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WHEN DOES AN INTEREST RATE PATH "LOOK GOOD"? CRITERIA FOR AN APPROPRIATE FUTURE INTEREST RATE PATH

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When does an interest rate path "look good"?

Criteria for an appropriate future interest rate path[1]

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Abstract

Svensson (2004) suggested that a monetary policy committee of a central bank (MPC) should "find an instrument-rate path such that projections of inflation and output gap 'look good'." Academic literature on monetary policy gives guidance as to what the words "look good" means. However, there is a need for a translation of the theoretical framework into concrete criteria when an MPC shall evaluate interest rate paths in practice. Six criteria for an appropriate interest rate path are presented. In the November 2005 *Inflation Report*, Norges Bank presented for the first time an optimal interest rate path including a fan chart illustrating the uncertainty of the forecast using these criteria. Examples used in explaining the criteria are drawn from Norwegian experiences.

JEL Codes: E42, E52, E58
Keywords: Forecasts, flexible inflation targeting, optimal monetary policy

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1 Motivation

It is well established that a central bank's monetary policy committee (MPC) has to be forward looking in setting interest rates. It is also well established that it is not only the overnight interest rate that is important, or the interest rate that is valid until the next MPC meeting, but also the expected interest rate path prevailing for some years ahead. As Woodford (2005) puts it: "… the ability of central banks to influence expenditure, and hence pricing decisions is critically dependent upon their ability to influence market expectations regarding the future path of overnight interest rates, and not merely their current level."

The MPC needs to make an analysis and decide which interest rate path best fulfils the objectives of the central bank. The MPC also needs to communicate its view to the public. The MPC can, as regards interest rate assumptions, approach this problem in three different ways. The MPC can assume a *constant interest rate* path (CIR), a *market interest rate* path (MIR), or an *optimal interest rate path* (OIR).

The pros and cons of the different approaches are discussed in detail in various articles; see, for example, Goodhart (2005), Svensson (2005) and Woodford (2005). However, regardless of which interest rate assumption the MPC decides to use, it has to determine whether the inflation forecast and the forecast for the real economy are in accordance with the objectives of the MPC mandate. Svensson (2004) suggested an iteration process where the MPC shall "find an instrument-rate path such that projections of inflation and output gap 'look good'". This can be seen as a "down to earth" approximation of a complex optimising problem. The MPC then needs criteria for what is a "good interest rate path" – criteria to which the MPC can relate.

The theoretical framework provides limited concrete and easily communicable guidance. Also, when a committee makes a decision, an agenda for the discussion is needed. Finding a good path represents a solution to a complex problem where many concerns are taken into account at the same time. However, an MPC cannot discuss everything at the same time. The proposed criteria can therefore be seen as an "ordre du jour" or agenda points for "main issues for discussion" when the MPC discusses forecasts and policy. These agenda points are all different aspects of the same problem. In practice, it may therefore be useful to have some simple points of reference that help in evaluating whether an interest rate path seems reasonable in relation to the monetary policy objective. In other words, the loss function framework[3] needs to be translated from mathematics into practical guidelines which are easy to discuss in meetings. For external communication and transparency purposes, it is also an advantage that the criteria are easy to understand.

This paper presents six criteria that may be used to determine whether an interest rate path "looks good". Examples used in explaining the criteria are drawn from Norwegian experiences.

[3] It has been argued in the literature that the MPC's relationship with its loss function is analogous to that of the consumer to her utility function; hence, the MPC's choice of an interest rate path can be formulated as a fairly standard dynamic optimization exercise. While this optimizing framework is standard in textbooks of macroeconomics, it is far from clear how it should be implemented as a part of the operative policymaking process.

The six criteria are not on equal footing. The criterion 1 is of primacy. Monetary policy is all about giving the economy a nominal anchor. Shocks may have driven inflation away from target. If monetary policy is to anchor inflation expectations near the target, interest rate policy must be geared to moving inflation towards the target. Inflation should be stabilised close to the target within a reasonable time horizon.

Criteria 2 to 5 are of more secondary nature and are only of interest if they underpin and support criterion 1, or at least do not weaken the prospects for price stability. There must therefore be a feed back from the arguments under these criteria and back to criterion 1.

Criterion 6 is of a different nature again. Even if the analysis has a foundation in advanced economic theory and advanced mathematical tools are used, it must be acknowledged the uncertainty for example in measuring the output gap. It is also complicated to assess what is the true underlying inflation.

It is therefore necessary to cross-check our interest rate setting by assessing the policy in the light of simple rules which are less dependent on a specific analytical framework. On the other hand, the rules will not capture all details in the projections, but can provide an indication of whether the current interest rate level is reasonably adapted to the economic situation.

2 The justification and assessment of the various criteria

2.1 Anchoring inflation expectations

Monetary policy shall ensure that the economy has a credible nominal anchor so that inflation expectations are stable around the inflation target. An appropriate interest rate path must first of all contribute to this. Hence:

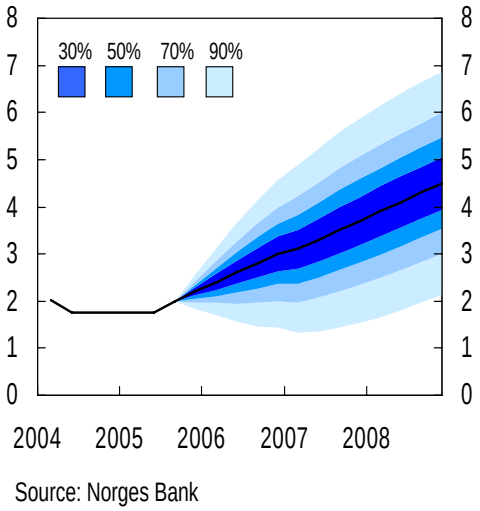
> *Criterion 1: Anchoring inflation expectations*
>
> *If monetary policy is to anchor inflation expectations around the target, the interest rate must be set so that inflation moves towards the target. Inflation should be stabilised near the target within a reasonable time horizon.*[4]

In order to promote stable inflation expectations, it may be appropriate to be specific with regard to the time horizon (e.g. 1-3 years). If a very long time horizon is specified, the basis for stable inflation expectations around the target might be weakened. A specific time horizon must depend on the type of disturbances to which the economy is exposed.

Young inflation targeting central banks that do not have the track record of price stability that, for instance, the Bundesbank had, may need to build credibility. Thus, ensuring that inflation expectations stay well anchored at the target in the long term is one reason to place emphasis on reaching the inflation target within the medium term.

Another condition that the interest rate path should satisfy in order to anchor inflation expectations is the "Taylor principle", which says that the nominal interest rate should in-

[4] Norges Bank sets the interest rate with a view to stabilising inflation at the target within a reasonable time horizon, normally 1-3 years. The more precise horizon will depend on disturbances to which the economy is exposed and how they affect the path for inflation and the real economy ahead.



Source: Norges Bank

Chart 1. The sight deposit rate in the baseline scenario with fan chart. Percent. Quarterly figures. 2004Q1–2008Q4

crease by more than the increase in inflation. If this condition is not satisfied, self-fulfilling inflation expectations ("sun spots") may arise.

In the November 2005 Inflation Report, Norges Bank presented for the first time an optimal interest rate path including a fan chart that illustrated the uncertainty of the forecast using these six criteria.[5] Chart 1 shows the forecast of the future interest rate path.[6]

2.2 Getting the balance between inflation and output right

Under flexible inflation targeting, the policy maker gives weight to both variability in inflation and variability in output and employment. In the theoretical literature, the trade-off between price stability and stability in the real economy is often described as minimising a loss function, which includes both inflation variability and output variability.[7] The central bank should then choose the interest rate path that minimises the discounted "losses" in all future periods:[8]

$$L_t = E_t \sum_{k=0}^{\infty} \delta^k [(\pi_{t+k} - \pi^*)^2 + \lambda (y_{t+k} - y^*_{t+k})^2]$$

The loss function includes the deviation between inflation and the inflation target ($\pi - \pi^*$) and the deviation between output and potential output (y–y^*). The deviations are repre-

[5] Norges Bank (2005)

[6] When central banks become more open and transparent about their views on future interest rates (as Chart 1 illustrates) the question is no longer: "What will happen to the inflation path?", but "What will happen to the interest rate path?" The academic world has encouraged central banks to pose the question in this way for a long time.

[7] One could also add a term with the (change in) the interest rate. There is, however, no consensus in the literature about whether an interest rate term should be included.

[8] See, for example, Kuttner (2004), Walsh (2003) p. 524 and Svensson (2003b). The symbols should be well known.

sented quadratically. Substantial deviations are thereby deemed to be considerably more costly than small deviations. The parameter λ is the weight on output fluctuations, relative to inflation deviations. The first order condition for minimising the "loss" in a given period is that the expected marginal benefit of bringing inflation closer to the target must be equal to the expected marginal cost of this policy for the real economy.[9] In simplified terms, the first order condition states that the interest rate path should strike a reasonable balance between the objective of stabilising inflation around the target and the objective of stable developments in the real economy. This may be operationalised in the following way:

> *Criterion 2: Getting the balance between inflation and output right*
>
> *Assuming that inflation expectations are anchored around the target, the inflation gap and the output gap should be kept in reasonable proportion to each other until they close. The inflation gap and the output gap should normally not both be positive or negative simultaneously.[10] If both gaps are positive, for example, a path with a higher interest rate would be preferable, as it would bring inflation closer to the target and contribute to more stable output developments.*

The first sentence may appear self-evident and provides scope for exercising judgment. There may, however, be different perceptions as to what is a reasonable relationship between the output gap and the inflation gap, and they will depend on the weight given to output stability relative to inflation stability (the parameter lambda in the loss function). This requires that interest rates are set in such a way that assessments of both the inflation gap and the output gap are consistent over time. In this connection, it may be useful internally in the central bank to calculate the lambda of decision-makers on the basis of their prioritisation of different interest rate paths. If decision-makers do not have consistent assessments over time, they should be made aware of this before they make the interest rate decision. If a flexible inflation targeting regime is to be credible, lambda should be greater than zero. Assessments that are consistent over time, i.e. a fairly stable lambda, would probably help to make monetary policy more predictable.

Moreover, the interest rate path should normally be as efficient as possible. It should not be possible to move inflation closer to the target without widening the output gap at the same time. This is reflected in the two last sentences in criterion 2. If, for example, inflation is above target and output is above trend, it means that a better balance could have been achieved by setting the interest rate higher, so that both the output gap and the inflation gap are smaller.

How easy it is to fulfil criteria 1 and 2 simultaneously will depend on the disturbances to which the economy has been exposed, capacity utilisation in the economy at the outset

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[9] According to theory, the cost will depend on the weight the central bank gives to stabilising output (the size of λ), how strong the correlation between output and inflation is, and the level of the output gap at the start, see, for example, Kuttner (2004). For simplicity, we disregard the fact that the first order condition will depend on whether monetary policy follows an optimal precommitment policy or a discretionary policy (see Walsh (2003) Chapter 11.3).

[10] However, economic theory indicates that under an optimal precommitment policy, it will under some circumstances (e.g. after a cost-push shock) be optimal to keep both the inflation gap and the output gap negative or positive for some time ahead, see, for example, Walsh (2003) pp. 527-529.

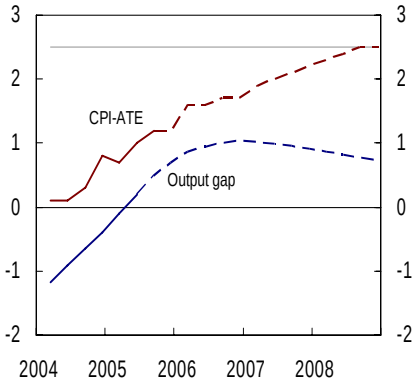

Chart 2. Projections for the CPI-ATE and output gap in the baseline scenario. Percent. Quarterly figures. 2004Q1–2008Q4.

and how far inflation is from the target. The inflation gap and the output gap are shown together in Chart 2. This chart has been included in Norges Bank's Inflation Report since 2003 in order to indicate that the balance between these gaps is assessed.

Using more technical terms, Faust and Henderson (2004) summarise the key content in criteria 1 and 2 in the following statement: "Common wisdom and conventional models suggest that best practice policy can be summarized in terms of two goals. First, get the mean inflation right, second, get the variance of inflation right."

In addition to getting the balance between inflation and output right, there are other important considerations which should be taken into account when we evaluate whether or not the proposed interest rate path "looks good". These considerations are discussed below.

2.3 Robustness

Monetary policy decisions are made in the face of considerable uncertainty. There is uncertainty as to the current state of the economy, the underlying driving forces and the economy's functioning, including expectations formation and the impact of monetary policy. Projected developments in output and inflation are based on key assumptions, which are associated with considerable uncertainty, taken into account that the actual state of the economy is not fully known.

The literature often distinguishes between two types of uncertainty; additive and multiplicative uncertainty.

Additive uncertainty is the uncertainty associated with developments in exogenous variables.[11] Additive uncertainty is typically expressed in terms of "add-factors" in our economic models and through other exogenous factors such as e.g. fiscal policy and the oil price. According to theory, additive uncertainty, where uncertain factors are assumed to be independent of the interest rate, should not be taken into account when setting interest rates. Certainty equivalence applies here, which means that we make an unbiased projection for the uncertain factor and take the projection into account in the same way as if we knew with certainty that it would occur. However, there are also situations when the poli-

[11] See Bergo (2004) and the references therein for a more detailed discussion about uncertainty.

cymaker should also evaluate whether a particular interest rate path provides an acceptable outcome under alternative, albeit realistic assumptions concerning developments in exogenous variables. This will contribute to a more robust monetary policy strategy.

Uncertainty about the actual functioning of the economy is denoted as multiplicative uncertainty. Multiplicative uncertainty can involve uncertainty about the structural parameters in the model, such as the partial effect of the interest rate on aggregate demand, the exchange rate and the short term relationship between inflation and output. Uncertainty about how economic disturbances influence inflation expectations is also multiplicative uncertainty. Earlier results from economic theory suggest that monetary policy should sometimes respond more cautiously to economic disturbances when there is uncertainty concerning the effect of the interest rate.[12] More recently, theoretical studies have shown that the central bank should be more aggressive when setting interest rates when faced with certain types of multiplicative uncertainty, for example, uncertainty regarding inflation persistence.[13]

Frank Knight (1921) differentiates between "risk" and "uncertainty". With risk, we know the probability distribution for the potential outcomes, but with pure uncertainty we do not. One approach to dealing with Knightian uncertainty is to apply the principles of robust control.[14] This implies hedging against worst-case outcomes. However, the risk associated with this strategy is that unreasonable emphasis is placed on low probability events.

Ideally, the monetary policy strategy should be robust to various assumptions concerning the current situation in the economy and the possibility that relationships in the economy may be incorrectly described. Thus:

> *Criterion 3: Robustness*
>
> *Interest rate developments, particularly in the next few months, should result in acceptable developments in inflation and output also under alternative, albeit not unrealistic assumptions concerning the economic situation and the functioning of the economy.*

In practice, this means that we should test within a suitable model the outcome for inflation and output under alternative, albeit not unrealistic assumptions. The choice of alternative assumptions may differ from one inflation report to another, depending on what risk factors are deemed to be the most pertinent at the time in question. Moreover, in dealing with alternative assumptions concerning the functioning of the economy, one could use (completely) different economic models. Hence, a suite of models can be very useful.

In practice, new information will result in changes in the interest rate. However, information often comes with a lag. It is therefore most relevant to assess whether the interest rate in the next few months is robust to other assumptions concerning economic developments and the functioning of the economy. Further ahead, it will in any case be possible to make adjustments to the interest rate path as the bank's assessments of economic developments gradually change.

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[12] See Brainard (1967).

[13] See Söderström (2002).

[14] See Hansen and Sargent (2004).

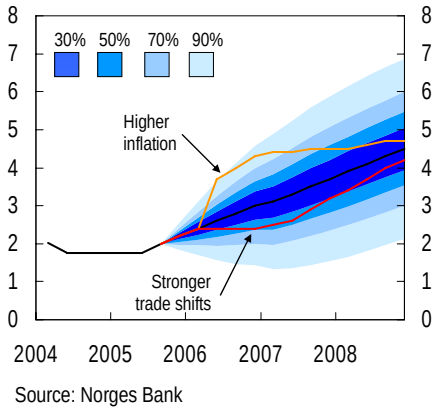

Chart 3. Sight deposit rate in the baseline scenario and in the alternatives with stronger trade shifts and lower wage growth (red line) and higher inflation (yellow line). Percent. Quarterly figures. 2004Q1–2008Q4.

An example of a "what if we are wrong"-analysis in Norges Bank (2005) is presented below.

Norges Bank's MPC acknowledges that it must be prepared for unexpected events in the future. The two alternative scenarios discussed in this example are shown in Chart 3 are:

- More pronounced globalization
- Stronger pick-up in domestic inflation

The alternative with more pronounced globalization

Charts 3 illustrates how the interest rate may be set if it becomes clear in the course of the first half of next year that the effects of intensified international competition and globalisation are even stronger than assumed in the baseline scenario (the red line in the chart). It is assumed that the central bank will maintain the interest rate path in the baseline scenario in the first months and not respond to disturbances until summer 2006 due to a lagged policy response – a recognition lag. Neither market participants, households nor enterprises expect the economy to follow a different path before that time.

The alternative with a stronger pick-up in domestic inflation

The real interest rate is low and the monetary stance is expansionary. There is a risk that an interest rate that is kept low for a longer period may lead to expectations of a persistently low interest rate. This kind of shift in expectations may entail a higher-than-projected rise in output, demand, wages and consumer prices. A possible monetary policy response to this alternative scenario with pressures in the Norwegian economy is also illustrated in Chart 2 (the yellow line in the chart).

2.4 Interest rate smoothing

Experience shows that central banks typically take a gradual approach in their interest rate setting. This is denoted as interest rate smoothing in the literature. As discussed above, uncertainty about the effects of monetary policy implies a cautious response to shocks.

Although “cautiousness” and “interest rate smoothing” are not exactly the same in theory, the difference is probably small in practice. A cautious policy also tends to give a more gradual interest rate path. Moreover, a gradual adaptation of the interest rate level may lead to greater predictability and facilitate economic agents’ adjustment to the change.[15] Thus:

> *Criterion 4: Interest rate smoothing*
>
> *Interest rate changes should normally be moderate unless the credibility of the nominal anchor is threatened.*

An additional reason for interest rate smoothing has been provided by Woodford (2003). He shows that one can achieve some of the gains from commitment by changing the interest rate gradually. This is because such behaviour implies historical dependence, which characterises optimal policy in a timeless perspective.

However, the question of whether it is appropriate to proceed gradually depends on the disturbances to which the economy is exposed. Under some types of shocks, when there is a risk that inflation may deviate considerably from the target over a longer period, and there is an imminent possibility that inflation expectations will be affected and confidence in monetary policy is in jeopardy, a rapid and pronounced change in the interest rate may be appropriate.[16]

Rudebusch (2005) alludes to two schools of thought on gradualism. One asserts that the persistence of policy rates reflects an inertia that is intrinsic to the central bank. Under this view, there is a long, intentionally drawn-out adjustment of the policy rate in response to economic news. Such partial adjustment implies that the central bank knowingly distributes desired changes in the policy interest rate over an extended period of time. For example, given typical empirical estimates, if a central bank knew it wanted to increase the policy rate by a percentage point, it would only raise it by about 20 basis points in the first three months and by about 60 basis points after one year. The opposing view is that the persistence of the policy rate simply reflects the response of the central bank to the slow

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[15] Blinder (1998) pp. 17-18 probably captures some fairly representative central bank thinking when he advocates that a central bank should decide on the appropriate interest rate and then move towards this rate slowly in order to see if things turn out as perceived. This is according to Brainard (1967) responding to Knightian uncertainty.

[16] In a comment to a preliminary version of this paper David Archer (BIS) acknowledges that the first criterion allows for some variation in the policy response depending on circumstances, by the use of the word "normally". In the second criterion, the possibility that expectations may not be anchored on the target is mentioned, and according to the fourth criterion, the interest rates might not always move gradually. David Archer proposes bringing these possibilities together in the context of allowing for potential state-dependent responses in expectations by introducing an additional criterion along the following lines: *"Where there are reasonable grounds to be concerned that inflation expectations are at risk of drifting away from the target, interest rate adjustments should come sooner and faster, aiming to bring inflation back to target earlier. A particularly relevant example is when inflation outcomes have been away from target, above or below, for an extended period."* Such considerations are very important in practice. However, adding such a criterion to the list would increase the number of agenda points for the MPC discussion from 6 to 7. How many agenda points one should have is a matter of practical concern.

cyclical fluctuations in the key macroeconomic driving variables of monetary policy, notably inflation and output. In this case, the persistence of the policy rate reflects an inertia that is extrinsic or exogenous to the central bank. Therefore, from this second perspective, the slow adjustment of the policy rate simply reflects the slow accretion of information relevant to the setting of the policy interest rate by policymakers, who then completely adjust the policy rate fairly promptly – within, say, a few months – when confronted with new information.

Rudebusch acknowledges that policymakers exhibit intrinsic and extrinsic inertia. However, he argues that the two types of inertia operate at *different time horizons*, and it is extrinsic inertia that is relevant for the policy projections presented in the inflation reports. In particular, at any given meeting, policymakers may limit the size of a policy move as a result of financial stability concerns. Therefore, rather than moving 100 basis points at a given meeting, they may move only 50 basis points and then postpone the remaining 50 basis points until the next meeting. This is indeed an intrinsic inertia, but it operates at a meeting-to-meeting frequency. Such inertia is really not relevant for the interest rate paths shown in the inflation reports. Even with significant intrinsic inertia MPC meeting by meeting, the central bank can essentially hit its desired rate at a trimester (quarterly) frequency. That is, for the purposes of Taylor rules and quarterly interest rate paths, the relevant inertia is extrinsic.

2.5 Financial imbalances

Financial stability has become an increasingly important objective in economic policymaking during recent decades. One approach to handling threats to financial stability deals with risks originating from outside the financial system. Strong growth in debt and asset prices, as well as other macroeconomic disturbances, can ultimately have an adverse impact on financial stability.

Financial imbalances may also affect output and inflation. For example, a sharp rise in property prices and borrowing might be a source of instability in demand and output in the somewhat longer run. In turn, this may also affect inflation. Consequently, these issues need to be discussed explicitly when assessing the appropriateness of interest rate paths. Thus, when assessing criteria 1 and 2, the developments in debt and asset prices should be considered.

Borio and Lowe (2002), however, argue that while low and stable inflation promotes financial stability, it also increases the likelihood that excess demand pressures will show up first in credit aggregates and assets prices rather than in goods and services prices. According to their view, some situations call for a monetary response to credit and other asset markets in order to preserve both financial and monetary stability.

Gjedrem (2005) discusses the nexus between financial stability and monetary policy and states that "... risks to financial stability due to evolving financial imbalances are likely to develop over a long period of time. From this perspective, the question of whether financial stability considerations should be explicitly included in monetary policy is heavily debated, both in academia and within central banks. The answers diverge and international consensus has not yet been reached. … In Norway, a flexible inflation-targeting country,

we have chosen to incorporate financial stability considerations into the monetary policy decision process."

These considerations are operationalised as:

> *Criterion 5: Financial imbalances*
>
> *Interest rate setting must also be assessed in the light of developments in property prices and credit. Wide fluctuations in these variables may constitute a source of instability in demand and output in the somewhat longer run.*

Another argument for having this criterion as a separate one (in addition to criteria 1 and 2) is that in practice, discussing issues one by one in a given order may help to structure the debate and ensure that all relevant aspects are dealt with.

2.6 Cross-checks

Criteria 1-5 are all analysed within the forecasting and policy analysis system (FPAS) of Norges Bank.[17] Interest rate developments should, however, be cross-checked against various simple rules and indicators that are less dependent on a specific analytical framework and a specific forecast for the Norwegian economy. Simple rules and indicators will not capture all the details in the projections, but can provide an indication of whether the current interest rate level is reasonably well adapted to the economic situation. If the baseline scenario in the inflation report includes a considerably different interest rate path than implied above, the reasons for this should be explained.

These cross-checks will not help the MPC in the difficult deliberations about whether to move the interest rate by 25 basis points, or whether to move at the next meeting or the following. However, they may warn the MPC if the committee is 250 basis points off! Looking back at more than 150 years of monetary history,[18] we may hope to identify episodes where this may have been the case. A suitable system of cross-checks will then potentially signal with "yellow" lights when thresholds are exceeded, and help to avoid such episodes in the future.

> *Criterion 6: Cross-checks*
>
> *It may be useful to cross-check by assessing interest rate setting in the light of some simple monetary policy rules without using the model framework of the first five criteria. If the interest rate deviates systematically and substantially from simple rules, it should be possible to explain the reasons for this.*

An obvious first cross-check that the MPC operates with in its own optimal interest rate projection is the market rate.

It may be difficult to know whether the operational definition of the inflation target is the most relevant one. It is also extremely difficult to gauge the present state of the economy both for the underlying inflation at the state of the output gap. So if one does not know "where one should go" and does not know "where one is", what is the most robust strat-

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[17] For a brief discussion of the FPAS system and the use of models in Norges Bank, see Qvigstad (2005). For the core model of this system, see Husebø et al (2004).

[18] Eitrheim et al (2004)

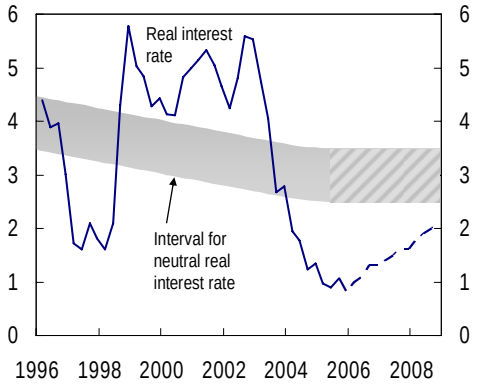

Chart 4. 3-month real interest rate and the neutral real interest rate in Norway. Percent. Quarterly figures 1996Q1–2008Q4. The real interest rate is computed as the money market rate deflated by inflation measured by the CPI-ATE. The projected real interest rate for the period 2005Q4–2008Q4 is based on the baseline scenario.

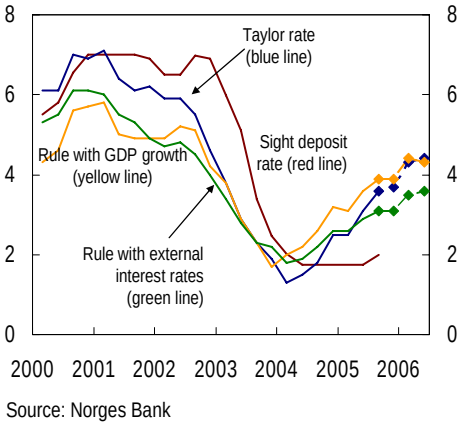

Chart 5. Sight deposit rate, Taylor rule, rule with GDP growth and rule with external interest rates. Inflation as in the baseline scenario. Percent. Quarterly figures. 2000Q1–2006Q2

egy for the interest rate? Should the real interest rate gap be zero? If the real interest rate gap is large in historical terms, one should be able to argue for it. So another cross-check could be the real interest rate gap. Chart 4 shows the real interest rate gap as published in the Norges Bank Inflation Report 3/2005. The neutral real interest rate is indicated with a band, as it is difficult to have a precise notion of this concept.[19]

Simple interest rate rules have in many cases proved to be less sensitive to statistical shortcomings, even though they have other drawbacks. Monetary policy rules must be interpreted with caution and only provide a rough indication of the appropriate interest rate range. Some simple interest rate rules are presented in Chart 5.

The Taylor rule is based on an estimate of the output gap. However, the output gap cannot be observed directly and is therefore an uncertain variable. An alternative rule that applies to observed GDP growth is also presented[20]. Both of these two rules have limitations as a reference for a small, open economy. An interest rate increase in line with the rules may

[19] Bernhardsen (2005)

[20] Orphanides et al. (2002)

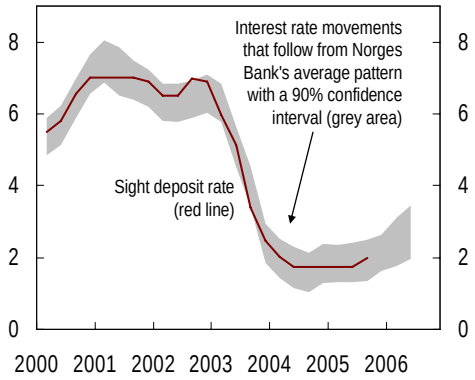

Chart 6. Sight deposit rate and interest rate developments that follow from Norges Bank's average pattern for the setting of interest rates. Percent. Quarterly figures. 2000Q1–2006Q2. The interest rate movements are explained by developements in inflation, mainland GDP growth and 3-month interest rates among trading partners.

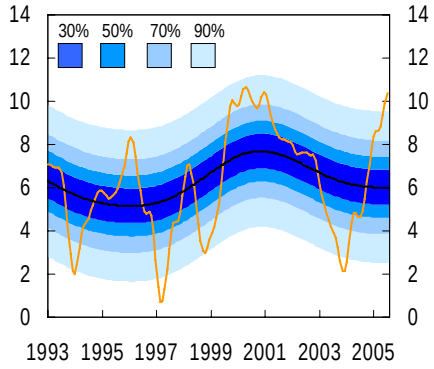

Chart 7. Money supply (M2). 12-month growth, estimated trend growth and intervals. Percent. Monthly figures. 1993M1–2005M8. Actual M2 growth is smoothed . Trend growth is estimated using a Hodrick-Prescott filter (λ=100 000). The confidence intervals are based on the standard deviation calculated using the deviation between actual M2 growth and trend growth.

lead to a marked appreciation of the currency, which implies that it would take considerably longer to reach the inflation target. A Taylor rule that also incorporates the international interest rate is also presented.

Norges Bank has also estimated a reaction function on the basis of the Bank's historical response pattern; see Chart 6. This rule is a cross-check as to whether the present interest rate setting is consistent with the previous observed reaction pattern of the MPC over the corresponding historical period. [21] If it deviates, the reasons for this should be explained.

Historically, there has been a relationship between price developments on the one hand and the rate of money supply (M2) growth in relation to GDP on the other.[22] M2 growth can be used as an indicator of price developments and developments in private demand for goods and services.[23] Chart 7 shows actual and trend growth in the money supply in the period 1993–2005, and the historical variation around trend growth.

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[21] Bernhardsen and Bårdsen (2004)

[22] Eitrheim et al. (2004)

[23] Svensson (2003a)

Issing (2005) argues that monetary analysis is essential, not old-fashioned. Indeed, monetary analysis is an important component of the cross-checks, also for countries that classify themselves as inflation targeters!

Last but not least, a successful monetary policy requires a reasonably good understanding of the state of the economy and its functioning. This is, however, not the topic of this paper.[24]

3 Conclusion

The six criteria presented in this paper are meant as a translation of academic literature on monetary theory into "MPC language" and can function as a practical guide for structuring the "main issues for discussion" (ordre du jour) of an MPC meeting.

Since November 2005, the MPC of Norges Bank has chosen to base the forecasts of inflation and the real economy on an optimal interest rate path. The optimal interest rate path is developed through an iteration process in which the criteria for when an interest rate path "looks good" are used.

The forecasts for the Norwegian economy are used for the MPC's own deliberations and are also published and used in the external communication. In this way, Norges Bank fulfils the Duisenberg definition of transparency that a central bank is transparent if the external communication reflects the internal deliberations (Duisenberg, 2001). Blinder and Wyplosz (2005) argue that the way the MPC chooses to communicate is related to the institutional set-up of the MPC. Thus, what is "good" for the MPC of Norges Bank is not necessarily "good" for other MPCs.

Also central banks using the market interest rate assumption or constant interest rates need some criteria when assessing whether this assumption yields "good" results. Central banks using assumptions of market rates or constant rates would use the criteria to assess whether the results are "good". A central bank using an optimal interest rate would use the criteria in the iteration process developing the optimal path. The MPC of Norges Bank used the criteria presented in this paper also when it based the analysis on the market's expected interest rates (prior to November 2005).

Although the criteria have already been presented in Norges Bank's Inflation Report, they must be considered as work in progress. The criteria will probably evolve over time, as new insights and new considerations emerge about how monetary policy should be conducted. The criteria can be more precisely defined or "regrouped", but if they are to function as a practical "main issues for discussion" (ordre du jour) for an MPC meeting, there are limitations to how long a list of criteria can be.

[24] See Bergo (2005) for more on this topic.

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