero responses that largely explains the increase in perceived inflation towards the end of the period. For inflation expectations, the adjusted series indicates that throughout the period these were firmly anchored around the Riksbank's inflation target.

For perceived inflation, the difference between the original and the adjusted series narrows over time, from about 1.2 percentage points in January 2002 to about 0.6 percentage points in May 2004. For expected inflation the difference narrows from 0.9 to 0.8 percentage points. As the difference for perceived inflation varies over time, the break in the time series cannot be corrected with a dummy variable. For expected inflation, on the other hand, the difference between the original and the adjusted series is relatively stable. For the purpose, for example, of testing whether households' inflation expectations comply with the assumption of rationality, the break in the time series should be manageable at present with a dummy variable. But the proportion of zero responses in GfK's surveys needs to be followed in the future to see whether it approaches the levels in SCB's earlier series. If that happens, an adjustment of the type presented in Figures 6 and 7 would be preferable to dummy variables.

The difference between the original and the adjusted series narrows over time for perceived inflation and is relatively stable for expected inflation.

## Much of the difference left unexplained

The differences in socioeconomic structures and the effects of probing can explain up to 0.5 percentage points of the discrepancy.

The inflation opinions of households differ, as we have seen, between different socioeconomic groups. SCB and GfK both stratify the sample to ensure that it is representative in terms of gender, age and region. But the structure of income does differ between the two surveys. However, the income differences can only explain up to 0.1 percentage point of the discrepancy in households' inflation opinions.

A difference between the surveys that is quantitatively more important has to do with how an "about the same" response is followed up. SCB simply codes these responders as perceiving or expecting 0 per cent inflation. GfK uses a probing procedure to distinguish those who believe prices are about the same (e.g. only 1 per cent higher) from those who consider prices are completely unchanged (0 per cent inflation). These secondary questions tend to raise households' inflation opinions by up to 0.4 percentage points.

The remaining discrepancy is mainly due to GfK having considerably fewer respondents who perceive or expect 0 per cent inflation.

The remaining discrepancy is mainly due to GfK having considerably fewer respondents who perceive or expect 0 per cent inflation, even when an adjustment is made for probing. The proportion with 0 per cent inflation opinions does rise over time in GfK's surveys but is still a bit below the earlier level in SCB's surveys. We cannot explain why GfK's proportion of zero responders is so much lower but we can at least create consistent time series by adjusting for the difference in this proportion. In the case of inflation expectations, we find that it is possible at present to manage the break in the series with a simple dummy variable, for instance when testing whether households' inflation expectations comply with the assumption of rationality. But the proportion of 0 per cent inflation expectations should be monitored in future; if it were to rise and approach the levels in SCB's earlier surveys, it would no longer be possible to handle the break in such a simple manner as with a dummy variable.

The survey does not seem to be representative of educational levels and the distribution of income.

Our analysis also indicates that the survey is not representative of educational levels and the distribution of income. As households' inflation opinions vary with their education and income, it is important to make the survey as representative as possible in these respects. Inflation opinions vary more with income than with education, so it is more important to make the survey representative of income. The income concept in the HIP is the household's total annual disposable income, including taxable benefits, before taxes. One argument against stratifying the sample for this concept of income is that respondents have difficulty in arriving at a reliable figure. If that is the case, one could try stratifying the survey in terms of a variable that correlates with this concept of income, for instance the respondent's monthly wage before tax.



Finally, a break in an important time series is naturally unfortunate. In the event of future changes of method, it would therefore be desirable if the surveys were carried out in parallel for more than two months so that if a break occurs, its causes can be elucidated with a view to creating consistent time series.

## References

- Bryan, M. F. & Palmqvist, S., (2004), "Testing Near-Rationality Using Detailed Survey Data", PM, Sveriges Riksbank.
- Bryan, M. F. & Venkatu, G., (2001a), "The Demographics of Inflation Opinion Surveys", *Economic Commentary*, Federal Reserve Bank of Cleveland.
- Bryan, M. F. & Venkatu, G., (2001b), "The Curiously Different Inflation Perspectives of Men and Women", *Economic Commentary*, Federal Reserve Bank of Cleveland.
- Heikensten, L., (1999), "The Riksbank's inflation target – clarification and evaluation", *Quarterly Review* 1, Sveriges Riksbank.
- Heikensten, L. & Vredin, A., (2002), "The art of targeting inflation", *Economic Review* 4, Sveriges Riksbank.
- Jonung, L., (1981), "Perceived and Expected Rates of Inflation in Sweden", *American Economic Review* 71 (5), 961–8.
- Kokoski, M., (2000), "Alternative CPI Aggregations: Two Approaches", *Monthly Labor Review* 123 (11), 31–9.

# ■ Microfoundations of macroeconomic price adjustment: Survey evidence from Swedish firms

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*This paper presents the results of a survey on price-setting behavior conducted on a large random sample of Swedish firms. The median firm adjusts the price once a year. State- and time-dependent price setting are about equally important. The four highest-ranked explanations for price rigidity in this study (implicit contracts, sluggish costs, explicit contracts, and the kinked demand curve) have close correspondents among the top five places in two similar large-scale surveys carried out in the UK and the U.S. The results point to the importance of the long-term relations with customers for the rigidity of prices (the estimated share of sales that go to regular customers is more than 80%).*

## Introduction

The sensitivity of prices to monetary and other shocks plays a crucial role in how these shocks impact the macroeconomy. The micro evidence on price adjustment that can be used to guide our thinking in this regard is remarkably limited, however (see Taylor, 1999 for an overview). A few studies have examined price setting by a single firm or in a single market (for instance, cover prices of magazines in Cecchetti, 1986; prices in mail-order catalogs in Kashyap, 1995; gasoline retail prices in Asplund, Eriksson & Friberg, 2000; orange juice in Levy, Dutta & Bergen, 2002). These studies have typically found that prices are rigid and that fixed costs of adjusting prices provide a workable description of price adjustment. However, they also document a number of inconsistencies with fixed adjustment

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**The micro evidence on price adjustment that can be used to guide our thinking in this regard is remarkably limited.**

costs. A somewhat broader data set can be found in Carlton (1986), where prices of industrial commodities were examined, producing similar findings. The small number of micro studies available makes them a rather weak foundation for macroeconomic modeling. While it is an ingenious idea to gather data by examining prices in mail-order catalogs or on magazine covers, can we be confident that results from these consumer markets extend to other markets?

In their study, Blinder, Canetti, Lebow & Rudd asked firms direct questions on how they reason when setting prices.

Partly as a reaction to this, an alternative empirical approach was adopted in Blinder, Canetti, Lebow & Rudd (1998) (hereafter BCLR) on U.S. data (reported in part in Blinder, 1991, 1994). The idea was to ask firms direct questions, expressed in laymen's terms, on how they reason and act when they set their prices.<sup>1</sup> An important aspect of the methodology was to put the questions to a random sample designed to be representative of GDP. A similar set of questions has since been put to a large number of UK firms by Hall, Walsh & Yates (2000) (hereafter HWY), although the sample was non-random.

We investigate the price-setting behavior of Swedish firms based on more than 600 questionnaire responses.

In this paper we investigate the price-setting behavior of Swedish firms based on more than 600 questionnaire responses from a random sample designed to be representative of Swedish price-setting behavior. As discussed by BCLR, the approach adopted – to try to convey complex theories to practitioners and ask about their importance – is controversial. Responses may be sensitive to, for instance, the wording of questions, the order in which they appear, and the setting in which the questions were answered.<sup>2</sup> Even positive reviewers of the BCLR book, such as Ball (1999), remain skeptical about the results regarding the more complex questions that ask firms to evaluate various propositions with regard to how they act and think when changing prices. Indeed, such caution is well founded, and the motive for BCLR to use structured surveys based on a random sample was to allow for statistical testing and replication. As they note (p. 47): “The ability to replicate research findings is the essence of scientific inquiry; it is how you distinguish a fluke from a fact”. Will additional questionnaires using the same approach but with different wording, different samples, and under different circumstances produce similar results? If so, our confidence in the results should strengthen. Indeed, that seems to be the case. The picture painted by our study is in many ways very similar to that of BCLR and HWY. All three studies suggest that prices are

<sup>1</sup> A number of older antecedents exist, typically using smaller non-random samples (see BCLR and Hall et al., 2000 for references). One Swedish antecedent is Assarsson (1989) who interviewed 48 manufacturing companies. A parallel body of literature uses similar methods to investigate reasons for wage rigidities and other aspects of the labor market (see, for instance, Campbell & Kamlani, 1997).

<sup>2</sup> It should be noted that research based on surveys is common in other social sciences, and there is a large body of knowledge on how to ask and interpret questions (see, for instance, Weisberg, Krosnick & Bowen, 1996).

quite rigid. In this study, the median firm adjusts the price once a year. The four explanations for price rigidity that are ranked highest by the respondents in our study (implicit contracts, sluggish costs, explicit contracts, and the kinked demand curve) are also found among the top five places in terms of importance in both the other studies.<sup>3</sup>

While we see the present paper's perhaps main contribution as supporting the methodology and results in BCLR, there are also a number of important differences. Since the survey underlying BCLR was conducted in 1990–92, there was scope for updating the list of theories and issues into which we inquired.<sup>4</sup> For instance, we ask about theories on price adjustment that are based on capital market imperfections. These theories have received considerable theoretical attention, and our respondents do indeed assign them a relatively important role. Moreover, while previous studies chose not to include questions about theories that in any way implied that firms were colluding (for instance implicit collusion in repeated games à la Rotemberg & Saloner, 1986) we decided to ask about these theories, since they have received so much theoretical attention. Our list of theories is mainly based on the presentation in one of the leading graduate textbooks, that of Romer (1996).

A few words about the macroeconomic setting are appropriate before proceeding. After going through a severe recession in the early 1990s, Sweden, at the time of the survey (spring 2000), had an essentially stable economic environment with GDP growth of 4.3%, a budget surplus of 4.6% of GDP, inflation of 1.4%, and an open unemployment rate of 4.7% (all figures are averages for 2000). Monetary policy was conducted under a floating exchange rate and with a 2% inflation target.

The paper is structured as follows. First we present the survey in brief. Then we address the questions of how rigid prices are and when they change. That is followed by a presentation of the results on the different theories of price rigidity and an examination of the cyclical variability of markups and the reasons for changing the price. The study ends with a discussion of what we believe to be fruitful directions for future research.

## Survey design and some background characteristics

The population from which our sample was drawn comprised all Swedish firms with more than five employees, with the exception of sectors where

Support for BCLR's methodology and results is perhaps our paper's main contribution, though there are a number of important differences.

<sup>3</sup> The wording of questions differs between studies. What we call "sluggish costs" is represented by two separate statements in the previous two studies. Also, they ask about coordination failure rather than the closely-related notion of the kinked demand curve.

<sup>4</sup> HWY test the same set of theories as BCLR.

The population comprised all Swedish firms with more than five employees, excluding sectors where prices are determined by political means or where products are not priced.

price setting is fully determined by political means, and sectors whose products are not priced.<sup>5</sup> A questionnaire was sent by mail to the 1285 firms that had been sampled. The survey was conducted by Statistics Sweden (the national bureau of statistics) and accompanied by a cover letter signed by the governor of the Swedish central bank (Sveriges Riksbank), both of which may have contributed to the relatively high response rate of 48.7%.<sup>6</sup> To ensure that our sample included large firms, and to be able to compare behavior across groups, the population was stratified into eight groups according to the number of employees (four size classes) and to whether the firm was in the manufacturing or the services industry.

Given that the sample was stratified, we weighted results to calculate estimates of the population mean. To estimate the behavior of the average firm, we weighted the stratum means with the share of the stratum in the total population (in terms of the number of firms). Furthermore, the pricing decisions of very large firms are more important for the economy than those of a local supermarket. We therefore multiplied each response by the respective firm's overall pre-tax turnover from domestic sales to weight the results (see Appendix for further details on how the survey was conducted and how the weighting was performed). We focused on turnover-weighted results when analyzing answers to the questions. These results should give a fairly accurate view of the importance of firms' price-setting policies for the Swedish price level.

Several questions asked respondents to indicate how important various considerations are when, for instance, deciding whether to adjust the price. The alternatives given were "very important", "moderately important", "of minor importance", and "totally unimportant".<sup>7</sup> These were converted into a numerical scale where 4 corresponds to "very important" and 1 to "totally unimportant". The mean rank presented in the paper is the weighted average of these four alternatives.

When asking about prices, we had to deal with the fact that most firms sell many types of products, at home and abroad, with and without discounts, and with different service content. We asked firms to keep in

<sup>5</sup> Firms with fewer employees were not considered since a large number of these companies exist mainly for tax reasons and do not run any specific business. Examples of excluded companies are residents' associations, public service and defense, social services, education, and health (in contrast to practices in some other countries, these are publicly funded in Sweden).

<sup>6</sup> As shown in Appendix, the response rate was lower for smaller firms as well as for service-producing firms. The fact that the sample mean is constructed by weighting stratum means with the shares of the stratum in the total population enables us to avoid possible selection problems due to underrepresentation of small or service-producing firms, provided that the responses are representative within each stratum. Unfortunately, we have not been able to investigate this latter assumption.

<sup>7</sup> Some questions asked respondents to indicate the extent to which they agree with a given statement. The available responses were "agree totally", "agree to some extent", "agree only to a small extent", and "do not agree at all".

mind the actual domestic transaction price of their main product to their main type of customer when answering the questions (HWY used a similar approach, asking the respondents to focus throughout on the main product or the main product group, while BCLR asked about the most important products when investigating the frequency of price changes). The alternative of asking about several different products and types of customers is likely to have reduced the response rate considerably. Moreover, we suspected that if we instead were to ask about some “average price-setting behavior” for all the firm’s products and types of customers, respondents would have found some of the questions (on the frequency of price changes, for instance) imprecise and confusing. Nevertheless, we were concerned with how well the pattern for the main product corresponded to the price-setting patterns for other products. We therefore included a final question on whether the firm considered the answers to be representative of its other products as well. A total of 90.2% either confirmed this to be the case or reported that they sell only one product. Some further issues on data quality are discussed in the Appendix. On the whole, the answers appear well thought-out, internally consistent, and correct.

We asked firms, when answering the questions, to think of the actual domestic transaction price of their main product to their main type of customer.

Before turning to the main focus of the study – how firms set their prices – it is worth presenting the results of some background questions. Table 1 presents an overview of the distribution of sales by type of customer, the firm’s relationship with its customers, and its competitive situation. The estimated average proportion of sales made to regular customers – those with which the firm expects to do business again – is 86.2%. The typical customer is another firm; the average share of sales made to other companies is 72.6%, and a further 4.8% of sales are directed at other companies within the same corporate group. The average share of sales that are directed at households is only 11.6%. This is similar to the findings of BCLR where 20.8% of sales were directed at consumers and 70.4% at businesses. The turnover-weighted estimate of the proportion of firms, which perceive that they have no competitors within their main line of business, is 4.3%, while the proportion that claims to have 12 competitors or more is 27.5%. This leaves some two-thirds of firms with 1-11 competitors, i.e. in markets that we typically think of as oligopolistic.

To sum up, while standard theory focuses on an arms-length onetime sale by a manufacturer to consumers, the results here indicate that the typical transaction involves two firms that expect to do business again in an oligopolistic market. Before proceeding, it is worth emphasizing that an overwhelming majority of the firms report that they indeed have the ability to set prices: 90.6% of respondents answered that “the company

TABLE 1. AVERAGE RESPONSES TO BACKGROUND QUESTIONS

Question in the survey	Alternative	Percentage share (turnover-weighted)
Does your company have the ability to set the price of its main product itself, or is it entirely set by, for instance, a parent company/group or otherwise outside the company?	Sets price itself	90.62
	Price set by parent...	9.06
	No response	0.32
In your opinion, how many competitors does your company have within your main field of operations? Please include only those companies with which you are in direct competition. If your company is a tobacconist, for instance, you should only include the companies within your region, town, or district that you consider direct competitors!	None	4.32
	1	20.01
	2	1.3
	3	23.15
	4	3.83
	5–8	16.51
	9–11	3.31
>12	27.55	
	Category	Percentage share (turnover-weighted)
Please give an approximate description of how the sales of your main article/service are distributed between different types of customers	Households	11.59
	Companies and divisions within our own group	4.78
	Other companies	72.65
	Other types of customers	9.54
Approximately how large a percentage of the sales of your main article/service is to <i>regular</i> customers with whom you will do business again, and how large a percentage is to occasional customers?	Regular customers	86.16
	Occasional customers	12.39

can set the price itself” rather than “the price is set by a parent company/group or otherwise outside the company”.

## When do prices change?

### HOW OFTEN DO PRICES CHANGE?

We asked the firms “How many times a year does the price of your main article/service change?” The estimated turnover-weighted proportion of firms in the population that adjust the price of their main product once a year was 40.3%, and an additional 27.1% adjust prices less than once a year. This is well in line with previous micro studies of price rigidities – indeed, in his summary of findings on price adjustment, Taylor (1999) notes that prices change on average once a year. Compared to the survey studies of BCLR and HWY, prices change somewhat less frequently. In BCLR, about half of firms changed prices once a year or less, whereas the corresponding number in our study is close to 70%. In HWY, the median firm changed its price twice in the year preceding their study (conducted in September 1995). One reason for the somewhat divergent results may be that the frequency of price changes is correlated with inflation, which was below 1.5% at the time of our study, whereas it was around 4% at the time of the studies of both BCLR and HWY. Another possible reason for the somewhat divergent results is that large firms, which tend to



adjust prices more frequently, were overrepresented in the sample of HWY.<sup>8</sup>

We experimented with regressions that examine how the number of price changes relates to market structure variables. For instance, running an ordinary least squares regression of NP (a measure of the number of price changes per year) on LARGE (dummy variable equal to 1 if the firm has more than 200 employees), MANUF (dummy variable equal to 1 if the firm is in the manufacturing sector), VARIA (dummy variable equal to 1 if the firm estimates that more than 50% of costs are variable), REGUL (the share of customers that the firm classifies as regular customers), HOUSE (the reported share of customers that are households), and HCONC (dummy variable equal to 1 if the firm reports having three competitors or fewer) yields (with *t*-statistics in parentheses):

$$\begin{aligned}
 NP = & 4.28 + 0.54 * LARGE - 0.46 * MANUF + 0.29 * VARIA + 0.002 * HOUSE \\
 & (7.50) \quad (2.87) \quad (2.38) \quad (1.58) \quad (0.51) \\
 & - 0.015 * REGUL - 0.73 * HCONC \\
 & (2.31) \quad (3.21) \\
 \text{Nobs} = & 613 \qquad \qquad \qquad \text{Adj. } R^2 = 0.05 \qquad (1)
 \end{aligned}$$

Firms tend to adjust their prices more frequently if they are large, are not operating in manufacturing, have a large share of variable costs, have relatively few regular customers, and operate in markets with more than just a couple of competitors. The share of sales to households seems virtually unrelated to the number of price changes.

We examined many of the questions to see if we could relate the responses to observable structural variables such as those used in equation (1). In general, the explanatory power of such regressions relating conduct to structure is low. This should come as no surprise; rather it is typical of cross-sectional studies on industry data (see, for instance, Bresnahan, 1989, and Schmalensee, 1989 for discussions). The reason is that markets differ along so many lines, including cost structure, the nature of strategic interaction, and the shape of demand curves, that we should not expect to find stable relations between a few variables, such as the number of competitors and the extent of price rigidity, in cross-sectional data. Some of the structural effects seen in the regression (equation 1) seem relatively robust, however, in particular, the finding that large firms adjust more frequently (also found in BCLR and HWY) and that firms in more concentrated markets adjust less frequently (see, for instance, Carlton, 1986). Explanatory power in regressions, such as the

<sup>8</sup> BCLR also studied larger firms; their sample excluded firms with less than U.S.\$ 10 million in sales.

above, could be improved by adding variables that capture firm conduct or beliefs (for instance, the use of written contracts, or how highly different explanations of price rigidities are rated), but it would then become difficult to view these additional explanatory variables as exogenous. In any case, the aim of our work is to understand the prevalence of different types of behavior, and we predominantly focus on the aggregate picture that emerges.

#### PRICE REVIEWING: TIME-DEPENDENT VERSUS STATE-DEPENDENT PRICING RULES

The two approaches to price adjustment – time-dependent and state-dependent price setting – have different implications for when prices adjust.

The stability of prices indicates that there are costs associated with changing them. The two main approaches to model price adjustment when it is costly to change prices – time- and state-dependent price setting – have different implications for *when* prices adjust. A firm is said to follow a *time-dependent rule* if it changes its price at certain time intervals. These intervals may be fixed as in the original staggered contract model developed by Taylor (1980) or, in order to simplify the mathematics, stochastic as in Calvo (1983). On the other hand, under a *state-dependent rule*, the price is adjusted when the deviation between the current price and the optimal price has become large enough to make the profit gained from adjusting the price outweigh the cost of adjustment.<sup>9</sup> Thus, a fundamental difference between the two types of rules is that when events motivate a price change, a state-dependent rule predicts an immediate response, provided the shock is sufficiently large, whereas under a time-dependent rule firms will wait until the “time has come”.

While models based on time-dependent pricing tend to be fairly tractable, generating well-behaved dynamic adjustment paths of the price level to innovations in nominal money, the impact in models based on state-dependent pricing is generally more complex and allows for a wide range of outcomes. The extreme case is the neutrality result of Caplin & Spulber (1987), where a small number of firms making large adjustments lead to money being completely neutral.

Also under a time-dependent rule, the price will change only if this is motivated by changed economic conditions (a price change will always occur on an exogenous date, but not necessarily on *all* such dates). Thus, the relevant question in the survey concerns the reviewing of prices rather than actual changes, the results of which are reported in Table 2.

The estimated turnover-weighted proportion of firms that review

<sup>9</sup> The seminal paper is Barro (1972). Later examples of studies that model state-dependent pricing are Sheshinski & Weiss (1983) and Caplin & Leahy (1997).

TABLE 2. FREQUENCY OF PRICE REVIEWS

Question in the survey	Alternative	Percentage share (turnover-weighted)
How often do you actively review the price of your <i>main article or service</i> and assess whether or not it should be changed?	Daily (or more often)	19.04
	Review at specific time intervals	23.12
	Review mainly at specific time intervals, but also in connection with special events (e.g., a drastic change in the price of inputs)	21.68
	Review made in connection with special events	28.19
	Other	7.05
How often do you review prices in according to a specific time interval?	Every week	3.92
	Every month	8.14
	Every quarter	15.32
	Once a year	65.95
	Every second year	0.019
	Other	6.63
Do you review the prices of several articles and services at the same time when conducting price reviews?	All prices reviewed at the same time	23.14
	Most prices reviewed at the same time	15.28
	Some prices reviewed at the same time	13.75
	Only one price reviewed at a time	41.4
	Sell only one article	3.02

prices at specific intervals is 23.1%, and a further 21.7% review mainly at specific intervals. We interpret this as 44.8% of the firms following a time-dependent rule under normal conditions. If we assume that firms that review prices continuously (daily or more often) adjust their prices more or less immediately in response to special events, an estimated 47.2% follow a state-dependent rule under normal conditions.<sup>10</sup> Finally, note that when one includes firms that mainly review at specific time intervals as well as in response to particular events, a total of 68.9% follow a state-dependent rule if sufficiently significant events occur. This finding that firms will deviate from time-dependent pricing when shocks are sufficiently large is intuitively reasonable, but has, to our knowledge, not been documented before.<sup>11</sup>

The results indicate that a time-dependent rule is typical for 44.8% of firms and a state-dependent rule for 47.2%.

Our results thus point to a more important role for state-dependent pricing than previous survey studies at first suggest; in BCLR and HWY, 60% and 79%, respectively, reported that they use time-dependent rules. One could speculate that Sweden's low-inflation environment at the time of the survey, with little need for recurrent inflation-driven nominal price adjustments, helps explain this pattern. Furthermore, BCLR (p. 90) note that for several of the firms that responded as following time-dependent rules, answers to other questions indicated that they actually follow state-

<sup>10</sup> The estimated turnover-weighted proportion of firms that reviewed prices at least daily was 19% and a further 28.2% reviewed in connection with special events. Clearly, 44.8 and 47.2 do not add up to 100; the remainder of firms specified "other" in response to this question.

<sup>11</sup> In HWY, 10% of the companies said that they performed a mixture of time- and state-dependent pricing. However, in BCLR and HWY, the questions on time- and state-dependent pricing were not structured in a way that allowed for a change of price-setting rule in the case of significant events. HWY note, however, that it is hard to believe that time-dependent price-setters "would not review or change prices in response to an event if that event was associated with a dramatic enough change in the state or the environment" (p. 432, footnote 12).

dependent rules: “the fraction with meaningful periodic price reviews declines to about 40% of the total”. Lastly, HWY’s question was whether prices were reviewed at a specific frequency or in response to particular events. The firms that perform daily reviews (19% in our study) would then have been likely to answer “at specific intervals” and contribute to raising the proportion that follows time-dependent reviewing relative to our results.

We also examined if the decision to follow state- or time-dependent price setting could be explained by market structure, using the same explanatory variables as in equation (1). Operating in the manufacturing sector, having a greater share of household customers, and having a greater share of regular customers are all associated with a statistically significant higher probability of using time-dependent price setting. Being in a tight oligopoly is associated with a statistically significant lower probability of using time-dependent pricing. When strategic interaction is important, it is not surprising that firms want to be prepared to change prices as soon as competitors take action. Again, the predictive power of the regressions is low (pseudo  $R^2$  is 0.05), as is to be expected from the empirical literature on industrial organization.

#### SYNCHRONIZATION OF PRICE REVIEWS

For the firms that practice time-dependent price reviewing, a yearly interval is used by most or 65.9%, followed by a quarterly interval used by 15.3%.

For the firms that use time-dependent price reviewing, a yearly interval is most frequent, with a turnover-weighted proportion of 65.9%, as shown in Table 2. The second most chosen frequency is quarterly price reviews, as indicated by 15.3% of the turnover-weighted observations. Given the prevalence of yearly price reviews, their specific timing is of interest; do most firms review prices in a certain month or are price reviews evenly spread across the year? It turns out that there is a considerable bunching of price reviews over the year; 44% of firms that specified a particular month, reviewed prices in January or December. The timing of reviews may partly be driven by the fact that new government regulations and taxes often take effect on January 1. A total of 16 and 11% reviewed in October and November, respectively, with the rest of the months receiving more or less equal shares, except July, which was not specified. Thus, while there is considerable synchronization among firms that use annual price reviewing, it should be kept in mind that the importance of synchronization is tempered by the fact that many firms use state-dependent price setting or review quarterly. Nevertheless, the reported concentration of price reviews to the turn of the year is consistent with the observed monthly changes in the consumer price index; the mean (1980–2001)

absolute change in the consumer price index in January was 1.25%, compared with 0.52% in an average month.

#### SYNCHRONIZATION WITHIN FIRMS

Results regarding synchronization within firms point to a bimodal distribution. The turnover-weighted proportion of firms that review one price at a time is 41.4%, while 38.3% review the prices of all their products, or most of their products, at the same time. Thus, roughly the same percentage of firms performs either a large degree of synchronization or none at all. The proportion of firms that reviewed most prices at the same time was much larger among smaller firms. This is consistent with the findings of Lach & Tsiddon (1996), who in their study of price changes in grocery stores found high synchronization within firms.

The proportion of firms that review one price at a time is 41.4%, while 38.3% review all or most of their product prices all at once.

#### WHY WAS THIS TIME INTERVAL CHOSEN FOR PRICE REVIEWS?

We also asked firms that follow a time-dependent rule to rank various explanations for the chosen time interval. These results are shown in Table 3.<sup>12</sup>

A two-sided *t*-test rejects the hypothesis that explanations have the same mean rank at the 1% level of significance. Fear of disturbing customer relations and a low frequency of shocks were clearly the most important reasons for the chosen time intervals. These findings are consistent with the ranking of different theories of price rigidities that we now turn to.

### Theories of price rigidity

The survey contained a section where the respondents were confronted with different theories of price rigidity and asked how well these theories describe the situation in their firm. Of course, conveying central aspects of theories by translating them into short non-technical statements is difficult. Nevertheless, as argued at length by BCLR, if a particular theory for rigid prices is important, we expect price setters to recognize the chain of reasoning associated with that theory.

Firms were asked how well different price rigidity theories describe their own situation.

Early criticism of (fixed) costs of nominal price adjustment as a reason for price rigidity noted that these adjustment costs often needed to be

<sup>12</sup> Note that the number of observations differs between questions, because the number of firms that answered "not applicable/do not know" or abstained from answering differs. In general, the questions that received lower scores also had a somewhat higher share of firms answering "not applicable/do not know" or not answering at all.

**TABLE 3. THE IMPORTANCE OF DIFFERENT EXPLANATIONS FOR THE CHOSEN INTERVAL OF PRICE REVIEWS (TURNOVER-WEIGHTED RANK)**

Question: Why have you chosen this particular time interval for reviewing the price? How well do the following statements agree with the situation in your company?

Statement in survey	Mean rank	Standard deviation	No. of observations
The price could not be changed more often without a risk of upsetting customer relations	3.48	0.73	309
The factors influencing the price do not change often enough to motivate reviewing the price more often	3.03	0.74	313
It would be too costly in terms of time and/or money to gather relevant information and discuss price-setting decisions more often	1.97	1.07	295
We do not determine the time interval ourselves; it is set by the parent company/group, an authority, etc.	1.70	0.68	270

implausibly large to motivate rigid prices. The new Keynesian economics of the 1980s taught us that menu costs may be relatively small to individual price setters, but that they can accumulate to have large macro effects (see Mankiw, 1985). More generally, menu costs do not need to be large for the price to remain unchanged even in the face of relatively large monetary shocks if firms have little incentive to adjust their prices when aggregate output changes. Following the presentation in Romer (1996), one may think of a firm that is deciding whether to change its price in the face of a fall in aggregate demand with prices of other firms held fixed. The fall in demand implies a downward shift in the profit function, which is a function of the (relative) price. Unless the profit function shifts in a perfectly parallel fashion, a new price will become optimal. The closer the new optimal price is to the old one, the smaller the incentives will be for the firm to change its price. The sensitivity of the profit-maximizing price to changes in aggregate demand is often referred to as the degree of real rigidity. The firm's incentive to adjust its price also depends upon the curvature of the profit function. If the profit function is relatively flat, moving to the new optimum makes little difference in terms of profits. A prime candidate for making the profit function relatively flat around the optimum is that costs are relatively stable.

On a general level, we were interested in whether costs of adjusting the nominal price or low incentives to adjust the price were seen as the main reason for not changing prices. We therefore asked: "Assume that you notice that there has been a slight increase in demand for your main article/service. What is normally the strongest argument for leaving the price unchanged?" The respondents were given the following alternatives: (1) it is too costly to change the price (relabeling, new price lists, etc.), (2) it is important not to diverge from the prices of competitors, and (3) it is better to leave the price unchanged as long as the costs do not change. An overwhelming majority chose one of the latter two alterna-

tives, with more or less equal shares given to each of these explanations. In fact, the turnover-weighted estimate of the proportion that considered actual costs of changing prices to be the most important factor was 0.2%. Thus, perhaps not very surprisingly, costs of nominal price adjustment do not in themselves appear to be a primary reason for leaving prices unchanged. Note, however, that even though menu costs are considered relatively unimportant for the price change decision, they may be non-trivial, as found in a study of supermarket pricing by Dutta et al. (1997).<sup>13</sup>

We now turn to a detailed discussion of the different theories. Respondents were asked to rank the importance of each of the statements designed to summarize the different theories for why prices might be sluggish. The average, turnover-weighted results are shown in Table 4. The dashed lines indicate that a two-sided *t*-test rejects the hypothesis that the explanations immediately above and below the line have the same mean rank at the 5% level of significance. In table 4, we also made an attempt to classify the different theories as reflecting either *costs* of adjusting the nominal price (nominal rigidity) or *low incentives* to adjust the relative price (here referred to as real rigidity).

According to the theory of *implicit contracts*, transaction costs induce firms and customers to enter into implicit agreements that stabilize prices when demand fluctuates. This idea is closely related to work by Okun (1981) on what he called “the invisible handshake”, which, in turn was based on work aimed at explaining wage rigidity.<sup>14</sup> Even though Okun appears to have intended the implicit contract theory to apply to nominal rather than real prices, this is by no means obvious.<sup>15</sup> Typically, customers are assumed to care about real, or relative, prices, and not nominal ones. However, in our survey, we asked if a price change would risk damaging customer relations, *even if competing companies were also to change their price*. This addition was made primarily as a way of separating this motive for price stickiness from the theory of the kinked demand curve, where a price increase results in a substantial loss of sales due to a higher relative price. Thus, firms appear to believe that customers appreciate a stable nominal price and that they may be dissatisfied even if the price relative to that of competitors remains unchanged. One reason why this version of implicit contracts may not still be accurately

Respondents were asked to rank the importance of alternative theories, summarized in simple terms, of why prices might be sluggish.

<sup>13</sup> We also asked questions aimed at uncovering the nature of adjustment costs – whether firms mainly see them as fixed, increasing in the size of the price change (as in Rotemberg, 1982), or a combination of the two (as in Slade, 1998). Fixed adjustment costs were seen as the most important (90.5% of those who answered), but the question appears to have been conceptually difficult, and a full 43.7% answered “do not know/not relevant”. Similarly, a question on whether fixed costs varied over time (as in Caballero & Engel, 1993) appears to have been difficult (15.3% answered “do not know/not relevant”). 49 percent answered that adjustment costs were stable over time and a further 30.7 that they varied, but too little to influence the pricing decision.

<sup>14</sup> See for instance Azariadis (1975).

<sup>15</sup> See BCLR (p. 150).

regarded as a nominal stickiness is that even if the price relative to the closest competing firms does not change, the price relative to other products and services may do so. Table 4 (page 58–59) therefore shows the theory in both columns. It is not surprising that a fear of upsetting customer relationships is an important consideration when setting prices given the large share that are regular customers. The mean turnover-weighted score given to the implicit contract theory is 3.06 for firms with at least 90% of sales to regular customers, whereas the mean score is 1.94 for firms with less than 10% of their sales to regular customers.

The theory that we have chosen to call *sluggish costs* is represented by the statement “the costs of the firm’s inputs do not vary much over the business cycle, which implies that the price of the firm’s output does not change much either”. Thus, it embraces two hypotheses: that the cost of inputs is an important determinant of the firm’s price-setting decision, and that these costs do not fluctuate much with changes in aggregate demand. In a way, this does not explain price stickiness; it basically argues that some prices are stable because other prices – those of inputs – are also stable. Nevertheless, it suggests that input-output linkages among firms along a multi-stage production process may play an important role in explaining aggregate price rigidity.<sup>16</sup>

The third-highest score is given to renegotiation costs of *explicit contracts*, which clearly can be regarded as a nominal rigidity. Of course, explicit contracts explain nominal price stickiness in a trivial way and beg the question why such contracts are used in the first place. In a number of background questions, we further investigated the use of explicit contracts. We asked: “Approximately how large a part of the sales of your main article/service are through contracts signed in advance, which specify for example a particular quantity and/or particular sales price for a specific period of time?” The use of written contracts appears widespread, with the estimated turnover-weighted proportion of firms that have at least three-quarters of their sales specified through written contracts being 48.2%. Of the firms that do use written contracts, 65.5% use contracts that specify both price and quantity, while a further 32.1% use contracts that only specify price. Most firms respond that their typical contract is valid for a maximum of one year – the turnover-weighted proportion that is valid for half a year or less is 36.2%, and a further 46.0% are valid for 7–12 months. Only some 2% of firms responded that a contract covered two years or more. Also, note that even though the common use of contracts appears to be an important source of price rigidity, it need not imply that prices remain unchanged during the contract period;

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<sup>16</sup> This idea is explored in, for example, Basu (1995).



29.5% of firms (turnover-weighted proportion) responded that the price specified in a contract was typically indexed to inflation or to some cost index. Finally, it should be stressed that a significant proportion of firms make little use of written contracts – 18.7% do not sell through written contracts at all, and a further 16.8% made only 1%–25% of their sales through written contracts.

Among the theories that more explicitly involve interactions between competitors, the *kinked demand* curve received the highest score. The argument here is that the firm assumes the worst when considering which price to set. If it raises its price, it expects that other firms will not follow suit and hence it will lose market shares. If, on the other hand, it cuts its price, it assumes that competitors will promptly do the same. Thus, even substantial changes in marginal costs may not induce a change in price. A suggested explanation for the kinked demand curve is imperfect information among customers that makes existing customers more sensitive to price increases than prospective new customers are to price decreases (see, for example, Stiglitz, 1979; Woglom, 1982).

The fifth-highest rank is given to *countercyclical cost of finance*. The idea here is that capital market imperfections make the cost of finance higher in recessions, when firms' cash flow and credit worthiness are lower (see, for example, Kiyotaki & Moore, 1997). This contributes to upholding marginal costs, and thereby prices, in a downturn. The relatively high score given to this may partly be explained by the credit crunch that Sweden experienced in the early 1990s, which is still likely to be fresh in memory.

A closely related reason for the firm to keep prices high when demand is low may be *liquidity constraints*. This theory combines the assumption that a firm's stock of customers responds only gradually to price changes with the assumption that capital market imperfections create liquidity constraints. A reduced cash flow during a recession may cause a firm to keep its price up, sacrificing future customer stock because liquidity constraints make today's revenue extra valuable (see, for instance, Gottfries, 1991; Chevalier & Scharfstein, 1996).

*Pricing thresholds* is a theory based on consumer psychology. Retailers often price at SEK 49.95, for example, instead of SEK 50. Apparently, they assume that their product will sell considerably better at a price marginally lower than some specific, presumably psychologically significant, figure. Hence, they may be reluctant to change the price, even when faced with an increase in demand. While hard to reconcile with the standard versions of rational consumer behavior, the explanation, nevertheless, appears to carry some weight as an explanation of price rigidities.

The theory we have called *shifting customer clientele* suggests that

TABLE 4. THE IMPORTANCE OF DIFFERENT THEORIES OF PRICE STICKINESS (TURNOVER-WEIGHTED RANK)

Question: There are a number of theories as to why companies sometimes choose not to change the price or only to change the price slightly. Here are a number of theories presented in brief. How important are these theories when it comes to explaining potential price inertia and price adaptation in your company during economic booms and economic recessions?

Theory	Statement in survey	Mean rank Nominal	Real	Standard deviation	No. of observations	Place in Blinder et al. (U.S.)	Place in Hall et al. (UK)
Implicit contracts <sup>a</sup>	Customers prefer a stable price and a change could damage customer relations, even if competing companies also change their prices	3.00	3.00	0.82	523	4	5
Sluggish costs	The cost of the company's inputs does not change much over the business cycle, which contributes to the price of the company's article/service remaining roughly the same		2.45	0.81	463	2, 9 <sup>b</sup>	2, 6 <sup>b</sup>
Explicit contracts	The price is regulated in formally-written contracts that are costly to renegotiate	2.27		1.10	460	5	1
Kinked demand curve	The price is sticky because the company loses many customers when it is raised, but gains only a few new ones when the price is reduced		2.17	1.00	486	1 <sup>c</sup>	3 <sup>c</sup>
Countercyclical cost of finance	In a recession the costs of the company's external financing, e.g. bank loans, increase. This contributes to keeping the price up during recessions		2.08	0.76	461	-	-
Liquidity constraints	In a recession, when demand is weak and cash flow is low, the price may need to be kept up to cover costs and to finance current investment projects		1.85	0.75	471	-	-
Pricing thresholds	Psychological "thresholds" for the price exist. The article/service is assumed to sell much better at SEK 49.95 than SEK 50.05, for example	1.85		1.05	467	8	4
Shifting customer clientele	The customer mix changes over the business cycle so that in a recession, the company loses its least loyal customers, while more loyal customers remain. As the latter are less price sensitive, the price can be maintained during a recession		1.75	0.87	450	7	9

TABLE 4. THE IMPORTANCE OF DIFFERENT THEORIES OF PRICE STICKINESS (TURNOVER-WEIGHTED RANK)

Theory	Statement in survey	Mean rank Nominal	Real	Standard deviation	No. of observations	Place in Blinder et al. (U.S.)	Place in Hall et al. (UK)
Deviation from implicit collusion	Price wars are more common when demand in the economy is high, which contributes to keeping the price down during booms		1.68	0.88	460	-	-
Thick-market (supply-side)	When there is a high level of economic activity, the company's costs for reaching customers and/or finding suitable sub-contractors decline. This contributes to keeping prices down during booms		1.60	0.75	454	-	-
Physical menu costs	There are "physical" costs connected with price changes, e.g. printing new price lists, the cost of notifying retailers, etc.	1.54		0.68	475	6 <sup>d</sup>	11
Thick-market (demand-side)	When there is a high level of economic activity and consumption is high, customers have a greater tendency to compare prices. Customers are thus more sensitive to price changes during booms than during recessions		1.50	0.75	475	-	-
Information-gathering costs	It is costly in terms of time and/or money to gather relevant information for pricing decisions	1.40		0.70	491	6 <sup>d</sup>	-

Notes: <sup>a</sup> As it is unclear whether implicit contracts in the form implied by the question in the survey are best characterized as a nominal or a real rigidity, the rank is displayed in both columns.

<sup>b</sup> The wording used to describe "sluggish costs" approximately corresponds to two separate statements in both BCLR and HWY: "price increases are delayed until costs have risen" (called cost-based pricing) and "variable costs are roughly constant as production rises" (called constant marginal costs).

<sup>c</sup> BCLR and HWY essentially use the wording "firms tend to hold back price changes, waiting for other firms to go first" when describing the theory called coordination failure. We assume that this hypothesis is approximately manifested by the flat upper part of the kinked demand curve, where "the firms will lose a lot of customers when raising the price".

<sup>d</sup> BCLR use a definition "costly price adjustment", which covers both of the hypotheses "decision-making costs" and "physical menu costs".

the elasticity of demand is procyclical because the composition of customers differs over the business cycle (see, for example, Bils, 1989). The assertion in our questionnaire is based on a model in which firms have both loyal customers with low price elasticities and occasional customers with higher price elasticities. The loyal customers tend to stay put even during a cyclical contraction, which implies that the price is kept relatively high.

The theory called *deviation from implicit collusion* suggests that it is more tempting to defect from a collusive agreement when demand is relatively high. As a consequence, markups have to be kept lower in booms to provide sufficient incentives for implicit collusion (see, for instance, Rotemberg & Saloner, 1986; Rotemberg & Woodford, 1991, 1992). Of course, it may be problematic to ask firms straightforward questions related to collusion, even though implicit collusion in itself is not illegal.<sup>17</sup> In the questionnaire, we therefore used the wording “Price wars are more common when demand in the economy is high, which contributes to keeping the price down during a boom”, which we believed to be fairly uncontroversial.

Price stickiness may also emanate from so-called *thick-market effects*, both on the demand side and the supply side. On the *demand side*, the idea is that consumers tend to increase their search activity when they shop more intensively, i.e. during periods of high economic activity (see Warner & Barsky, 1995). One reason for this may be that there are economies of scope involved in such a search. As a result, the elasticity of demand is greater in peak periods, which tends to keep prices down. On the *supply side*, it is assumed that when economic activity is high, it is easier for the firm to sell its products and to find suitable subcontractors. This tends to suppress costs, and hence prices, during booms.<sup>18</sup>

Low scores are given to two menu-cost theories of the more traditional type. *Physical menu costs*, such as printing new price lists and notifying retailers, received a mean score between “totally unimportant” and “of minor importance”. An often-suggested alternative, *information-gathering costs* (see, for example, Ball & Mankiw, 1994) scored even lower.

Throughout, there is a high correlation between our findings and the results obtained by BCLR and HWY for the U.S. and the UK, respectively. The last two columns of Table 4 show the ranking of theories in these two studies. The precise wording aimed at representing the different theories

The four highest-ranked theories in our study were also ranked among the top five in the other studies.

<sup>17</sup> This was also the reason why BCLR and HWY did not ask about this theory.

<sup>18</sup> The classic reference is Diamond (1982).

differs somewhat, as does the set of theories tested.<sup>19</sup> Interestingly, however, the four highest-ranked theories in our study are also found within the top five places in the other studies, given our interpretation of how the presentation of the theories in BCLR and HWY relates to that in our study (notes to Table 4 explain the differences). Implicit and explicit contracts, sluggish costs, and the kinked demand curve are the explanations for rigid prices that firms judge to be the most important.

Thus, the studies paint a very similar picture. The risk of disturbing customer relations by changing the price is a central cause of price rigidity. In addition, interaction with competitors matters insofar as a single firm appears to be reluctant to raise its price ahead of other firms. Explicit contracts that fix the price for a certain period are an important reason for nominal price stickiness. In addition to these demand-related reasons, limited variability of costs is a key explanation of stable prices over the business cycle. While even this short list may appear to indicate that everything but the kitchen sink is important, we shall argue in our concluding discussion that there may be a rather precise lesson to be learned from the answers.

#### ON THE CYCLICALITY OF MARKUPS

The above test of theories draws on two related bodies of literature. One looks at the reasons why costs of adjusting nominal prices imply either a gradual adjustment of the price to a new equilibrium following a shock, or no adjustment at all. These theories not only encompass the whole nominal rigidities camp but also include the kinked demand curve. The other set of theories focuses explicitly on how the profit-maximizing markup develops over the business cycle. For instance, even if there were no costs associated with adjusting prices, the optimal markup might be lower in a boom. The markups would then be countercyclical. The issue of whether markups are countercyclical or procyclical (lower or higher in booms) is important since procyclical markups would tend to dampen fluctuations in economic activity, whereas countercyclical markups would amplify fluctuations. While many of the models explicitly predict countercyclical markups, for instance the relatively highly-ranked countercyclical cost of finance, the test of the theories above does not give us any conclusive evidence on the cyclical behavior of markups. For instance, countercyclical

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<sup>19</sup> HWY note that some of the suggested explanations in both BCLR's study and their own actually are symptoms rather than causes of price stickiness; for example the hypothesis that firms in the short run adjust stocks rather than prices. In the set of theories used in this study, we included, in particular, a number of potential sources of real rigidity from Romer (1996). We also excluded some of the theories that scored the lowest in BCLR's study, e.g. "judging quality by price".

costs of finance may exert important upward pressure on prices in a recession, but this may be more than outweighed by other factors.

In anticipation of this, the respondents were asked to rank how well a number of statements described the development of markups over the business cycle. Let us first note that marginal cost is difficult to estimate, except for very simple production technologies, and that firms' pricing decisions often tend to be based on average variable costs.<sup>20</sup> For this reason, we are unwilling to draw any strong conclusions about how markups over *marginal* costs develop over the business cycle based on the answers to this question. An increase in marginal costs is clearly associated with an increase in average variable costs, but the relationship between marginal and average variable costs is not necessarily one-to-one. For instance, if we increase quantity so that we move from a relatively flat section of the marginal cost curve to a steeply upward-sloping section, marginal costs will rise sharply whereas average variable costs will only gradually reflect the higher marginal costs.

A constant markup, changing the price proportionally when costs change, seems to be most common.

As reported in Table 5, the most common practice seems to be the use of a constant markup, changing the price proportionally when costs change. Next come procyclical markups while, interestingly, countercyclical markups are given the lowest mean rank, halfway between "agree only to a little extent" and "do not agree at all". A two-sided *t*-test rejects the hypothesis that the alternatives have equal rank at the 5% level of significance. The results are consistent with a sizeable literature that finds that markups on average variable costs are procyclical or independent of the business cycle (see, for instance, Domowitz, Hubbard & Petersen, 1986; Machin & Van Reenen, 1993; Ghosal, 2000). The results may also be consistent with countercyclical markups on marginal costs if many respondents, as one might suspect, had average variable costs in mind when answering the question. Following the logic above, marginal costs will vary at least as much as average variable costs over the business cycle; so if markups on average variable costs are constant, markups on marginal costs will be countercyclical. Despite this, the low rank of countercyclical markups surprised us; Rotemberg & Woodford (1999) interpreted the evidence in their survey as generally supporting countercyclical markups (on marginal costs).

A more definite resolution of whether markups on marginal costs are pro- or countercyclical is likely to emerge only through a considerable

<sup>20</sup> BCLR had some doubts about the responses on marginal costs, with only slightly more than 10% of firms saying that marginal costs were increasing in quantity. One could hypothesize that the problems associated with the concept are not so much due to business people not understanding the concept of marginal costs (after all, any MBA has had at least some exposure to economics). Rather, we expect them, just as empirical economists, to have difficulty estimating the marginal cost for all but the simplest techniques.

**TABLE 5. THE IMPORTANCE OF STATEMENTS REGARDING MARKUPS (TURNOVER-WEIGHTED)**

Question: The price of an article/service can be expressed as a percentage markup on the variable cost of producing an additional unit (the marginal cost). How well do the descriptions below of the markup on the main product agree with circumstances at your company?

	Statement in survey	Mean rank	Standard deviation	No. of observations
Constant markup	The markup is relatively constant. When costs change, the price is changed to a corresponding degree	3.01	0.74	497
Procyclical markup	When demand increases, variable costs rise less than the price the company can charge for the article/service, i.e. the markup increases	2.52	0.85	466
Markup varies unsystematically in relation to demand	The markup varies over time, but not in any systematic way in relation to demand	2.38	0.80	465
Countercyclical markup	When demand increases, variable costs increase more than the price the company can charge for the article/service, i.e. the markup declines	1.55	0.71	466

number of studies of industries with a very simple cost structure, so that one can be reasonably sure that good data on marginal costs exist, or by using structural models to estimate markups without using cost data (see, for instance, Genesove & Mullin, 1998 for an application and evaluation of this method).

#### WHY DO PRICES CHANGE?

We also asked firms to rank the importance of different motives for actually changing their price. While not necessarily linked to price rigidity, we felt that this was an important aspect for understanding the decision to adjust prices. These results are shown in Table 6. As before, a dashed line separates the cases where a two-sided *t*-test rejects the hypothesis that explanations have the same mean rank at the 5% level of significance. The pattern that emerges is well in line with standard economic theory. Changes that affect demand or marginal costs receive the highest scores. It is also notable that changes in the consumer price index per se have little importance. To the extent that the consumer price index matters, it does so predominantly through cost and demand channels. The highest score is given to price changes by competitors. As indicated by the background characteristics earlier reported, the typical firm operates in an oligopolistic market. We should hence not be surprised that interaction with competitors is important for the decision to adjust prices.<sup>21</sup>

Changes in competitors' prices were said to be the most important reason for price adjustment.

<sup>21</sup> As in several other cases, we ran regressions to see if results could be related to structural variables. Indeed, firms that reported having more competitors were more likely to reply that price changes by competitors are "very important" for the decision to change prices. As in other regressions relating to structure, explanatory power was low.

**TABLE 6. THE IMPORTANCE OF DIFFERENT CAUSES FOR CHANGING PRICES (TURNOVER-WEIGHTED)**

Question: Why does the price of your main article/service change? How important have the factors below, inside and outside the company, been in setting the price in recent years?

Statement in survey	Mean rank	Standard	No. of observations
Price changes by competitors	3.27	0.75	524
Changes in costs for foreign inputs	3.05	1.01	476
Pressure from important customers	3.04	0.86	497
Changes in demand for article/service	3.01	0.87	518
Changes in costs for (other) [not labour or capital] domestic inputs	3.00	0.95	507
Changes in taxes and charges	2.98	0.98	506
Changes in capital costs	2.76	1.08	521
Directives from parent company, group, authority, etc	2.38	0.90	357
Exchange rate movements	2.24	1.09	485
Changes in wage costs	2.11	1.06	537
Sales campaigns	2.02	0.97	463
Changes in consumer price index	1.89	0.79	481
We routinely raise the prices at regular intervals	1.52	0.63	290

## Discussion

The logic underlying incomplete contracting seems to go a fairly long way towards explaining price rigidity.

The results of our random sample indicate that the typical sale is made to another business that is also a regular customer. It is likely that there is at least some form of relation-specific investment on the buyer's side – for instance, choosing a new supplier would mean retraining staff and adjusting machinery and work patterns. Having made such a relation-specific investment, the buyer is vulnerable to ex post opportunism by the seller unless the parties contract on all contingencies ex ante. This is known as the holdup problem and has been extensively studied within contract theory.<sup>22</sup> A partial solution to the holdup problem is written contracts – you commit to sell to us at a specific price. Such contracts are incomplete, however, and trust and reputation take on important roles. Based on the survey evidence, it seems like the logic underlying incomplete contracting has the potential to go a long way towards explaining price rigidity. All the highest-ranked theories of price rigidity correspond well with such a view. The theories of implicit contracts and kinked demand curve are both consistent with the notion of a stock of customers, a group that has made some relation-specific investment. Explicit contracts are clearly also compatible with this notion, and if a firm's input side looks anything like its

<sup>22</sup> See Battigalli & Maggi (2002) for a recent analysis. A related literature examines switching costs in consumer markets (see Klemperer, 1995).



output side, such contracts imply that costs will be relatively stable. An important role for incomplete contracts in explaining price rigidity is also consistent with the very detailed case study of pricing by a single firm conducted by Zbaracki et al. (2000).

Consequently, there appears to be much to be said for basing models of rigid prices on a contract theory approach. Incorporating incomplete contracting problems more explicitly into general equilibrium models might be too much to ask for. We believe, however, that an understanding of these underpinnings would be rewarding in that it might enable us to conclude that time-dependent price-setting rules or convex adjustment costs can be convenient modeling tricks, but that the search for micro-foundations of rigid prices might fruitfully shift towards issues such as verifiability (Are you trying to take advantage of me by raising the price or have your costs really gone up so that you need to share the burden?), constraints on pricing set by outside options, and renegotiation of nominal contracts. In a holdup framework, a price hike that is not clearly linked to an increase in costs may signal that the seller is trying to take advantage of the lock-in produced by the buyer's relation-specific investment, whereas a lowering of prices might attract few new customers in the short run since they are locked in with their current suppliers.

Questionnaires have similarly suggested that incomplete contracts may be an important explanation for why wages are rigid (see, for instance, Campbell & Kamlani, 1997). This has been followed up fruitfully in theoretical work by Macleod & Malcomson (1993) and in experimental work by Fehr & Falk (1999). We believe that similar approaches may also hold much in store for price rigidities.

## References

- Asplund, M., Eriksson, R. & Friberg, R., (2000), "Price Adjustments by a Gasoline Retail Chain", *Scandinavian Journal of Economics* 102, 101–121.
- Assarsson, B., (1989), *Prisbildning på industriella marknader* (Price formation in industrial markets), SNS Förlag, Stockholm (in Swedish).
- Azariadis, C., (1975), "Implicit Contracts and Underemployment Equilibria", *Journal of Political Economy* 83, 1183–1202.
- Ball, L., (1999), "Review of Blinder et al. Asking about Prices – A New Approach to Understanding Price Stickiness", *Journal of Economic Literature* 37, 1188–1189.
- Ball, L. & Mankiw, N. G., (1994), "A Sticky-Price Manifesto", *Carnegie-Rochester Conference Series on Public Policy* 41, 127–151.
- Barro, R. J., (1972), "A Theory of Monopolistic Price Adjustment", *Review of Economic Studies* 34, 17–26.
- Basu, S., (1995), "Intermediate Goods and Business Cycles: Implications for Productivity and Welfare", *American Economic Review* 85, 512–531.
- Battigalli, P. & Maggi, G., (2002), "Rigidity, Discretion and the Cost of Writing Contracts", *American Economic Review* 94, 798–817.
- Bils, M., (1989), "Cyclical Pricing of Durable Goods", NBER Working Paper No. 3050.
- Blinder, A. S., (1991), "Why Are Prices Sticky? Preliminary Results from an Interview Study", *American Economic Review* 81, 89–96.
- Blinder, A. S., (1994), "On Sticky Prices: Academic Theories Meet the Real World", in Mankiw, N. G. (ed.), *Monetary Policy, NBER Studies in Business Cycles*, s. 117–150, The University of Chicago Press, Chicago.
- Blinder, A. S., Canetti, E. R. D., Lebow, D. E. & Rudd, J. B., (1998), *Asking about Prices – A New Approach to Understanding Price Stickiness*, Russell Sage Foundation, New York.
- Bresnahan, T. F., (1989), "Empirical Studies of Industries with Market Power", in Schmalensee, R. & Willig, R. (eds.), *Handbook of Industrial Organization*, s. 1011–1058, Elsevier Science B.V., Amsterdam.
- Caballero, R. & Engel, E. M., (1993), "Microeconomic Rigidities and Aggregate Investment Dynamics", *European Economic Review* 37, 697–717.
- Calvo, G. A., (1983), "Staggered Prices in a Utility Maximizing Framework", *Journal of Monetary Economics* 12, 383–398.

- Campbell, C. M. & Kamlani, K. S., (1997), "The Reasons for Wage Rigidity: Evidence from a Survey of Firms", *Quarterly Journal of Economics* 112, 759–789.
- Caplin, A. S. & Leahy, J. V., (1997), "Aggregation and Optimization with State-Dependent Pricing", *Econometrica* 65, 601–625.
- Caplin, A. S. & Spulber, D. F., (1987), "Menu Costs and the Neutrality of Money", *Quarterly Journal of Economics* 102, 703–725.
- Carlton, D. W., (1986), "The Rigidity of Prices", *American Economic Review* 76, 637–658.
- Cecchetti, S. G., (1986), "The Frequency of Price Adjustment: A Study of the Newsstand Prices of Magazines", *Journal of Econometrics* 31, 255–274.
- Chevalier, J. A. & Scharfstein, D. S., (1996), "Capital-Market Imperfections and Countercyclical Markups: Theory and Evidence", *American Economic Review* 86, 703–725.
- Cochran, W. G., (1977), *Sampling Techniques*, 3rd edition, John Wiley and Sons, New York.
- Diamond, P. A., (1982), "Aggregate Demand Management in Search Equilibrium", *Journal of Political Economy* 90, 881–894.
- Domowitz, I., Hubbard, R. G. & Petersen, B. C., (1986), "Business Cycles and the Relationship Between Concentration and Price-Cost Margins", *RAND Journal of Economics* 17, 1–17.
- Dutta, S., Bergen, M., Levy, D. & Venable, R., (1997), "The Magnitude of Menu Costs: Direct Evidence from Large U.S. Supermarket Chains", *Quarterly Journal of Economics* 112, 791–825.
- Fehr, E. & Falk, A., (1999), "Wage Rigidity in a Competitive Incomplete Contract Market", *Journal of Political Economy* 107, 106–134.
- Genesove, D. & Mullin, W. P., (1998), "Testing Static Oligopoly Models: Conduct and Cost in the Sugar Industry 1890–1914", *RAND Journal of Economics* 29, 355–377.
- Ghosal, V., (2000), "Product Market Competition and the Industry Price-Cost Markup Fluctuations: Role of Energy Price and Monetary Changes", *International Journal of Industrial Organization* 18, 415–444.
- Gottfries, N., (1991), "Customer Markets, Credit Market Imperfections and Real Price Rigidity", *Economica* 58, 317–323.
- Hall, S., Walsh, M. & Yates, A., (2000), "Are UK Companies' Prices Sticky?" *Oxford Economic Papers* 52, 425–446.
- Kashyap, A. K., (1995), "Sticky Prices: New Evidence from Retail Catalogs", *Quarterly Journal of Economics* 110, 245–274.

- Kiyotaki, N. & Moore, J., (1997), "Credit Cycles", *Journal of Political Economy* 105, 211–248.
- Klemperer, P., (1995), "Competition when Consumers have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade", *Review of Economic Studies* 62, 515–539.
- Lach, S. & Tsiddon, D., (1996), "Staggering and Synchronization in Price-Setting: Evidence from Multiproduct Firms", *American Economic Review* 86, 1175–1196.
- Levy, D., Dutta, S. & Bergen, M., (2002), "Heterogeneity in Price Rigidity: Evidence from a Case Study Using Microlevel Data", *Journal of Money, Credit, and Banking* 34, 197–220.
- Machin, S. & Van Reenen, J., (1993), "Profit Margins and the Business Cycle: Evidence from UK Manufacturing Firms", *Journal of Industrial Economics* 41, 29–50.
- Macleod, W. B. & Malcomson, J. M., (1993), "Investments, Holdup, and the Form of Market Contracts", *American Economic Review* 83, 811–837.
- Mankiw, N. G., (1985), "Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly", *Quarterly Journal of Economics* 100, 529–538.
- Okun, A. M., (1981), *Prices and Quantities: A Macroeconomic Analysis*, Brookings Institution, Washington, DC.
- Romer, D., (1996), *Advanced Macroeconomics*, 1st edition, McGraw-Hill, Boston.
- Rotemberg, J. J., (1982), "Sticky Prices in the United States", *Journal of Political Economy* 90, 1187–1211.
- Rotemberg, J. J. & Saloner, G., (1986), "A Supergame-Theoretic Model of Price Wars During Booms", *American Economic Review* 76, 390–407.
- Rotemberg, J. J. & Woodford, M., (1991), "Markups and the Business Cycle", *NBER Macroeconomics Annual* 6, 63–129.
- Rotemberg, J. J. & Woodford, M., (1992), "Oligopolistic Pricing and the Effects of Aggregate Demand on Economic Activity", *Journal of Political Economy* 100, 1153–1207.
- Rotemberg, J. J. & Woodford, M., (1999), "The Cyclical Behavior of Prices and Costs", in Taylor, J. B. & Woodford, M. (eds.), *Handbook of Macroeconomics*, s. 1051–1135, Elsevier Science B.V., Amsterdam.
- Schmalensee, R., (1989), "Inter-Industry Studies of Structure and Performance", in Schmalensee, R. & Willig, R. (eds.), *Handbook of*

- Industrial Organization*, s. 951–1009, Elsevier Science B.V., Amsterdam.
- Sheshinski, E. & Weiss, Y., (1983), "Optimum Pricing Policy Under Stochastic Inflation", *Review of Economic Studies* 50, 513–529.
- Slade, M. E., (1998), "Optimal Pricing with Costly Adjustment: Evidence from Retail Grocery Prices", *Review of Economic Studies* 65, 87–107.
- Stiglitz, J. E., (1979), "Equilibrium in Product Markets with Imperfect Information", *American Economic Review* 69, 339–345.
- Taylor, J. B., (1980), "Aggregate Dynamics and Staggered Contracts", *Journal of Political Economy* 88, 1–23.
- Taylor, J. B., (1999), "Staggered Price and Wage Setting in Macroeconomics", in Taylor, J. B. & Woodford, M. (eds.), *Handbook of Macroeconomics*, s. 1009–1050, Elsevier Science B.V., Amsterdam.
- Warner, E. J. & Barsky, R. B., (1995), "The Timing and Magnitude of Retail Store Markdowns: Evidence from Weekends and Holidays", *Quarterly Journal of Economics* 110, 321–352.
- Weisberg, H. F., Krosnick, J. A. & Bowen, B. D., (1996), *An Introduction to Survey Research, Polling and Data Analysis*, 3rd edition, Sage Publications, Thousand Oak.
- Woglom, G., (1982), "Underemployment Equilibrium with Rational Expectations", *Quarterly Journal of Economics* 97, 89–107.
- Zbaracki, M. J., Ritson, M., Levy, D., Dutta, S. & Bergen, M., (2000), "The Managerial and Customer Dimension of the Cost of Price Adjustment: Direct Evidence from Industrial Markets", Working Paper 00-14, Reginald H. Jones Center, The Wharton School, University of Pennsylvania.

## Appendix: Methodological issues and data quality

The survey was conducted by Statistics Sweden during March–May 2000. The questionnaire was put together by the authors, with Statistics Sweden providing input on the design of questions. Data collection and sample design were handled by Statistics Sweden. The sample was stratified according to the number of employees and according to the manufacturing/services industry (see Table A1). The total number of firms sampled was 1300, and the questionnaire was sent to 1285 firms (15 of the sampled firms either had no sales, had merged, or had ceased to exist).

TABLE A1. THE SAMPLE

Stratum	Population size	Sample size	Response rate
5–19 employees, manufacturing	7,803	200	45.5
5–19 employees, services	30,900	195	34.9
20–199 employees, manufacturing	3,817	198	50
20–199 employees, services	7,349	196	45.9
200–999 employees, manufacturing	467	198	63.1
200–999 employees, services	449	199	48.2
>999 employees, manufacturing	91	50	58
>999 employees, services	87	49	57.1
Total	50,963	1 285	48.7

The questionnaire was sent out to firms on March 14, 2000 and was accompanied by a cover letter signed by the governor of Sveriges Riksbank. A follow-up letter was sent after two weeks and an additional follow-up letter three weeks thereafter.

### MEAN RANK

Since sampling fractions differ across strata, we needed to adjust for this when estimating the population mean  $\bar{Y}$ , which is calculated as (see, for instance, Cochran, 1977)

$$\hat{\bar{Y}} = \frac{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{N} * y_i}{N}$$

where  $h = 1, 2, \dots, 8$  represent strata,  $N_h$  is the population size in stratum  $h$ ,  $N$  is the total number of firms in the population,  $n_h$  is the number of responses in stratum  $h$ , and  $y_i$  is the response given by firm  $i$ .

As discussed, we also wanted to weight the answers with a measure of the firms' importance for the development of the price level. We used turnover from domestic sales (based on the reporting of value-added tax) as a weight, and thus estimated  $\bar{Y}' = \bar{Y} * \text{domestic turnover}$ . As we did not

have the total turnover from domestic sales for the population, this also had to be estimated, yielding the following expression for the estimated population mean:

$$\hat{Y}' = \frac{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * y'_i}{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * domesticturnover_i}$$

PROPORTIONS

We were also interested in describing the proportion of firms that specified a particular alternative, such as 50% of firms adjusted their price once a year. Here, as well, we needed to adjust for the differential sampling fractions across strata, so the estimated proportion in the whole population that specified alternative *k* becomes

$$\hat{p} = \frac{\sum_{h=1}^H \frac{N_h}{n_h} * a_{hi}}{N}$$

where *a<sub>hi</sub>* takes the value 1 if the firm has specified option *k* and 0 otherwise. We also estimated the proportion weighted by domestic turnover, specified as

$$\hat{p}' = \frac{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * a_{hi} * domesticturnover_i}{\sum_{h=1}^H \sum_{i=1}^{n_h} \frac{N_h}{n_h} * domesticturnover_i}$$

THE QUALITY OF RESPONSES

Let us briefly address the quality of responses. One issue relates to whether respondents misinterpreted questions and whether cognitive factors such as the sequencing of questions led respondents to particular answers. One way to check the quality of the answers is to see if responses to different questions are mutually consistent, and to see if the story that they tell makes sense. Some cases were puzzling. For instance, 27 firms answered that they had no competitors in their main line of business, but four of these firms nevertheless claimed that price changes by competitors had been a very important reason for changing prices in recent years. While there may have been competitors that had recently gone out of business, thus making these answers consistent, it is possible that respondents may have had their own firm in mind when answering one question and their corporate group in mind when answering another.

Nevertheless, for the most part we found that answers were indeed

consistent. For example, 200 firms claimed in question 4 that they review prices annually, while in question 10, 192 of these firms stated that they change prices on average once a year or less.<sup>23</sup> Also, as we argued above, the picture that emerges is consistent with what has been found in previous studies using a different wording for questions, a somewhat different set of theories, different sequencing, and different methods for collecting data (BCLR used personal interviews).

As discussed, we inquired about the price setting of the most important product. How is this likely to influence the conclusions about the stickiness of prices and the nature of price adjustment that one can infer from our study? On a quantitative level, the average price level of many firms is likely to be less sticky than the prices of their individual products since not all prices are reviewed at the same time. What about the qualitative nature of price adjustment? As discussed in the beginning of the article, 90.2% of firms claimed that the answers given were also representative of their other products. This indicates that the results are not likely to be seriously misleading with respect to the pattern of price adjustment.

Theory, and therefore many of the questions, is focused on relatively simple standardized products with fixed prices. In contrast, many firms see their products as tailor-made to some degree (think, for instance, of optometric services where the components are priced according to a price list and the price of the glasses will depend on customer choices). To help such firms, we gave instructions at the beginning of the questionnaire that firms with "tailor-made" products should focus on the price of inputs (typically the charge per hour). Firms which in a background question described their product as non-standardized did not appear to have found the questions in the rest of the survey problematic; they answered the rest of the questions in much the same way as other firms, and had about the same response rate. One can of course speculate that these firms may have adjusted their answers in order to make them fit in better in our "economist" framework. An indication that this is not the case (besides the fact that we tried to give clear instructions) is that firms indeed appear to have made use of the option "not applicable/do not know" in cases where they found our questions confusing or a poor reflection of their views of reality. For instance, as mentioned in footnote 13, almost half of respondents chose "not applicable/do not know" to the rather abstract question on the functional form of adjustment costs.

Yet another concern regards the care that respondents exercised when answering. Did they simply jot down some figures or did they actu-

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<sup>23</sup> 164 of the firms changed yearly, 28 less than once a year and five gave "other" as their response. That leaves us with only three apparently contradictory answers: two that claimed to change price on average twice a year and one that claimed to change five to eight times per year.



ally possess the relevant knowledge and make an effort to answer correctly? One way to examine this is to use the figures on both turnover from domestic sales and total turnover that were included in the data from Statistics Sweden. We asked respondents the following closely-related question: "Approximately how large a percentage of the sales of your main article/service is in Sweden and how large a percentage abroad?" While there were a number of outliers, the answers to our question closely matched the turnover data from Statistics Sweden (based on the tax accounting of value-added tax). The mean difference between the reported export share in the survey and the export share in the turnover data was 2.5 percentage points. At the 10<sup>th</sup> percentile the difference between the two figures was -6.3 percentage points, while at the 90<sup>th</sup> percentile the difference was 16.8 percentage points. We take this as a comforting indication that the average respondent not only knows his/her company well, but also exercised care in completing the questionnaire.

## ■ Notices

### *The Riksbank takes over the activities in Svensk Kontantförsörjning AB*

At an extraordinary general meeting on 29 September 2004, the Riksbank's subsidiary Svensk Kontantförsörjning AB (SKAB) decided that the company's activities would be transferred to the Riksbank on 1 October 2004. This decision followed the decision made by the Executive Board on 19 August regarding further efficiency improvements in the bank's cash management activities.

At an extraordinary general meeting on 29 September, the Riksbank's subsidiary Pengar i Sverige AB (PSAB) decided to approve the sale of assets, etc. from PSAB to Securitas Värde AB.

There are no longer any operational activities being conducted in SKAB or PSAB. The liquidation of the companies is expected to be completed before the end of next year. New boards of directors have been elected at the general meetings. Björn Hasselgren, head of department with responsibility for matters relating to the Riksbank's companies, has been elected as new chairman of the boards of directors. Kersti Eriksen and Kai Barvell, both employed at the Riksbank, will remain on the boards.

### *Riksbank alters management forms*

At its meeting on 13 October 2004 the Executive Board decided to make certain changes in the way the bank is managed.

During the spring the number of departments was reduced to six large departments and one small, the Internal Auditing Department. This decision is now being followed up with the establishment of a management group consisting of the heads of the six large departments. The chairman of this management group will be the head of the General Secretariat, Mats Galvenius.

The purpose of these changes is to attain a clearer allocation of responsibility between the members of the Executive Board and the heads of department, and to ensure coherent and uniform management of the bank. The intention is that the changes will be implemented on 1 January 2005.

### *Riksdag decision to declare some older banknotes and coins invalid*

The Riksdag (the Swedish parliament) decided on 27 October 2004, following a proposal from the Riksbank, that some older series of banknotes and coins shall cease being legal tender after 31 December 2005.

The following banknotes and coins are covered by the decision:

- All of the silver-coloured 50-öre coins will become invalid.
- The older, slightly larger type of 20-kronor note will become invalid.
- The older 100-kronor and 500-kronor banknotes will become invalid.

The aim is to reduce the number of parallel versions in circulation. Moreover, practical cash management will be simpler with fewer versions of banknotes and coins.

The banknotes and coins concerned will be gradually withdrawn during the remaining period of just over one year until they become invalid. In addition to regular information updates to the retail trade and banks, a large-scale information campaign is planned for autumn 2005. Special regulations apply to redeeming banknotes that are already invalid. See the Riksbank's website for further information: [www.riksbank.se](http://www.riksbank.se).

## ■ Monetary policy calendar

- 2000-01-03 The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.0 per cent as of 4 January 2000.
- 02-03 The *repo rate* is increased by the Riksbank from 3.25 per cent to 3.75 as of 9 February 2000.
- 04-03 The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.5 per cent as of 4 April 2000.
- 12-07 The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 13 December 2000. The Riksbank also increases its *deposit* and *lending rates* in each case by 0,5 percentage points. The deposit rate is set at 3.25 per cent and the lending rate at 4.75 per cent. The decision takes effect on 13 December 2000.
- 2001-07-05 The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 11 July 2001. The Riksbank also increases its *deposit* and *lending rates* in each case by 0.25 percentage points. The deposit rate is set at 3.5 per cent and the lending rate at 5.0 per cent. The decision takes effect on 11 July 2001.
- 09-17 The *repo rate* is lowered by the Riksbank from 4.25 per cent to 3.75 per cent as of 19 September 2001. The Riksbank also lowers its *deposit* and *lending rates* in each case by 0.50 percentage points. The deposit rate is set at 3.0 per cent and the lending rate at 4.5 per cent. The decision takes effect on 19 September 2001.
- 2002-03-18 The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 20 March 2002. The *deposit rate* is accordingly adjusted to 3.25 per cent and the *lending rate* to 4.75 per cent.
- 04-25 The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 2 May 2002. The *deposit rate* is accordingly adjusted to 3.5 per cent and the *lending rate* to 5.0 per cent.
- 06-28 The *reference rate* is confirmed by the Riksbank at 4,5 per cent for the period 1 July 2002 to 31 December 2002.
- 11-15 The *repo rate* is lowered by the Riksbank from 4.25 per cent to 4.0 per cent as of 20 November 2002. The *deposit*

*rate* is accordingly set at 3.25 per cent and the *lending rate* to 4.75 per cent.

- 12-05 The *repo rate* is lowered by the Riksbank from 4.0 per cent to 3.75 per cent as of 11 December 2002. The *deposit rate* is accordingly set at 3.0 per cent and the *lending rate* to 4.5 per cent.
- 2003-01-01 The *reference rate* is confirmed by the Riksbank at 4.0 per cent for the period 1 January 2003 to 30 June 2003.
- 03-17 The Riksbank decides to lower the *repo rate* from 3.75 per cent to 3.50 per cent, to apply from 19 March 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.75 per cent and 4.25 per cent respectively.
- 06-05 The Riksbank decides to lower the *repo rate* from 3.50 per cent to 3.00 per cent, to apply from 11 June 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.25 per cent and 3.75 per cent respectively.
- 06-30 The *reference rate* is confirmed by the Riksbank at 3.0 per cent for the period 1 July 2003 to 31 December 2003.
- 07-04 The Riksbank decides to lower the *repo rate* from 3.0 per cent to 2.75 per cent, to apply from 9 July 2003. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 2.00 per cent and 3.50 per cent respectively.
- 2004-01-01 The *reference rate* is confirmed by the Riksbank at 3.0 per cent for the period 1 January 2004 to 30 June 2004.
- 02-06 The Riksbank decides to lower the *repo rate* from 2.75 per cent to 2.50 per cent, to apply from 11 February 2004. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 1.75 per cent and 3.25 per cent respectively.
- 03-31 The Riksbank decides to lower the *repo rate* from 2.50 per cent to 2.00 per cent, to apply from 7 April 2004. Furthermore, the Riksbank decides that the *deposit* and *lending rates* shall be adjusted to 1.25 per cent and 2.75 per cent respectively.
- 06-30 The *reference rate* is confirmed by the Riksbank at 2.0 per cent for the period 1 July 2004 to 31 December 2004.
- 2005-01-01 The *reference rate* is confirmed by the Riksbank at 2.00 per cent for the period 1 January 2005 to 30 June 2005.



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Statistics from Sveriges Riksbank are to be found on the Internet ([www.riksbank.se](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) ([dsbb.imf.org](http://dsbb.imf.org)). Dates of publication is also available on [www.riksbank.se](http://www.riksbank.se).





# 1 Riksbank's assets and liabilities

## ASSETS. PERIOD-END STOCK FIGURES. SEK MILLION

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

## LIABILITIES. PERIOD-END STOCK FIGURES. SEK MILLION

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

## 2 Money supply

### END-OF-MONTH STOCK

		SEK million		Percentage 12-month change		
		M0	M3	M0	M3	
2001	Jan	84 327	960 545	Jan	2.5	1.1
	Feb	84 282	947 276	Feb	4.0	-0.4
	March	85 188	969 559	March	5.0	2.6
	April	86 379	975 366	April	5.8	0.9
	May	86 711	983 764	May	5.9	-0.1
	June	87 288	1 012 094	June	7.2	6.2
	July	86 705	977 812	July	6.6	3.5
	Aug	87 693	985 811	Aug	6.6	3.8
	Sept	87 892	1 008 439	Sept	6.0	4.3
	Oct	88 809	1 022 639	Oct	7.3	5.4
	Nov	89 947	1 039 646	Nov	7.1	6.6
	Dec	96 743	1 038 972	Dec	8.8	6.7
2002	Jan	89 737	1 031 807	Jan	6.4	7.4
	Feb	88 950	1 014 905	Feb	5.5	7.1
	March	89 998	1 033 020	March	5.6	6.5
	April	88 666	1 049 030	April	2.6	7.6
	May	88 818	1 025 757	May	2.4	4.3
	June	89 383	1 053 910	June	2.4	4.1
	July	88 631	1 037 162	July	2.2	6.1
	Aug	89 945	1 051 986	Aug	2.6	6.7
	Sept	89 567	1 061 341	Sept	1.9	5.2
	Oct	89 461	1 051 867	Oct	0.7	2.9
	Nov	90 465	1 068 389	Nov	0.6	2.8
	Dec	95 866	1 086 057	Dec	-0.9	4.5
2003	Jan	90 122	1 085 994	Jan	0.4	5.3
	Feb	90 505	1 072 732	Feb	2.9	5.7
	March	91 966	1 092 435	March	2.2	5.8
	April	92 334	1 095 256	April	4.1	4.4
	May	92 346	1 097 622	May	4.0	7.0
	June	92 296	1 106 661	June	3.3	5.0
	July	91 608	1 090 284	July	3.4	5.1
	Aug	93 324	1 109 725	Aug	3.8	5.5
	Sept	92 451	1 113 021	Sept	3.2	4.9
	Oct	92 364	1 114 967	Oct	3.2	6.0
	Nov	93 070	1 107 251	Nov	2.9	3.6
	Dec	98 481	1 119 288	Dec	2.7	3.1
2004	Jan	93 087	1 109 798	Jan	3.3	2.2
	Feb	92 465	1 117 521	Feb	1.0	4.2
	March	92 399	1 116 429	March	0.5	2.2
	April	92 653	1 130 152	April	0.3	3.2
	May	93 032	1 132 356	May	0.7	3.2
	June	94 732	1 115 232	June	2.6	0.8
	July	92 962	1 115 661	July	1.5	2.3
	Aug	94 355	1 126 118	Aug	1.1	1.5
	Sept	93 992	1 147 939	Sept	1.7	3.1
	Oct	93 657	1 149 171	Oct	1.4	3.1
	Nov	95 163	1 161 064	Nov	2.2	4.9

### 3 Interest rates set by the Riksbank

#### PER CENT

	Date of announcement	Effective from	Repo rate	Deposit rate	Lending rate	Period	Reference rate <sup>1</sup>
2000	02-04	02-09	3.75			2002:2 half-year	4.50
	12-07	12-13	4.00	3.25	4.75	2003:1 half-year	4.00
2001	07-06	07-11	4.25	3.50	5.00	2003:2 half-year	3.00
	09-17	09-19	3.75	3.00	4.50	2004:1 half-year	3.00
2002	03-19	03-20	4.00	3.25	4.75	2004:2 half-year	2.00
	04-26	05-02	4.25	3.50	5.00	2005:1 half-year	2.00
	11-15	11-20	4.00	3.25	4.75		
2003	12-05	12-11	3.75	3.00	4.50		
	03-18	03-19	3.50	2.75	4.25		
	06-05	06-11	3.00	2.25	3.75		
2004	07-04	07-09	2.75	2.00	3.50		
	02-06	02-11	2.50	1.75	3.25		
	03-31	04-07	2.00	1.25	2.75		

<sup>1</sup> 1 July 2002 the official discount rate was replaced by a reference rate, which is set by the Riksbank at the end of June and the end of December.

### 4 Capital market interest rates

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

		Bond issued by:					
		Central Government				Housing institutions	
		3 years	5 years	7 years	9-10 years	2 years	5 years
2003	Jan	3.79	4.23	4.36	4.70	3.99	4.54
	Feb	3.56	3.97	4.11	4.47	3.77	4.27
	March	3.53	4.03	4.17	4.57	3.86	4.34
	April	3.59	4.17	4.30	4.72	3.93	4.57
	May	3.25	3.77	3.90	4.37	3.56	4.16
	June	2.97	3.53	3.79	4.20	3.11	3.80
	July	3.22	3.85	4.20	4.51	3.21	4.06
	Aug	3.58	4.18	4.45	4.70	3.55	4.42
	Sept	3.54	4.18	4.48	4.73	3.50	4.42
	Oct	3.62	4.31	4.60	4.85	3.53	4.54
	Nov	3.76	4.45	4.74	4.98	3.58	4.67
	Dec	3.55	4.30	4.60	4.86	3.38	4.51
2004	Jan	3.22	4.00	4.46	4.65	3.39	4.35
	Feb	3.04	3.86	4.42	4.55	3.19	4.19
	March	2.72	3.53	4.16	4.31	2.85	3.86
	April	2.77	3.75	4.40	4.55	2.88	4.09
	May	2.96	3.97	4.55	4.68	3.09	4.36
	June	3.01	4.03	4.60	4.72	3.11	4.40
	July	2.86	3.88	4.45	4.57	2.95	4.22
	Aug	2.75	3.85	4.29	4.42	2.83	4.05
	Sept	2.80	3.90	4.26	4.37	2.86	4.02
	Oct	2.68	3.75	4.13	4.25	2.75	3.84
	Nov	2.56	3.60	4.01	4.13	2.62	3.69
	Dec	2.34	3.33	3.76	3.90	2.38	3.38

## 5 Overnight and money market interest rates

### MONTHLY AVERAGE. PER CENT

		Repo rate	Interbank rate	Treasury bills			Company certificates	
				3-month	6-month	12-month	3-month	6-month
2001	Jan	4.00	4.10	4.07	4.12		4.17	4.26
	Feb	4.00	4.10	4.01	4.07		4.14	4.23
	March	4.00	4.10	4.06	4.02	4.11	4.24	4.23
	April	4.00	4.10	3.94	3.98	4.01	4.12	4.11
	May	4.00	4.10	4.01	4.06	4.28	4.16	4.20
	June	4.00	4.10	4.17	4.27	4.48	4.39	4.46
	July	4.17	4.27	4.31	4.42		4.50	4.58
	Aug	4.25	4.35	4.28	4.31	4.37	4.45	4.48
	Sept	4.05	4.15	4.01	4.06	4.15	4.18	4.22
	Oct	3.75	3.85	3.70	3.72		3.90	3.91
	Nov	3.75	3.85	3.71	3.74	3.91	3.89	3.87
	Dec	3.75	3.85	3.71	3.76	3.97	3.96	3.96
2002	Jan	3.75	3.85	3.74	3.81		3.94	3.97
	Feb	3.75	3.85	3.87	3.99		4.01	4.14
	March	3.84	3.94	4.09	4.29	4.64	4.27	4.43
	April	4.00	4.10	4.25	4.41		4.52	4.69
	May	4.25	4.35	4.29	4.48	4.79	4.64	4.79
	June	4.25	4.35	4.28	4.42	4.71	4.88	5.00
	July	4.25	4.35	4.26	4.37		4.89	4.95
	Aug	4.25	4.35	4.19	4.29	4.43	4.83	4.87
	Sept	4.25	4.35	4.17	4.21	4.29	4.82	4.84
	Oct	4.25	4.35	4.07	4.14	4.14	4.67	4.64
	Nov	4.15	4.25	3.91	3.84	3.93	4.20	4.19
	Dec	3.85	3.95	3.66	3.68	3.77	3.97	3.95
2003	Jan	3.75	3.85	3.65			3.90	3.88
	Feb	3.75	3.85	3.61	3.40	3.55	3.85	3.79
	March	3.64	3.74	3.40	3.36	3.35	3.64	3.57
	April	3.50	3.60	3.42			3.62	3.59
	May	3.50	3.60	3.18	2.96		3.43	3.37
	June	3.16	3.26	2.81	2.71	2.61	3.03	2.94
	July	2.82	2.92	2.68			2.87	2.82
	Aug	2.75	2.85	2.71	2.81		2.88	2.90
	Sept	2.75	2.85	2.71	2.73	2.91	2.88	2.92
	Oct	2.75	2.85	2.73			2.89	2.93
	Nov	2.75	2.85	2.72	2.75		2.88	2.93
	Dec	2.75	2.85	2.69	2.70	2.83	2.86	2.87
2004	Jan	2.75	2.85	2.60			2.77	2.74
	Feb	2.59	2.69	2.46	2.38	2.47	2.59	2.59
	March	2.50	2.60	2.27	2.23	2.28	2.43	2.40
	April	2.10	2.20				2.15	2.18
	May	2.00	2.10	1.99	2.07	2.33	2.15	2.23
	June	2.00	2.10	1.98	2.07	2.38	2.15	2.24
	July	2.00	2.10				2.15	2.24
	Aug	2.00	2.10	2.03	2.13		2.15	2.25
	Sept	2.00	2.10	2.00	2.13		2.15	2.26
	Oct	2.00	2.10				2.16	2.27
	Nov	2.00	2.10	2.03	2.12		2.14	2.25
	Dec	2.00	2.10	2.00	2.05		2.12	2.16

## 6 Treasury bill and selected international rates

### MONTHLY AVERAGE. PER CENT

		3-month deposits				6-month deposits			
		USD	EUR	GBP	SSVX <sup>1</sup>	USD	EUR	GBP	SSVX <sup>1</sup>
2001	Jan	5.62	4.71	5.69	4.07	5.47	4.62	5.59	4.12
	Feb	5.25	4.70	5.61	4.01	5.11	4.61	5.53	4.07
	March	4.87	4.64	5.41	4.06	4.72	4.51	5.31	4.02
	April	4.53	4.64	5.25	3.94	4.40	4.53	5.14	3.99
	May	3.99	4.58	5.09	4.01	3.99	4.50	5.07	4.06
	June	3.74	4.40	5.10	4.17	3.74	4.28	5.18	4.27
	July	3.66	4.41	5.11	4.31	3.69	4.33	5.18	4.41
	Aug	3.48	4.30	4.87	4.28	3.49	4.17	4.88	4.35
	Sept	2.92	3.91	4.56	4.01	2.89	3.78	4.49	4.06
	Oct	2.31	3.54	4.27	3.70	2.25	3.39	4.25	3.72
	Nov	2.01	3.32	3.88	3.71	2.02	3.20	3.86	3.74
	Dec	1.84	3.27	3.94	3.71	1.90	3.19	3.96	3.76
2002	Jan	1.74	3.28	3.94	3.74	1.85	3.28	4.04	3.81
	Feb	1.81	3.30	3.94	3.87	1.94	3.33	4.08	3.99
	March	1.91	3.34	4.03	4.09	2.15	3.45	4.23	4.29
	April	1.87	3.39	4.06	4.25	2.11	3.47	4.26	4.41
	May	1.82	3.40	4.05	4.29	2.01	3.56	4.26	4.48
	June	1.79	3.41	4.06	4.28	1.93	3.52	4.27	4.42
	July	1.76	3.34	3.94	4.26	1.82	3.40	4.07	4.37
	Aug	1.69	3.28	3.90	4.19	1.69	3.31	3.91	4.29
	Sept	1.73	3.24	3.88	4.17	1.71	3.18	3.89	4.21
	Oct	1.71	3.20	3.88	4.07	1.67	3.08	3.87	
	Nov	1.39	3.07	3.88	3.91	1.40	2.96	3.89	3.84
	Dec	1.33	2.86	3.92	3.66	1.34	2.81	3.92	3.68
2003	Jan	1.27	2.76	3.88	3.65	1.29	2.69	3.87	
	Feb	1.25	2.63	3.65	3.61	1.25	2.51	3.59	3.40
	March	1.19	2.47	3.56	3.40	1.17	2.39	3.50	3.36
	April	1.22	2.48	3.54	3.42	1.20	2.41	3.48	
	May	1.20	2.35	3.53	3.18	1.16	2.25	3.49	2.96
	June	1.03	2.09	3.55	2.81	1.00	2.02	3.48	2.71
	July	1.04	2.08	3.38	2.68	1.05	2.04	3.37	
	Aug	1.05	2.09	3.43	2.71	1.11	2.12	3.52	2.81
	Sept	1.06	2.09	3.60	2.71	1.10	2.12	3.70	2.73
	Oct	1.08	2.09	3.72	2.73	1.12	2.12	3.87	
	Nov	1.08	2.10	3.88	2.72	1.17	2.17	4.07	2.75
	Dec	1.08	2.09	3.93	2.69	1.15	2.13	4.08	2.70
2004	Jan	1.04	2.03	3.96	2.60	1.10	2.06	4.11	
	Feb	1.03	2.02	4.08	2.46	1.09	2.03	4.19	2.38
	March	1.02	1.97	4.21	2.27	1.07	1.95	4.34	2.23
	April	1.06	1.99	4.30		1.19	2.01	4.45	
	May	1.16	2.03	4.44	1.99	1.44	2.08	4.63	2.07
	June	1.41	2.06	4.69	1.98	1.72	2.13	4.91	2.07
	July	1.54	2.06	4.77		1.80	2.13	4.93	
	Aug	1.66	2.06	4.86	2.03	1.87	2.11	4.98	2.13
	Sept	1.85	2.06	4.84	2.00	2.01	2.14	4.93	2.13
	Oct	2.01	2.10	4.80		2.15	2.13	4.85	
	Nov	2.24	2.12	4.77	2.03	2.42	2.16	4.81	2.12
	Dec	2.44	2.12	4.76	2.00	2.65	2.16	4.78	2.05

<sup>1</sup> Treasury bills.

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

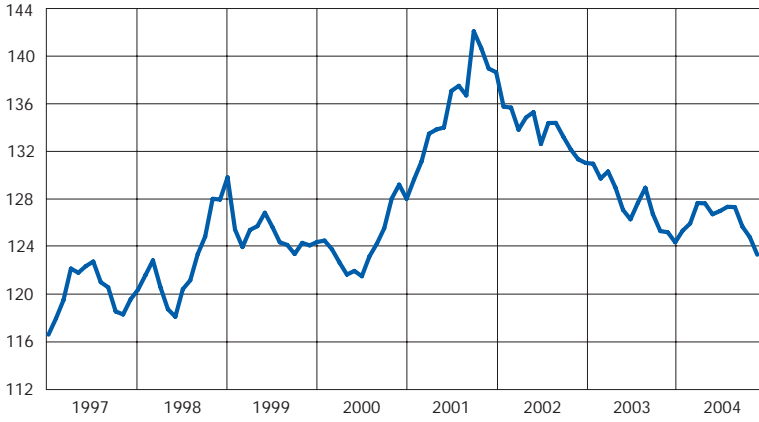
### MONTHLY AVERAGE

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

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

## 8 Nominal effective TCW exchange rate

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

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