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Monetary Policy Signaling and Movements in the Swedish Term Structure of Interest Rates

by

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Abstract

This paper examines how various monetary policy signals such as repo rate changes, inflation reports, speeches by Executive Board members, and minutes from monetary policy meetings affect the term structure of interest rates. We find that unexpected movements in the short end of the yield curve are mainly driven by unexpected changes in the repo rate, while speeches is potentially a more important determinant for the longer interest rates. Moreover, speeches signaling repo rate increases had far stronger effects than speeches signaling repo rate decreases, which can explain why unexpected decreases of the repo rate had a substantially bigger impact on the yield curve than unexpected increases. Our conclusion is that central bank communication is an essential part of the conduct of monetary policy.

Keywords: *Monetary policy signaling, central bank communication, the term structure of interest rates.*

JEL Classification: E43, E44, E58

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1. Introduction

The efficiency of monetary policy is strongly related to monetary policy signaling, i.e. the way policy makers indicate their intentions through policy reports, speeches and other communication channels. The reason for this is that important variables such as the exchange rate and long-term interest rates reflect expectations of future monetary policy. Thus, the monetary policy stance should be assessed in terms of expected future monetary policy intentions rather than the current setting of the central bank's instrument (normally a short-term nominal interest rate).[1] Indeed, there are examples of models in which the intended future level of the official interest rate rather than its current level is considered to be the instrument for the central bank, see Svensson (2003).

The theoretical considerations above suggest that policy makers should try to steer a (very) long-term interest rate by signaling the intentions of future monetary policy and confirm and support such a signaling policy by adjusting the short-term interest rates. However, in practice there are several problems with such a policy device. First, it is hardly meaningful to indicate policy intentions more than a few years ahead since future monetary policy depends on future economic conditions, which become very hard to predict as the forecast horizon increases. Second, the controllability of interest rates declines with maturity since movements in long-term interest rates to a large extent reflect exogenous factors such as global interest rate trends and fluctuating term premia. It is therefore an open empirical issue to determine to what extent monetary policy signaling can affect medium term and long term interest rates. The aim of this paper is to shed some light on this issue by examining the relationship between monetary policy signaling by the Riksbank (the Swedish central bank) and movements in the Swedish term structure of interest rates.

The literature that analyzes term structure effects from monetary policy actions includes Cook and Hahn (1989), Buttiglione, Del Giovane and Tristani (1997), Lindberg, Mitlid and Sellin

[1] See e.g. Svensson (2000) who shows that aggregate demand in an open economy depends on the sum of expected future short real interest rates in excess of the natural real interest rate, which under the expectation hypothesis can be approximated by a long-term real interest rate (in excess of the natural real interest rate) times its maturity

(1997), Favero, Iacone and Pifferi (1996), Haldane and Read (2000) and Kuttner (2001).[2] This paper extends the analysis in the literature cited above in at least two important directions. First, it relates unexpected term structure movements not only to unexpected monetary policy actions, but also to unexpected changes in other important factors like foreign interest rates, surprises in the outcome of inflation, GDP and other macro variables as well as unexpected portfolio effects. This paper is hence also to some extent related to studies analyzing macroeconomic announcement effects (Flemming and Remolona (1999)). Second, the paper broadens the concept of monetary policy actions to include (in addition to the changes in the official interest rate) signals from board member speeches, inflation reports and minutes from monetary policy meetings.[3] These additional channels for monetary policy action turn out to be important. Like Buttiglione et al. (1997) and Haldane and Read (2000) we find that unexpected changes in the official interest rate has a quite small and insignificant impact on longer market interest rates (maturity of 5 years). However, unexpected signals from speeches appear to have significant effects on longer interest rates that are larger than those from unexpected changes of the official rate. In addition other monetary policy signals provided from the inflation reports and the publications of minutes also seem to be of some importance.[4] The main conclusion of this paper is that central bank communication is an essential part of the conduct of monetary policy – an aspect that recently has started to gain some attention in the literature (see e.g. Guthrie and Wright (2000) and Woodford (2001)).

The paper is organized in the following way. In section 2 the interaction between economic shocks, monetary policy signaling, monetary policy decision-making and movements in the term structure of interest rates are discussed using features from the policy process at the Riksbank. In section 3 a model of the Swedish term structure of interest rates is presented, which incorporates factors discussed in section 2. The model is evaluated in section 4. Section 5 summarizes and concludes.

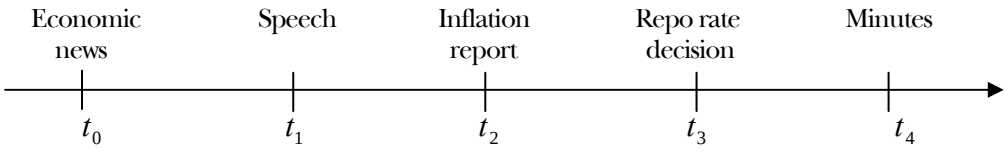
[2] Term structure effects from (unexpected) changes of the monetary policy instrument have also been analyzed in VAR-models, see e.g. Evans and Marshall (1998).
[3] Signaling via speeches and inflation reports were also considered in Lindberg, Mitlid and Sellin (1997). Moreover, the effects of central bank statements have been analyzed by Guthrie and Wright (2000).
[4] A problem is that it is only unexpected signals that should affect interest rates, which requires a measure of expected values. The expected signals from inflation reports and minutes are, however, difficult to measure.

2. The Monetary Policy Process and Signaling at the Riksbank

In this section we discuss the role of monetary policy signaling and its effects on the term structure of interest rates. The discussion will be based on the policy process at the Riksbank but we believe that many of the mechanisms can be found in the policy process at other central banks as well. We will consider four different types of signaling channels; (i) speeches by Board members, (ii) judgements about future inflation, (iii) announcements of repo rate decisions, and (iv) publications of minutes from Executive Board meetings where repo rate decisions were taken.

Figure 1 presents a simplified example of how the policy process works at the Riksbank and the role of the different signaling channels. Assume that economic news arrive at time t_0. The implications for future inflation are then analyzed internally and a decision-maker indicates in a speech (at time t_1) how prospects of future inflation might have changed. A more detailed analysis including an explicit inflation forecast is then published in the inflation report at time t_2. A repo rate decision is announced at time t_3 and different views among decision-makers about the appropriate monetary policy stance as well as individual voting behavior of the decision-makers are published, in the minutes from an Executive Board meeting, at time t_4. Then the policy process cycle is repeated.[5]

Figure 1. The policy process cycle at the Riksbank – an illustrative example



This description of the policy process at the Riksbank is of course a simplification in many respects. For instance, economic news arrives almost continuously over time and several speeches are often given during the policy process cycle. On the other hand, inflation reports are not published during every cycle. Moreover, the policy process at the Riksbank has

[5] As will be apparent later on in the text the term "policy process cycle" is most relevant in the new policy making regime effective from January 1999. In this regime the period between two policy meetings (at which repo rate decisions are taken) constitutes a cycle.

changed over time. The most important change took place in January 1999, when the new Riksbank Act became effective. Before 1999 monetary policy decisions were taken by the Governor, who set the repo rate in accordance with general guidelines provided by a Governing Board consisting of parliament members. However, the new Riksbank Act states that an Executive Board consisting of six professional members is responsible for the overriding monetary policy objective of achieving price stability.[6] This change in the policy process has several implications that are important to bear in mind.

First, pre-1999 speeches were signaling intentions of the Riksbank whereas speeches post-1998 reflect views held by individual members of the Executive Board. Second, pre-1999 monetary policy conclusions were discussed in the inflation report and a repo rate decision in accordance with these conclusions was normally announced some time later (in case an adjustment of the repo rate was judged to be appropriate). Post-1998 the inflation report presents an inflation forecast that the majority of the Executive Board supports and the policy conclusions can be found in a press release published at the same time as the inflation report announcing the repo rate decision (i.e. t_2 coincides with t_3). Third, the introduction in 1999 of the Executive Board as the decision-making body was accompanied by other new features of the decision-making process such as pre-announced monetary policy meetings (held 8-10 times per year) from which minutes are published with a delay of a few weeks.[7]

How does signaling through these different channels affect the term structure of interest rates? First, it is important to note that in the extreme case when the central bank slavishly follows a policy rule, say a Taylor type rule, signaling will have no effect on interest rates. Immediately when relevant economic news arrive market participants adjust their expectations according to the rule and subsequent signaling will only serve as a confirmation of this policy rule. In reality central banks do not follow simple rules perfectly and monetary policy considerations are based on a large number of indicators that are subject to interpretations and judgements. An important function of speeches is to signal decision-

[6] In 1999 the Governing Board was replaced by the Governing Council (also consisting of members of parliament), that retains general supervisory functions and appoints members of the Executive Board. For a fuller discussion we refer to Berg and Lindberg (2000).

[7] Two clarifications can be made: First, in the beginning of 1999 the delay was several weeks but since October 1999 minutes are published with a delay of about two weeks. Second, in press release No. 66 of November 6, 1999, it was announced that repo rate decisions normally only will be made at the pre-announced monetary policy meetings. However, this device was in line with the practice established in the beginning of 1999.

makers' interpretations of new economic information. Moreover, a central bank that is successful in signaling its monetary policy intentions should experience rather small term structure effects from changes in the official interest rate. It can therefore be misleading, as pointed out by Woodford (2001), to associate the effectiveness of monetary policy by the ability to obtain large term structure effects by surprising the market.

One may argue that signaling speeches given before 1999 should have had more impact on interest rates than the ones held after 1999 since the speaker (in most cases the Governor or one of the Deputy Governors), who knew the planned monetary actions in the near future, was able to give rather precise information about future intentions. Today members of the Executive Board can only indicate individual views concerning the appropriate stance of monetary policy in speeches whereas the actual decision will be the outcome of a voting process that cannot be predicted for certain by anyone, including the members of the Executive Board. One could argue that the arrangement with a collective of decision-makers who make decisions by voting may tend to make the monetary policy less predictable in the short run compared to the case of a single decision-maker. On the other hand, a collective of decision-makers, where members are gradually replaced over time, may imply more continuity in the policy process and therefore increase predictability of monetary policy in a longer perspective. The replacement of a single policy-maker can be a more important event associated with substantial uncertainty, which might sometimes generate credibility problems.

Monetary policy statements of the kind analyzed by Guthrie and Wright (2000) are not considered to be an important part of the Riksbank's communication policy and are therefore not included in the analysis. Our focus is instead on speeches by members of the Executive Board, which are not assumed to have a signaling value by Guthrie and Wright. This difference in methodology reflects differences in the communication policy between the Riksbank and the Reserve Bank of New Zealand.

As indicated above, the Riksbank's inflation reports published post-1998 may not contain very much additional information concerning future policy intentions in the near future given that a press release with policy conclusions and a repo rate decision is published the same day,

especially when an adjustment of the repo rate is announced.[8] However, the inflation report does contain a detailed inflation forecast as well as a quantitative risk assessment that should be indicative of monetary policy intentions in the future. In this context it should be noted that inflation forecasts have been published since Inflation Report 1997:4. Moreover, the inflation report does sometimes signal changes concerning the analytical framework, which may have some impact on investors' monetary policy expectations in a longer perspective.

Minutes from the Executive Board's monetary policy meetings have been published since 1999 with a delay of a few weeks. The minutes present the range of views held within the Executive Board about the appropriate monetary policy stance as well as the voting behavior of individual members. Minutes show the support for the latest repo rate decision among the members of the Executive Board, which should be indicative of future repo rate adjustments (Gerlach-Kristen (2003)). For instance, if all members voted for an unchanged repo rate then investors may assign a lower probability to further increases in the repo rate compared to the case when there is a minority that favors an increase in the repo rate.

The review of the policy process at the Riksbank above raises several interesting issues. What are the effects from various signaling channels on the term structure of interest rates; how large are the impacts on short-term interest rates and long-term interest rates respectively, and how important is it to control for the publication of relevant economic news? In the next section we will develop a model for the term structure of interest rates in order to quantitatively assess these kinds of issues.

3. A Model for the Swedish Term Structure of Interest Rates

The model developed in this section can easily be modified and be applied to any small open economy with an inflation targeting central bank. The economy is small and open in the sense that the domestic term structure of interest rates is influenced by movements in the foreign term structure.

3.1 The Determinants of Unexpected Movements in the Term Structure

[8] In other words the fact that several monetary signals are given simultaneously give rise to multicollinearity problems.

The basic mechanism that we want to study is how monetary policy signaling will affect expectations of future short-term interest rates. Economic theory tells us that unexpected movements in the term structure are driven by changes in expectations of future short-term interest rates and unexpected changes in the term premia. Moreover, when analyzing interest rate effects of monetary policy signaling it is crucial to control for other factors affecting the term structure of interest rates. Hence we find it natural to attribute movements in the term structure to unexpected movements in the foreign term structure, unexpected monetary policy signals, unexpected economic news and unexpected changes in market conditions:

$$\Delta i(t,\tau) - E_{t-1}\left[\Delta i(t,\tau)\right] = \kappa(\tau)\left[\Delta i^{*}(t,\tau) - E_{t-1}\left[\Delta i^{*}(t,\tau)\right]\right] + \Delta i^{sig}(t,\tau) + \Delta i^{news}(t,\tau) + \varepsilon^{\rho}(t,\tau)\,, \quad (1)$$

where $i(t,\tau)$ is the continuously compounded interest rate at time t on a nominal domestic zero coupon bond maturing τ periods ahead, $i^{*}(t,\tau)$ is a corresponding foreign interest rate, $\kappa(\tau)$ is a parameter, $\Delta i^{sig}(t,\tau)$, $\Delta i^{news}(t,\tau)$ and $\varepsilon^{\rho}(t,\tau)$ represent unexpected term structure movements caused by new monetary policy signals, unexpected and important economics news and changed market conditions (formally unexpected changes in term premia) respectively. The notation $\Delta x(t)$ denotes $x(t)$-$x(t\text{-}1)$ and $E_{t-1}[\cdot]$ is the expectation operator conditional on information available at time *t-1*. We will next turn to the non-trivial task of defining the above concepts in terms of observable variables.

3.2 Measuring unexpected changes in the term structure

When specifying the unexpected movements in the term structure we make use of the fact that an implicit forward interest rate at time t for a loan with maturity τ and settlement s periods ahead, $f(t,\tau,s)$, can be written as

$$f(t,\tau,s) = [\,i(t,\,\tau+s)\,(\tau+s) - i(t,s)\,s]/\,\tau. \quad (2)$$

In what follows we will consider settlement $s = 1$ period ahead. We also have that

$$f(t\text{-}1,\,\tau,1) = E_{t-1}\left[i(t,\tau)\right] + \rho^{f}(t-1,\tau,1)\,, \quad (3)$$

where $\rho^f(t-1,\tau,1)$ is a forward term premium that should be very small.[9] Thus, an expectation adjustment term, $v(t\text{-}1, \tau)$, defined as

$$v(t\text{-}1, \tau) \equiv f(t\text{-}1,\tau,1) - i(t\text{-}1, \tau) = i(t\text{-}1, \tau+1) - i(t\text{-}1,\tau) + (i(t\text{-}1, \tau+1) - i(t\text{-}1,1))/\tau, \quad (4)$$

should be a natural proxy for $E_{t-1}[\Delta i(t,\tau)]$. In the expression above we have used the fact that one period in our study corresponds to one week implying that also τ should be measured in weeks.[10] Substituting (2), (3) and (4) into (1), using the corresponding expressions for foreign interest rates, and rearranging yields

$$\Delta i(t,\tau) - v(t\text{-}1, \tau) = c(t\text{-}1,\tau) + \kappa(\tau)\,[\,\Delta i^*(t,\tau) - v^*(t\text{-}1,\tau)\,] + \Delta i^{sig}(t,\tau) + \Delta i^{news}(t,\tau) + \varepsilon^{\rho}(t,\tau), \quad (5)$$

where

$$c(t\text{-}1, \tau) = \kappa(\tau)\,\rho^{f^*}(t-1,\tau,1) - \rho^f(t-1,\tau,1). \quad (6)$$

We will base our empirical analysis on (5), which differs from (1) only by the term $c(t\text{-}1,\tau)$ that is likely to be small. The expectation adjustment term, $v(t\text{-}1,\tau)$, can be interpreted in the following way. The interest rates, $i(t-1,\tau)$ and $i(t,\tau)$ reflect expectations of monetary policy during the time intervals $[t\text{-}1,t+\tau\text{-}1]$ and $[t,t+\tau]$ respectively, and the differences in monetary policy expectations between these two intervals is captured by the term $v(t\text{-}1,\tau)$. One realizes that the expectation adjustment term is negligible when τ is large. When τ is small it is of potential importance to take this term into account.[11] In particular, if the next pre-announced policy meeting is scheduled just after the maturity of a three month T-bill at time $t\text{-}1$, the expected change of the one month interest rate might be substantial since the three month T-bill observed at time t will include a potential repo rate adjustment within the maturity.

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[9] The forward term premium, $\rho^f(t-1,\tau,1)$, should reflect the uncertainty concerning the spot rate, $i(t,\tau)$, in the next period (in our case the next week).

[10] The general expression for the expectation adjustment term is actually $v(t\text{-}s,\tau,s) = i(t\text{-}s,\tau+1) - i(t\text{-}s,\tau) + (i(t\text{-}s,\tau+1) - i(t\text{-}s,1))\,s/\tau$. We use weekly data and let one period correspond to one week, implying $s = 1$.

[11] One should be aware of that for small τ there are measurement problems. Good estimates of the term $v(t\text{-}1,\tau)$ require good estimates of short-term interest rates that differ very little in time to maturity. This in turn requires

3.3 The foreign interest rate

The foreign interest rate is constructed as a weighted average of estimated zero coupon yields for Germany (GE), the United Kingdom (UK) and the United States (US) according to

$$i^*(t,\tau) = 0.5i^{GE}(t,\tau) + 0.25i^{UK}(t,\tau) + 0.25i^{US}(t,\tau). \qquad (7)$$

This construction can be seen as a rough proxy for a TCW-weighted interest rate, with the weights for the three largest currencies scaled up.[12] Unexpected movements in the foreign term structure are measured in the same way as in section 3.2.

It is important to realize that unexpected movements in the foreign term structure reflect unexpected news in the global economy that affect monetary policy expectations more or less in all countries as well as changes in global market conditions (i.e. term premia). This means that the other terms on the right hand side in (1) only capture domestic factors. Especially, the term $\varepsilon^{\rho}(t,\tau)$ will only reflect the domestic component of the unexpected changes in market conditions. For instance, the drastic fall of Swedish long-term interest rates during the second half of 1998 was partly a result of a downward adjustment of global monetary policy expectations that the Asian crises caused and partly the result of a decrease of the global component of the Swedish term premium.[13] A closer inspection reveals that Swedish long-term interest rates did not fall as much as in Germany, UK and US indicating a possible increase of the domestic component of the term premium.

3.4 The economic news term

Interest rate movements caused by unexpected economic news, $\Delta i^{news}(t,\tau)$, is modeled as

$$\Delta i^{news}(t,\tau) = \eta^{\pi}(\tau)\left(\pi(t) - \pi^{e}(t)\right) + \eta^{y}(\tau)\left(y(t) - y^{e}(t)\right) + \eta^{u}(\tau)\left(u(t) - u^{e}(t)\right)$$

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many observations of different short-term interest rates in the short end of the yield curve, which we do not have. Thus, the term $v(t\text{-}1,\tau)$ should be viewed as a rough indicator of how monetary policy expectations change.

[12] The Riksbank uses the Trade and Competition Weighted (TCW) index as a measure of the krona's effective exchange rate. According to TCW the D-mark has a weight of 0.22 whereas the sterling and the US-dollar both have weights of 0.12. We have examined other ways of defining the foreign interest rate without any substantial changes of the results.

[13] The decrease of the global term premium probably reflects an increased demand for liquid assets such as government bonds.

$$+ \eta^{r}(\tau)\left(r(t) - r^{e}(t)\right) + \eta^{p}(\tau)\left(p(t) - p^{e}(t)\right), \qquad (8)$$

where $\pi(t)$, $y(t)$, $u(t)$, $r(t)$, and $p(t)$ are the official outcomes of actual CPI inflation, GDP-growth, unemployment, retail sales index, and producer price index respectively announced at time t and where superscript e indicates market participants' expected values of these variables normally less than a week before the announcement. Expectations are mainly taken from surveys but expectations modeled by simple time series methods have been used to fill in the gaps when no surveys were available (see the appendix for details).

The included domestic news variables are the ones that market participants pay most attention to.[14] Inflation and GDP are expected to be the most important factors since we are aware of the significance of these variables in estimated Taylor rules. However, we expect the effects from inflation and GDP-growth to be smaller than in estimated Taylor rule since developments in these variables often reflect changes in business cycle conditions, common to the global economy, which to a large extent is captured in foreign interest rate movements.

The inclusion of the news of other domestic variables is made in order to safeguard for the possibility that we do not exclude any important factors that market participants think have an impact on monetary policy considerations. An unexpected rise in unemployment is often expected to lead to a more expansionary policy. However, rising unemployment will also tend to worsen the fiscal budget position, which tend to increase interest rates and the net effect is ambiguous. The retail trade index is a potentially important indicator of demand pressure in the economy that should have a positive effect on interest rates. The producer price index should reflect costs that firms are facing and we therefore expect that a positive shock to the producer price index will lead to a positive interest rate effect.

3.5 The domestic monetary policy signaling component

The monetary policy signaling component, $\Delta i^{sig}(t,\tau)$, is assumed to be of the form

$$\Delta i^{sig}(t,\tau) = \mu_1(\tau)D^{sp}(t) + \mu_2(\tau)\ (repo(t) - E_{t-1}[repo(t)]) + \mu_3(\tau)\ [\pi_2^f(t) - 2] + \mu_4(\tau)m(t)\,, \qquad (9)$$

[14] In preliminary analysis we included news of the net trade balance, even though according to some sources market participants do not focus on these numbers. As we expected there was no significant impact on our results.

where $D^{sp}(t)$ is a dummy variable taking the value +1 (-1) when a speech at time t contains an unexpected signal of a contraction (expansion) of monetary policy and zero otherwise, $repo(t) - E_{t-1}[repo(t)]$ is a repo rate decision announced at time t relative to its expected value at time $t-1$, $[\pi_2^f(t)-2]$ is the Riksbank's inflation forecast two years ahead relative to the inflation target of 2 percent[15], $m(t)$ is a minority view indicator that will be described below, and the $\mu_i(\tau)$ are parameters. The expected future repo rate at time $t-1$, $E_{t-1}[repo(t)]$, is based on survey expectations expect in the beginning of the sample (year 1996) where it is approximated by the two week forward interest rate at time $t-1$, see the appendix for details.[16]

Since 1999 decisions not to change the repo rate are announced to the public. Such announcements should of course be considered as monetary policy signals but one may argue that they differ from announcements of non-zero repo rate changes. In contrast to non-zero repo rate adjustments the announcements of zero adjustments of the repo rate are not likely to contain information of substantial revisions of the Riksbank's view of the appropriate stance of monetary policy. Announcements of no change in the repo rate are

[15] Several clarifications concerning the nature of the inflation forecast should be made. (i) The inflation forecast is conditioned on an unchanged repo rate. Consequently an inflation forecast above (below) the inflation target signals the need of a future increase (decrease) of the repo rate. (ii) Before 1999 the inflation forecast was based on the annual change of the CPI. However, in the beginning of 1999, Deputy Governor Heikensten made a clarification with the message that monetary policy will not respond to transitory inflation effects such as interest rate expenditures and effects from subsidies and taxes, see Heikensten (1999) for details. This clarification was generally interpreted in the sense that monetary policy mainly will be guided by the prospects for underlying inflation (measured by UND1X), and we use the inflation forecast for UND1X from 1999 and onwards. (iii) Before the fourth inflation report 1997 the Riksbank did not publish an explicit inflation forecast. In five of the six preceding inflation reports it was stated that the inflation rate was judged to be two percent at the end of the forecast period, which we interpret as if the inflation forecast two years ahead was on target. In the first inflation report of 1997 it was stated that the inflation rate was judged to be below the target and in this case we set the inflation forecast to 1.9 percent. In Jansson and Vredin (2001) it is revealed that the actual forecast was 1.9 percent.

[16] Estimated forward rates are problematic to use when repo rate decisions are taken according to a pre-announced schedule as the following example demonstrate. Assume that investors the week before a monetary policy meeting are convinced that the repo rate will be raised by 25 basis points the coming week. The expectations of the future repo rate 2 weeks as well as 1 month ahead should both then be 25 basis points higher than the current repo rate since the subsequent monetary meeting will be held more than 1 month ahead. However, most techniques for estimating forward rates fail to capture this short run flatness of repo rate expectations and typically the estimated 2 week forward rate is somewhere between the current rep rate and the estimated 1 month forward rate, which often means that the 2 week forward rate only partially reflects the expected increase of the repo rate. This problem with estimated forward rates is less of a problem in the beginning of the sample during which the repo rate could be changed any time as the small expectations errors in the beginning of the sample demonstrates, see table A3 in the appendix.

treated as a separate signaling variable in order to examine if they differ from announcements of non-zero repo rate adjustments.

The inflation forecast in the inflation report is defined as the *mode* of the conditional distribution for the inflation rate two years ahead, which can be viewed as the most likely outcome for inflation.[17]

It is a non-trivial task to determine when a speech contains an unexpected monetary policy signal as illustrated by the following example. Assume that monetary policy expectations are neutral, i.e. the short end of the yield curve is flat. A speech signaling an increase of the repo rate will then lead to expectations of future rise of the repo rate and a positively sloped yield curve. A subsequent speech with the same monetary policy signal will then have no effect since the yield curve has already responded to a similar signal. Based on the insights gained from this example we will use the following two step procedure to calculate the dummy variable $D^{sp}(t)$. In a first step a dummy variable $D^{sign}(t)$ is constructed such that it takes the value 1 (-1) when an interest rate increase (decrease) is signaled in a speech and zero if an unchanged monetary policy stance is signaled. Then in a second step the dummy variable $D^{sp}(t)$ is defined as

$$D^{sp}(t)=\begin{cases} 1 \;\; if\; D^{sign}(t)=1 \;\; and\; slope(t-1) < d \;\; or\; D^{sign}(t)=0 \;\; and\; slope(t-1) \le -d \\ -1 \;\; if\; D^{sign}(t)=0 \; and\; slope(t-1) \ge d \;\; or\; D^{sign}(t)=-1 \; and\; slope(t-1) > -d \\ 0 \;\; otherwise \end{cases} \quad (10)$$

where d is set to 0.05 in the base model, and the slope(*t-1*) variable is measured as the difference between the 30-day T-bill rate and the repo rate at time *t-1*. Thus if $D^{sp}(t)$ takes the value 1 (-1) the speech is judged to contain an unexpected signal of a more contractionary (expansionary) monetary policy whereas a zero value indicates a monetary policy signal in accordance with market expectations. This method for classifying speeches is similar to the dummy variable method applied by Guthrie and Wright (2000) for characterizing monetary policy statements. The main difference is that we control for monetary policy expectations, as reflected in the slope variable, in order to determine whether or not the signal is unexpected or not. Guthrie and Wright assume that all statements indicating a need to tighten or loosen monetary policy

[17]Formally the mode is the outcome that maximizes the density function of the underlying (conditional) distribution. The mode forecast will typically differ from the adjusted forecast (i.e. the mathematically expected value) in presence of asymmetric risks to the forecast. For details see Blix and Sellin (1998).

conditions are unexpected (excluding pre-announced speeches and statements that are part of regular information releases).

The construction of the variable $D^{sp}(t)$ is problematic and subjective judgements must be used in several steps. First, it must be decided if a speech contains a monetary policy signal as well as the nature of the signal (i.e. the value of $D^{sign}(t)$). In the appendix there is a list of speeches containing signals as well as quotations motivating the assigned nature of the speeches. Thereafter it must be decided if the signal was expected or not according to expression (9), which is based on the assumption that investors have expectations of increases (decreases) of the repo rate in the near future only if the slope variable is greater (less) than 5 (-5) basis points. The consequences of changing the slope parameter d will be examined.[18]

The minority view indicator is defined as

$$m(t) = \frac{1}{6}\sum_{k=1}^{6} \Delta repo^{k}(t) - \Delta repo(t\text{-}n), \qquad (11)$$

where $\Delta repo^{k}(t)$ is the preferred repo rate adjustment of Executive Board member k according to the minutes published at time t, and $\Delta repo(t\text{-}n)$ is the actual repo rate adjustment that took place (n weeks earlier) at the monetary policy meeting that the minutes are referring to.[19] A positive value of the indicator $m(t)$, which can be viewed as the *average* preferred repo rate adjustment relative to the preferred repo rate adjustment *of the majority*, signals that there are preferences for a tighter monetary policy within the Executive Board and hence we expect a positive relationship between $m(t)$ and unexpected movements in the term structure of interest rates. Indeed, Gerlach-Kristen (2003), who analyzes the voting behavior of the Monetary Policy Committee at Bank of England, constructs a model in which the indicator $m(t)$ is indicative of future monetary policy actions. It is worth emphasizing, however that the purpose of publishing minutes by the Riksbank is not to signal monetary policy intentions, but to give a transparent description of the monetary policy views that are held within the Executive Board.

[18] An interesting possibility is to estimate the parameter d, e.g. by maximum likelihood estimation. However, we have refrained from this rather complex possibility.

It should be noted that the signaling variables $[\pi_2^f(t)\text{-}2]$ and $m(t)$ are not defined in terms of deviations from expected values. The problem is that we do not have measures of investors' expectations concerning these variables.[20] Alternatively one can say that we have approximated the expected values for $[\pi_2^f(t)\text{-}2]$ and $m(t)$ by zeros. Anyhow, we expect that if the inflation report or the minutes contain unexpected monetary policy signals then they will show up in $[\pi_2^f(t)\text{-}2]$ and $m(t)$ respectively.

3.6 Unexpected changes in market conditions

Finally we have to address unexpected movements in the term structure that cannot be attributed to unexpected international term structure movements, monetary policy signals or economic news. These are contained in the last term in (1): $\varepsilon^{\rho}(t,\tau)$. It is natural to think of these remaining effects as a result of changes in market conditions such as changes in demand for liquidity or portfolio adjustments. Formally this kind of movements can be seen as unexpected shocks to the domestic component of a term premia. Moreover, since term premia often exhibit autocorrelation we expect term premia factors to enter our equations also with a lag.[21] We assume that the term premium includes a domestic portfolio component of the form

$$\rho^{d}(t,\tau) = \varphi(\tau)\,\delta^{L}(t) \qquad (12)$$

where $\delta^{L}(t)$ is the difference between domestic and foreign 10 years forward rate interest rates. We think of the term $\rho^{d}(t,\tau)$ as representing portfolio adjustment effects in the following way. If investors want to substitute from domestic to foreign bonds this should tend to increase domestic long term (forward) interest rates relative to foreign interest rates. Such

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[19] For example, in the minutes published November 29, 1999 it can be read that the Executive Board member Mr. Bergström voted for an unchanged repo rate whereas the majority voted for an increase of the repo rate of 35 basis points. In this case we have that $m(t) = -0.35/6$.

[20] There are measures of inflation expectations and inflation forecasts but there are no measures of expectations concerning the conditional forecast published in the inflation reports. This forecast is conditional on an unchanged repo rate and must be distinguished from traditional forecasts.

[21] To illustrate this assume that the term premium (expressed as deviation from its stationary value) follows an AR(n) process: $\rho(t,\tau) = \theta_1\rho(t\text{-}1,\tau)+\ldots+\theta_n\rho(t\text{-}n,\tau)+\varepsilon^{\rho}(t,\tau)$. The unexpected change in the term premia can then be written as $\varepsilon^{\rho}(t,\tau) = \Delta\rho(t,\tau)+\mu_1\Delta\rho(t\text{-}1,\tau)+\ldots+\mu_{n-1}\Delta\rho(t\text{+}1\text{-}n,\tau)+\mu_n\rho(t\text{-}n,\tau)$, where $\mu_i = 1-(\theta_1+\ldots+\theta_i)$. We see that lagged changes in the term premium have a positive impact on unexpected term structure movements that also is smaller than the contemporaneous change in the term premia ($\mu_1 < 1$).

effects are often present during periods of international financial turmoil, e.g. in the autumn of 1998. Moreover, in the mid-90's portfolio effects of this kind were large in Sweden and driven by imperfect (and fluctuating) credibility for the Swedish economic policy that the worrisome development of the national debt caused. Dillén and Hopkins (1998) have shown that long-term forward interest rate differentials play an important role in explaining term structure movements in Sweden that are not related to monetary policy expectations.[22]

In addition we acknowledge the possibility that there is a global component in the term premium incorporated in foreign interest rates. For instance, it is reasonable that the drastic fall in international market interest rates during the second half of 1998 partly reflected a reduction in term premia caused by increased demand for liquid assets, such as government bonds. To the extent that this component exhibits serial correlation we would expect that lagged changes in the foreign interest rates should enter significantly in our empirical model.

Finally we include lagged values of the other regressors (monetary policy signals and economic news) in order to examine the specification. The hypothesis is that investors immediately and correctly evaluate unexpected monetary policy signals and economic news implying that lagged values of these variables should not be significant determinants of term structure movements. However, if it takes time for investors to evaluate news of a particular kind this should lead to a positive lagged effect. A variant of this argument is that influential commentators (including politicians) comment on news, e.g. a repo rate decision, with some delay, which in turn leads to subsequent movements in interest rates. Another possibility is that investors overreact to news in which case there should a lagged effect of the opposite sign.[23]

3.7 Data

We use weekly data from April 16, 1996 to September 30, 2003. There are two main reasons why we do not extend the analysis backward in time. First, it is hard to find relevant measures

[22] Dillén and Hopkins (1998) derive the presence of the long-term interest rate differential in a term premium (expression from a theoretical regime switching model in which investors fear that the low inflation policy will be abandoned in the future. Strictly speaking the long-term interest rate differential reflects an expectational error (unfulfilled expectations of a switch to a high inflation regime). Moreover, a German long-term interest rate was used as the foreign interest rate in this study.

[23] Notice that there are basically two different arguments for deviations from the expectation hypothesis: (i) investors demand term premia for holding bonds or (ii), expectations are not fully rational due to e.g. delayed evaluation of news or overreaction.

of expectations concerning domestic variables such as inflation and GDP-growth prior to 1996. Second, during the first half of the 90's Swedish interest rates were often high and very volatile due to credibility problems. Even though it is possible to control for some of these effects the inclusion of data from the first half of the 90's is likely to blur the analysis. Swedish and foreign interest rates are estimated as continuously compounded zero coupon yields using (with a few exceptions) interest rate quotations from Tuesdays. These quotations should be viewed as end of the week observations and all events that occur between Wednesday morning and the following Tuesday afternoon are considered as week *t* events. Market participants' inflation and GDP-growth expectations have been taken from surveys undertaken by Reuters. Expectations of unemployment, retail sales index and producer price index and net trade are mainly based on surveys from Reuters, but also time series methods have been used. Details about the data used can be found in the Appendix.

4. Results and evaluation

4.1 Results in the basic model and overall impression

Table 1 displays estimates of the model for unexpected movements in the Swedish term structure of interest rates described in section 3. Four interest rates are examined: a short-term interest rate (maturity of 90 days), two medium-term interest rates (maturities of 1 and 2 years), and a long-term interest rate (maturity of 5 years). Overall the estimates make sense. Most factors have significant effects of the expected sign and there are very few significant estimates of the wrong sign. Serial correlated residuals appear not to be a problem according to the Durbin-Watson statistics. We will next take a closer look at exogenous factors (R* and RDIFF), followed by domestic economic news factors (CPI, GDP, UNEMPLOY, RETAIL, and PPI) before we examine monetary policy factors and the role of signaling.

4.2 Exogenous factors

Notice first that the impact of foreign term structure movements increases with time to maturity as expected and foreign interest rates appear to be the dominant factor for longer interest rates, see Table 2. This is natural since global economic shocks should affect long-term monetary policy intentions in different countries in a similar way whereas policy actions in the short run, i.e. the timing of policy actions, are related to foreign policy intentions only

to a limited extent. Moreover, lagged foreign interest rates also enter significantly (with one exception) in the regressions, but with a smaller magnitude, which is consistent with the presence of a serially correlated global term premium.

Changes in market conditions (measured by changes in the long-term forward rate differential between domestic and foreign bonds) exhibit significant impact on especially medium- and long-term interest rates indicating that weekly changes in interest rates are to some extent driven by noisy market effects. The absence of lagged effects indicates that these markets effects are probably not serially correlated. The term structure effects from the long forward rate differential are also small in comparison with the findings of Dillén and Hopkins (1998). The intercept terms are insignificant and very close to zero, which reinforces the impression that no important term structure factor has been left out in the analysis.

4.3 Domestic economic news factors

Economic news concerning GDP and inflation seems to have significant effects on especially medium- and long-term interest rates, whereas only CPI news exhibit some influence on short term interest rates. However, the small estimated coefficients are hard to reconcile with the view that the market believes that the Riksbank follows a Taylor rule closely. This impression is reinforced by the fact that CPI and GDP news do not seem to play an important role for monetary policy in the near future (which would be the case if the Riksbank followed a Taylor rule) but mainly affect expectations regarding monetary policy in the medium term. One important explanation for the modest coefficients is that the cyclical pattern in interest rates that Taylor rules are supposed to capture to a large extent is reflected in the foreign interest rate. Moreover, the impact on monetary policy expectations depends on how economic news is interpreted. If GDP surprises are interpreted to be the result of productivity shocks rather then changes in demand conditions (the output gap) then we expect limited effects on monetary policy expectations and market interest rates.

The other domestic news variables are generally small and insignificant. The effect from shocks in the unemployment rate is ambiguous though. The expected expansionary effect can be counteracted by the fact that an increase of the unemployment rate has a negative effect on public finances, which in turn sometimes generates credibility problems and higher interest rates. Shocks to the retail sales index have very little impact on interest rates. There is,

however, a statistically significant lagged negative effect on long term interest rates but the economic significance is small.[24]

4.4 Policy factors

Turning to the policy signaling variables we see from Tables 1 and 2 that announcements of repo rate changes are not fully discounted with a substantial effect on the 90 day T-bill rate. The quantitative effects on short-term interest rates are broadly similar to the findings by Cook and Hahn (1989), Favero, Iacone and Pifferi (1996) and Kuttner (2001). The impact from unexpected repo rate changes on longer market interest rate is smaller and declines with maturity. This observation, which is in line with the findings of Favora, Iacone and Pifferi (1996), Buttiglione, Del Giovane and Tristani (1997), and Haldane and Read (2000), suggests that interest rate policy is to a large extent used to implement current intentions rather than signal long run monetary policy intentions. Notice also that there appears to be some lagged effect from unexpected repo rate changes on the yield curve even if the effect is significant only on 1 year interest rates. This may indicate that it takes some time for investors to fully appreciate the signal or that the repo rate change triggers some kind of delayed reactions from influential commentators, which in turn affect market rates.

Announcements of no change in the repo rate only affect interest rates with maturities up to 1 year. This may reflect that investors are somewhat surprised by the timing of monetary policy actions but the decision not to change the repo rate does not appear to contain strong signals concerning monetary policy in a longer perspective. Moreover, there is an additional and significant lagged effect on short term interest rates, which may indicate that investors with some delay adjust their monetary policy expectations in the near future when the Riksbank surprises the market by not changing the repo rate.

[24] The average size of a shock in RTI is slightly less than 1 percentage point (see Table A1), which combined with the point estimate of -0.017 implies a 1.5-2 basis points lagged effect on the 5 year interest rate.

Table 1. Yield curve impact of market factors, news, and monetary policy.

Variable	90 day bill	1 year bond	2 year bond	5 year bond
Constant	-0.003	-0.001	-0.001	-0.001
	(1.077)	(0.344)	(0.255)	(0.218)
R*	**0.210**	**0.320**	**0.440**	**0.616**
	(4.861)	(8.507)	(14.214)	(20.332)
lagged effect	**0.099**	**0.092**	**0.089**	**0.080**
	(2.300)	(2.432)	(2.871)	(2.626)
RDIFF	**0.044**	**0.097**	**0.137**	**0.117**
	(2.569)	(4.155)	(5.247)	(4.563)
lagged effect	-0.011	0.008	0.013	-0.004
	(0.617)	(0.367)	(0.491)	(0.142)
CPI	**0.078**	**0.129**	**0.152**	**0.100**
	(2.483)	(3.026)	(3.187)	[2.122)
lagged effect	-0.009	0.067	0.037	0.049
	(0.274)	(1.578)	(0.784)	(1.035)
GDP	0.013	**0.036**	**0.047**	**0.042**
	(0.870)	(1.733)	(2.020)	(1.812)
lagged effect	0.017	-0.013	-0.014	0.003
	(1.132)	(0.635)	(0.587)	(0.129)
UNEMPLOY	0.015	0.002	-0.008	-0.017
	(0.670)	(0.083)	(0.238)	(0.517)
lagged effect	0.020	0.035	0.038	0.030
	(0.918)	(1.203)	(1.145)	(0.913)
RETAIL	-0.002	0.005	0.003	-0.002
	(0.572)	(0.969)	(0.426)	(0.340)
lagged effect	-0.002	-0.002	-0.009	**-0.017**
	(0.589)	(0.414)	(1.523)	(2.831)
PPI	0.000	0.019	0.024	0.036
	(0.012)	(0.844)	(0.923)	(1.407)
lagged effect	0.008	0.037	0.026	0.006
	(0.482)	(1.614)	(1.023)	(0.246)
REPO	**0.679**	**0.386**	**0.318**	**0.179**
	(10.852)	(4.555)	(3.374)	(1.922)
lagged effect	0.081	**0.138**	0.105	0.042
	(1.318)	(1.646)	(1.121)	(0.452)
NOREPO	**1.068**	**0.572**	0.156	-0.048
	(4.418)	(1.757)	(0.429)	(0.133)
lagged effect	**0.582**	0.196	0.224	-0.053
	(2.422)	(0.600)	(0.615)	(0.148)
SPEECH	**0.024**	**0.073**	**0.064**	**0.031**
	(2.152)	(4.789)	(3.750)	(1.861)
lagged effect	**0.026**	0.001	-0.001	0.013
	(2.250)	(0.050)	(0.071)	(0.774)
REPORT	**0.214**	**0.150**	0.117	0.132
	(3.641)	(1.881)	(1.314)	(1.502)
lagged effect	0.073	0.040	-0.009	-0.025
	(1.204)	(0.486)	(0.103)	(0.277)
MINUTES	0.193	0.139	0.085	0.198
	(1.063)	(0.561)	(0.309)	(0.726)
lagged effect	0.034	-0.016	0.075	0.229
	(0.189)	(0.066)	(0.274)	(0.847)
R2	0.412	0.334	0.417	0.535
DW	2.17	2.02	1.94	2.04

Coefficients significant at the 10 percent level are reported in boldface. t-values are reported in parentheses. The equations have been estimated using SURE. CPI, GDP, UNEMPLOY, RETAIL and PPI refer to the surprises in monthly percentage change in consumer price index, the percentage annual GDP growth rate, the percentage of the labor force without a job, the percentage annual change in the Retail Trade Index and Producer Price Index respectively. REPO is the announced change in the repo rate minus the expected change, NOREPO corresponds to REPO in the case when no change in the repo rate is announced, SPEECH is a dummy variable indicating the stance of monetary policy of the speaker according to (10), REPORT is the two year inflation forecast minus 2 per cent, MINUTES reflects the minority view in connection with a repo rate decision as revealed in the minutes of the Executive Board, see (11), R* is the change in the foreign interest rate with matching maturity to the dependent variable, and RDIFF is the change in the difference between domestic and foreign 10 years forward interest rates. DW is the Durbin-Watson test for first-order autocorrelation.

The observation that surprises in the repo rate appears to be the dominant source behind movements in short term interest rates raises some question about the transparency of the riksbank monetary policy. In an ideal world in which the central bank in a transparent and credible manner respond to economic news monetary policy signals and actions would be fully anticipated. To shed some light on this issue we notice first that the unexpected component on average attributes to about 50 percent the total repo rate change.[25] Calculations based on table 2 in Kuttner (2001) give that the corresponding number for changes in the Fed funds target is 40 percent. The riksbank's monetary policy actions appear in this sense to be somewhat less predictable than the Fed's. It is fair to say transparency remains an area where there is room for improvement for the Riksbank (and other central banks), see Fracasso, Genberg and Wyplosz (2003) and Leeper (2003). On the other hand it can be noticed that the impact on longer interest rates from this kind of monetary policy shocks appears to be smaller in comparison to the US, see Kuttner (2001). This observation may be interpreted as that expectations of monetary policy intentions are better understood in Sweden and therefore less sensitive to policy shocks. A somewhat different interpretation is that changes in the Fed funds target is the main tool for signaling long term monetary policy intentions, whereas other signaling devices are used in Sweden. We will shed some light on the latter issue below.

The overall impression is that repo rate changes only to a limited extent cause investors to revise their expectations regarding the Riksbanks' monetary policy intentions in a longer perspective, but investors are sometimes surprised by the timing of monetary policy actions. In this context it should be noticed that since 1999 the repo rate has been changed at policy meetings only 14 times out of 41 in our sample. This kind of behavior is hard to reconcile with optimal policy rules derived from models, which typically imply more frequent adjustments of the instrument. On the other hand the economic consequences of postponing a repo rate adjustment to the next monetary policy meeting are often limited and the actual timing of a decision depends to a large extent on the decision-makers' views concerning the appropriate tactics, which are hard to predict. The difficulty of predicting the

[25] This number is obtained from table A3 in the appendix as the sum of absolute values of repo rate surprises in absolute terms divided by the sum of absolute values of actual repo rate changes.

timing of policy moves in the short run is probably a major factor behind the limited predictability of the repo rate.

The observation that repo rate changes only signal long run monetary policy intentions to a limited extent gives rise to further questions; if shocks to the economy call for a substantial change in the monetary policy stance, which according to theory means changes in the longer segment of the yield curve, how can this be achieved? In other words, how are monetary policy intentions in a longer perspective signaled? It is in this context natural to examine which roles other channels for monetary policy signaling play.

Table 2. Variance decomposition of changes in interest rates, as a share of total explained interest rate variance (in percent).

Component	90 day bill	1 year bond	2 year bond	5 year bond
News variance	3.7	13.3	10.2	6.1
Policy variance	80.6	41.6	16.6	4.5
R* variance	9.6	31.1	53.5	78.3
DRDIFF variance	3.2	12.2	14.8	7.2

News includes the GDP, CPI, UNEMPLOY, RETAIL, PPI variables, while policy encompasses REPO, NOREPO, REPORT, SPEECH, and MINUTES. The contributions from the covariance components (not reported in the table) were all quite small (less than 3 percent in absolute values).

Inflation forecasts published in the inflation report appear to have some impact on interest rates with a maturity of 1 year or less. The quantitative term structure reaction appears to be much smaller than the actual repo rate response to changes in inflation forecasts, see Jansson and Vredin (2001).[26] This indicates that a substantial part of future monetary policy actions were expected by investors before the publication of the inflation forecast. Indeed, we do not expect a strong effect from the publication of the inflation forecast since its main role is to support the repo rate decision announced at the same time rather than to provide the market with additional signals. We have also examined various methods to incorporate the risk

[26] Jansson and Vredin (2001) find that an upward revision of the inflation forecast with 1 percentage point is associated with a short run response of the repo rate of about 66 basis points.

assessment in the inflation report without obtaining any effects on the Swedish term structure of interest rates.[27]

There are several reasons to our cautious interpretation of the effects from inflation forecast. One problem is that the impact of the inflation forecast is quite sensitive to outliers and in the baseline model we exclude the inflation forecast published December 8 1998.[28] Moreover, the fact that the unexpected component of the Riksbank's inflation forecast relative to the target is measured with error, since we do not know the expected value, also blurs the analysis. Finally, there is also a multicollinearity problem since the publication of inflation reports normally coincides with the announcement of a repo rate decision. The inflation report may contain some uncertain signaling effects that are difficult to extract due to measurement and statistical problems.

The minority view appears to have only a small and insignificant effect on Swedish short term interest rates indicating that investors may adjust their monetary policy expectations towards the minority view to some extent. The coefficients are smaller than the corresponding estimates reported by Gerlach-Kristen (2003). It should, however, be remembered that the unexpected component of the minority view (as defined by expression (9)) is measured with an error since we do not know the expected values, and that the motive behind the publication of minority views is not to affect monetary policy expectations, but to give a more detailed description of the decision-making process.

Finally, Table 1 indicates that unexpected signals from speeches have significant but at first sight small effects on Swedish interest rates. However, a closer examination reveals that the effect on the 5 year interest rate from an unexpected signal given in a speech corresponds to an unexpected repo rate change of 17 basis points, which is quite large.[29] Our tentative

[27] We have tried to use the risk-adjusted inflation forecast (corresponds to the mathematically expected inflation) which if anything had weaker effects on Swedish interest rates. When we added separate variables representing the risk assessment in the inflation report small insignificant effects of the wrong sign were obtained.
[28] The inflation forecast published December 8, 1998 was special in several respects. The forecast exhibits the largest deviation from the target in the sample and it also represents a rather large downward revision in comparison to the forecast published about 2 months earlier (September 29, 1998). Moreover, the low inflation forecast of 1.4 percent is measured in terms of CPI whereas the inflation forecast for underlying inflation (UND1X) was substantially higher (1.8) percent and it is not unreasonable that investors believed that future monetary policy would be guided by the outlook for UND1X – a praxis that was announced in the beginning of 1999, see footnote 15.
[29] The average surprise in non-zero changes in the repo rate is about 12 basis points.

conclusion is that speeches have been at least as important as unexpected repo rate changes for signaling monetary policy intentions in a longer perspective. This conclusion is noticeable given the problem of measuring unexpected monetary policy signals from speeches. Moreover, table 1 treats all speeches equally, but in reality some speeches are likely give stronger signals than others, an aspect we will examine below.

4.4 A closer look at the speeches

The analysis above indicates that speeches might be an important channel for monetary policy signaling. At the same time it is a non-trivial task to extract unexpected signals from speeches and therefore we find it appropriate to examine alternative methods. First, we analyze the consequences of assigning the very low value of 0.005 to the slope variable d in (9). This means that investors very seldom have neutral monetary policy expectations implying that most non-neutral speeches deliver expected signals. As seen from Panel A in Table 3 this leads to a reduction of the estimated coefficients[30] for the speech signals as well as R^2. A similar pattern (to a lesser degree) also emerges if we increase the slope variable d to 0.10.[31] The problem in this case is that investors are judged to have neutral monetary expectations most of the time implying that too many non-neutral unexpected speech signals are included.[32] Our choice of the slope variable d is probably not very far from the value that data would have chosen if this parameter were to be estimated.

Next we restrict the analysis to speeches that were followed by a non-zero repo rate change within 3 weeks. In this case the signals should be stronger since these signals typically were followed up by a corresponding policy move. In panel C we see that this does not seem to be the case as the estimated coefficients do not change much. Moreover, speech signals constructed in this way cannot be used in real time analysis.

[30] Changes of the definition of the speech variable had very small effects on estimates of the coefficients of the other regressors and they are therefore not reported.
[31] If we increase the parameter d to a sufficiently large number all non-neutral speeches become unexpected. The result in this case is quite similar to that presented in Panel B in Table 3.

Table 3. Alternative methods for extracting unexpected signals from speeches

Variable	90 day bill	1 year bond	2 year bond	5 year bond
A. d = 0.005 in (9)				
SPEECH	0.001	**0.025**	0.020	0.000
	(0.091)	(1.980)	(1.434)	(0.013)
lagged effect	**0.024**	0.003	-0.002	-0.004
	(2.671)	(0.200)	(0.141)	(0.318)
R2	0.406	0.301	0.399	0.531
B. d = 0.10 in (9)				
SPEECH	**0.019**	**0.049**	**0.034**	0.008
	(1.906)	(3.521)	(2.201)	(0.537)
lagged effect	0.004	-0.002	0.001	0.009
	(0.388)	(0.163)	(0.038)	(0.607)
R2	0.401	0.317	0.404	0.531
C. Include only speeches given within 3 weeks before repo rate adjustment				
SPEECH	**0.030**	**0.072**	**0.060**	0.029
	(1.667)	(2.928)	(2.187)	(1.066)
lagged effect	0.004	0.017	0.034	**0.049**
	(0.223)	(0.659)	(1.204)	(1.740)
R2	0.425	0.335	0.420	0.537
D. Impact of speeches given by the Governor before and after 1999				
SPEECH-pre99	**0.069**	0.048	0.026	0.001
	(3.170)	(1.606)	(0.785)	(0.032)
lagged effect	0.027	0.049	0.046	**0.073**
	(1.242)	(1.627)	(1.387)	(2.211)
SPEECH-post98	**0.064**	**0.111**	**0.127**	0.048
	(2.533)	(3.172)	(3.278)	(1.250)
lagged effect	0.006	-0.018	-0.052	-0.037
	(0.234)	(0.499)	(1.331)	(0.963)
R2	0.423	0.322	0.417	0.538
E. Speeches with unexpected contractionary or expansionary monetary policy signals				
SPEECH-contractionary	**0.034**	**0.104**	**0.103**	**0.070**
	(2.234)	(5.058)	(4.458)	(3.064)
lagged effect	**0.026**	-0.010	-0.011	0.008
	(1.732)	(0.506)	(0.499)	(0.356)
SPEECH-expansionary	0.010	0.034	0.015	-0.019
	(0.593)	(1.433)	(0.548)	(0.732)
lagged effect	0.024	0.015	0.011	0.018
	(1.309)	(0.604)	(0.397)	(0.662)
R2	0.413	0.344	0.428	0.544

t-values are reported in parenthesis below the estimated coefficients.

[32] When the parameter d is set to a very high number (i.e. no adjustment for monetary policy expectations as reflected in the slope of the yield curve) the size and the significance of the estimated coefficients weakens further.

We also examine whether speeches by the Governor had a bigger impact before the introduction of the collective decision-making of the Executive Board in 1999 than after.[33] However, the evidence presented in Panel D of Table 3 provides no support for this hypothesis. Indeed, speeches given post-1998 have a larger contemporaneous impact on medium- and long-term interest rates, but if we include lagged effects the picture is not clear. With the exception of the 2 years bonds we cannot reject the hypothesis of equal impact in the two sub-periods using a formal F-test on a 5 percent level. This is also the case for a joint test including all maturities. It can also be noticed that the Governor's speeches post-1998 had a larger impact than the speeches reported in table 1. This not surprising given that the Governor has the casting vote in the voting procedure and therefore a stronger influence on the repo rate decision.

Finally we examine if speeches with contractionary signals differ from signals with expansionary signals. In Panel E of Table 3 it is evident that unexpectedly contractionary speeches have had a much larger impact on Swedish interest rates than unexpectedly expansionary speeches. A mirror image of this result is that unexpected repo rate decreases have had much larger impact than unexpected repo rate increases, see Table 4. Indeed, it appears that unexpected increases of the repo rate have had no effects on medium and long term interest rates. The observations above suggest that investors have had difficulties to apprehend unexpected signals in speeches about future decreases of the repo rate and that investors therefore view repo rate decreases as a rather drastic change of policy intentions when they occur.

We do not, a priori, think that there should be any asymmetric response to repo rate increases and repo rate decreases. The estimated asymmetry is probably to some extent a small sample problem in the sense that the sample only includes 7 upward adjustments of the repo rate and at several occasions these adjustments were associated with substantial *reductions* of the interest rates with longer maturities. However, one cannot exclude the possibility that this reflects an asymmetric credibility effect, i.e. that repo rate increases lead to lower nominal interest rates thanks to lower inflation expectations but not the other way around (i.e. repo

[33] We only include the speeches of the former Governor Urban Bäckström in the analysis and do not include speeches of Lars Heikensten who was appointed as the new Governor in January 2003.

rate decreases lead to higher inflation expectations).[34] Another possible explanation to the asymmetry is that most of the repo rate decreases after 1996 have been against the long run trend, i.e. the repo rate has been cut when the current level of the repo rate has been below its long run equilibrium level. It is conceivable that such policy moves are harder to communicate, which may explain the lack of impact from speeches signaling unexpected repo rate decreases, and therefore leading to a substantial revision of monetary policy expectation when they occur.

Table 4. Impact of unexpected increases and decreases of the repo rate.

Variable	90 day bill	1 year bond	2 year bond	5 year bond
REPO-increases	**0.712**	0.069	-0.118	-0.098
	(5.681)	(0.405)	(0.622)	(0.519)
lagged effect	-0.085	0.269	0.277	0.235
	(0.678)	(1.578)	(1.459)	(1.244)
REPO-decreases	**0.670**	**0.484**	**0.454**	**0.263**
	(9.284)	(4.996)	(4.227)	(2.475)
lagged effect	**0.134**	0.098	0.053	-0.017
	(1.897)	(1.033)	(0.503)	(0.161)
R2	0.415	0.342	0.428	0.539

5. Conclusions

This paper examines how various monetary policy signals from the Riksbank (the Swedish central bank) affect the Swedish term structure of interest rates. The paper extends the existing literature in two important ways. First, it relates unexpected term structure movements not only to unexpected monetary policy actions, but also to unexpected changes in other factors like foreign interest rates, surprises in the outcome of economic variables such as inflation and GDP among other macroeconomic variables and unexpected portfolio effects. Second, the paper broadens the concept of monetary policy actions to include (in addition to the changes in the official interest rate) unexpected signals from speeches, inflation reports and minutes from monetary policy meetings.

[34] The observation that long term interest rates tend to decrease when the repo rate is increased can also be interpreted in terms of changed central bank preferences, see Ellingsen and Söderström (2001).

The overall picture is that the policy variables, especially unexpected changes in the repo rate (the official instrumental rate of the Riksbank), are the most important factors for movements of the short end of the yield curve (the nominal three month interest rate) but they still contribute significantly (in a statistical as well as in an economic sense) to movements in market interest rates of longer maturities. Surprises in the outcome of inflation and GDP and unexpected changes in market conditions (term premia) also had some impact on the term structure of interest rates. However, the foreign interest rate is probably the most important factor in the sense that it is the dominant factor for interest rates with a maturity of 2 years or more.

A closer inspection of the policy variables reveals that the impact on market interest rates from unexpected changes in the repo rate declines as maturity increases. The results are in line with the results in other papers analyzing how changes in the official rate affect the term structure of interest rates. However, announcements of no change in the repo rate only affect interest rates with a maturity of 1 year or less. The observation that unexpected repo rate decisions are a dominating factor behind movements in short term interest rate suggests that monetary policy is rather unpredictable in the short run, which in turn may reflect problem with transparency. It seems, however, that much of the lack of predictability of the repo rate stem from the fact that repo rate decisions are not as frequent as optimal policy rules imply and the exact timing of a policy move is also quite hard to predict. The reasons behind and consequences of this kind of policy behavior should be addressed in future research.

The published inflation forecast 2 years ahead have some impact on interest rates with a maturity of 1 year or less but this result should be interpreted with caution due to statistical and measurement problems. The minority view as reflected in the minutes published a few weeks after monetary policy meetings may affect investors' expectations concerning repo rate decisions in the subsequent meetings. The effect is, however, small and insignificant.

Unexpected signals from speeches appear to be as important (and potentially larger e.g. when the Governor delievers a speech) as unexpected repo rate changes for Swedish term structure movements. However, it can be misleading to compare repo rate changes and speeches as separate policy variables without taking the interaction between them into account. As an example of this interaction it is shown that speeches signaling repo rate

increases had a far stronger impact than speeches signaling repo rate decreases. Consequently, unexpected decreases in the repo rate had a much stronger impact than repo rate increases.

Finally, one should recall that there is an implicit and fundamental role of the repo rate in the sense that other channels for signaling future monetary policy intentions would be useless if there was no repo rate (or other instrument) that could implement these intentions. This does not, however, alter the main conclusion of this paper namely that central bank communication is an essential part of the conduct of monetary policy - an aspect that should be examined further in future research.

Appendix: Description of Data

Interest rate data. With the exception for the repo rate, which is expressed as a simple annual rate, interest rates are continuously compounded zero coupon interest rates estimated with the extended Nelson-Siegel method (see Svensson (1995)). Interest rates obtained in this way are displayed in figures A1 and A2.

Figure A1. Swedish (SE) and Foreign (FOR) zero coupon interest rates.

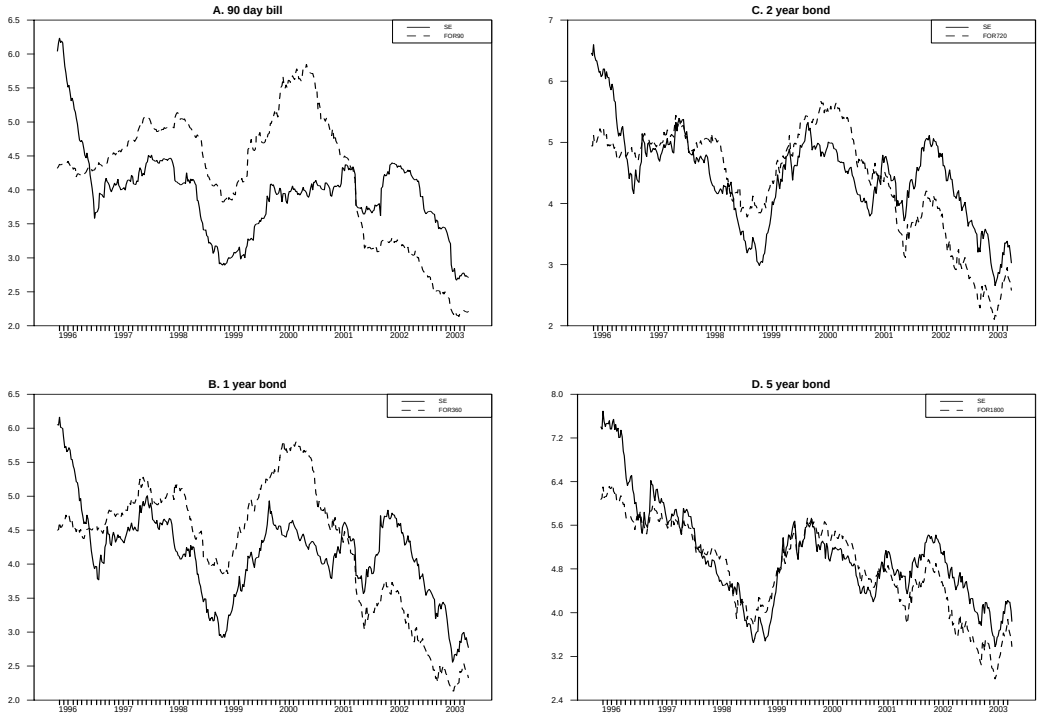

Figure A2. The repo rate and the 10 year forward interest rate differential.

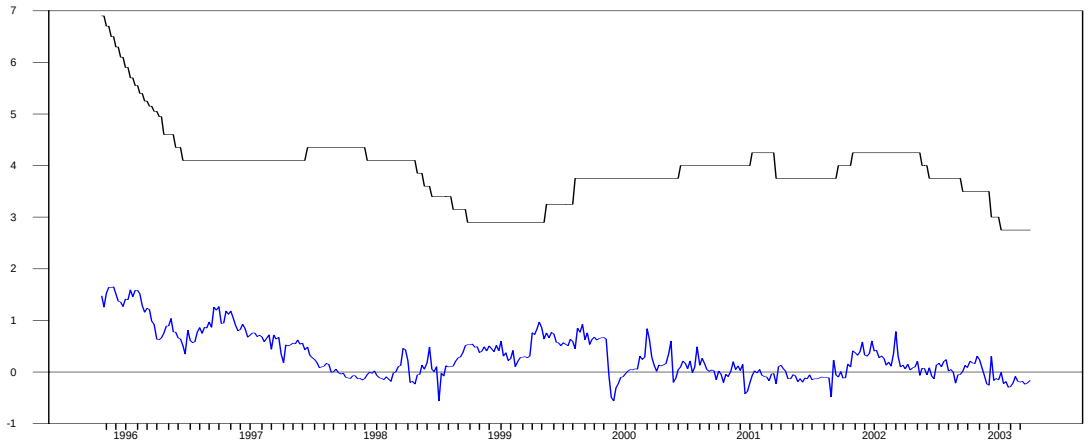

Table A1. CPI, GDP, Unemployment (UNEM), retail sales index (RTI), and producer Price Index (PPI) news releases with unexpected component (indicated with a superscript ue)

Date	CPI	CPI^{ue}	GDP	GDP^{ue}	UNEM	UNEM^{ue}	RSI	RSI^{ue}	PPI	PPI^{ue}
1996:04:16	0.5	0.2			7.4	-0.0*				
1996:04:30							-1.6	-1.4*	0.3	-0.1*
1996:05:14	0.3	-0.2								
1996:05:28							-1.6	-1.1*		
1996:06:04									-1.7	-0.3
1996:06:11					7.1	-0.1				
1996:06:18	-0.1	-0.1	1.4	0.4						
1996:06:25							0.1	0.2*		
1996:07:02									-2.9	0.1*
1996:07:09					8.4	0.5*				
1996:07:16	-0.4	-0.2								
1996:07:30							-1.3	-1.6*	-3.5	-0.1*
1996:18:13			1.1	-0.6						
1996:08:20	-0.2	0.0			8.8	0.1*				
1996:08:27							0.1	0.0*	-4.3	-0.1*
1996:09:10					9.0	0.4				
1996:09:17	-0.5	-0.5								
1996:09:24							2.7	2.0		
1996:10:01									-5.0	-0.4*
1996:10:15	0.6	-0.3			8.3	0.0*				
1996:10:22			1.4	0.3						
1996:10:29							-1.3	-2.3	-5.0	0.3*
1996:11:12					7.6	-0.3*				
1996:11:19	0.0	0.0								
1996:11:26							2.1	1.1*	-4.3	-0.1*
1996:12:10					7.9	0.5				
1996:12:17	-0.2	-0.1	0.8	-0.7						
1996:12:24							2.6	-0.3	-3.8	-0.4
1997:01:21	-0.2	0.1			8.7	0.4				
1997:01:28							0.4	-1.5*		
1997:02:04									-2.7	0.2
1997:02:11					8.8	-0.4*				
1997:02:25	0.2	-0.2					1.9	-0.5		
1997:03:04									-2.2	-0.1
1997:03:11					8.8	0.4				
1997:03:18	0.0	-0.2	1.8	0.1						
1994:03:25							0.3	0.2		
1997:04:01									-1.8	0.2
1997:04:15	0.4	0.0			8.4	0.0				
1997:04:29							2.4	0.9*	-1.0	0.3*
1997:05:20	0.5	0.3			8.3	0.0*				
1997:05:27							8.5	4.7		
1997:06:03									0.2	0.3
1997:06:10					7.8	-0.1				
1997:06:17	0.0	-0.1	1.6	0.0						
1997:06:24							4.4	1.9		
1997:07:01									1.4	0.2
1997:07:15	0.1	0.2			8.8	-0.2				
1997:07:29							3.8	-0.7	1.7	-0.2
1997:08:12			2.3	0.2						
1997:08:19	-0.2	-0.3			9.1	0.1				
1997:08:26							4.4	-0.1	1.9	-0.1
1997:09:09					8.5	-0.5				
1997:09:16	0.1	0.0								
1997:09:23							3.5	0.4		
1997:09:30									2.5	0.1
1997:10:14					7.3	-0.4				
1997:10:21	0.9	0.3								
1997:10:28			1.2	-1.1		1.9	-0.5	2.4	-0.1	
1997:11:11					6.8	0.1				
1997:11:18	0.1	0.0								
1997:11:25							1.0	-0.8	2.0	-0.5
1997:12:09					6.5	-0.1				
1997:12:16	-0.2	-0.2								
1997:12:23			2.7	0.2			4.1	0.6	2.5	0.6*
1998:01:20	-0.1	0.1			6.9	-0.2	4.4	0.4		
1998:02:03									2.1	-0.2

Table A1 continued

Date	CPI	CPI^{ue}	GDP	GDP^{ue}	UNEM	UNEM^{ue}	RSI	RSI^{ue}	PPI	PPI^{ue}
1998:02:10					7.4	0.3				
1998:02:17							2.2	-0.4		
1998:02:24	-0.3	-0.3								
1998:03:10			3.3	0.9	6.7	-0.5			2.1	0.5
1998:03:17	-0.1	-0.2								
1998:03:31							7.2	3.3	1.7	-0.2
1998:04:14	0.2	0.0								
1998:04:21					6.4	0.0	3.9	-0.1		
1998:04:28									1.0	-0.3
1998:05:19	0.3	0.0			6.6	0.3	0.5	0.0		
1998:06:02									0.1	-0.2
1998:06:09					6.3	0.1				
1998:06:16	0.2	0.3	2.3	-0.7			2.8	-1.0*		
1998:06:30									-1.3	-0.7
1998:07:14	-0.2	-0.1			6.9	-0.6				
1998:07:21							4.0	0.0		
1998:07:28									-0.9	0.4
1998:08:11			4.1	1.1						
1998:08:18	-0.2	0.1			8.0	0.5				
1998:08:25							2.6	-1.7		
1998:09:01									-0.8	0.2
1998:09:08					7.3	-0.5*				
1998:09:15	-0.5	-0.1					3.1	-0.2*		
1998:09:29									-1.3	-0.4
1998:10:06			4.2	0.1						
1998:10:13					6.1	-0.3				
1998:10:20	0.4	-0.3					8.1	0.1		
1998:10:27									-1.3	0.0
1998:11:17	0.2	0.1			5.6	0.0	3.0	0.0		
1998:12:01									-1.1	-0.2*
1998:12:15	-0.3	-0.2			5.4	0.0	2.7	-2.1*		
1998:12:22			3.4	0.0						
1998:12:29									-1.4	-0.1
1999:01:19	-0.2	-0.1								
1999:01:26					5.5	-0.3	3.3	-1.4*		
1999:02:02									-1.3	-0.1*
1999:02:16					6.2	0.1	2.9	-0.5*		
1999:02:23	-0.1	0.2								
1999:03:09									-1.8	-0.2
1999:03:16	0.0	0.1	3.2	0.5	5.6	-0.2				
1999:03:30							5.5	1.9	-3.0	-1.1
1999:04:13	0.4	0.1								
1999:04:20					5.4	0.0	6.4	2.9		
1999:04:27									-2.7	-0.3
1999:05:11	0.2	-0.3								
1999:05:25					5.3	0.0	6.3	2.2		
1990:06:01									-1.8	0.4
1999:06:15			3.6	0.2	4.9	-0.3	4.4	-1.3*		
1999:06:22	0.2	0.0								
1999:06:29									-0.9	0.1
1999:07:13	0.2	0.2								
1999:07:20					5.9	0.1				
1999:07:27							5.4	0.1*		
1999:08:03									-0.8	0.1
1999:08:10			3.7	-0.2						
1999:08:17					6.4	-0.4	4.2	-0.3		
1999:08:31	-0.4	-0.3							-0.8	-0.4*
1999:09:14	0.0	0.0			6.1	0.3				
1999:09:21							5.6	1.1		
1999:09:28			3.2	-0.5					-0.1	0.3
1999:10:19	0.7	0.1			5.5	0.1	8.1	3.1		
1999:10:26									0.3	-0.1
1999:11:16	0.1	-0.1			5.2	-0.1	4.2	-1.8		
1999:11:30									0.7	0.0
1999:12:14	-0.3	-0.2			5.2	0.1*				
1999:12:21			4.1	0.1			5.8	-0.4		
1999:12:28									1.4	0.5*
2000:01:18	0.2	0.2								
2000:01:25							7.2	1.3*		
2000:02:01					5.3	-0.3			2.2	0.5

Table A1 continued

Date	CPI	CPI^{ue}	GDP	GDP^{ue}	UNEM	UNEM^{ue}	RSI	RSI^{ue}	PPI	PPI^{ue}
2000:02:15					5.7	-0.1	9.1	3.5*		
2000:02:29	-0.4	-0.3								
2000:03:07									2.9	-0.4*
2000:03:14	0.5	0.3	3.4	-0.9	5.4	0.2				
2000:03:28							7.4	0.5*	4.4	0.1*
2000:04:18	0.5	0.0			5.1	-0.1*	9.4	2.4*		
2000:05:02									4.1	-0.3*
2000:05:16	-0.1	-0.3					7.8	-0.2*		
2000:05:23					4.7	-0.3*				
2000:05:30									3.3	-0.2*
2000:06:20	0.5	0.2	3.0	-1.3	4.1	-0.2*	8.0	1.6*		
2000:07:04									3.7	1.0*
2000:07:11	0.0	-0.1								
2000:07:18					5.1	0.1*	7.8	-0.2*		
2000:08:01									3.7	0.1*
2000:08:08			4.0	-0.2						
2000:08:15	-0.5	-0.1								
2000:08:22					5.2	-0.4	8.7	1.4*		
2000:08:29									3.7	0.0
2000:09:12					5.1	0.2				
2000:09:19	0.1	0.2					8.5	0.7*		
2000:09:26									3.7	0.1
2000:10:03			4.3	0.3						
2000:10:17	0.7	-0.1			4.1	-0.4	5.4	1.4		
2000:10:31									4.0	0.0
2000:11:14	0.2	0.1								
2000:11:21					4.0	0.2	6.6	-0.0*		
2000:11:28									4.6	0.5
2000:12:19	0.1	0.3	4.0	0.0	3.9	0.0	5.2	0.8		
2000:12:26									4.8	0.3
2001:01:16							4.0	-1.4*		
2001:01:23	-0.1	0.1			3.7	-0.3				
2001:01:30									3.7	-0.3
2001:02:13							3.7	-1.3*		
2001:02:20					4.4	0.3				
2001:02:27	-0.1	-0.1								
2001:03:06									3.0	-0.3
2001:03:13	0.4	0.2	2.6	-1.3						
2001:03:20					4.2	-0.4				
2001:03:27							4.9	0.7	2.5	-0.3
2001:04:17	0.7	0.2								
2001:04:24					3.9	-0.1*	2.6	0.5		
2001:05:01									2.6	-0.2
2001:05:15	0.9	0.5								
2001:05:22					3.7	0.0	2.3	-1.4*		
2001:05:29									3.3	0.3
2001:06:12							2.3	0.5		
2001:06:19	0.7	0.2	2.3	-0.3	3.5	-0.2				
2001:07:03									2.6	-0.4
2001:07:17	-0.1	0.1					1.9	0.1		
2001:07:24					4.2	-0.3				
2001:07:31									2.2	0.1
2001:08:14	-0.5	-0.2	1.4	-0.6						
2001:08:21					4.2	-0.4	2.1	0.4		
2001:08:28									2.1	0.0
2001:09:18	0.2	0.1			4.3	0.2	2.6	1.0		
2001:09:25									1.5	-0.2
2001:10:02			1.1	-0.3						
2001:10:16	0.8	0.1					3.0	0.2*		
2001:10:23					4.0	0.3				
2001:10:30									1.1	0.1
2001:11:13	-0.3	-0.2								
2001:11:20					4.0	0.0	4.3	1.7		
2001:11:27									0.5	0.3*
2001:12:11							2.1	-0.3		
2001:12:18	0.0	0.0	0.4	-0.9	3.7	-0.3				
2001:12:25									-0.9	-0.7
2002:01:15							2.6	-0.2		
2002:01:22	0.1	0.2			3.6	0.0				
2002:01:29									-0.8	-0.1
2002:02:12							1.0	-2.4*		

Table A1 continued

Date	CPI	CPI^{ue}	GDP	GDP^{ue}	UNEM	UNEM^{ue}	RSI	RSI^{ue}	PPI	PPI^{ue}
2002:02:19					4.4	0.2				
2002:02:26	-0.1	-0.3								
2001:03:05									-0.5	0.1
2002:03:12			1.1	0.6						
2002:03:19	0.2	-0.1			4.0	-0.2	1.7	-0.6*		
2002:03:26									-0.4	-0.1
2002:04:16	0.9	0.3					2.4	-0.1		
2002:04:30					3.8	-0.1			-0.4	-0.1
2002:05:14	0.4	-0.1								
2002:05:21							4.3	1.4		
2002:05:28					3.8	0.1			-0.7	0.2
2002:06:11			1.1	-0.2			4.7	0.7		
2002:06:18	0.3	0.0			3.4	-0.3				
2002:07:02									-0.2	0.2
2002:07:16	-0.1	0.0					4.9	0.9*		
2002:07:23					4.0	-0.4				
2002:07:30									-0.6	-0.4
2002:08:13			2.1	0.6						
2002:08:20	-0.4	0.0					4.5	-0.7		
2001:08:27					4.3	0.1			-0.8	-0.3
2002:09:17	0.1	0.0			4.1	-0.1	4.7	0.2		
2002:10:01			2.2	0.1					-0.3	0.4*
2002:10:15	0.8	-0.1					2.1	-1.5		
2002:10:22					4.2	0.3				
2002:10:29									-0.7	-0.4
2002:11:19	0.3	0.1			3.7	-0.4	7.3	3.3		
2002:11:26									-1.0	-0.2
2002:12:10			2.0	0.1						
2002:12:17	-0.2	-0.1			3.9	0.2	8.6	3.4*		
2002:12:24									-0.8	-0.2
2003:01:14							4.6	-1.1*		
2003:01:21	0.1	-0.1								
2003:01:28					4.1	0.2				
2003:02:04									-0.6	-0.1
2003:02:11							5.9	1.1		
2003:02:18					5.1	0.4				
2003:02:25	0.4	0.0								
2003:03:04							4.4	0.0	-0.2	0.4
2003:03:11			1.3	-0.4						
2003:03:18	0.9	0.3			4.5	-0.2				
2003:04:01							4.2	-0.1	0.6	0.6
2003:04:15	0.5	0.5			4.6	0.3				
2003:04:29							2.5	-0.8	0.6	-0.1
2003:05:13	-0.4	-0.3								
2003:05:27					4.6	0.1	5.2	2.7	-0.1	-0.5
2003:06:10			2.2	1.0						
2003:06:17	-0.1	-0.1			4.2	-0.2				
2003:07:01							2.7	-0.9	-1.4	-0.8
2003:07:15	-0.3	-0.3								
2003:07:22					4.8	-0.1				
2003:08:05							7.2	3.7	-1.6	-0.5
2003:08:12			1.3	-0.2						
2003:08:19	-0.3	0.1								
2003:08:26					5.0	-0.1	5.0	0.5		
2003:09:02									-1.5	-0.1
2003:09:16	0.0	-0.1			5.4	0.4				
2003:09:30			1.1	-0.2			6.4	0.4	-1.7	-0.1

Note: The dates represent the dates of the Tuesdays for the weeks in which the news were released. Data of outcomes are taken from Statistics Sweden. CPI is the monthly percentage change in consumer price index. GDP refers to the percentage annual GDP growth rate. Notice that a preliminary outcome for the annual GDP growth for the second quarter is reported in August each year, whereas the official GDP growth is reported in October. UNEM is the percentage of the labor force without a job. RSI and PPI are the percentage annual change in the Retail Sales Index and Producer Price Index respectively. Survey data is mainly taken from Reuters but sometimes another source is used. A * indicates that expectations are modeled according to a time series model (due to the lack of survey data). For UNEM an AR(1)-process with seasonal dummies was used. RSI is modeled as an AR(3)-process and PPI as an ARMA(2,12)-process. The correlations between times series residuals and survey based expectation error are around 0.75 in all cases. A full documentation of how expectations have been collected and calculated is available from the authors upon request.

Table A2. Speeches and quotes with monetary policy content

Date	Speaker (number of press release)	Title and place of speech	$D^{sign}(t)$	Quote
1996-04-19	Urban Bäckström	Sweden's economy and monetary policy Handelsbanken's Seminar in New York	-1	"All in all, this background suggests that there may be some scope for a further easing of interest rate policy. The real economic trends and the related outlook for future inflation will provide guidance in the task of assessing how large this scope may be. This assessment starts from sustained confidence in Sweden's economic policy, measured in terms of inflation expectations and exchange rate movements, viewed over a somewhat longer period."
1996-05-09	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance, Stockholm	-1	"Regardless of which of the two alternatives for the real economy that proves most probable, the Riksbank considers that there may continue to be some room for repo rate reductions. But the room for manoeuvre is contingent on the alternative that materializes, on the attendant inflation outlook, and on the confidence in economic policy."
1996-06-03	Urban Bäckström	Monetary policy perspective Monetary Policy Forum, Stockholm	-1	"The Riksbank's own assessment of the outlook for inflation in the coming years, which includes an appraisal of tendencies in the real economy, likewise indicates that the possibility of fulfilling the inflation target is good. Under these circumstances, therefore, there may continue to be some scope for easing the monetary stance."
1996-08-15	Urban Bäckström (Press release no 18)	Interest rate corridor lowered 0.5 percentage points Stockholm	-1	"During 1996 the repo rate has been lowered comparatively quickly. The pace of the Riksbank's recent cuts has been somewhat slower. It is essential that the conditions for future monetary policy are carefully analyzed in the light of incoming information. There may still continue to be some room for easing the monetary stance."
1996-10-09	Lars Heikensten	Monetary policy, Autumn Conference arranged by SNS (Centre for Business and Policy Studies)	-1	" Our assessment from the middle of September, which still stands, was that the available information pointed to some remaining room for cuts in the repo rate. It should not be expected, on the other hand, that in the period ahead monetary policy will follow a particular pattern. The future path will depend on new information and on how this relates to the analysis in the Riksbank's latest inflation report."
1996-10-09	Urban Bäckström	Current Issues in Monetary Policy, in Örebro	-1	" Under these circumstances the Riksbank considers that there is a good prospect of inflation being in line with the inflation target in the coming years. The available information accordingly suggests that some room may remain for cuts in the repo rate. It should not be expected, on the other hand, that in the period ahead the Riksbank will follow a particular pattern. The future path will depend on new information and on how this relates to the analysis in the Riksbank's latest inflation report."
1996-11-07	Urban Bäckström	The current situation for monetary policy Opening remarks at hearing by the Standing Committee on Finance,	-1	" The background to this is that while we perceive some limited room for a further lowering of the repo rate, the picture is not entirely unambiguous. We need time in which to follow and analyze incoming statistics. The conclusion to be drawn from the assessments that are made may also be an unchanged repo rate."
1996-11-07	Lars Heikensten	The Swedish Economy, at SE-Banken in New York,	-1	" In the light of the available information, the Riksbank considers that there is still some limited room for lowering the repo rate. But the picture is not unambiguous. This means that additional time is needed to follow and analyze incoming information. The conclusion to be drawn from the assessments that are made may also turn out to be an unchanged repo rate."
1997-01-28	Urban Bäckström	Maintaining Price Stability Address at Handelsbanken's seminar in London	0	" All in all, the picture of future inflation does not appear to have changed from the assessment in the December inflation report. The conclusion in that report - that monetary policy is relatively well balanced - therefore holds good."
1997-01-29	Lars Heikensten	Inflation and the Interest Rate, conference arranged by the Stockholm Chamber of Commerce and Veckans Affärer	0	" The picture I have outlined does not warrant any change in the conclusions presented in the December inflation report. Our main scenario suggests that at present the monetary stance is relatively well balanced."
1997-04-30	Urban Bäckström	Sweden's Economy and Monetary Policy , New York	0	" The conclusion in the latest inflation report was that monetary policy is well balanced. That conclusion still holds true."
1997-05-14	Urban Bäckström	The Swedish economy Skånska Sparbanksföreningen	0	" The repo rate was lowered most recently last December. Since then we have frequently declared that the monetary stance is well balanced. My message today is the same. On the whole, economic tendencies confirm the picture in the Riksbank's latest inflation report. So at present we see no need to alter the repo rate."
1997-05-15	Lars Heikensten	The economy and monetary policy Real-Estate Day, Grand Hotel, Stockholm	0	" The repo rate was lowered most recently last December. Since then we have frequently declared that the monetary stance is well balanced. This still applies."
1997-05-15	Urban Bäckström	The current situation for monetary policy, Opening remarks to the Standing	0	" The repo rate was lowered most recently last December. Since then we have frequently declared that the monetary stance is well balanced. This still applies. At present the Riksbank sees no need to

		Committee on Finance		alter the repo rate."
1997-06-15	Lars Heikensten	The economic situation The Centre Party's Economic Seminar, Haparanda	0	" The conditions for monetary policy in the years ahead will then be improved and greater freedom of action will be created for economic policy in the longer term."
1997-10-15	Lars Heikensten	Inflation and the interest rate, Sweden Financial Forum, Örebro	0	" The overall assessment in the inflation report is that the monetary stance is well balanced. Today there is no reason to modify that conclusion. In the past month there has been no appreciable change in the outlook for inflation."
1997-10-22	Lars Heikensten	Monetary Policy Autumn Conference Arranged by the Centre for Business and Policy Studies, Stockholm	1 (0)	Part 1: "As activity in the economy strengthens and the monetary policy perspective is moved forward in time, monetary policy has to be gradually adjusted so that instead of giving a certain expansive effect, it has a more neutral effect on the economy." Part 2: "Most indications are that the level of activity and resource utilization has risen further during the autumn. However, according to the Riksbank´s assessment, there is still available capacity to meet an upswing. Therefore our assessment is that monetary policy at present is well balanced."
1997-10-23	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance	1	"As economic activity becomes stronger and monetary policy adjusts its sights on the future picture, the Riksbank's monetary stance will have to gradually move away from its current expansionary position. The timing of such a move has to be assessed in the light of new information and today one cannot say when it will happen."
1997-11-19	Urban Bäckström	Sweden's economy and Monetary policy Swedish Shareholders Association, Stockholm	1	"From what I have said about demand, resource utilization and other factors, it is clear that some time in the future monetary policy will have to be given a somewhat less expansionary direction."
1998-01-27	Urban Bäckström	Inflation and the interest rate, Stockholm Chamber of Commerce and Veckans Affärer	0	" The conclusion is that at present there is no reason to alter the repo rate."
1998-03-12	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance	0	"All in all, in the Inflation Report the Riksbank concluded that the repo rate should not be altered at present. With the uncertainties in the assessment, however, there are strong reasons for appraising the construction of monetary policy continuously as new information become available. Since the presentation of the Inflation Report, some new statistics have been produced. They do not motivate an altered conclusion about the monetary stance."
1998-03-21	Lars Heikensten	Inflation and monetary policy Swedish Shareholders Association, Trelleborg	0	" The conclusion in the latest inflation report was that the repo rate should not be altered at present but that a cautious tightening would probably be considered in the year ahead. The information that has been obtained since the publication of the inflation report does not alter that conclusion."
1998-05-27	Lars Heikensten	Economic policy and inflation Meeting of Almega-affiliated employers' associations, Stockholm	-1	"With the bright inflation prospects and a strict interpretation of the Riksbank's rule for monetary policy decisions, today there may even be grounds for considering a minor downward repo rate adjustment. What the Riksbank now has reason to consider is whether such an adjustment would lead to good conditions for stable economic development in the future."
1998-08-25	Urban Bäckström	The present situation Näringslivets Fonds annual meeting	-1	"Some new information that has been obtained during the summer does not appreciably alter the picture we painted in June. If anything, the statistics on overall real economic activity and inflation point more in the direction of a future inflation tendency that is weaker than in the main scenario in our June report, though in that case the revisions would be only marginal."
1998-10-07	Urban Bäckström	The Swedish economy Svenska Handelsbanken's Seminar, New York	0	" Inflation prospects and the future path of monetary policy accordingly depend on two—contrary—factors: on the one hand, the international economic trend could be weaker than we have counted on and thereby lead to lower inflation; on the other, a sustained weak exchange rate that has no counterpart in a weaker real economy could generate increased inflationary pressure. Our monetary policy conclusion is that we will go on analyzing the course of events and appraise monetary policy continuously in the light of new information. Hopefully, the analysis in the Inflation Report should give an indication of our line of reasoning about the inflation outlook in Sweden and the future path of monetary policy that is as clear as possible in the global economy's present state of uncertainty."
1998-10-14	Lars Heikensten	Monetary Policy Autumn Conference arranged by the Centre for Business and Policy	0	" At present there are no grounds for altering the direction of interest rate policy."
1998-10-20	Urban Bäckström	Monetary policy during financial unrest Swedish Bond Promotion	0	" The monetary policy conclusion is that we must keep a close watch on the real economy, the financial system and the financial markets. At present we are waiting with a change in the repo rate but that decision may need to be altered in time as the picture becomes clearer."

1998-11-13	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance, Stockholm	-1	"The course of the Asian crisis and its contagious effects in the industrialized countries is having a larger impact than we counted on earlier. I cannot rule out the possibility that in order to fulfill the inflation target, further adjustments of the monetary stance will be called for in the same direction as recently. A weaker development in the rest of the world also affects conditions in Sweden."
1999-01-22	Lars Heikensten	The new currency and the Swedish economy Swedish Shareholders Association, Stockholm	-1	"Since the publication of the December Report, international economic activity can hardly be said to have changed appreciably for the better. […] The economic statistics for Sweden suggest that industrial activity may go on weakening. [….] The assessment of future inflationary pressure has to take these and other factors into account. At the same time, the downward path of market interest rates in recent months represents a demand stimulus further ahead."
1999-02-02	Urban Bäckström	The krona and the interest rate, Conference arranged by Stockholm Chamber of Commerce and Veckans Affärer	-1	"Thus, the international outlook can hardly be said to have improved since the publication of the December Report and there still seem to be risks of a development that is weaker. […] The Executive Board's monetary policy discussion on February 11th will thus focus to a large extent on assessing global economic prospects and their consequences for Sweden's economy. "
1999-03-25	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance, Stockholm	-1	"The conclusion from the Riksbank's inflation forecast is that, even when transitory effects from changes in indirect taxes, subsidies and interest rates are disregarded, the rate of inflation twelve to twenty-four months ahead will be below the Riksbank's target. Moreover, as I just said, the risk of lower inflation compared with the main scenario is greater than the upside risk."
1999-09-01	Urban Bäckström	The economic situation in Sweden Föreningssparbanken, Ulricehamn	0 (1)	"In my opinion, there is no reason as yet to reduce the expansionary effect on the Swedish economy that monetary policy is currently exerting. A monetary policy adjustment will indeed be called for at some time in the economic upswing but I still see its timing as an open question."
1999-10-06	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance, Stockholm	1	"Thus, there are still no signs of more widespread shortages that might generate unsettling inflationary impulses; but the risk spectrum has shifted. Moreover, the situation can change at short notice and the Riksbank has to be alert to this. We must be ready to take preventive action."
1999-10-12	Lars Heikensten	Monetary policy and the new Executive Board Autumn Conference Centre for Business and Policy Studies, Stockholm	1	"In connection with the publication of the Inflation Report we made it clear that the repo rate will need to be increased in the future if there is no new information that clearly alters the perspective. Even if inflation expectations continue to be low and there are certain signs that the economy is functioning more efficiently, the growth rate will have to be brought into line with the long-term potential. That we shall do in good time. We can thereby contribute to good, stable growth in the Swedish economy for a long time to come."
1999-10-25	Lars Heikensten	Competition, trade and inflation Örebro Association of Building Contractors	1	"The Inflation Report earlier this month allowed for the effects of increased competition and so on that we could identify. So the Riksbank's conclusion in connection with the publication of the Report—that the repo rate will need to be increased if nothing unforeseen happens—holds."
1999-10-26	Lars Heikensten	Economic conditions for wage formation National Institute of Working Life, Stockholm	1	"At the same time, it is important that current assessments and policy are discussed continuously. Along with most other observers, we now count on an acceleration of inflation in the coming years. Assessments of the rate at which inflation will move up may vary, of course. But when the underlying rate of inflation is 1.8 per cent, it is obvious that a repo rate increase ought not to wait particularly long, given that nothing unforeseen alters the economic assessment. Timely action creates the best conditions for a stable development with a longer upward phase."
1999-12-01	Lars Heikensten Repo rate increase reconfirmed by new information	Swedish Shareholders Association in Folkets Hus, Stockholm	1 (0)	"The new information since then strengthens my conviction that the interest rate increase was needed. If the economic upswing continues as expected, further interest rate increases will be called for in order to adjust growth to the rate that the Swedish economy can maintain with a continuation of low inflation. There are reasons for returning to this after the turn of the year."
2000-03-14	Kerstin Hessius	Controller Congress 2000	1	"Growth prospects in Sweden at present are robust and during an upward cyclical phase monetary policy must be gradually realigned in a less relaxed direction but the rate at which we have to proceed is by no means self-evident."
2000-03-17	Urban Bäckström	Swedish monetary policy Monetary Policy Forum	0	" After the latest repo rate increase in February, against this back-ground I consider that the inflation risks still seem to be fairly balanced."
2000-03-23	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance	0 (1)	" The strong economic activity and gradually growing inflationary pressure point to a future need for a further repo rate increase. The timing and size of the increase are considered in the light of, for example, new information and its significance for the Riksbank's overall inflation assessment. Our current assessment is

				that in the greater part of the coming one to two years, inflation is expected to be below 2 per cent. This speaks in favor of leaving the repo rate unchanged for now."
2000-05-18	Lars Heikensten (Press release no 28)	Present inflation prospects good Fastighetsvärlden Conference in Stockholm	1	"Although inflation prospects seem to be better, in my view there is reason to count on a need for further interest rate hikes. The rate at which they may be introduced has become more uncertain. That depends, as always, on our ongoing appraisal of inflation."
2000-06-06	Eva Srejber	The role of monetary policy for growth FöreningsSparbanken's Economics Day in Vellinge	1	"I am more concerned about what can happen with inflation and growth after the forecast period if demand increases at the rate we have anticipated. […T]he consequences that the economic development can have for macroeconomic stability and inflation beyond the forecast horizon must also be weighed in. The risk for financial imbalances now being built up when indebtedness is increasing and of inflationary pressure accumulating at the same time must in my view therefore be taken into account in the monetary policy decisions. […] The quantity of money and lending, especially to households, are for instance increasing at present at a rate which is probably not sustainable in the long term."
2000-08-22	Lars Heikensten (Press release No 48)	Domestic inflation surprisingly low Öhmans Fondkommission, Stockholm	1	"There are many indications that the growing competition, deregulations and so on may continue to aid the Riksbank in combating inflation. But even if they do, growth above the long-term potential will presumably generate rising inflationary pressure. With our present assessment of economic activity – an average growth rate in the coming years of over 3 per cent – it is thus natural to count on further interest rate increases."
2000-09-04	Eva Srejber	Price stability and growth SEB Malmö	1	"Caution indicates that monetary policy should at least be neutral in the present situation. I regard monetary policy as being expansive at present. I therefore consider that the interest rate should be increased."
2000-09-06	Villy Bergström (Press release no 52)	Sweden's economy performing strongly Aktie Torget's and Almi's "Market Day" at Uppsala University	1	" This has enabled us to defer an increase in the interest rate but the fact remains that if the economy continues to grow at the same good rate, an increase will come sooner or later. Production capacity is calculated to grow at an annual rate of 2–2.5 per cent, while demand growth is on a higher path. More and more unutilised resources are being brought into production. Sooner or later demand growth will have to be curbed."
2000-10-10	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance.	1	"The picture of a strong upswing in the Swedish economy still holds, with rising resource utilisation in the labor market, for example. That suggests that the repo rate may need to be raised in the future."
2000-11-07	Lars Heikensten	Six monetary policy issues Umeå School of Business and Economics	1	"For my part, there seems to be no reason at present for any appreciable change in the assessment I made in October, namely that a repo rate increase will probably be needed in the future in order to safeguard the continuation of a favorable and stable development, with low inflation and rising output."
2000-11-08	Urban Bäckström	The Swedish economy's future path Association of Swedish Chambers of Commerce & Industry, Stockholm	1	"In the absence of a sufficient slowdown in demand, an adjustment to the long-term growth path will need to be achieved with interest rate increases by the Riksbank. […] Consideration will also have to be paid, of course, to the inflation risks associated with the high price of oil and the high dollar rate. These were some of the risks we highlighted in the October Inflation Report."
2000-11-17	Lars Heikensten	Monetary policy Autumn Conference Centre for Business and Policy Studies, Stockholm	1	"Still, there are now many indications that resource utilization is relatively high and will go on rising. That implies that, little by little, inflationary pressure will grow. […] Although it is still too early to specify when, there will presumably be grounds for increasing the repo rate in the future."
2000-11-21	Villy Bergström (Press release no 74)	Conflicting trends in the Swedish economy The Swedish Shareholders Association in Örebro	1	"Demand is still growing more quickly than long-term sustainable growth, which means that available resources are being utilized. If the increase in demand continues at a rapid rate, sooner or later inflation will begin to rise and force increases in interest rates. However, the growth in demand is probably on the verge of slowing down somewhat."
2000-11-28	Urban Bäckström	The Swedish economy Swedish Shareholders Association, Stockholm	1	"To some extent, therefore, the situation for monetary policy has changed. That is also why I began by saying that the time will soon come to raise the repo rate. Not because I have dramatically revised my assessment of inflation prospects but rather because resource utilization is still rising and a shift can be discerned in the risk spectrum."
2000-11-28	Villy Bergström (Press release no 75)	The economic scope for wage increases Seminar in Industrihuset organized by the Mediation Institute, Stockholm	1	"However, considering the strong development in demand we anticipate for the coming two years, the signs of bottlenecks and labor shortages will probably increase and resource utilization will become more strained. It will probably also be apparent in the form of some upward pressure on prices and wages. Sooner or later, the Riksbank will have to increase the rate if a spontaneous slowdown does not occur."
2001-02-28	Villy Bergström	The Riksbank's role in the economy Swedish Shareholders	0	" It is still too early to say anything about the conclusions for monetary policy that can be drawn from this reasoning about future cyclical developments. The Riksbank's overall assessment will be included in the

		Association, Jönköping		next inflation report on 27 March. There will then be a clearer basis for assessing whether resource use is expected to be under such strain that a more stringent policy is required or whether the cyclical outlook has weakened so much that stimulation is called for. One thing is clear, however. Downward adjustments of growth assessments mean that the large number of interest rate increases that most analysts expected during the spring will hardly be necessary to keep inflation on target!"
2001-03-27	Urban Bäckström	The current situation for monetary policy Standing Committee on Finance	0	"All in all, however, the Executive Board of the Riksbank considers that the spectrum of risks is asymmetric, so that inflation somewhat below the main forecast is more probable than a higher rate. With the risks taken into account, inflation in the coming years is forecast to be around two tenths of a percentage point below the targeted level of 2 per cent. At the same time, the margins are so small that we have decided not to adjust the repo rate at this time."
2001-06-14	Urban Bäckström	Currency interventions cannot be ruled out Inter-Alpha's Steering Committee Press release no 38.	1	"The weak exchange rate at present is a deviation from the path in the main scenario that served as the basis for the latest Inflation Report. This means that if the krona remains weak for a longer period, there may be risk of inflation being higher one to two years from now. If there are grounds for believing that the krona will continue to be weak — and nothing else happens to alter inflation prospects — that will have consequences for monetary policy."
2001-06-15	Lars Heikensten	The krona has shifted the risk spectrum Trevises Economic Club in Malmö	1	"If the exchange rate were to remain weak and nothing untoward happens in other respects, it would have consequences for monetary policy."
2001-08-20	Urban Bäckström	Sweden's economy is slowing down, Social Democrats in Härnösand	0	"The important thing now is to look to the future. It is not the most recent economic figures that determine the course of events and it is not entirely clear what conclusions should be drawn with regard to developments in one to two years' time.[…] All in all, it would seem reasonable to assume that the conditions for the near future look relatively good for a cautious economic recovery, combined with an inflation rate in line with the Riksbank's target. However, it is important to follow developments closely in order to detect whether the course of events will strengthen or weaken."
2001-10-16	Urban Bäckström	The monetary policy situation, The Riksdag's Finance Committee	0	"In the light of the analysis in the Inflation report, at yesterday's meeting the Executive Board decided to leave the repo rate unchanged."
2001-11-07	Lars Heikensten	September 11th is leaving its mark on the statistics, HSB Bank's Finance Day.	0	"In conclusion, there are no grounds at present for changing the assessment that was presented in the Inflation Report a fortnight ago."
2001-11-27	Urban Bäckström	The Swedish economy, Swedish Shareholders' Association, Stockholm	0	"Most indicators appear to imply that inflation will be close to the target level of 2 per cent, or at least within a small margin on one side or the other."
2002-01-22	Lars Heikensten	Inflation high but a reassessment premature, Municipality of Oscarshamn Press release no 4	0	"In December, when allowance had been made for the risks of economic activity being weaker and domestic inflation somewhat higher, the Riksbank concluded that in the period one to two years ahead the rate of price increases would be more or less in line with the 2 per cent target. There are no grounds for changing that assessment appreciably,"
2002-02-02	Urban Bäckström	Shareholders Association, Sölvesborg-Bromölla	0	"The picture of inflation broadly holds. The rate of price increases is expected to slacken by degrees. On the other hand, the relationship in a wide sense between growth and inflation is still a source of uncertainty. As I see it, the Riksbank must keep a close eye on new inflation statistics, deepen the analysis in the event of deviations and weight this into the ongoing formation of monetary policy."
2002-02-25	Eva Srejber:	Monetary policy and inflation expectations, Föreningssparbanken in Karlstad	1	"It is important to react quickly with interest rate policy when there are downside risks, but it is equally important to react quickly to upside risks. As can be seen in the minutes of the Executive Board meeting on 7 February 2002, I entered a reservation against the decision to leave the interest rate unchanged. I would rather have seen an increase in the interest rate of 0.25 percentage points, which is not any severe tightening of policy, but should rather be seen as not stepping so hard on the gas."
2002-03-07	Urban Bäckström	Sweden´s economy and monetary policy , Skånes Provinsbank, Helsingborg	1	"If inflation, even disregarding the temporary effects, is above the target initially, activity is entering an upward phase and economic policy's impact on the economy is expansionary, then monetary policy ought to contribute to a somewhat lighter foot on the accelerator. But if most of the unduly high inflation stems from transient increases in the price level and if an economic upturn is not yet assured, it may then indeed be advisable to somewhat defer an upward adjustment of the instrumental rate.[…] Personally I share the concern about inflation prospects that a number of my colleagues have expressed in speeches recently. "
2002-03-19	Urban Bäckström	The monetary policy	1	"If activity continues to strengthen as expected and there is no

		situation, The Riksdag's Finance Committee		reason to reappraise the economy's inflation propensity, it is reasonable to assume that the repo rate in Sweden will be adjusted successively upwards. […] It is a natural consequence of the Riksbank being in earnest about its task of ensuring a rate of price and wage increases that is in line with the inflation target in a situation where economic activity in Sweden is become gradually stronger."
2002-04-16	Lars Heikensten	The economic situation Press release no 18	1	"In the Report's main scenario, the rates of both CPI and UND1X inflation were calculated to be 2.2 per cent one year ahead, followed by 2.4 and 2.2 percent, respectively, after two years. … All in all, I do not think there are reasons at present for appreciably altering the assessment of inflation we presented in the March Report and registered in the minutes of the monetary policy meeting on 18 March."
2002-04-17	Urban Bäckström	Perspective on the inflation target, Swedish Economics Association	1	"Concerning the past year's increase in inflation, it was not the supply shocks that prompted the decision in March to raise the repo rate but the picture that was beginning to emerge of the Swedish economy being rather close to or even somewhat above full resource utilization. This may be a major problem, not for current inflation but rather for future inflation as activity continues to strengthen."
2002-04-22	Lars Nyberg	The repo rate - spring 2002, Swedish taxpayers' association in Malmö and Kristianstad	1	"In my opinion, there is no reason, all in all, to alter significantly the assessment of economic prospects made in the latest Inflation Report, with regard to either the international picture or the Swedish picture. We wrote in the press release from the Executive Board meeting on 18 March: "If economic activity continues to strengthen as expected - and if there are no grounds for changing the appraisal of the inflation propensity - it is, however, reasonable to assume that the level of interest rates in Sweden will be adjusted successively upwards."
2002-05-06	Villy Bergström	The Riksbank and the Swedish economy, Press release no 22.	0	""The Riksbank's total assessment is that over the next six months inflation will fall from the current high levels as the effects of last year's transitory price increases subside, although it is possible that in the short term the higher petrol and oil prices may slightly slow down the decline. After this, the relatively high resource utilization is expected to contribute to labor costs and domestic inflation increasing somewhat once again. The Riksbank's most recent interest rate hikes should be regarded in the light of these developments"
2002-05-22	Lars Heikensten	Main features of the inflation assessment still apply, Press release no 29.	1	"If the economic recovery continues as we expect and there are no grounds for altering the assessment of inflation prospects, there is reason to suppose that further repo rate increases may be needed."
2002-05-29	Urban Bäckström	Earlier assessments still largely apply, Press release no 31.	1	""If the economic recovery continues as we expect in the forecast period and there is no reason to alter the assessment of inflation prospects, it is likely that repo rate increases may be needed."
2002-05-31	Lars Nyberg	Positive development in line with the Riksbank's forecast, Press release no 32.	1	"If economic activity continues to strengthen in line with the Riksbank's assessment, however, further interest rate rises will be necessary."
2002-06-28	Villy Bergström	Reasonable to await further information, JAK Members' Bank's summer seminar in Mellanfjärden, Press release no 43	0	"Further interest rate increases may be required to give a clear signal that the Riksbank does not intend to put the inflation target at risk. On the other hand, international developments are currently rather more uncertain than I assessed them to be at the previous monetary policy meeting. This would indicate that there may be reason to wait a while before raising interest rates again, to ensure that the Riksbank's assessment still holds true."
2002-09-05	Lars Nyberg	The Swedish Economy in the fall of 2002Nordic Capital in Stockholm, Press release no 52	0	"[T]he events on the stock markets and the uncertainty regarding international economic activity that this has created have had a negative effect on the risk scenario. At the same time, I believe that the risk of higher inflation still remains, because of a high level of resource utilization in the wake of the continuing strong figures for employment and growth. […] The future shape of monetary policy will depend, as always, on the new information received."
2002-09-24	Urban Bäckström	The Swedish economy and monetary policy , Executive Club, IS Halmia at Hotel Tylösand. Press release no 55	0	"The work on our next inflation report is now under way. At this stage I find it difficult to form a really clear picture of future developments. […]The consequences all this will have for inflation prospects and monetary policy will have to be judged as new statistics become available."
2002-10-09	Lars Heikensten	Some monetary policy issues, Center for Business and Policy Studies' (SNS) annual conference on the economic situation and economic policy.	0	"The most likely scenario today is that inflation will remain roughly in line with our target level over the coming years, although probably at the lower edge. […]Given this, we at the Riksbank are now considering how we should act at the autumn's monetary policy meetings."
2002-10-17	Urban Bäckström	The monetary policy situation, The Riksdag´s Finance Committee	0	"The Riksbank's overall assessment today is that with the risk spectrum taken into account, inflation one to two years ahead will be approximately in line with the target, albeit somewhat on the low side. The most probable outcome in the years ahead continues to be that economic activity becomes stronger. Together with the

				difficulties in assessing the situation - not least on account of the fluctuations in the financial markets - this has led the Riksbank to opt at present for leaving the repo rate unchanged. But the financial market developments and their economic effects warrant close attention."
2002-11-11	Kristina Persson	What is the situation for the Swedish economy? Habo, Jönköping county, organized by Föreningssparbanken, the Federation of Private Enterprises and the Swedish Shareholders' Association.	-1	"In this situation, lower interest rates may have the function of stimulating the real economy without triggering inflation."
2002-11-13	Villy Bergström	Monetary policy and wage formation, HSB Bank's Finansdag	0	"[I]f other groups were also to demand higher wages, the inflation target might be threatened. The Riksbank would then be forced to tighten monetary policy by raising the repo rate, which would lead to lower growth and employment.[…] It remains to be seen whether wage formation is now sufficiently flexible to manage the necessary changes in relative wages."
2003-02-20	Lars Heikensten	Inflation rise expected to be temporary, Hammarby bandy club, Press release no 15	0	"The Riksbank's assessment is that the rise in inflation is temporary and that we can expect significantly lower inflation as early as late spring and the summer….In a couple of weeks' time the Riksbank will be publishing a broad survey of economic activity and inflation perspectives. In this context it is important to balance the risks of a weaker development, and what these may entail for inflation, against the risk of inflation setting in"
2003-03-05	Irma Rosenberg	Monetary policy and the Swedish economy, Swedish Society of Financial Analysts	0	"[T]he Riksbank's assessment is that the upturn in inflation is temporary and that there is reason to expect lower inflation as early as the late spring and summer. Although, as I said earlier, this assumes that those setting prices and wages do not attempt to compensate themselves for the temporary price rise."
2003-03-18	Lars Heikensten	Introduction on monetary policy, Riksdag Committee on Finance	0 (-1)	"If there is short-term room for maneuver and it is possible to obtain higher growth and employment without threatening the inflation target, this should be safeguarded by lowering the repo rate."
2003-04-08	Villy Bersström	Risk of higher inflation but above all great uncertainty, Sparbanksstiftelsen in Västervik, Press release no 27	0	"The appropriate future repo rate will depend, of course, on continued economic developments in the wake of the Iraq war, but also on the expected direction of economic policy as a whole. In this context, it is worth noting the budget agreement reached between the government and its cooperation partners, which indicates that the stabilizing principles, which have governed budget policy in recent years still stand."
2003-05-23	Lars Nyberg	Weak economic developments affect inflation prospects, Nordea Fixed Income seminar in Copenhagen, Press release no 34	-1	"Information received since the meeting at the end of April indicates, in my opinion, that the international downside risks are still slightly greater than the domestic upside risks. In addition, demand is weaker both in Sweden and abroad and price pressure is subdued. I therefore consider there is certainly scope for more expansionary monetary policy."
2003-05-27	Irma Rosenberg	Clearer picture of weaker economic activity, Öhman Fondkommission, Press release no 35.	-1	"There is cause to expect a weaker inflationary trend, while there are also a number of clear downside risks. Resource utilization in Sweden is expected to be lower compared to the April assessment. It is anticipated that this will subdue inflation, thereby creating scope for a more expansionary monetary policy."
2003-09-02	Irma Rosenberg	Economic activity in line with assessment, Swedish Society of Business Economists (SIMRA), Press release no 51.	0	"All in all, I believe that economic activity so far is in line with the assessment we presented at the most recent Executive Board meeting in August. It now remains for us to monitor incoming data until the October Inflation Report, in which we will provide a more comprehensive assessment of the economic outlook and its implications for inflation over the coming 1-2 years."

Note. $D^{sign}(t) = 1$ (-1) implies that the quote is interpreted as indicating a forthcoming tightening (easing) monetary policy stance by the Riksbank whereas 0 indicates a neutral signal concerning coming monetary policy moves. Alternative values for the dummy variable is provided within parenthesis for some speeches as discussed below. The following principles have guided assignment of values for the dummy variables. (i) If a general need for increasing (decreasing) the repo rate is expressed and/or if there are judgments about inflation prospects that clearly imply the need of a future increase (decrease) of the repo rate then the dummy variable is assigned the value 1 (-1). (ii) If the speech does not signal a need for an adjustment of the repo rate in a specific direction the dummy variable get the value zero. (iii) If a need for a repo rate adjustment is accompanied by a clear declaration that the repo rate does not need to be changed in the near future the dummy variable obtains the value zero. This is the reason why the speeches given 1998-03-21, 1999-09-01 and 2000-03-23.are judged to be neutral even if the last two of these speeches can be viewed as borderline cases where a tightening signal also is possible. Another borderline case is the speech given 1999-12-01, where it is clear that a repo rate adjustment not will occur before the turn of the millennium. Since there are technical rather than economic grounds for this position we assign a tightening signal even if a strict application of principle (iii) may suggest a neutral signal. (iv) If several speeches are given during the same week then an overall assessment is made and the speeches are given a common value, which also constitute that week's value of the variable $D^{sign}(t)$ (there is only one assigned speech signal per week). Principle (iv) explains why the speech given 1997-10-22 is given a value 1 even if part 2 of that speech calls for a zero value according to principle (iii). For the speech given 1997-10-23 we make the overall assessment that the signals from speeches given that week indicate a future increase of the repo rate. Finally, we have examined alternative characterizations of the borderline speeches mentioned above with no

significant changes of the results. Speeches (sometimes summarized only in a press release) are available on the Riksbank's official web site, www.riksbank.se.

Table A3. Monetary policy signals

Date*	Speech	Report	Repo change	Unexp. repo	Norepo	Minutes
1996:04:23			-0.25	0.08*		
1996:05:07			-0.20	0.06*		
1996:05:21			-0.20	-0.03*		
1996:06:04			-0.20	-0.10*		
1996:06:18			-0.20	-0.04*		
1996:07:02			-0.20	0.06*		
1996:07:16			-0.20	0.03*		
1996:07:30			-0.15	0.06*		
1996:08:13			-0.15	0.00		
1996:08:27			-0.15	0.06*		
1996:09:10			-0.10	0.00*		
1996:09:24			-0.10	0.05*		
1996:10:08			-0.10	0.01*		
1996:10:22			-0.35	-0.25		
1996:11:12	-1.00					
1996:11:26			-0.25	-0.18*		
1996:12:17			-0.25	-0.14*		
1997:01:28	1.00					
1997:02:04	1.00					
1997:03:25		-0.10				
1997:05:06	1.00					
1997:06:17	1.00					
1997:10:21	-1.00					
1997:11:25	1.00					
1997:12:09		0.50				
1997:12:16			0.25	0.08		
1998:06:02	-1.00					
1998:06:09		-0.40	-0.25	-0.13		
1998:08:25	-1.00					
1998:09:29		-0.10				
1998:11:03			-0.25	-0.25		
1998:11:17	-1.00					
1998:11:24			-0.25	-0.21		
1998:12:08		-0.60				
1998:12:15			-0.20	-0.17		
1999:02:16			-0.25	-0.05		
1999:03:30	-1.00	-0.20	-0.25	-0.11		
1999:04:27					0.04	
1999:06:08					0.02	-0.04
1999:08:17					0.00	
1999:09:21						0.06
1999:10:12		0.10			-0.08	
1999:10:26						0.08
1999:11:16			0.35	0.26		
1999:11:30						-0.06
1999:12:14		0.20			0.00	
2000:02:08			0.50	0.21		
2000:03:21	-1.00					
2000:03:28	-1.00	0.10			-0.23	
2000:04:18						0.08
2000:05:09					-0.08	
2000:05:23	1.00					

2000:06:13		-0.10			0.00	
2000:06:27						0.08
2000:07:11					0.00	
2000:07:25						0.08
2002:08:22					-0.05	
2000:09:05						0.08
2000:10:10		-0.10			-0.15	
2000:10:24						0.08
2000:11:14	1.00					
2000:11:28	-1.00					
2000:12:12		-0.10	0.25	0.02		
2000:12:26						-0.04
2001:02:06					0.00	
2001:03:27		-0.10			0.00	
2001:05:01					0.00	
2001:06:05		0.10			0.03	
2001:06:19	1.00					
2001:07:10			0.25	0.12		
2001:07:24						-0.13
2001:08:28					0.00	
2001:09:18			-0.50	-0.49		
2001:10:16		0.00			0.08	
2001:11:13					0.07	
2001:12:11		-0.20			0.02	
2001:12:18						-0.04
2002:02:12					0.00	
2002:02:26	1.00					0.04
2002:03:19		0.20	0.25	0.14		
2002:04:09						-0.04
2002:04:30			0.25	0.20		
2002:05:28	1.00					
2002:06:04	1.00					
2002:06:11		0.00			-0.06	
2002:06:25						0.04
2002:07:09					-0.08	
2002:08:20					0.00	
2002:10:22		-0.10			0.00	
2002:11:05						-0.04
2002:11:12	-1.00					
2002:11:19	1.00		-0.25	-0.11		
2002:12:10		-0.10	-0.25	-0.20		
2002:12:24						0.04
2003:02:11					0.00	
2003:03:11	1.00					
2003:03:18		-0.30	-0.25	0.00		
2003:03:08	1.00					
2003:04:29					0.05	
2003:05:13						0.08
2003:06:10		-0.40	-0.50	-0.13		
2003:07:30			-0.25	-0.11		
2003:08:19					0.00	

Date refers to Tuesday of the week the signal was given. Speech are all non-zero values of the variable $D^{sp}(t)$ defined in equation (10) when speech signals from table A2 are used and the slope variable is set to 5 basis points. Minutes is the minority variable defined in equation (11). Norepo is the unexpected component when the announced change of the repo rate is zero. The * indicates that a 2 week forward interest rate observed in date *t-1* was used, otherwise expectations measured as the mathematical expectations of answers from surveys conducted by Reuters, SME and Dagens Industri (the biggest business newspaper in Sweden) were used. The survey closest to the announcement day was used in the case when several surveys were available. The expectation errors obtained in this way are well in accordance with the qualitative comments

(from the Dagens Industri's archives) made after the repo rate announcements. Details about how the expectation errors have been calculated are available from the authors upon request.

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