INFLATION-FORECAST TARGETING:
A TWENTY-FIRST CENTURY MONETARY STANDARD?

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• Why interested in a monetary standard?
  — monetary arrangement that guarantees the continued value of the monetary unit

• Recent developments in monetary economics have shown not just the value of stable prices, but of confidence in the future purchasing power of money
  — costly efforts to economize on money balances
  — uncertainty about future value of money discourages financial contracting
  — inflation expectations sensitive to current inflation impairs ability to use monetary policy for short-run stabilization
• Increased appreciation not just of the benefits of stable inflation, but of the benefits of *anchoring inflation expectations*

• But not enough to merely announce goal: must be *seen* to systematically *pursue* it, if expect to anchor expectations

  — hence desirability of commitment to a *policy rule* that dictates the actions required to serve the ultimate goals of policy
Monetary standards: successive approaches:

- Late 19th C: the gold standard

- 1960s-70s: money growth targeting

- 1990s-present: inflation-forecast targeting
Problems with the Gold Standard

- Rigid framework allows no scope for monetary stabilization policy

- Stability of prices hostage to developments in world gold market
  - little reason for relative price of gold to be stable
  - Became an engine of deflation during 1930s (Eichengreen)

- Also inefficient to tie up valuable commodity in reserves used to back money supply
• Should be able to do better, in principle, with a properly managed fiat currency: but how to create confidence in stability of its value?

• No longer possibility of *private enforcement* of commitment to policies consistent with price stability

  — instead must rely on *political accountability* of monetary authorities

  — but for what, and on the basis of what kind of evidence regarding their actions?
Money Growth Targets

- Use policy to ensure fixed rate of growth (to extent possible) in a measure of the money supply

  — money growth target chosen to be consistent, over long run, with desired inflation rate, given expected long-run real growth

  — example: ECB “reference value” of 4.5% M3 growth expected to be consistent with 1.5% inflation, which in turn conforms to official definition of price stability
• Idea: define an *intermediate target* for something the CB can more directly control than inflation
  — clearer guide to policy, improves *verifiability* of commitment

• At same time, theoretical and empirical grounds to expect direct relation between money growth and inflation, over sufficiently *long run*

• In practice, target usually for a relatively broad aggregate (M3 for ECB), because more stable relation to ultimate stabilization objectives
• Problem: money growth not an accurate guide to whether policy is on track in short run
  — money growth *should* vary in an equilibrium with stable prices

• Money demand increased by output growth, even if due to *growth in potential*

• Relation of money demand to real income varies with changes in transactions methods
  — likely an important problem for economy undergoing rapid regulatory and/or institutional change
• Even if money-prices relation is reliable over long run, this is of little use for the conduct of policy

— easy enough to tell in any event if inflation has been on target over a long period

• In practice, little attention is now paid to growth of monetary aggregates in advanced economies such as US

— Importance of the M3 reference value has declined even at the ECB
Inflation-Forecast Targeting

• Besides explicit inflation target, commitment to a structured decision procedure:
  — CB will adjustment instrument(s) as necessary in order to ensure that economy's projected evolution satisfies a quantitative target criterion
  — e.g. Bank of England: CPI inflation projection to equal 2.0 percent at 8-quarter horizon

• Predictability/verifiability of policy ensured through commitment to regularly publish the projections, explaining CB’s analysis of outlook and why policy judged to be on track
the near term and then falls back, settling around the target over the medium term. Moderating energy and import price inflation are partially offset by slightly higher pay growth and some rebuilding of corporate profit margins. Inflation returns to target a little more rapidly than in the August Report.

As usual, there are substantial uncertainties surrounding these projections, especially on the supply side. These include: the implications of rapid growth in money and credit; the momentum in consumption and investment spending; the prospects for world activity; the degree of slack within the economy; and the outlook for wages and prices in the light of movements in energy and import prices. Overall, the risks to growth and inflation are judged to be broadly balanced, though, as in August, there is greater-than-usual uncertainty over the outlook for inflation.

The policy decision

At its November meeting, the Committee noted that, under the assumption that Bank Rate follows market yields, the central projection was for output to continue growing steadily and for inflation to move higher in the near term and then fall back to settle around the target. Given that outlook, and bearing in mind the balance of risks, the Committee judged that an increase of 0.25 percentage points in Bank Rate to 5% was necessary to bring CPI inflation back to the target in the medium term.
• Idea: use *all* available information about current outlook to judge appropriate instrument setting, not tied to mechanical reaction function
  — information used in producing projections need not have been *anticipated* at time of commitment to the *target criterion*
  — could include non-quantitative information ("judgment")

• Target criterion involves CB’s actual stabilization goals, not a mere "intermediate target"
  — consider economy’s projected path and not just current state
• Goal of anchoring *expectations* well-served by revealing CB’s analysis of future outlook

• Can show how current departure of inflation from target is consistent with unchanged medium-run outlook

• Also a convenient of way of signalling near-term outlook for *monetary policy*
  — can include *interest-rate projection*, as Norges Bank does
Chart 1.9a The sight deposit rate in the baseline scenario with fan chart. Per cent.
Quarterly figures. 04 Q1 - 09 Q4

Source: Norges Bank
Questions about Forecast Targeting

- Should only the inflation forecast matter?

- How forward-looking should the projections be?

- What assumptions about future policy should be made in constructing the projections?
(1) **Should only the inflation forecast matter?**

- Those banks that have been most explicit about what IFT means (except Norway) have generally emphasized the way the inflation forecast (at a particular horizon) determines policy.

- But commentators (Svensson, Bernanke-Mishkin, King) have stressed that in practice, inflation-targeting CBs are never concerned solely with inflation — commitment to return inflation to target rate in “medium term” allows flexibility in short run.

- *Inflation Reports* of Bank of England, Riksbank present projections for real activity *alongside* inflation projections, even if role in policy decision is less explicit.
• What is different about inflation:

— particularly crucial to stabilize inflation expectations

— less reason for people to have definite expectations about inflation, except insofar as based on a view of CB behavior

• Nonetheless, not optimal to completely stabilize inflation, except under relatively special circumstances

— more robust conclusion: under an optimal policy, little variation in forecastable inflation rate several quarters in the future
One response to this observation: target criterion refers only to where inflation is projected to be some years in future — allowing flexibility to adjust transition path in way that helps to stabilize real economy

But (if this genuinely allows any flexibility!) this means that the target criterion is incomplete — does not actually suffice to determine appropriate short-run policy choice
Superior alternative: specify a target criterion that also explains to what extent short-run departures from the long-run inflation target are justified.

Example: criteria for an acceptable set of projections used by the Norges Bank.
Monetary policy cannot fine-tune developments in the economy, but must prevent the largest effects when the economy is exposed to disturbances. In some situations, it may be appropriate to guard against particularly adverse developments.

The policy rate was reduced to a very low level in 2003 and 2004 primarily with a view to preventing inflation expectations from becoming entrenched well below target. In spite of a longer period of low inflation, inflation expectations are close to the inflation target (see Chart 1.8). According to TNS Gallup’s expectations survey, a growing share of enterprises expects purchase prices to rise. At the same time, the contact enterprises in Norges Bank’s regional network expect retail prices to increase in the period ahead. On balance, the likelihood that low inflation will be followed by deflation now appears to be small. Nevertheless, it is appropriate to guard against the risk of a slower rate of inflation when inflation is already at a low level.

Capacity utilisation is rising at a faster pace than expected. We have previously seen that cost inflation can accelerate quickly in a tight labour market. It may then be necessary to increase interest rates substantially in order to stabilise inflation. Such a development would be particularly unfavourable in a situation with high household debt. With a high debt burden, an interest rate increase would result in a considerable fall in disposable income. The risk of a pronounced downturn in the economy as a result of a high level of capacity utilisation and rising price and cost inflation seems to have increased somewhat. In order to guard against such a development, a pre-emptive increase in interest rates would be appropriate.

Monetary policy affects the economy with a lag and primarily influences inflation one to three years ahead. Against the background of high growth in output and employment, rising wage growth and a weaker krone, there are prospects of higher consumer price inflation ahead. On balance, developments since the previous Report suggest that it would be appropriate to raise the policy rate gradually towards a more normal level at a somewhat faster pace than envisaged earlier, although it is unlikely that rates will be raised at every monetary policy meeting (see Charts 1.9 and 1.10). Based on our current assessment, the interest rate will thus continue to be raised in small, not too frequent steps if economic developments are broadly in line with projections.

A gradual normalisation of the interest rate level will contribute to curbing growth in the Norwegian economy. Growth in household demand will be restrained by somewhat weaker growth in real disposable income. Investment growth in the mainland economy is expected to ease. Weaker growth in the world economy, in conjunction with

Criteria for an appropriate future interest rate path

The following criteria may be useful in assessing whether a future interest rate path appears reasonable compared with the monetary policy objective.

1. 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, normally 1-3 years. For the same reason, inflation should also be moving towards the target well before the end of the three-year period.

2. Assuming that inflation expectations are anchored around the target, the inflation gap and the output gap should be in reasonable proportion to each other until they close. The inflation gap and the output gap should normally not be positive or negative at the same time further ahead.

3. 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.

4. The interest rate should normally be changed gradually so that we can assess the effects of interest rate changes and other new information about economic developments.

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

6. It may also be useful to cross-check by assessing interest rate setting in the light of some simple monetary policy rules. If the interest rate deviates systematically and substantially from simple rules, it should be possible to explain the reasons for this.

1 The inflation gap is the difference between actual inflation and the inflation target of 2.5%. The output gap measures the percentage difference between actual and projected potential mainland GDP.
**Chart 1.13** Projected CPI-ATE\(^1\) and output gap in the baseline scenario. Quarterly figures. Per cent. 04 Q1 – 09 Q4

\(^1\) CPI-ATE: CPI adjusted for tax changes and excluding energy products. A further adjustment is made for the estimated effect of reduced maximum day-care rates from January 2006.

Sources: Statistics Norway and Norges Bank
• Taking into account output gap does not imply any reason to doubt commitment to medium-term inflation target
   — the near-term target criterion is not only consistent with the (fixed) medium-term inflation target, it implies it

• Hence appropriate to consider such a criterion to be a “flexible inflation target”
(2) How Forward-Looking Should the Projections Be?

- IFT central banks often emphasize (only) inflation projection at horizon 2-3 years in future

- But a criterion that can actually determine the current policy decision should emphasize effects at the nearest horizon affected by current policy decision

- And most estimated structural models imply effects of changes in interest-rate policy within 6 months or less
• But this *doesn’t* mean multi-year projections not needed!

• In a forward-looking model, *can’t solve* for the near-term effects of current policy decision without *also* solving for the expected future paths of inflation, output, etc., given assumptions about future policy
  — in principle, need to solve for *infinite-horizon* projections, even if don’t take seriously [and hence would not publish] the precise quantitative assumptions more than a few years into future

• Look for consistency of projections, not just with near-term criterion *now*, but with an *unending sequence* of near-term criteria at successive future dates as well
(3) **What Assumptions about Future Policy Should be Made in Constructing the Projections?**

- Multi-year projections cannot be produced without some assumption about policy over the forecast horizon (or even longer)

- But CBs that publish the projections on which policy is based have often been reticent about openly making any assumption about future policy
Two popular ways of avoiding this issue:

— projections conditional upon constant interest rate over forecast horizon: current rate assumed to be maintained [BoE before 8/04]

— projections conditional upon market expectations of the forward path of interest rates, inferred from term structure [BoE since 8/04]
Problems with CIR projections:

- Forward-looking models often imply equilibrium indeterminate under this assumption, so can’t answer whether projection satisfies criterion

- Backward-looking models often imply unstable dynamics under this assumption, so hitting inflation target at a single horizon an unappealing criterion

— apparently true of BoE projections
• Assumed forward path may *not* be consistent with bank’s own beliefs

— often not consistent with the projection itself!

• But then what interpretation of the exercise?
It should also be stressed that the profile for official interest rates derived from the market yield curve merely offers a convenient benchmark assumption. Even if market participants and the MPC have a common view about the economic outlook, the MPC may decide that it is appropriate for official interest rates to follow a different path from that implied by the yield curve in order to achieve its Remit. Moreover, as emphasised in the main text, the economy is most unlikely to evolve along the path described by the central projection.

associated with more subdued consumption growth than in previous periods. So it seemed possible that a sharp decline in house price inflation would not imply a substantial weakening of household spending. Nevertheless, the MPC believes that a housing market turnaround would restrain future consumer spending to some extent. And with real household disposable income no longer rising so rapidly, consumption is likely to grow at just below its long-run average rate for much of the next two years. Compared with May, prospective consumption growth is a little weaker in the first year, but broadly the same further out.

**Business investment**

The recovery in business investment since early 2003 continued. Further growth is likely, as recent indicators of investment intentions suggest. Recoveries in investment during the past 25 years have typically seen four-quarter business investment growth of around 20% or more. The MPC does not expect such a surge to be repeated during the current upturn. The slowdown in investment was more muted than in previous cycles. Moreover, corporate debt remains high relative to assets and income. So firms may be less willing to borrow during the coming years and that may limit companies’ investment spending growth. The MPC expects investment to grow a little faster than GDP during the forecast period. Compared with May, business investment growth is marginally stronger in the near term, but weaker further out.
Projections based on market expectations:

- Avoids such obvious discrepancy between assumption about future policy and bank’s own likely beliefs

- But if simply supply an interest-rate path apparently expected by the market, still subject to the objections listed above:
  
  — eq’m indeterminate in forward-looking model
  
  — eq’m unstable in backward-looking model
  
  — exercise self-contradictory if market expectations are not those of the CB itself
• More sophisticated variant: model monetary policy by a Taylor-type reaction function, with a shift factor in each future period that is adjusted so that projections agree with interest-rate path forecasted by market

• But if the sequence of shifts is assumed to be forecasted by private sector, this doesn’t solve the indeterminacy problem! (Indeterminacy of the sequence of shift factors.) — nor does it solve the instability problem

• If it is assumed not to be forecasted by PS, the analysis is incoherent
• Use of ME also runs an additional risk:
  — possible instability due to *self-fulfilling expectations* (in the economy, as opposed to CB’s projections)

• How new decision procedure at BoE appears to work:
  — if projection based on market expectations *satisfactory*, then BoE adjusts repo rate *to conform to expected path*

• Problem: if CB delivers *whatever interest rate is forecasted* by markets, nothing anchors what that forecast should be!
• Only results in indeterminacy to extent that alternative paths all result in projections consistent with target criterion

— but this is a weak restriction if inflation need only be expected to revert to long-run average level 2 years in future

• In practice, BoE seems reluctant to disagree with the interest-rate decision expected by the markets

— e.g., in 8/05, ME projections imply target criterion not satisfied, so bank reverts to CIR projections to justify interest-rate decision expected by markets nonetheless!
and early 2004, output subsequently slowed more sharply. But business surveys and reports from the Bank’s regional Agents suggest that the slowdown may have been less marked than implied by the current vintage of official data. The Committee has given some weight to that evidence in evaluating the recent pace of expansion.

Chart 1 shows the MPC’s assessment of the outlook for four-quarter GDP growth under the assumption that official interest rates follow a path implied by market yields. In the central projection, output growth remains subdued in the near term, reflecting the continued sluggishness of domestic demand. Output growth then picks up as the impetus from recent movements in asset prices works through to consumption, investment and net trade. The profile is weaker in the near term than in the May Report, but stronger further out.

Costs and prices

Consistent with the loss of momentum in activity, total hours worked fell in the three months to May and claimant-count unemployment edged higher. Reports from the Bank’s regional Agents point to a further easing in employment growth. Settlements in the private sector edged up, but regular pay growth eased. Unit labour cost growth picked up on the back of decelerating productivity, but only to around recent averages.

Other cost pressures were mixed. Manufacturers’ input price inflation rose, reflecting higher fuel prices, but output price inflation eased from its recent high levels. The available indicators for services output prices, though mixed, on balance point to little change in inflationary pressures in that sector. The prices of imported consumer goods have stopped falling.

CPI inflation edged up to 2.0% in June. The pickup in CPI inflation since last year is likely to reflect both the direct and indirect impacts of higher oil prices as well as the pressure of demand on supply in the first half of last year.

The outlook for inflation

Chart 2 shows the Committee’s assessment of the outlook for CPI inflation, also assuming that official interest rates move in line with market yields. Under the central projection, inflation moves above the 2% target and then dips, as the impact of recent increases in oil prices wanes and pressures on capacity ease. Inflation then rises above the target once more, as output growth picks up and the contribution from import prices increases. Compared with May, the profile is a little higher in the near term and also somewhat higher in the final year of the projection.
Chart 3 shows the corresponding projection for inflation assuming that interest rates are maintained at their current level of 4.5%. Output growth is a little weaker under this assumption, and the pickup in inflation towards the end of the projection is consequently less marked.

As usual there are substantial risks surrounding the central projections. These include: the momentum in consumer spending; the sources of the recent pickup in inflation; and the prospect for oil prices. There is a range of views among members, but the Committee judges that, relative to the central projection, the overall balance of risks to growth is slightly to the downside in the near term. The balance of risks to inflation is correspondingly slightly to the downside further out.

**The policy decision**

At its August meeting, the Committee noted that under the central projection conditioned on market interest rates, annual output growth remained subdued in the near term but grew briskly thereafter, with inflation rising to, and then above, the target two or so years ahead. The Committee also noted that under the central projection conditioned on a constant interest rate of 4.5%, growth was projected to be a little weaker, with inflation close to the target at the two-year horizon. In the light of this outlook, and bearing in mind the balance of risks, the Committee judged that a reduction of 0.25 percentage points in the repo rate to 4.5% was necessary to keep inflation on track to meet the target in the medium term.
• Only approach that avoids these problems: base projection on assumption of future policy determined by a policy rule, that

(i) indicates how interest rates will respond to fluctuations in inflation, output, and

(ii) is regarded by CB as a reasonable representation of its “typical” behavior

— not just an assumed interest-rate path

• Approach used by RBNZ (and Norges Bank since 11/05)
• Common objection: assumption about future policy will be misunderstood to represent a commitment, constraining future policy

— apparently not a problem in New Zealand

— Norges Bank: use of “fan chart,” alternative scenarios, clear statement of conditionality — helps to make clear that the interest-rate path shown is not a commitment

• More effective means of policy signalling than the sorts of code words used by Fed, ECB, BOJ
Chart 1.14a Sight deposit rate in the baseline scenario and in the alternatives with lower inflation and with high price and cost inflation. Per cent. Quarterly figures. 04 Q1 – 09 Q4

Source: Norges Bank
Conclusions – monetary policy strategy

The Executive Board’s assessment is:

- Underlying inflation has been lower than projected in recent months. Nevertheless, several factors point to higher inflation ahead. Capacity utilisation is high and there is little spare capacity in the Norwegian economy. Employment is rapidly rising and unemployment has exhibited a marked decline. There are signs of higher wage growth and expectations of rising inflation. At the same time, the krone exchange rate has depreciated from strong values.

- The interest rate path presented in this Report will provide a reasonable balance between the objective of bringing up inflation towards target and the objective of stabilising developments in output and employment, conditional on the information currently available to Norges Bank.

- Monetary policy influences the economy with a lag. Over several years, interest rates have been considerably lower than what we consider to be a neutral level. The interest rate may gradually be raised to a more normal level at a somewhat faster pace than envisaged earlier, although it is unlikely that rates will be raised at every monetary policy meeting. Based on our current assessment, the interest rate will thus continue to be raised in small, not too frequent steps if economic developments are broadly in line with projections.

- The sight deposit rate should be in the interval 3¼ - 4¼% in the period to the publication of the next Inflation Report on 15 March 2007, conditional on economic developments that are broadly in line with projections. New information may reveal aspects of economic developments that indicate that the Norwegian economy is moving on a different path than projected. On the one hand, major shifts in trade patterns, strong competition, weaker global growth or a stronger krone exchange rate may result in low inflation. On the other hand, low real interest rates or a further depreciation of the krone may lead to a higher-than-projected rise in output and inflation.
(4) The Problem of Self-Consistency of the Policy Assumption

- Self-consistent policy assumption: should have the property that if future situation is the one envisioned in the current projections, use of the same forecast-based criterion to decide about policy in the future should lead to the future policy envisioned in the current projections

- whether a particular policy rule (if specified as a reaction function) has this property depends on details of one’s model — but can check this
• Example of an approach that is *not* self-consistent: Svensson recommends selection of policy assumption in each decision cycle that results in projections that *minimize a loss function*

• Problem: in case of forward-looking model, will generally lead to choice of a forward path for policy that is *not time-consistent* — the familiar Kydland-Prescott (1977) problem

• Norges Bank procedure — choose coefficients of assumed reaction function so as to obtain “desirable” projections — can have same problem — in fact, coefficients change each time
• Is there a solution to the problem of self-consistency?

• Yes: specify future policy by assuming *satisfaction of a target criterion* which is the same each period

  — e.g., the Norges Bank assumption of proportionality each period between inflation gap and output gap
Are Forecasts Sufficiently Reliable?

- Possible weakness of forecast-targeting relative to other monetary standards: what if models used to forecast are insufficiently accurate?

- Might have *persistent* inflation target misses if a bias in forecast persists for many years
  - Could easily happen, e.g. due to persistent mis-estimate of productivity trend and hence of output gap, in model where output gap is critical for inflation forecast
  - Orphanides explanation of 1970s inflation in US
United States, The Output Gap in Real-Time and Final Data

Source: Orphanides (2000)
• How to guard against this kind of mistake?

• One answer: target money growth

— an approach that doesn’t involve CB in attempting to estimate output gap, so no obvious errors due to poor knowledge of it

• But money target doesn’t solve the problem: want nominal spending to expand with productivity growth, and need to know how to adjust money growth target to achieve this: a constant growth-rate target isn’t right if there are shifts in the productivity trend
• Alternative approach to guarding against persistent inflation target misses: commitment to aim policy at correcting past target misses
   — advantage of a price level target (or target path)

• This is a feature of an optimal policy commitment, even when CB model is known to be perfectly accurate, in case of baseline NK model (CGG 1999)

• Also means less problems created by inaccuracy of CB real-time estimate of state (e.g., productivity): Gorodnichenko and Shapiro (2006)

• And a rule more robust to CB model mis-specification: Aoki and Nikolov (2005)
• Especially dangerous: *ex post* adjustment of inflation target in response to target misses
  — means inaccurate forecasts have *permanent* effects
  — expectation of this creates great *uncertainty*, and worsens short-run policy tradeoff

• A policy temptation:
  — “opportunistic disinflation” by Fed in 1990s
  — recent discussion in Sweden (target undershooting since 2004)
Conclusions

• IFT a promising approach to ensuring the value of a currency
  — clear grounds for anchored expectations
  — yet allows greater flexibility of short-run policy than past proposals for monetary standards

• Yet room for refinement of current procedures
  — greater clarity about near-term target criterion
  — more explicit about factors beyond inflation projection
  — projections based on internally consistent policy assumptions
  — commitment to error-correction