PRACTICAL EXPERIENCE WITH INFLATION TARGETING

International Conference held at the Czech National Bank, May 13-14, 2004

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Inflation targeting has been the buzzword in central banking circles and in monetary policy-oriented academic research for more than a decade now. On the theoretical front, many researchers have devoted their attention to modelling the principles and implications of various forms of the regime in various specific macroeconomic settings. On the practical front, many central banks have opted for this regime, often for different reasons.

The Czech National Bank has been using the inflation targeting framework to conduct its monetary policy since 1998. One of the Bank's monetary policy priorities is to summarise the experience – its own as well as that of other inflation targets – with the practical implementation of the regime and to pass on the lessons through various channels to central banks that are considering introducing the regime in their own monetary policy practice.

The two main channels of this activity have been the Bank's Internal Research and Policy Notes and bilateral meetings with experts from individual central banks. While using these channels, we have realised that there is at least one more channel, a channel that has not been used very much world-wide. Although the theoretical findings on inflation targeting have been the focus of numerous international conferences, occasions for central bankers to meet and exchange their accrued experience with practical implementation of the regime have been much less frequent.

This is why we decided to organise the conference "Practical Experience with Inflation Targeting". The conference was held at the Czech National Bank in Prague on May 13-14, 2004. This volume contains written versions of almost all of the contributions to the conference, in some cases slightly adapted by the authors. A quick look at the table of contents will reveal that quite a few internationally respected experts on the practice of inflation targeting accepted our invitation to speak at the conference. They came from central banks which have a rich experience with the regime and whose practices have already converged close to what might be viewed as the best practice of implementation of inflation targeting.

The table of contents also indicates the basic design of the conference. The speakers were asked to focus on one of five essential aspects of inflation targeting, namely, targets and independence, forecasting, decision-making, dealing with the exchange rate and communication. Each topic was covered by three speakers. In all five sessions, the first speaker was asked to give a core presentation on the topic, drawing on the practice and his perception of the experience of his own central bank. The other two speakers were asked to "discuss" the core presentation, primarily in the form of complementary comments based, in turn, on how they perceive the experience and techniques of their central banks.

A special session of the conference entitled "Views from Outside" was devoted to the question of why some of the major central banks are actually reluctant to switch from their current monetary policy framework to inflation targeting. We considered this session particularly important because it pointed out that inflation targeting may not be a panacea and that some of its features may, in certain circumstances, make it unattractive relative to some of the available alternatives. In this way, the session allowed the conference to give a more balanced view of inflation targeting.

I would like to thank all the contributing authors, discussants and participants at the conference. Thanks also go to Marie Kuprová, my assistant, for her technical work in preparing the volume for publication.

Michal Skořepa
Conference Organiser
Director, Monetary Policy and Strategy Division, Czech National Bank

DAVID ARCHER
Assistant Governor
Head of Economics Department
Reserve Bank of New Zealand

DONALD COLETTI
Research Director
Bank of Canada

GUY DEBELLE
Adviser
Monetary and Economic Department
Reserve Bank of Australia

ERWIN HARYONO
Junior Economist
Policy Analysis and Planning Division
Bank Indonesia

ANNE-BERIT CHRISTIANSEN
Director
Economic Department
Central Bank of Norway

PER JANSSON
Deputy Director
Monetary Policy Department
Sveriges Riksbank

JANA JIRSÁKOVÁ
Head of Monetary Policy Section
National Bank of Slovakia

HIMANSHU JOSHI
Director
Monetary Policy Department
Reserve Bank of India

BRIAN KAHN
Senior Deputy Head
Research Department
South African Reserve Bank

HAKAN KARA
Head of Economic Modelling Division
The Central Bank of the Republic of Turkey

PETER KARÁDI
Economist
National Bank of Hungary

TOMASZ LYZIAK
Chief Specialist
Bureau of Macroeconomic Research
National Bank of Polan

JEAN-MARC NATAL
Senior Economist
Swiss National Bank

ATHANASIOS ORPHANIDES
Adviser
Federal Reserve System

BALASZ PARKANYI
Economist
National Bank of Hungary

THÓRARINN G. PÉTURSSON
Head of Research
Economic Department
Central Bank of Iceland

JUAN MAURICIO RAMÍREZ CORTÉS
Director
Inflation and Macroeconomic Department
Bank of the Republic Colombia

ENZO ROSSI
Economic Adviser
Swiss National Bank

PETER ŠEVČOVIC
Chief Executive Director
Monetary Division
National Bank of Slovakia

LUCYNA SZTABA
Macroeconomic and Structural Analysis Department
National Bank of Poland

GABRIEL STERNE
Manager
Monetary Assessment and Strategy Division
Bank of England

INGVILD SVENDSEN
Assistant Director
Monetary Policy Department
Central Bank of Norway

ANDERS VREDIN
Director
Monetary Policy Department
Sveriges Riksbank

RISKI E. WIMANDA
Economist Assistant
Policy Analysis and Planning Division
Bank Indonesia

BERNHARD WINKLER
Counsellor to the Executive Board
European Central Bank

PARTICIPANTS FROM THE CZECH NATIONAL BANK

JAN FRAIT
Member of the Bank Board

TOMÁŠ HOLUB
Director
Monetary and Statistics Department

MIROSLAV HRNČÍŘ
Director
Division of Economic Research

VIKTOR KOTLÁN
Director
Monetary Policy and Strategy Division
Monetary and Statistics Department

PETR KRÁL
Deputy Director
Macroeconomic Forecasting Division
Monetary and Statistics Department

MICHAL SKOŘEPA
Deputy Director
Monetary Policy and Strategy Division
Monetary and Statistics Department

TARGETS AND INDEPENDENCE

Inflation Targets, Independence and MPCs: The UK and International Experience

Gabriel Sterne – Bank of England

Abstract

Central bank independence is a key component of numerous inflation targeting frameworks, but the literature, that describes central bank independence as a pre-condition for inflation targeting misses the point, since both inflation targets and independence are themselves part of a broader process of strengthening society's resolve to develop institutional arrangements that deliver low inflation. The UK experience from 1992 to 1997 demonstrated that – even without independence – inflation targeting could be a marked improvement on previous policy regimes, and this may have helped to encourage the decision to make the Bank of England independent in 1997. In this paper I compare the UK experience with other inflation targeting economies in order to demonstrate how, under the broad inflation targeting umbrella, a fairly wide range of institutional arrangements have delivered improved macro-economic performance. Moreover, inflation targeting regimes have typically acted to strengthen support for institutional arrangements by building a constituency for low inflation.

Key Words: inflation targets, independence, monetary policy committees

1. INTRODUCTION

It is over 25 years since Kydland and Prescott (1977) and Barro and Gordon (1983) delivered the message that policymakers operating under discretion could be subject to time-inconsistent preferences, resulting in an inflation bias. This and other lessons from the theory and practice of monetary frameworks have been deeply absorbed by designers of monetary frameworks. Legislation written in the early 1990s for many new central banks in the transitional economies of central Europe, for example, provided a far greater degree of independence than those Acts written for numerous African central banks following their countries achieving independence from colonial powers in the 1950s, ' 60s and '70s. As regards the United Kingdom, our governments took longer than some to be persuaded that any economic benefits from central bank independence were sufficient to offset perceived losses in democratic accountability. As a result, the Bank of England was not granted instrument independence until 1997, nearly five years after inflation targeting was introduced.

Central bank independence appears to be entrenched in the legal framework of many countries. And to central banks it remains the most prized aspect of the monetary framework. Across a broad range of 60 central banks operating various monetary frameworks, Fry *et al* (2000) reported that central banks regarded independence

as the most important from a list of 21 monetary framework characteristics. Perhaps independence is regarded as highly important by central banks because central bankers are aware it can in principle be removed by legislation that could replace that which awarded it. In many countries there is little to stop governments introducing new legislation to reverse independence, so a legal guarantee may be reversed in the event of any marked shift in society's preferences.

Central banks targeting inflation have tended to operate policies that have aimed to reinforce society's preferences for institutions with credibility for delivering low inflation. In the Fry et al survey inflation targeters valued independence highly, making it the third most important aspect of the monetary framework. But this was slightly lower than central banks operating other frameworks. In first, second and fourth place inflation targets ranked inflation targets, the maintenance of low inflation expectations and transparency, all of which are associated with policies that are aimed not just at securing better medium-term macro-outcomes, but may also help to develop a constituency for low inflation in the wider population, thereby strengthening the stability of the institutions underpinning the inflation targeting framework.

Inflation targeting frameworks have often been adopted in economies without a history of stable inflation, and frameworks have been designed to increase the likelihood of a durable framework, both by introducing rules that clarify the incentives for each of the central bank and government to pursue policies consistent with price stability, and also by adopting policies that offer the possibility of strengthening society's confidence in the framework through transparency about what monetary policy can and cannot achieve. The importance of building a constituency for low inflation was specifically acknowledged as the goal of a working party set up by the Bank of England in 1997 (see, HMT, 1998).

The UK inflation targeting framework has helped to bring unprecedented stability to the UK economy. Benati (2004, forthcoming) demonstrates a contemporaneous fall in the volatility of inflation and output since 1992 and notes that the simultaneous decline in inflation and output volatility contrasts with the predictions of the impact of more aggressive monetary policy in most existing New Keynesian models, which would suggest a fall in the volatility of inflation, but an increase in the volatility of output. The effects of transparency in more effectively anchoring expectations may be the missing link (Chortareas et al, 2002).

The paper will proceed as follows. In the following section I examine lessons from the independence literature. I describe the evolution and operation of the UK inflation targeting framework, both before the Bank of England was given operational independence in section 3, and after in Section 4. Are there lessons to be learned from the UK experience? In section 5, I compare features of the UK framework with the operation of inflation targeting internationally, where there are important differences in important aspects of implementation of the framework. The differences may relate either to the inherited framework influencing the design of the current inflation targeting framework, the current preferences of monetary framework designers, and the circumstances in which inflation targeting is practiced. Section 6 concludes.

2. LESSONS FROM THE LITERATURE ON CENTRAL BANK INDEPENDENCE

Monetary framework designers have learned much from the theoretical literature on central bank independence (see Walsh (2003) for a survey). The contributions of Kydland and Prescott (1977) and Barro and Gordon (1983) demonstrated how, *ex post*, policymakers would be attracted towards higher inflation and that the private sector with rational expectations would therefore expect inflation to be higher than desired, leading to an inflation bias.

The literature has suggested two broad means of solving the time-consistency problem. The first involves delegation. Friedman's broad k% money rule is an early contribution. Walsh, 1995 suggests that inflation

targets can be used to form the basis of a contractual relationship between government and the central bank. Rogoff (1985) suggests the delegation of monetary policy to a conservative central banker. The other approach says that real central bankers "just do it", (McCallum, 1995). Blinder (1998) argues that during his time on the Fed Board, discussions never suggested that the Fed might be prone to an inflation bias.

Neither set of solutions to the time-consistency problem are fully satisfactory (King, 2004). The solutions from the literature on rules versus discretion only move the time-consistency issue one steps back, since legislation, rules and contracts can be rewritten. And the "just do it" solution fails to explain why so many banks "didn't". The global experience of inflation is highly varied both across countries and time.

In practice, it may be difficult to enforce monetary policy contracts because, according to King *op cit*, they are inevitably incomplete. There is no ultimate enforcer of contracts defining monetary framework arrangements. In principal it might be possible to tackle this issue by introducing into the constitution a state-contingent optimal monetary reaction function that could be overturned only by a substantial majority. But in practice it is impossible to define an optimal policy rule over all possible future outcomes of the economy to which we would like to commit. Independence has been insufficient to guarantee lasting stability in policy and institutions in a number of countries. In contrast to the Barro-Gordon world where an ongoing central bank or government has an interest in building reputation, Governments' preferences towards low inflation and stability in its delegated monetary authority may ebb and flow in reflection of society's views. And society's preferences towards inflation may themselves be hard to predict. The success of the Bundesbank may in part be attributable to the German population's aversion to inflation following the experience with hyper-inflation in the 1920s that led society to accept a highly independent central bank. But US and Japanese institutions have delivered consistently low inflation without experiencing any high-inflation episodes, while some economies have not been so shy of inflationary policies even once bitten by the effects of high inflation; some Latin American economies, for example, have endured numerous episodes of very high inflation.

Given the inevitable incompleteness of contracts defining monetary arrangements, what is it about inflation targeting that has made it widely used in so many countries? First, it may be because inflation targeting has both introduced a framework that involves certain rules that clarify the difference between the responsibilities delegated to the central bank and government. Second, the central bank operates with some degree of discretion, albeit constrained to some extent by a commitment to the target. Discretion is inevitable given that we are uncertain about the future and are constantly learning about the economy. Third, most inflation targeting countries have consistently made efforts to build a constituency for low inflation, thereby reinforcing society's confidence in its monetary framework.

Inflation targeting is frequently summarised as operating under constrained discretion. The practical arrangements in many inflation economies are such that by delegating operational independence to the central bank the government also delegates the task of learning about the economy (King, *op cit*). And although it is appropriate to delegate learning to an organisation with the greatest technical expertise, the act of delegating learning must inevitably mean from time-to-time government also delegates the opportunity to make mistakes. The likelihood of making policy mistakes is correlated with economic volatility and uncertainty, so the institutional arrangements of independence and inflation targeting are likely to have been most tested in disinflating economies, where targets have sometimes been missed by quite wide margins. So far, however, inflation targeting has been a robust framework. There are to date, hundreds of "country-years" of experience with inflation targeting in sometimes turbulent economic circumstances, yet across a very broad range of economies. Many of these countries have made significant procedural changes to the monetary framework during their use of inflation targets, but I remain unaware of any country to have dropped inflation targets, other than those countries in Europe who have gone on to join the Euro Area.

3. THE UK FRAMEWORK 1992-1997: INFLATION TARGETING WITHOUT FULL OPERATIONAL INDEPENDENCE

In the wake of the UK's exit from Exchange Rate Mechanism (ERM), then Chancellor Norman Lamont announced the introduction of inflation targeting in his Mansion House speech on October 29th 1992. He commissioned the Bank of England to 'provide a regular report on the progress being made towards the Government's inflation objective.' In a lecture at the London School of Economics on November 11, Lord Kingsdown, then Governor of the Bank of England, hailed "an opportunity to demolish the image of the United Kingdom as a second-rate inflation-prone economy."

The changes were seen as a landmark by many at the time and were greeted with excitement inside the Bank of England, even though the Bank of England had not been afforded any increase in its statutory powers, and much of the conjunctural analysis in the *Inflation Report* had previously been published in its *Quarterly Bulletin*. One important innovation was the introduction of inflation forecasts in the newly introduced *Inflation Report*, which offered the prospect of some increase in *de facto* independence by raising the possibility that the Bank of England might have a different view about the prospects for inflation from those published by the Government in its budget forecasts contained in the *Red Book*[1]. In the same LSE lecture, the Governor said that "our aim will be to produce a wholly objective and comprehensive analysis of inflationary trends and pressures."

Neither markets nor price and wage setters were immediately convinced that the UK's switch to inflation targeting implied a higher degree of credibility for UK monetary policy. The first *Inflation Report*, published in February 1993 described how implied 10-year nominal forward rates increased by nearly 3 percentage points between 14 September 1992 and 19 January 1993 (Chart 1), consistent with an increase in expected inflation. Much of the increase occurred before the adoption of inflation targeting was announced, when monetary policy was conducted on a discretionary basis, but forward rates continued to increase after the announcement.
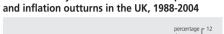
The absence of any immediate positive shift in sentiment following the introduction of inflation targeting was, perhaps, understandable. The credibility of the UK policy framework had been severely undermined in the wake of the ERM exit and several previous regime switches. UK governments had in the past adopted numerous short-lived monetary frameworks, including those based upon various types of money targets, discretionary policies, soft exchange rate pegs and hard exchange rate pegs. It was not clear to markets that the decision to adopt inflation targeting would in itself require government to become more active in its efforts to control of inflation. For the introduction of Bank of England forecasts to make a difference to policy decisions it would require that the Bank of England's forecasts were objective, and that Government actions be sensitive to the increase in transparency. The channel is broadly similar that contained in a number of models (e.g. Geraats 2001, Faust and Svensson, 2001): under transparency, credibility becomes more sensitive to a policymaker's actions thereby increasing the incentive to avoid inflationary policies. But, following years of high and variable inflation, it is unsurprising that the private sector were not immediately convinced to reduce their inflation expectations.
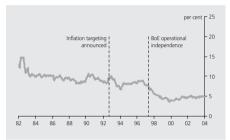
A further important institutional step was the decision by the next Chancellor, Kenneth Clarke, to publish minutes of policymaking meetings between himself and Governor Eddie George six weeks after the event. Governor George later reflected that the process "not only allowed the Bank to express its own analysis and judgements about monetary policy publicly, it actually required us to do so." This was a marked departure from the past, when, although the Bank of England had opportunities to disagree with Government, for example in appearances before the Treasury and Civil Service Select Committee, "such opportunities needed to be used with discretion or they could have caused a breakdown in the continuous and constructive cooperation between the central bank and the Government" (George, 2000 op cit).

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1   The forecast contained a point forecast and error bands. The fan chart was introduced in February 1996.

Monetary policy scored important successes during the period. King (1997) pointed to sustained growth, low inflation, and a variance of inflation that declined to 0.09 per cent, from 2.21 per cent in the preceding decade. He acknowledged that the global disinflationary trend in the late 1990s may have provided a favourable backdrop for the implementation of inflation targeting, but nevertheless argued that "the birth of the inflation target coincided with one of the most successful episodes of the UK's post-war economic performance." There were some qualifications to the success, however. Inflation expectations proved stubborn, whether measured by forward rates (chart 1) or consumer expectations (chart 2). In the first quarter of 1997, 10-year forward rates averaged 7.9%, only 0.5 percentage points lower than in the second quarter of 1992, before market concerns over the sustainability of ERM membership came to the fore. Over the same period RPIX inflation fell by 2.4 percentage points.

Chart 1: Ten-year forward rates in the UK 1982-2004

Chart 2: One-year ahead inflation expectations and inflation outturns in the UK, 1988-2004

These developments are consistent with the view that the framework was achieving increased credibility through delivering lower inflation, but that such gains were the hard-earned results of a framework that resulted in policy actions that delivered lower inflation, which in turn increased credibility. The credibility of the framework increased when the reforms were seen to be delivering results. Consumers' expectations of inflation declined steadily although no more quickly than the fall in actual inflation (Chart 2). Though the announcement of the framework did not appear to move markets by much, experience of the framework in operation did convince markets of the Bank of England's objectivity. Forecasts contained within the Bank of England's *Inflation Report* did not always coincide with budget forecasts, and the minutes of the so-called "Ken and Eddie show" did reveal differences of opinion, particularly in the run up to the 1997 general election. The Bank of England demonstrated the intellectual autonomy that was envisaged by the authors of the arrangements, and to some extent this may have affected the incentives for Government to expand the economy with surprise inflation. Yet as the independence was not guaranteed by legal statute, it is plausible that the markets needed to witness the independence of the actions before their expectations were affected. The framework was not, however, fully credible. Current Chief Economist Charles Bean argued that:

> *"Although the post-1992 institutional changes placed some constraints on the ability of the Chancellor to base interest rate decisions on political rather than economic considerations, that discipline was inevitably only partial given the scope for differences in view about the prospects for inflation. Thus a Chancellor could judge that interest rates should be lower than the Governor either because of genuine differences in view about economic prospects or because of political considerations. As an outside observer could never be sure that it was the former rather than the latter, the new arrangements lacked full credibility."(Bean, 2004)*

And Governor George (*op cit*) acknowledged that without independence "the markets believed that the politicians would not let go of the decisions on implementation of monetary policy. And this was damaging. It meant that inflation expectations did not adjust to the extent they might have done to the decline in actual inflation."

In summary, the UK experience of inflation targeting pre-independence is consistent with the view that the framework helped to build a constituency for low inflation partly by increasing the incentives for the Bank of England to act independently and transparently, which in turn increased the costs to government of ignoring the Bank's advice. The framework did not guarantee operational independence, but in practice provided the Bank of England the more opportunity to voice independent opinions, an effective increase in *de facto* independence. And the successful operation of the framework may have helped to convince the incoming Labour government of the merits of providing the Bank of England with operational independence. As Bean (op cit) notes, "this was widely seen a revolutionary step and did not immediately gain the wholehearted support of all sections of the parliamentary Labour party." Furthermore, the move was initially opposed by the Conservative party in opposition.

4. THE UK FRAMEWORK FROM 1997: INFLATION TARGETING AND FULL OPERATIONAL INDEPENDENCE

The Bank of England had been targeting inflation for 4 $\frac{1}{2}$ years before the (new) Chancellor of the Exchequer, Gordon Brown, awarded operational independence to the Bank of England and legislated for the formation of a 9-member monetary policy committee (MPC). In contrast to the experience of when inflation targeting was introduced in 1992, market expectations immediately responded - the inflation premium fell significantly (Chart 3)). King (2002) argued the development was "highly suggestive of a fall not just in expected inflation but also in the inflation risk premium [and] the level of real interest rates." In this section I examine some important aspects of the UK framework.
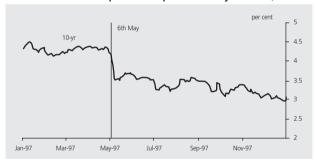
Chart 3: Total inflation premium expected in ten years time, UK 1997

4.i Goal dependence

In the UK framework, the Government maintains control over the inflation target. This has worked well. The arrangements offer a greater role for government in target-setting than in most economies, which is broadly in keeping with relative historical precedents. The UK's democratic institutions have historically been revered by society. In 1929, for example, Montagu Norman, Governor of the Bank of England wrote that:

> *I look upon the Bank as having the unique right to offer advice and to press such advice even to the point of nagging; but always of course subject to the supreme authority of the government.*[2]

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2   Royal Commission on Indian Currency and Finance. Mins. of Ev. vol. v (1926) Non-Parliamentary. Question. 14597

With such traditions, it may have been relatively important that the UK framework be designed in such a way that could alleviate any perception of a 'democratic deficit' that might arise if an unelected body such as the MPC were to set the objectives of monetary policy. There are, however, other potential advantages to maintaining goal dependence. The effective co-ordination between the monetary authority and the government may be improved when government is involved in setting the objective. And removing the necessity for monetary policymakers to discuss objectives can make monetary policy decisions much less complicated. In discussing the operation of the UK MPC, King (2000) argued '[t]he process works because [the MPC] do not question each other about the objective… And when there is a discussion about what that target should be, it takes place outside the Committee.' Furthermore, the clear designation of responsibilities for setting and implementing monetary policy have, in the United Kingdom, helped in terms of transparency and accountability of the framework.

In the UK case, the arguments for target independence in the inflation targeting framework have not been compelling. One such argument is that any government involvement is undesirable since it is inevitably inclined to have weaker anti-inflationary resolve than a central bank. It might therefore undermine the framework by seeking to exploit political advantage by forcing the central bank to expand the economy by raising the inflation target. Such an action has never been undertaken by a UK government, and even if one was so inclined, it is plausible that government might be deterred by the knowledge that an increase in inflation that followed a public announcement of a higher inflation target would not surprise anybody, and would therefore have only limited effects on short-run real activity.

4.ii Consistency in the target

The government retained control over the setting of the inflation target. In 1997, the Chancellor specified that the objective for the MPC was to achieve, at all times, a 2 $\frac{1}{2}$% rate of inflation in the RPIX, a consumer price index that excluded the direct effect of mortgage interest payments. The government has retained the right to change the nature of the target altogether, for example, to an exchange-rate target. In practice the Chancellor has generally chosen to re-iterate the unchanged nature and level of the inflation target in his annual budget statement. The focus on a single, unchanging nominal point target has been strength of the UK inflation targeting framework. The only time he has exercised that right to vary the target was announced in 2003 when, partly in order to make the target consistent with those countries in the Euro Area, he switched to a target of 2.0% for the CPI, the UK analogue of HICP. And although the Governor of the Bank of England recognised merits in the motivation for the switch, he also acknowledged some disadvantages. Speaking at the *Inflation Report* Press conference in August 2003, prior to the change in the target, Governor King said that "when you defend a free kick from David Beckham you don't expect having covered the right post suddenly to turn round having left the ball to go past the outside of the post to find someone behind you has moved the goal post and it's gone inside". The point is consistent with that of Goodhart (2000), who argued that "Having a single quantified objective greatly facilitates delegation to agents who can then be held accountable, because it is relatively easy to see whether or not the MPC has succeeded in achieving the objective."

4.iii Parliamentary scrutiny in the United Kingdom

Within a framework of central bank independence there are a variety of ways in which such scrutiny can be exercised (for example through the press or by the legislature). Parliaments may call central bank officials to account for their monetary policy actions at regular intervals. In some countries, predetermined appearances may be supplemented by additional appearances should these be warranted by economic conditions. And in several inflation-targeting frameworks, there exist predefined conditions under which central banks account for their actions.

The UK [House of Commons] Treasury Committee, in its 1997 Report on the 'Accountability of the Bank of England', examined how it might best hold the MPC to account and concluded that: '… by bringing information

into the public domain we can help clarify the thinking and actions of those responsible for the formulation and delivery of monetary policy and the rigorous scrutiny of the basis for policy decisions will enhance the credibility and effectiveness of the monetary framework as a whole.'

In the United Kingdom there is no statutory number of appearances and the decision on the number rests with Parliament. The Governor and members of the MPC are regularly invited to appear in front of Select Committees of both the lower and upper Houses of Parliament to discuss monetary policy issues. Appearances in front of the House of Commons Treasury Committee usually follow publication of the February, May and November *Inflation Report*, although the Treasury Committee reserves the right to call MPC members more often should economic conditions warrant it. These committees, which have the benefit of professional advisors, can cross-examine members of the MPC for periods of several hours at a time, at least once a quarter. Furthermore, most members of the MPC are appointed by the Chancellor following an Act of Parliament, and the MPC is ultimately responsible to the government for carrying out the mandate it is given. Around half of the appearances are by the Governor, though the system of individual accountability ensures that other MPC members appear before the Committee.

A final important aspect of parliamentary scrutiny in the UK framework is that there are pre-ordained circumstances in which scrutiny can be triggered. The initial remit set for the MPC required the Governor to send an open letter to the Chancellor of the Exchequer whenever inflation is more than one percentage point above or below the target. The letter should be written following an MPC meeting, referring as necessary to the *Inflation Report*.

The UK's letter-writing procedure has assuaged potential criticisms of inflation targeting. A criticism of inflation targeting has been that the framework may deter the central bank from responding to supply shocks. But the letter may be used to explain the necessity to react to supply shocks even when such actions imply missing the inflation target. The letter need not be apologetic. As Goodhart (2000) pointed out if the deviation was the result of indirect tax increases the letter might say 'Chancellor, you did it yourself.'

4.iv Committees or individuals

The MPC has five executive members of the Bank and four external non-executive members, all of whom are chosen for their experience or expertise on monetary policy and not as representatives of different interest groups. The members of the MPC are appointed by the Government. The Governor and his two deputies are appointed for five-year terms. The external members' three-year contracts may be renewed; so far two have been. The interest-rate decision is made by vote, and the voting patterns are reported in minutes published two weeks after each meeting.

External members have dissented from the majority more often than internal members, though there are many examples in which the votes of internals have been split, including numerous occasions in which the votes of the Governor have differed from one or other of his deputies. Goodhart (*op cit*) argues there is no pressure placed on internal members to form any block of votes.

Split votes have not undermined the credibility of the MPC. Markets may have interpreted split votes as a guide toward future decisions, but observers have generally accepted the arguments of King (1997) that split votes should be expected when a group of experts make technical decisions about the economy. As Goodhart (2000) argues "A pretence of unanimity, when in fact the arguments for and against one course or another are surely finely balanced, does not lead to greater public understanding of the issues, or to real transparency of outcomes."

The MPC was formed when the Bank of England was made independent in 1997, so it is not possible to make a direct comparison of the performance of an independent MPC against an independent Bank of England in

which the Governor alone has sole responsibility for setting monetary policy. Nevertheless, the MPC is widely regarded as being a successful component of the UK framework.

There are several aspects of the MPC's structure that are conducive to good decision-making. First, there is evidence that committees are more likely to make better decisions than individuals because members learn from each other (Lombardelli *et al*, 2002). King (2002) reaffirms this to have been his practical experience on the MPC, arguing that "it is the exploration of alternative views about what is happening in the British economy, and the discussion of these views by the Committee in a spirit of investigation not advocacy, that is central to the pooling of knowledge through which committees reach decisions that are superior to those taken by individuals."

Second, the structure of the MPC provides some strong incentives for each individual to maximise effort, since the vote of each individual member is published and each member may be called to appear before a parliamentary committee to account for his or her vote. Lomax (2004) suggests there is "a powerful set of incentives for members of the MPC to focus on maintaining price stability; to pay attention to all relevant information; to weigh up the risks; to take timely decisions; and to explain them clearly." Similarly, Goodhart argues that "There are very clear incentives to do one's best" although he is one of the few past or present members of the MPC to support Walsh's (1995) proposal that there be a pecuniary reward for maintaining inflation close to target. Third, the committee structure may provide protection to a Governor who might otherwise be exposed to personal and political pressures, since policy decisions can be assumed to represent a balanced result of various different arguments.

4.v Relationships with the fiscal authority

Since 1997 there have been relatively few tensions in the conduct of fiscal and monetary policy. There are several ways in which the framework allows for coherence between fiscal and monetary decisions. First, a representative of the Treasury observes MPC meetings. Second, there exist forecasting conventions that ensure similar fiscal assumptions are used by both the Treasury and the Bank of England. Announced nominal government spending plans provide the basis for forecasting nominal government consumption (Bank of England, 2000)[3]

5. THE UK EXPERIENCE IN AN INTERNATIONAL CONTEXT

How transferable have been the lessons from the United Kingdom and other industrialised economy inflation targets? And what have been the lessons from the practice of inflation targeting in emerging economies? The inflation targeting experience of industrialised countries suggested that central banks without an established track record for providing durable monetary stability could gain credibility fairly quickly by designing frameworks that provide appropriate incentives for government and the central bank to deliver low inflation. These in turn can help to build a constituency for low inflation that involved a virtuous circle of reducing inflation expectations and strengthening society's confidence in its monetary institutions. The operation of inflation targeting will be affected in numerous ways by the more testing circumstances that can exist in emerging and disinflating economies. Here, I focus on several aspects that have been seen to be important ingredients of the success of the UK framework, but which may be harder to implement in a 'nosier' environment.

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3 In other inflation targeting countries fiscal policy decisions had much stronger implications than in the United Kingdom, but I do not discuss these in this paper.

5.i Operational independence

The evidence presented above is that inflation targeting is a marked improvement on previous frameworks employed by the UK monetary authorities, even though the Bank of England was not provided with operational independence until nearly five years after inflation targeting was introduced. Gains were achieved through transparency and increased awareness of policymakers of the need to anchor expectations. The main lesson I draw here is that the literature that describes independence as a pre-condition[4] for successful inflation targeting misses the point, since it focuses on the average performance of the whole framework when the correct metric should be the marginal contribution of inflation targets to a framework, given the combination of other framework characteristics.

Inflation targets have the potential to make a contribution to improving monetary policy, even in emerging economies without full legal or *de facto* independence. A long-term objective of framework reform is to securely anchor inflation expectations by building support for low inflationary policies amongst the population and government. In that regard the introduction of inflation targets – and the inevitable increase in transparency that accompanies them – could improve matters whatever the current position on central bank independence. Furthermore, the introduction of inflation targets could encourage governments to increase the degree of legal or *de facto* operational independence.

5.ii Targets or forecasts?

I noted in section *4.ii* that the consistent nature of the inflation target has been an important factor in the successful operation of the UK's "target-dependent" framework. amongst its members, a widely perceived strength of the UK's MPC was that the MPC never questioned each other about objectives of monetary policy in MPC meetings. This has meant the MPC has been able to focus more clearly on the technical judgments of hitting the inflation target in a manner that may be more difficult to enforce when targets are shifting.

Inflation targets, have, however, been used more commonly when shocks have taken inflation away from the steady state. Emerging economies have implemented inflation targeting in circumstances when one or more of the following factors can complicate institutional arrangements: First, the current inflation rate and the current inflation target may be markedly different from the long-run target; second, the output costs of moving quickly back to the long-run inflation target may be expected to be large; and third, the short-run behaviour may be driven by many large and uncertain developments.

Targets that may change year by year are often more akin to forecasts than rigid policy rules. Mahadeva and Sterne (2001) develop a simple model in which both the short-run inflation target and the long-run objective of price stability enter the policymaker's objective function. Theoretical and empirical results – based upon data for inflation targets and misses for 60 countries in the 1990s – suggest that inflation target revisions are predictable. They are generally revised up or down in the line with the most recent miss from the short run target, but also revised down according to how strong are preferences to converge quickly on the long-run target of price stability.

Even when these intermediate inflation targets on the road to price stability are viewed more as forecasts rather than rigid policy rules, this does not necessarily imply that the adoption of inflation targets is any less effective in attempts to establish credibility. It does, however, imply a rather different interpretation of the mechanism by which inflation targets affect outcomes. The 'targets as rules' approach would suggest that targets might help to reduce inflation by affecting policymakers' reaction function through a delegatory framework, such as

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4   See, for example, Masson *et al* (1997)

Walsh-type contracts. The 'targets as forecasts' view suggests that the benefits are more related to increased transparency. According to this view, policymakers providing inflation 'forecasts' as milestones on the way to price stability may put their reputation on the line and so have a greater incentive to deliver outcomes consistent with the path towards price stability.

The following section provides arguments as to why I think the 'targets as forecasts' is a more accurate description of how inflation targeting has helped to secure lower inflation outcomes in emerging economies.

5.iii Responsibility for target-setting

The act of setting the inflation target has been effective because it provides the UK government with a stake in the monetary framework. The experience of emerging economies during disinflation suggests that no combination of responsibilities between target- and instrument-setting has won over-riding popularity (Table 1). The central bank of Chile had a high degree of independence during its disinflation, whereas the Israeli framework is the only one in which the government set the inflation target during a disinflation.

Table 1: Responsibilities for setting inflation targets in selected countries in 1999

Target set by government	Israel, UK
Target jointly set	Australia, Canada, Jamaica, Korea, Mauritius, Mexico, New Zealand, Peru
Target set by central bank	Chile, Czech Republic, Finland, India, Poland, Slovakia, Sweden

Note (1) Not all countries referred to their regimes as inflation targeting.
     (2) Some countries have switched responsibility for target-setting since the survey was completed.
Source, Fry *et al* (2000). Details of individual country procedures were not published in the original book.

When an emerging economy is prone to large and persistent shocks, it is much more complicated to design a monetary strategy that attempts to utilise distinctions between setting the instruments and medium-term objectives of monetary policy. In designing roles for the legislature and the central bank in the monetary framework it is necessary to take into account the likelihood that during disinflation, the process of setting or revising the inflation target may at times be inseparable from that of setting policy instruments; for example in the lead up to an annual process of revising the target the government is able to exert some influence on what interest rates should be set in subsequent months. Arguments for and against target independence are therefore more complicated when the target shifts year-by-year, or when the economy is prone to large shocks.

5.iii.a Arguments for central banks setting the target in emerging economies

One argument against government involvement in setting the inflation target is that in an emerging economy prone to shocks, the political pressures for government to try to exploit a perceived trade-off between output and inflation may be high. Since the noise-to-signal ratio is also likely to be high, a policymaker may be more tempted to try to exploit any such trade-off in the hope that inflationary policies could be masked by the noisy environment. Furthermore, in countries on a disinflation path, an annual process in which government revises the target provides a regular temptation for government to attempt to inflate the economy (or to disinflate at a relatively gradual pace). Such a policy dilemma rarely occurs in industrialised countries since the target is very infrequently revised, and even when it is revised the decision is so widely scrutinised that it is difficult to envisage that an increase in the target could "surprise" agents into producing more output.

So in an emerging economy where government sets the inflation target, it may be harder to reduce perceptions of an inflation bias in monetary policy and more difficult to anchor low inflation expectations. As one respondent

to the Fry *et al* survey noted "What use is instrument independence when the government sets politically motivated goals that are binding."[5] The extent to which a government is able to make short-term political gain by setting relatively high inflation targets is highly uncertain and may vary from country to country; ultimately government's incentives to attempt inflationary policies depend upon society's views and its preferences on any output-inflation trade-off.

A second argument for target independence is that it may in some circumstances provide a more practicable approach to the introduction of inflation targeting insofar as legislative changes and other formalities are less likely to be needed. In some cases an inflation targeting framework may evolve from an ever-increasing focus on central bank inflation forecasts. Table 1 lists seven countries whose central banks used inflation targets in 1999. Although some of these were classified as inflation targeting according to narrow definitions such as those used by the IMF, other countries were using inflation targets more tentatively. In countries where the momentum towards inflation targeting came from central banks rather than governments, there may have been benefits in adopting inflation targets in order to increase the transparency of monetary policy, even when governments had not legislated or otherwise signed up to the framework.

5.iii.b Arguments for government setting the target in emerging economies

Providing a role for government through target-setting may be advantageous to the extent that it eases concerns that the central bank is driving decisions about the medium-term objectives of monetary policy. This is similar to the argument of Debelle and Fisher (1996), who argue that government should have some role in target setting because there exists a trade-off between output and inflation variability. A government that has no responsibility for setting a short-run inflation target even when shocks are large and have a sustained impact, may become acutely aware of any "democratic deficit." Similarly, in providing a central bank with full operational and target independence, government effectively delegates not just the process of learning about the economy but also the process of learning from policy mistakes. In a noisier environment, mistakes are likely to be more frequent.

5.iii.c Shared responsibility for setting the target

In a number of countries the inflation target has been jointly set, consistent with the view that inflation targets can be used as a basis for communication between government and the central bank. For example, Gordon Theissen, Governor of the Bank of Canada[6] reported that 'Having an agreed target just changes the whole nature of discussions [with Government] and I think makes monetary policy more credible, more understandable and less of an issue of controversy than it was before."

Inflation targets provide a sounder basis for governments and central banks to communicate over policy objectives than other potential domestic policy anchors. It is much harder to use money targets for this purpose, for example, since a pre-requisite to using money targets is the necessity of forming a view on likely velocity shocks; typically an area in which successfully central banks have a comparative advantage. To my knowledge, the last government ever to have sole-responsibility for setting money targets was the UK government in the 1980s.

A clear strength of inflation targets is that they provide a communication vehicle between central banks, government and the private sector. An inflation targeting framework in which government and central bank each have a stake is in my opinion likely to be more effective and sustainable in the long run. Nevertheless, the arguments presented in this section suggest that other arrangements may at times be more practicable to

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5   Fry et al (2000)
6   In Mahadeva and Sterne (2000), p194

evolve, and may allow policy to become more transparent and credible, and help to develop a constituency for low inflation, such that further framework reform is possible.

5.iv Accountability and scrutiny

There are (at least) two reasons why only guarded conclusions can be drawn from an assessment of country practices in the procedural details of monetary policy formulation. First, theories of central bank accountability and scrutiny have not provided clear guidance as regards the detailed distinctions that exist around the world. Second, between practices, very few studies exist that examine the consequences of differences in the detail of procedural approaches.[7]

The broad conceptual framework I shall use to draw tentative conclusions is that the likelihood of policy errors is minimised when a framework provides all individuals involved in setting policy with clear and transparent incentives to maximise effort and make decisions consistent with the policy remit. I will however, also discuss the numerous practical constraints that have meant that practices in most economies are not fully consistent with this "optimal" framework.

In the absence of a precise theoretical framework, the area is fertile ground for learning from cross-country experiences. In this section I provide previously unpublished data that describes aspects of the remit, make up, and decision process of monetary policy committees in 49 economies with floating exchange rates (Table 2). I also examine differences in the nature of parliamentary scrutiny of monetary policy decision processes in 12 economies.

5.iv.a Committees and individuals

Committees or individuals: Monetary policy decisions are generally made by committee. Of the 47 in Table 2 for whom data are available, 21 operate frameworks in which decisions are made by vote, 20 by consensus and only 6 are based on the decisions of individuals. As discussed in section 4.iv, committees have the advantage over individuals that committee members are able to learn from each other, and experimental evidence therefore suggests that committees produce better results than individual judgments. The survey evidence in Table 2, however, suggests that even when individuals have sole responsibility for monetary policy judgments, as is the case in six of the 49 countries, in each case the individual is supported by a committee offering monetary policy advice. In the case of New Zealand the Governor was supported by 10 members of the Reserve Bank's staff.

Individual or collective accountability: The UK government has legislated to provide a policy framework that gives strong incentives to those involved. Individuals must vote, have their votes published, and be accountable to Parliament for their votes. To the extent that an individual's effort and skills are correlated with the likelihood that he or she must publicly defend a policy judgment, the system has clear advantages. Yet the system of individual accountability where voting patterns are published is operated in just six of the 47 countries reporting in Table 2. There are several reasons why more countries have not yet adopted the practice of individual accountability. First, the practice remains relatively new and has not had time for the change to be implemented. A further survey in a few years time could reveal many more central banks publishing individual voting records. Second, a system of sole ultimate responsibility (which may also include frameworks in which the Governor defends the consensus position) provides exact clarity of responsibility, leads to greater ease of decision-making, and lessens internal dissent. When economies operate in noisy environments, or when there exist potential disagreements between individuals about what the short-run inflation target and hence the speed of disinflation

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7 Meade and Stasavage (2003) is an exception. Their empirical work supports the view that the FOMC's decision in 1993 to begin releasing full transcripts of its meetings altered the incentives for participants to voice dissenting opinions.

should be, committee discussions may become less highly focused on the technical issues based around the closeness of inflation forecasts to the target and the consequences for monetary policy. Split votes could then become more of a source of excitement than has been the case in the United Kingdom. Third, many frameworks have delivered good results without the need for adopting individual accountability. The counter to the last argument is that reforms that lock in stronger performance incentives may be more likely to lead to continued policy successes after the current incumbents have departed.

Outsiders: It is common to have 'outsiders' on the monetary policy committee (i.e. those with no role in the management structure of the central bank). 19 of the 47 central banks have outsiders on the board. In 9 cases the outsiders include one or more government representatives. In 11 instances the outsiders form a majority on the Committee or Board. In some of these countries the committees are the Board of the Central Bank and the exact nature of their influence on monetary policy decisions is unclear. Nevertheless, the international experience provides a highly mixed experience with regard to the use of individuals without a clear role in the central bank structure.

A potential advantage to having outsiders is that this may increase the public's perception of policymakers' objectivity insofar as it alleviates any impression that career central bankers tend to inevitably act in unison. Having outsiders may, however, pose practical issues in terms of how central bank analytical resources should be distributed. To highlight some issues, here I pose questions for which there are no simple answers. If, for example, the insiders are in a small minority on the committee, how should control of forecasts and research agenda be assigned and to what extend should research be aligned with the 'outsiders' interests? In central banks with target independence, should the outsiders have a say in terms of setting the target? In circumstances where the economy is prone to shocks and inflation is well away from levels consistent with price stability, can inflation targeting eliminate the need to discuss objectives as well as the appropriate level for interest rates (a perceived advantage in the UK framework).

Table 2: The Structure, Processes and Authority of Monetary Policy Committees in 49 economies with floating exchange rates in 1999

	Albania	Armenia	Australia	Bahamas	Barbados	Canada	Chile
Degree of independence to set targets	Full	some	some	none	none	some	full
Decision made by	vote	vote	cons	cons	vote	cons	vote
publication of the voting patterns							
Frequency of the meeting (per year)	12	52	12	12	12	52	12
Number of people in the committee	9	8	9	10	7	6	n/a
Insiders, with role in c.b management structure	3	8	2	10	1	6	
No role in management structure (non-gov)	0	0	6	0	5	0	
Government/political representatives	6	0	1	0	1	0	
Non-voting Government observers on the committee							

	Ghana	Guyana	Hungary	India	Israel	Jamaica	Japan
Degree of independence to set targets	Full	some	Some	Full	none	some	full
Decision made by	n/a	indiv	Vote	Cons	indiv	indiv	vote
publication of the voting patterns							yes
Frequency of the meeting (per year)	52	52	52	varies n/a	12	52	26
Number of people in the committee	9	8	13		8	4	9
Insiders, with role in c.b management structure	7	8	13		5	4	9
no role in management structure (non-gov)	1	0	0		3	0	0
Government/political representatives	1	0	0		0	0	0
Government Observers on the committee							1

	New Zealand	Nigeria	Poland	Romania	Slovenia	South Africa	Sri Lanka
Degree of independence to set targets	some	some	some	some	some	full	full
Decision made by	Indiv	cons	vote	n/a	vote	cons	cons
publication of the voting patterns			Yes				
Frequency of the meeting (per year)	12	12	12	12	26	17	104
Number of people in the committee	10	3	10	9	11	4	3
Insiders, with role in c.b management struct.	10	1	1	9	5	4	2
Non-gov. Outsiders: no role in management	0	0	9	0	6	0	0
Government/political representatives	0	2	0	0	0	0	1
Government Observers on the committee			1		1		

Source: Fry *et al*, (2000) Individual country data not previously published. 49 of the original 94 respondents are included. In some cases the author has deduced numerical values from more qualitative survey responses provided in 1999 so the numbers may occasionally differ slightly from current practices. Fixed exchange rate regimes were omitted.

	Croatia	Cyprus	Czech Republic	Ecuador	Egypt	ECB	Fiji	Georgia	Germany
	some	full	full	full	none	full	some	some	Full
	vote	vote	vote	cons	indiv	vote	cons	cons	Vote
			*						
	12	12	80	52	52	26	12	52	26
	8	5	6	4	9	23	10	8	17
	3	5	6	4	9	6	10	8	17
	5	0	0	0	0	17	0	0	0
	0	0	0	0	0	0	0	0	0
		1	1	1		2			1

	Kazakhstan	Kenya	Korea	Kyrgyz	Malaysia	Mauritius	Mexico	Moldova	Mongolia
	some	full	some	some	some	some	some	full	some
	vote	cons	vote	vote	cons	cons	vote	cons	indiv
			Yes						
	12	52	26	52	52	12	daily	52	52
	11	5	7	6	7	3	5	4	13
	8	4	1	4	7	3	5	4	12
	0	0	6	2	0	0	0	0	1
	3	1	0	0	0	0	0	0	0
							1		

	Sweden	Switzerland	Taiwan	Thailand	Tonga	Turkey	Uganda	UK	USA	Zambia
	full	full	Some	full	full	some	some	None	full	Full
	vote	vote	Cons	cons	cons	cons	cons	Vote	vote	cons
	yes							Yes	Yes	
		4	4	12	12		52	12	8	12
	6	3	14	6	6	7	n/a	9	12	13
	6	3	1	6	1	7		5	12	13
	0	0	13	0	2	0		4	0	0
	0	0	0	0	3	0		0	0	0
								1		

5.iv.b Parliamentary scrutiny

Parliamentary scrutiny is an important aspect of inflation targeting and other monetary frameworks. In a small survey of 14 economies, Lepper and Sterne (2000) find wide variation the nature of parliamentary scrutiny. There is no firm evidence, however, that particular types of framework are associated with different overall levels of parliamentary scrutiny, nor that standard practices emerged within inflation targeting economies. The Bank of Japan, European Central Bank (ECB) and Federal Reserve each make higher-than-average appearances before parliament to account for monetary policy actions, and the technical support provided to the relevant committees is relatively high in the US Congress and in the European Parliament.

The level of scrutiny can be circumstance specific, and some inflation targeting frameworks have defined specific conditions that would trigger scrutiny and the form it would take (Table 3). In no case is this a legal requirement, although Table 3 suggests that Inflation targeting economies are more likely to account for deviations in outcomes from expected outcomes, and are able to do so with reference to a clearer benchmarks than central banks not employing inflation targets.

Table 3: Are there procedures when a target (or numerical objective) is missed?[1]

	Established	Details
Australia	No	
Canada	Yes	The Renewal of the Inflation-Control Target, May 2001, available at http://www.bankofcanada.ca/en/press/pr01-9.htm states that 'If CPI inflation persistently deviates from the 2 per cent target midpoint, the Bank will give special attention in its *Monetary Policy Reports* or Updates to explaining why inflation has deviated to such an extent from the target midpoint, what steps (if any) are being taken to ensure that inflation moves back to this midpoint, and when inflation is expected to return to the midpoint.'
Czech R	Yes	Explanations as to why the target is missed are presented in the *Inflation Report.* The Board's discussion of explanations is presented in the minutes which are included in the *Inflation Report.*
Euro area	Yes	The ECB has provided a numerical quantification of its primary objective of price stability. In its Monthly Bulletins and at appearances before the European Parliament, the ECB reports about its monetary policy and whether it has achieved its objective, and if not, why this has been the case.
Germany	No	
Israel	No	
Japan	No	There is no published numerical policy target or objective.
Korea	No	
New Zealand	Yes	When in 1995 and 1996 the inflation target was missed, the Minister of Finance wrote to the non-executive Directors of the Bank asking for their opinion on the Governor's performance.
Norway	Yes	When the inflation target was adopted in March 2001 the Norges Bank undertook to provide an assessment in its annual report to the government if there are significant deviations between the actual price inflation and the target. Particular emphasis would be placed on deviations outside the plus or minus one percentage point range. The Ministry of Finance stated in a White Paper in March 2001 that other circumstances might necessitate such an assessment to the government on occasions other than the annual report.
United Kingdom	Yes	The initial remit requires that whenever the inflation target is missed by more

		than one percentage point, the Governor should send an open letter to the Chancellor of the Exchequer following a Monetary Policy Committee meeting and referring as necessary to the *Inflation Report.*
United States of America	No	The semi-annual reports to Congress were initiated in 1978 by the Humphrey-Hawkins Act but the Federal Reserve is no longer required to explain any deviations from the intermediate monetary targets in its semi-annual report to Congress. The Act now requires that "the Chairman of the Board shall appear before the Congress at semi-annual hearings, as specified in paragraph (2), regarding (A) the efforts, activities, objectives and plans of the Board and the Federal Open Market Committee with respect to the conduct of monetary policy; and (B) economic developments and prospects for the future described in the report required in subsection (b) of this section."

[1] In no cases are the procedures a legal requirement. Most central banks in the sample may, to some extent, explain misses to any target or numerical objective in standard bulletins and parliamentary appearances. The extent to which such procedures may be characterised as 'established' was assessed by each central bank. The author recognises the possibility of subjectivity in responses.

Source: Lepper and Sterne (2002)

6. INTERPRETATION AND CONCLUSIONS

Central bank independence is an important aspect of numerous inflation targeting frameworks, but the literature that describes central bank independence as a pre-condition for inflation targeting misses the point, since both inflation targets and independence are themselves part of a broader process of strengthening society's resolve to develop institutions that deliver low inflation. The precise sequencing of monetary reforms is circumstance-specific, and will depend upon the likelihood of maximising the prospect of society developing a more lasting preference for institutions that carefully guard monetary stability, given the constraints of a society's preferences, institutions and the nature of the shocks and rigidities in the economy.

The UK experience from 1992 to 1997 demonstrated that inflation targeting could deliver a marked improvement on previous policy regimes, even when implemented without independence. And the successes of the framework may have encouraged politicians to make the Bank of England independent, insofar as they demonstrated that offering the Bank of England and incentive to objectively agree or disagree with government policy decisions may have led to a more credible policy regime.

In this paper I have compared the UK experience with other inflation targeting economies in order to demonstrate how, under the broad inflation targeting umbrella, a fairly wide range of institutional arrangements have been implemented, many of which have had to be adapted to reflect the differing economic and political circumstances of emerging economies. Delegating operational independence to an independent central bank is unlikely on its own to be an eternal solution to the inflation bias in monetary policy, since laws that decree independence are reversible. Other aspects of the regime such as transparency and accountability have reinforced the political legitimacy of central banks insofar as successful inflation targeting frameworks have tended to offer some stake for government in the framework, and also make voters aware of the framework to which they have agreed.

Appendix 2: Country-specific details on the monetary policy decision process in 1999

Source: Fry *et al* (2000). Details of individual country procedures were not published in the original book. Some countries have since changed aspects of the process. Fixed exchange rate regimes are omitted.

Albania: 9 members in the supervisory board are all elected by parliament including Governors and two vice-Governors. The other members represent the parliament and council of ministers.

Armenia: Weekly meetings last 1 hour. Documents are distributed that discuss recent developments.

Australia: The meeting is the first Tuesday of the month and lasts around 3 hours, with presentations by the Economic and Financial Markets groups. The Board is preceded a week or so by a meeting of the Policy Discussion Group. The Board consists of the Governor, Deputy Governor, Secretary of the Treasury and up to 6 other appointees.

Bahamas: The meeting lasts between 1-3 hours, and coincides closely with monthly meeting of Governor with the Clearing Banks Association. The decision is a consensus of Central Bank Policymakers, and in some instances, with Finance Minister's input. The committee comprises 10 members of Bank's senior management, including Governor and Deputy Governor.

Barbados: There is a 2-3 hours meeting where the Board of Directors analyse current economic developments, a macroeconomic forecast, and policy recommendations. The Board of directors is chaired by the Governor and includes the Director of Finance and Economic Affairs and government representatives, plus 5 other members from academia.

Canada: The Governing Council (GC) meets daily. The GC and other senior officials meet weekly to discuss monetary policy for the upcoming week. Staff prepares quarterly economic forecasts.

Chile: There is a monthly presentation of a brief *Inflation Report*. A more complete report is presented quarterly.

Croatia: The Council is advised at monthly meetings that last 3-4 hrs. Information on liquidity of the banking system is presented at daily meetings. The CNB Council has 8 members - Governor, Deputy Governor, Vice Governor and 5 independent experts.

Cyprus: There is no Monetary Policy Committee. The Board reviews monetary policy at monthly meetings which last 2-3 hours. The board consists of 5 directors. In addition, a representative of Ministry of Finance (without voting rights) and the Heads of Divisions also participate.

Czech Republic: Operational strategy is discussed weekly at a 1-2 hour meeting. The strategy of CNB on financial markets is discussed daily. The distribution of the votes is published but not the names. The Committee includes the Governor, 6 members of the Board. A representative of the Ministry of Finance attends but has no right to vote.

Ecuador: The past week's intervention on the money and exchange markets is assessed, as are the major economic indicators and the expected liquidity situation for the following week. Sterilisation objectives are suggested.

Egypt: The meeting is 1-2 hours long. The committee is comprised of the Governor and Deputy, senior executives, sub-Governor, and Assistant sub-Governor of Monetary Policy department.

ECB: Meetings of the governing council are normally scheduled for one day (Thursday). The General Council of the ESCB meets four times a year. It has taken over the functions of the former EMI that still need to be performed because some EU Member states do not yet participate in the Euro area. The president of the EU Council and a member of the European Commission may participate in the meetings without voting rights. The Governing council normally acts by simple majority of the votes cast by its members present in person. In the event of a tie The President has the casting vote.

Fiji: The overall framework is set monthly by the Monetary Policy Committee. The Policy Making Committee comprises Governors and Management (10). The Board makes the final decision.

Germany: The Directorate meet once a week for a few hours and Central bank council every two weeks for an entire day. The Directorate included 8 members including the President and Vice-President, and representatives from the different departments of the Bundesbank. The Central Bank Council includes 17 members, 8 from the Directorate and9 Presidents, representing the different Lander according to the Federal system.

Ghana: The Open Market Operations committee meets for about 3 hours. The Committee includes the Governor, Deputy Governor, representative of Minister of Finance and Accountant General. Various Directors and Senior Advisors in the Central Bank.

Guyana: Meetings tend to last for 45 minutes. The committee is provided with a forecast of the central banks balance sheet and the target for the period. The Minister of Finance decides on key monetary policy decisions.

Hungary: The Operational Monetary Committee meets once a week. The Central Bank Council at least quarterly.

India: The Monetary Policy Strategy Committee meets monthly; the Central Board meets weekly, and the Financial Markets Committee meets daily. Senior officials attend from Departments of: Monetary Policy, Economic Analysis and Policy, Internal Debt management, External Investments and Operations, Executive Directors and Deputy Governor.

Israel: Every month each department prepares a recommendation on interest rates. The Governor decides on policy after consulting with the senior directors, advisors to the Governor and Head of Monetary Policy and Banking Departments. He has never taken a decision that was out of the range of all recommendations.

Jamaica: Meetings of monetary policy makers last a minimum time of 30 minutes. The policy-making committee is chaired by the Deputy Governor for Research and Economic Programming. It comprises senior staff engaged in the Economics areas of the bank and from the Banking and Market Operations. The proceedings are reviewed by the Governor.

Japan: The duration of the first meeting of the month is normally 6 to 8 hours, and the second one is normally 3 to 4 hours. At the first monetary policy meeting of the month, the Bank View of the Monthly Report of Recent Economic and Financial Developments is approved. Then, this Monthly Report is published two days after the meeting. The Policy Board consists of nine members. The members consist of six Deliberative members, the Bank of Japan's Governor and two Deputy Governors. The Deliberative members shall be appointed from among those with academic expertise or experience including experts on the economy or finance (see Article 23, Paragraph 2 of the Bank of Japan Law).

Kazakhstan: The Board of Governors of NBK meets once or twice a month. NBK management not less than once a month. The Board of Governors decides on policy and is comprised of the Governor, Deputy Governor, Heads of Divisions. The NBK management decides on change in instrument.

Kenya: The committee is comprised of the Governor, deputy Governor, Chief Banking Manager, Director of Research, Treasury representative.

Korea: The Monetary Policy Committee meeting is held twice a month, on the first and the third Thursdays. However, only the first Thursday's meeting addresses the stance of monetary policy. The MPC is comprised of seven members appointed by the President. The only ex-office member is the Governor of the Bank of Korea who is the Chairman of the Committee. The other members are recommended, respectively, by the Minister of Finance and Economy, the Governor of the Bank of Korea, the Chairman of the Financial Supervisory Commission, the President of the Korea Federation of Banks, and the Chairman of Korea Securities Dealers Association.

Kyrgyz Republic: The weekly meeting assesses the current situation, short-term forecast and decisions for the next week.

Malaysia: The Committee is comprised of Governor, Deputy Governor. Five assistant Governors and senior directors of BNM.

Mauritius: The meeting lasts approximately one hour and discusses a briefing paper on developments in monetary aggregates prepared by the Central Bank. It is attended by the Minister of Finance and his Financial secretary, Governor, Managing Director, Director-Research (Bank of Mauritius).

Mexico: There is no specific duration of the meeting. There is a daily general discussion of interest rates, exchange rates, domestic financial markets. Results are announced through a press bulletin. The Central Bank's board is comprised of five members including the Governor and two Deputy Governors. The Minister of Finance or deputy Minister of Finance may attend Board meetings without voting rights. The Central Bank may summon any staff to provide some information.

Moldova: The highest management is the Council of administration of the NBM, which votes in order to decide on how to establish the main parameters of the monetary policy and instruments for its implementation. Since November 1995 the Monetary Committee meets weekly to discuss monetary developments and decision making and decides by consensus. The Monetary Council includes First vice Governor – Head of the Monetary Committee, Head of Monetary Policy and Research Department, Head of Open Market Operations Department, Director of Foreign Exchange Department.

Mongolia: The policy board directs its activities to formulate monetary, credit and foreign exchange policy and structural reforms of the banking sector.

New Zealand: The meeting lasts between 1 and 2 hours and reviews data on the real economy, inflation, money aggregates and financial markets. Since 1999 the Bank has announced dates on which it may change the official rate. The dates are approximately 6 weeks apart. Decision-making is vested in Governor. Regular attendees on Advisory committee include the Governor, 2 deputy Governors, Head of Financial Markets and Economics Dept. and five other economists.

Nigeria: The monthly meeting appraises developments, and reviews strategies with a view to fine-tuning policy. An annual meeting aims to coordinate policy proposals with government. The Committee on Monetary and Fiscal Policies introduced in 1997 includes the Minister of Finance, Minister of National Planning and Governor of the Central Bank.

Poland: The meeting lasts for one day and discusses developments in the monetary, financial and real sectors.

Romania: NBR Administration Board Meetings last 4-5 hours. It evaluates the application of the monetary policy, the instruments used, and proposals for short-term monetary policy. The NBR's Administration Board takes major monetary policy decisions and has 9 members: the Governor, First Vice-Governor, two Vice-Governors and five other members.

Slovenia: Fortnightly lasts for 1 day. Votes require a two-third majority.

South Africa: There is a meeting from 8.30 to 12.30 every third Monday. Senior officials of Bank are invited to make presentations when necessary. Comprehensive minutes are kept, approved and signed by the Governor (Chairman). The decision is normally by consensus though votes are taken when required. The policy sub-committee of the Board of Directors includes the Governor plus three Deputy Governors. Meetings are attended by the secretary, the economic adviser to the Governors and the management adviser to the Governors.

Sweden: Various preparatory meetings will be held in advance. Formal documentation is always sent out in advance. Various presentations are held during the meeting by staff, head of departments and other officials depending on the subject matter. From 1999, votes will be published in the minutes.

Switzerland: The quarterly discussion on Monetary Policy by the governing board 90 minutes. The Money Market Steering group meets weekly. There are daily meetings covering Monetary Policy issues and portfolio management. For the quarterly discussion, the Governing board includes the President Vice-president, Governor, plus 5 deputies, plus 2-3 senior economists. For the weekly discussion, the MSG includes the Governor plus his deputies, plus head of money market unit, head of portfolio management unit, head of staff. From 1st Department: Chief economist, plus two senior economists.

Taiwan: They meet quarterly. When deemed necessary, the Governor may convene special meetings of directors to discuss operations and to formulate monetary policy. Currently, the Board of Directors consists of fourteen directors, of which six are executive directors, including three ex officio directors, and three directors from the banking community. Of the eight remaining directors, one is from agricultural, two from business, two from the banking community, as well as three from the academic community.

Thailand: A committee comprised of an informally appointed group of Executives met 8-10 times a year. The BOT is currently setting up a new Monetary Policy Committee and the first meeting is expected in 1999.

Tonga: 2-3 hour meeting including various monetary and economic indicators. The Committee includes 6 members:3 from the government, 2 from private sector and the Governor.

Uganda: The $^1/_2$ day meeting discusses current economic, financial and monetary conditions, price developments.

United Kingdom: The meeting lasts for 1 day, preceded by a full day [now a $^1/_2$ day meeting] where staff presents financial, monetary and economic data. The MPC has five executive members of the Bank and four external non-executive members.

USA: The FOMC meets eight times per year, in January/February, March, May, June/July, August, September, November, and December. The Federal Open Market Committee includes the seven members of the Board of Governors, the president of the Federal Reserve Bank of New York, and, on a rotating basis, four of the other eleven Federal Reserve Bank Presidents. All twelve Reserve Bank Presidents participate in FOMC policy discussions. By tradition, the Chairman of the Board of Governors is elected Chairman of the FOMC, and the President of the Federal Reserve Bank of New York is elected Vice Chairman. The Board of Governors has monetary policy responsibilities that are distinct from those of the FOMC. The Board makes decisions about

adjustments to reserve requirements. The discount rate, which is established by the Board of Directors of each Reserve Bank, is subject to review and determination by the Board of Governors.

Zambia: Monthly meetings discuss a report on developments in the real, monetary sector, fiscal sector and external sectors and draw policy recommendations. The committee includes the Governor, 2 Deputy Governors, and 3 Directors: Economics; Financial Markets and Financial System Supervision Departments, Assistant Directors: Economics (3); Financial Markets (2) and Financial System Supervision (2) Departments.

References

Barro, R. J., Gordon, D. B. A positive Theory of Monetary Policy in a Natural Rate Model. *Journal of Political Economy*, August 1983, 91(4), pp.589-610.

Benati, L. (2004) Investigating Inflation Persistence across monetary regimes, Bank of England Working Papers, forthcoming.

Bank of England (1999) *Economic models at the Bank of England*, London: Bank of England.

Bean, C. (2003) Inflation Targeting: The UK Experience' paper presented at annual meeting of the German Economic Association, Zurich, October. www.bankofengland.co.uk/speeches/speech203.pdf

Blinder, A. (1998) Central banking in theory and in practice, *Cambridge, Massachusetts: MIT Press.*

Chortareas, G., Stasavage, D., Sterne, G. (2003) Does monetary policy transparency reduce the costs of disinflation The Manchester School,
http://www.blackwell-synergy.com/links/doi/10.1111/1467-9957.00365/abs/

Debelle, G., Fischer, S. (1994) *How Independent Should a Central Bank Be?* In Fuhrer, J, ed., *Goals, Guidelines, and Constraints Facing Monetary Policymakers*, Federal Reserve Bank of Boston

Faust, J., Svensson, L. (2001) Transparency and credibility: monetary policy with unobservable goals, *International Economic Review*, Vol. 42, No. 2, pages 369-97.

Fry, M., Julius, D., Mahadeva, L., Roger, S., Sterne, G. (2000) Key Issues in the Choice of Monetary Framework in Mahadeva, L. and Sterne, G. (Editors) (2000), *Monetary Frameworks in a Global Context,* Routledge, London www.bankofengland.co.uk/ccbs/publication/pdf/mpfagcabstract.htm

Geraats, P. (2001) Why adopt transparency? The publication of central bank forecasts, *ECB Working Paper No. 41*. http://www.ecb.int/pub/wp/ecbwp041.pdf

George, E. (2000) Central bank independence Speech by to the SEANZA Governors Symposium in Colombo, Sri Lanka, on 26 August 2000. www.bankofengland.co.uk/speeches/speech95.htm

Goodhart, C. A. E. (2000) The role of the Monetary Policy Committee strategic considerations and operational independence in Mahadeva, L. and Sterne, G. (Editors) (2000), *Monetary Frameworks in a Global Context,* Routledge, London www.bankofengland.co.uk/ccbs/publication/pdf/mpfagcabstract.htm

HMT (1998) The new monetary policy framework London www.hm-treasury.gov.uk/mediastore/otherfiles/4.pdf

Kydland, F. E., Prescott, E. C. (1977) Rules Rather than Discretion: the Inconsistency of Optimal Plans. *Journal of Political Economy*, June 1977, 85(3), pp. 473-491.

King, M. A. (2004) The Institutions of Monetary Policy The Ely lecture to the American Economic Association, January www.bankofengland.co.uk/speeches/speech208.pdf

King, M. A. (2002) The Inflation Target Ten Years On. *Bank of England Quarterly Bulletin*, 2002, 42 (4), pp. 459-474. www.bankofengland.co.uk/speeches/speech09.pdf

King, M. A. (1999) Challenges for monetary policy: new and old, Bank of England Quarterly Bulletin, Vol 39, No 4, pages 397–415 www.bankofengland.co.uk/speeches/speech51.pdf

King, M. A. (1998) The UK economy and monetary policy: looking ahead, Bank of England Quarterly Bulletin, November, pages 283–6.

King, M. A. (1997) Changes in UK Monetary Policy: Rules and Discretion in Practice. Journal of Monetary Economics, 1997, (39), pp. 81-87.

King, M. A. (1997) The inflation target five years on, Bank of England Quarterly Bulletin, November. www.bankofengland.co.uk/qb/qb970401.pdf

Lepper, J., Sterne, G. (2002) A small survey of parliamentary scrutiny of central banks Bank of England Quarterly Bulletin, www.bankofengland.co.uk/qb/qb020302.pdf

Lomax, R. (2004) Inflation targeting – Achievement and challenges Speech to the Bristol Society at University of the West of England, Bristol, February 2004 www.bankofengland.co.uk/qb/qb0401.pdf

Lombardelli, C., Proudman, A. J., Talbot, J. I. (2002) Committees vs. individuals: an experimental analysis of monetary policy decision-making, Bank of England Working Paper www.bankofengland.co.uk/workingpapers/wplist02.htm

Mahadeva, L., Sterne, G. (2002) Inflation targets as a stabilization device, The Manchester School, forthcoming and revised as the role of Inflation targets and forecasts in disinflations: Bank of England Working Paper, www.bankofengland.co.uk/workingpapers/wplist02.htm

Mahadeva, L., Sterne, G. (Editors) (2000) Monetary Frameworks in a Global Context, Routledge, London www.bankofengland.co.uk/ccbs/publication/pdf/mpfagcabstract.htm

Meade, H., Stasavage, D. (2003) Publicity of Debate and the Incentive to Dissent: Evidence from the US Federal Reserve Meade, E and Stasavage, mimeo, London School of Economics

Mangano, G. (1998) Measuring central bank independence: a tale of subjectivity and of its consequences, Oxford Economic Papers, Vol 50, page 468-492.

Masson, P, Savastano, M. A., Sharma, S. (1997) The scope for inflation targeting in developing economies', IMF Working Paper No 130.

Rogoff, K. (1985) The optimal degree of commitment to an intermediate monetary target, Quarterly Journal

of Economics, 1 November, pages 169–90.

Walsh, C. (1995) Optimal contracts for central bankers, American Economic Review, Vol 85, pages 150–67.

Walsh, C., Carl, E. (2003) Monetary Theory and Practice, 2nd edition MIT press, Cambridge Massachussets

Comments on Targets and Independence

Guy Debelle – BIS and Reserve Bank of Australia

In discussing Gabriel's interesting paper on the issue of targets and independence, I will draw on the Australian experience and some particular lessons that can be taken from it. The focus of my discussion will be on: practical versus legislative independence; who should specify the target; what should be in the target; and what role does the target play.

1. PRACTICAL VERSUS LEGISLATIVE INDEPENDENCE

By way of background, unlike a number of other inflation-targeting countries, Australia's adoption of an inflation-targeting framework was evolutionary rather than revolutionary. To a large extent, the evolutionary shift reflected the absence of a catalytic crisis such as the radical program of economic reform that occurred in New Zealand following a prolonged period of poor economic outcomes, or in the case of the UK and Sweden, the sudden departure from the ERM.

In part for this reason, at the inception of the inflation target there was no change to the legislated framework in Australia, which has not materially altered since its inception in 1959. Moreover, the existing legislative framework was regarded as satisfactory: the Reserve Bank of Australia (RBA) has always had a high degree of legislated independence (Macfarlane 1996a). However, the operational independence was not always as high. The Australian experience reinforces the notion that legislation does not guarantee independence (although it can certainly hinder it); it is the practice which matters most.

Like other inflation-targeting central banks, the RBA has complete instrument independence in setting monetary policy. This independence has been present at least since the end of the 1980s. Prior to that, it was constrained by a number of factors, including the fixed exchange rate regime which was in place until 1983; although the exchange rate peg was adjusted frequently, the Governor of the RBA was only one of the members of the committee that determined the adjustment. In addition, until the mid 1980s, the RBA was required to be the buyer of last resort of government bonds, which constrained its market operations.

The removal of these features together with the deregulation of the financial system that occurred at the same time, allowed the RBA to use the cash rate (the interest rate on banks' settlement balances with the RBA) as the sole instrument of monetary policy. The shift to one instrument contributed to the RBA's increasingly taking full responsibility for the monetary policy decision over the 1980s. Thus by the end of the 1980s, the RBA's independence had increased greatly both operationally and politically (Macfarlane 1996b). To some extent, this was made concrete in 1990 by the RBA commencing the practice of announcing, by press release, changes in the stance of monetary policy at the time they occurred.

Thus the practical independence was not firmly entrenched until the constraints imposed by the structure of the financial system were removed. This was despite effective legislative independence since the inception of the Act.

2. GOALS AND OPERATIONAL TARGETS

The legislation specifies that the goal of the Reserve Bank is to set monetary policy to best contribute to:

a) the stability of the currency of Australia;
b) the maintenance of full employment in Australia; and
c) the economic prosperity and welfare of the people of Australia.

Note that these goals were determined for a fixed exchange rate regime. With the floating of the currency in 1983, the first of these goals has been interpreted to mean price stability, rather than literally the stability of the exchange rate.

Hence, the RBA does not have goal independence, but has instrument independence. The distinctions between goal and instrument independence that Stan Fischer and I drew a decade ago are still valid (Debelle and Fischer 1994). I continue to think that central banks in a democratic society should not have goal independence but should have instrument independence.

But, as is the case in a number of countries, the goals specified in the central bank act in Australia are not precise enough from a practical sense. Something more is required to translate them into an operational goal for monetary policy. So while the broad goals should be set by the government, who should set the operational goals, namely the inflation target, is not so clear cut.

In Australia, the operationalisation of these broad objectives is contained in the inflation target which is laid out in the *Statement on the Conduct of Monetary Policy.* The *Statement* is an agreement signed jointly between the Governor of the Reserve Bank and the Treasurer (equivalent of the Minister of Finance in other countries) as representative of the government.

The *Statement* clarifies the possible tension between the real and nominal goals specified in the Act. It recognises that price stability is the main contribution that monetary policy can make to sustained growth in output and employment, but also recognises that monetary policymakers need to be cognisant of the short-term effects of monetary policy on the real economy. The current Governor of the RBA has characterised the interaction between the two goals thus: 'monetary policy is set in a way which allows the economy to grow as fast as possible, consistent with the inflation objective, but no faster' (Macfarlane 1996b).

Again the formalisation of the inflation target was an evolutionary process in Australia. Initially it was announced by the then Governor back in 1993 as a useful framework for monetary policy. It was subsequently verbally endorsed by the government, and finally was codified in the *Statement* in 1996. However, the *Statement* has not been institutionalised in any formal sense.

So the inflation target in Australia is now jointly agreed between the government and the central bank.
I think this arrangement works well. It means that the government and the central bank are on the same page in terms of macroeconomic goals. There are benefits from cooperation and communication between the government and the central bank, which should not be seen as impinging on the central bank's independence, and this is one area where such interaction is useful.

What should be in the target?

The target should be precise enough to be operational. In that sense, it should stipulate what measure of inflation is to be targeted (CPI, underlying measures), a numerical value or range, and some sense of time horizon.

How frequently (if at all) should the target be changed? In a transition to low inflation, the question is easier to answer. Some time path should be laid out, and the sensibility of that time path should probably be reviewed on a reasonably frequent basis, say, annually. Once low inflation is established, the need to change the target should be rare, except in circumstances like those that occurred in the UK, when the calculation of the CPI changed. We had a similar situation in Australia a few years ago when the national statistical agency changed its methodology for calculating the CPI and no longer included mortgage interest charges. At that point the government and the RBA agreed that there was no longer a need to target an underlying measure of inflation (which excluded items such as mortgage interest charges) but instead target the CPI itself (which had greater public understanding).

In both cases, the main aim is to get the discussion of the target out in the open so that the justification for it can be publicly debated. If there is a sense that the government is not setting an appropriately ambitious target for monetary policy, then it will pay the cost in terms of higher longer term interest rates (for example). If there is agreement that the target is appropriate for the circumstances, then it is unlikely that any price will be paid. The critical factor is that the goal of policy is clear to everyone rather than being changed behind closed doors.

What role does target play?

The inflation target plays a number of important roles.

It anchors inflation expectations in the general community. A good example of that in Australia occurred in 2000, when the introduction of a goods and services tax boosted the price level overnight by a few percentage points. The CPI inflation rate spiked to around 6 per cent. However, expectations remained anchored on the inflation target, and when the price level spike dropped out of the calculation of the inflation rate, CPI inflation was back at 2.5%, right in the middle of the inflation target range.

As Gabriel talks about in his paper, it serves a very important role in building a constituency for low inflation.

The inflation target is also useful as a communications device. The discussion of policy settings occurs with the inflation targeting framework. Instead of policy debates occurring between people with different macro policy objectives, we have found that with that issue taken off the table, the policy debate is a lot more focussed. Similarly, the target provides a clear focus for the internal policy debate. Debating within a framework is a lot easier and more productive than debating across frameworks.

The target also serves an important role as an accountability benchmark. Although in the end, it is the track record in terms of delivering price stability and a robust economy that matters, one can regard the inflation target as laying out the track on which to establish the record.

Accountability is an appropriate counterpart to independence, and the two shouldn't be seen as substitutes, but rather complements. The central bank is accountable to a number of different groups. First and foremost it is accountable to the general public, and hence needs to explain itself in terms that the general public can understand. The public's acceptance of the central bank's framework and decisions is a vital ingredient in preserving the central bank's independence and in maintaining the constituency for low inflation. Second, it is accountable to the government, and appearances before parliamentary bodies are often a primary vehicle of accountability to the general public. This entails another level of communication. Third, central bank accountability is often enforced by financial markets, which can mean still another level of communication. Accountability and communication therefore doesn't involve one vehicle. Rather the output of the central bank has to be tailored for different levels of economic understanding. It is important to avoid pitching all communication only at too technical a level which may be suitable for the market but not the general public.

In Australia, nearly all of the accountability is in terms of the Governor, not the RBA Board. The Governor and Deputy Governor speak in public on the topic of monetary policy, and it is the Governor that appears before the parliament. This may in part reflect the composition of the Board in Australia, where only two of the nine members are internal to the RBA (the Governor and Deputy), most of the remainder are from the business community; there is also an academic and the Secretary of the Treasury (who is a bureaucrat not a politician). The composition of the Board in Australia also has an influence on the decision to publish votes, in a manner similar to that at the ECB. You want the Board members not to feel constrained to vote to reflect their constituency.

Finally a brief aside on the time consistency framework that Gabriel discusses and its usefulness in considering monetary policy issues. Notwithstanding the use I have made of it in my own research, I think the question needs to be asked as to how applicable is it anymore (or indeed was it ever that applicable?). The key issue of central bank independence and inflation targeting is that political short-terms are taken out of the monetary policy decision. The one-shot game that is the core of the time consistency problem is really not at the heart of the monetary policy decision problem. Generally, central banks have not been in the business of generating temporary bursts in economic activity. Politicians with short horizons, sometimes, but central banks rarely. This it is not an issue of time consistency, but rather one of the political business cycle. Monetary policy mistakes have certainly been made which has given rise to costly and prolonged spells of inflation but not as a result of exploiting slow-moving inflation expectations. Instead I find the explanations that focus on misperceptions of the evolving nature of the economy along those suggested by Athanasios Orphanides (2003) or Tom Sargent (1999) much more compelling.

References

Debelle, G., Fischer, S. (1994) How Independent Should a Central Bank Be?, in J. Fuhrer (ed), *Goals, Guidelines, and Constraints Facing Monetary Policymakers*, Federal Reserve Bank of Boston Conference Series no.38.

Macfarlane, I. (1996a) Making Monetary Policy – Perceptions and Reality, *Reserve Bank of Australia Bulletin,* October, October, pp. 32–37.
http://www.rba.gov.au/PublicationsAndResearch/Bulletin/bu_oct96/bu_1096_3.pdf

Macfarlane, I. (1996b) The Task for Monetary Policy, *Reserve Bank of Australia Bulletin*, December, pp. 17–22.
http://www.rba.gov.au/PublicationsAndResearch/Bulletin/bu_dec96/bu_1296_4.pdf

Orphanides, A. (2003) The Quest for Prosperity without Inflation, *Journal of Monetary Economics*, vol. 50, pp. 633-663.

Sargent, T. (1999) *The Conquest of American Inflation*, Princeton University Press: Princeton, New Jersey.

**Central Bank Independence and Inflation Targets in Practice
Discussion**

Michal Skořepa – Czech National Bank

In his paper, Gabriel raises a number of important issues concerning primarily central bank independence. I would like to add a comment on this topic, drawing on the specific experience of the Czech National Bank. More specifically, I will try to explain why central bank independence may be easier to occur in transition countries than in developed countries.

Economic theory often assumes that the government has – microeconomically speaking – such preferences and perceives to have such an implicit budget constraint (or a possibility frontier) that it seeks to win votes by increasing output (and employment) beyond the trend level. The government is assumed to navigate monetary policy to produce surprise inflation that will devalue contracted nominal wages and lead firms to employ more labour and produce more output. Under rational expectations, however, the public anticipates this strategy embodies it ex ante into its price expectations and the expected result is then disappointing: output at the trend level and inflation biased upwards (rather than vice versa, as the public and the government would hope for).

This paradox is often called "the problem of time-inconsistency". It was first analysed by Barro and Gordon (1983) along general lines sketched by Kydland and Prescott (1977). As a short-hand, let's call the preferences and budget constraints conducive to the above behaviour on the part of governments KP-preferences and KP-budget constraints (after Kydland and Prescott).

Counter to the above-mentioned assumption that governments try to win votes by pushing output above a sustainable level runs the empirically observed increase in the number central banks that have gained more or less independence from the government. The fact that actual governments (have to) give the power over monetary policy away to the central banks can be explained potentially in three ways, of which more than one may apply to any given country:

a) As Gabriel points out in his paper, the lesson from the time-inconsistency literature has been „deeply absorbed by designers of monetary frameworks". Legislators have come to the conclusion that an ability of the governments to influence monetary policy has more costs than benefits. McCallum (1995) makes a similar point.

b) Implicit budget constraints perceived by the governments have changed from the KP-form to a different form. Politicians now see that they can win votes more easily if they concentrate on manipulating other policies. Monetary policy is no longer an attractive tool for winning votes.

c) Preferences of governments have changed from the KP-form to a different form. Politicians no longer want to win votes.

While factor (c) seems to be purely hypothetical, factors (a) and (b) may both be highly relevant. In what follows, I want to show briefly that they have been probably more relevant in the case of the Czech Republic than has been the case in most developed countries and that the outcome was therefore the Czech National Bank having an exceptionally high degree of independence.

The Czech National Bank has been established right after Czechoslovakia had been split into the Czech Republic and Slovakia in January 1993. In all its activities as well as legal position, it followed upon the Czechoslovak State

Bank that ceased to exist at the end of 1992. For the sake of simplicity, we will talk here about the CNB only but it should be kept in mind that the process of building the CNB's independence had started already before the CNB was established.

First, let's look at how independent the CNB has become. It has acquired

- operational independence: when carrying out the tasks and duties conferred upon it by law and when performing its other activities, the CNB Bank Board may not seek or take instructions from the President, Parliament, the Government or any other body; this includes formulation of inflation targets (apart from the CNB's general objective, set in the CNB Act, to maintain "price stability") and the task to set the monetary policy instruments appropriately;

- personal independence: members of the Bank Board are appointed and relieved from office by the President of the Republic without the assistance of the government; the CNB Act rigorously defines the reasons that would justify the dismissal of a Bank Board member (failure to fulfil the conditions required for the performance of his/her duties, failure to perform his/her duties for a period exceeding six months, or being guilty of serious misconduct);

- financial independence: the CNB is prohibited to do any direct financing of the public sector; it operates under a budget approved by the Bank Board; at the end of the financial year, the CNB is required to compile (and pass in the form of a financial report to the Parliament for review) a profit and loss account and to have it verified by an external auditor.

As we can see, the CNB has achieved a relatively high degree of independence. For instance, many of the banks that are considered to be the avant-garde of inflation targeting (such as central banks in the UK, Australia, Canada, New Zealand) have to accept the inflation target as set by the government or at least have to agree on the target with the government (Fry, Julius, Mahadeva, Roger & Sterne, 2000). In fact, we would probably find few central banks around the world, which would be given more independence. This outcome may seem to collide with the picture of a transition economy as an economy characterised by low economic culture, underdeveloped markets, weak institutions, etc.

A closer look, however, will reveal that the Czech form of transition economy was in fact a very pro-central-bank-independence environment. Going back to the factors that may cause occurrence of central bank independence, in the Czech case we will see that factors (a) and (b) were both influential, perhaps more than they are in a standard Western economy.

First, using Gabriel's words, the "designers of the monetary framework" in the Czech Republic have "deeply absorbed" the lesson from the time-inconsistency literature. In the first half of the 1990s, many members of the Czech governments were economists, a statement that has recently been hardly true of most governments in industrial countries. Most of these economists came out to the light after the political changes started to take place. They came mostly from the academia where, connived at by the communist regime, they had been studying "at a distance" the principles of market economy and problems of practical economic policy in the West. Some of them spent some time, mostly in the freer 1960s, studying economics at Western universities. After the communist regime was over-turned, these economists were ready to assume important positions in the government and state administration and to design all the necessary economic reforms and co-ordinate their implementation.

A specific feature of the Czech cultural environment has always been a strong influence of the German culture. Czech economists of the 1990s were no exception: as regards the position and performance of the central bank, most of them viewed the Bundesbank as the idol, as a well-run, successful and highly respected central

bank. Therefore, much effort was exerted to design the Czech monetary policy regime along the lines of the German set-up. Needless to say, the Bundesbank was an extremely independent central bank (though its independence dates back to long before the time-inconsistency literature occurred). It follows that the effort to learn from the German central banking legislation helped establish a high degree of independence of the Czech National Bank.

What made the designers of the Czech monetary framework even more deeply influenced by the time-inconsistency considerations was the inflow of foreign experts from the IMF and other institutions. They gave advice on many different aspects of the transition, including central bank legislation and the design of monetary policy regime. Most of these experts, of course, were well-aware, whether from the literature or from experience accrued in countries around the globe, of the problems that a dependence of the central bank on the government may cause.

The Czech central bank legislation was, in a sense, a white page (because the previous contents was obviously not usable in many important respects), unlike the legislation that has evolved in developed countries. Therefore, the new Czech economic legislation, drawn by economists with the help of foreign experts from a scratch, in a sense, was close to the ideal of the most up-to-date legislation that an economist could imagine – including a very independent central bank. Given that the bank itself had a strong say in the process of shaping the new legislation, it wouldn't be very surprising if some observers would conclude that the resulting degree of independence is perhaps even beyond the optimum. For example, Guy Debelle (see the other comment to Gabriel's paper in this volume) thinks it is preferable if the specific level of inflation target is set jointly by the central bank and the government, rather than by the central bank alone (for a position even more against central bank's goal independence, see Bergström, 2001).

To recap, the transition character of the Czech economy was helpful in giving the central bank a high degree of independence through factor (a) – because specific traits of the Czech economy in transition made it easier to apply the message of the time-inconsistency literature. Transition supported the establishment of a very independent central bank also through factor (b) - the implicit budget constraint of the government was dramatically different from the standard KP-form. As a result, the government may be willing more than is usual in developed countries to let the power over monetary policy pass to the hands of an independent central bank.

That is what probably happened in the Czech Republic – the governments had other and more effective tools with which they might secure votes. The transmission from governmental action to benefits for voters was much shorter and much more predictable with these tools than with monetary policy. One such effective tool was coupon privatisation. The government could determine the rules of a "game" during which the state was going to give out almost for free its property worth billions of Czech crowns (mainly shares in state-owned businesses, etc.) to all interested citizens over age 15.

The government had also enough power to create pressure on commercial banks (all state-owned at that time) to provide large volumes of loans to "grease" the transition economy. The volumes turned out later to be excessive and led to numerous bankruptcies in the banking sector and to a credit crunch. At those pioneering times, however, the government did not preview these consequences. A third tool that was also much more promising and reliable than monetary policy was a quick introduction of at least limited currency convertibility. The public appreciated the new possibility to change at least a small amount of Czech koruna into foreign currencies and travel abroad.

Apart from holding these preferable tools to win votes, the government may also have disregarded to some extent the details of the new central bank legislation. This conjecture stems from the following fact: a specific feature of an economy in the first years of transition – and this was true in the Czech case as well – is that

personal ties tend to overshadow formal institutions. Proponents of the old regime in key positions within the government and state administration are fired, often in one broad sweep. Their places are then taken over by a clique of new people who are often friends or at least former colleagues who know each other well and represent the same group of "revolutionaries" and their followers. The key economic ministers of the first Czech governments seem to have believed that precisely through these personal links, they would be able to create pressure on the new Bank Board. Also, the central bank and the government were co-operating very closely in a number of technical operations during the transition process and so members of the government may have had the feeling that it would be possible to push the central bank, regardless of its formal independence.

All these transition-related factors have helped to establish the Czech National Bank as a very independent central bank, at that time more independent than central banks in many industrial countries. The hypothesis that transition may be a pro-independence environment seems to be supported by a brief twist in the history of the CNB – the vibration over its independence during 2001.

In January 2001, an amendment of the CNB Act came into force. The primary purpose of the amendment was to harmonise the act as much as possible with those parts of the Community acquits that concern the European System of Central Banks which the CNB was to join at the moment of the Czech Republic's accession into the EU. Together with numerous harmonising changes, however, the members of the Parliament approved several changes in the Act that were aimed at weakening the CNB's independence significantly. The new Act required that

• the specific level of inflation target be approved by the government;
• the exchange rate regime be approved by the government;
• the members of the Bank Board be nominated by the government;
• Parliament approves the operational, i.e. monetary policy-unrelated part of the CNB's budget.

This attempt to trim the CNB's independence seems to be consistent with the "transition-helps-independence" hypothesis as follows. At the end of the 1990s, the economy moved quite some way in the direction away from the transition economy of the early 1990s towards a standard market economy of the Western type. Therefore, much fewer economists were among the members of the government. The number of foreign advisors coming to the Czech Republic had fallen down significantly as well. The government (here we do not distinguish between the members of the Parliament and the ministers) found it much harder to get hold of votes-winning tools other than the standard ones, such as monetary policy. Coupon privatisation was long over, the banking sector was in the midst of a credit crunch and, for several years already, the public had been used to full convertibility of the currency. The "revolution-born" personal links had faded out so that the government could no longer push the CNB more than the CNB Act allowed.

In this changed environment, it is no wander that the political representation made an attempt to regain at least some of its power over monetary policy. The response, however, was a strong wave of criticism from local experts as well as from abroad (the IMF, the European Commission, the ECB, etc.). As soon as in August 2001, the Constitutional Court of the Czech Republic nullified the above-listed changes in the CNB Act as unconstitutional. The Court explained that "according to economic theory", central bank independence is crucial for maintaining stability of the currency, the exchange rate and inflation. The CNB thus remained very independent and it still is.

The question is why constitutional courts (or similar independent bodies) in other countries where, for example, the inflation target is set by the government, do not apply economic theory with a similar rigour and why international institutions remain mostly silent, too. There seems to be a certain asymmetry in the

process of building central bank independence. The society as well as foreign observers seem to leave it to a large extent up to the local government (including the Parliament) to increase the independence. Once a certain advanced degree of independence has been reached, however, it becomes the standard in a given country and the society (in the case of the CNB represented by the Constitutional Court) defends it against attempts to reduce it. This asymmetry reminds us of the "status quo bias" known from behavioural finance (e.g., Madrian and Shea, 2000).

References

Barro, R. J., Gordon, D. B. (1983) A positive theory of monetary policy in a natural rate model. *J. of Political Economy*, 91(4), pp. 589-610.

Bergström, V. (2001) Independent central banks in democracies? *Sveriges Riksbank Economic Review*, 1, pp. 5-18.

Fry, M., Julius, D., Mahadeva, L., Roger, S., Sterne, G. (2000) Key issues in the choice of monetary framework. In Mahadeva, L., Sterne, G. (eds.): *Monetary Frameworks in a Global Context*. Routledge, London.

Kydland, F. E., Prescott, E. C. (1977) Rules rather than discretion: the inconsistency of optimal plans. *Journal of Political Economy*, 85(3), pp. 473-491.

Madrian, B., Shea, D. (2000) The power of suggestion: inertia in 401(k) participation and savings behaviour. NBER Working Paper 7682.

McCallum, B. T. (1995) Two fallacies concerning central bank independence. *American Economic Review*, 85(2), 207-211.

PROJECTIONS

Constructing the Staff Economic Projection at the Bank of Canada

Don Coletti – Bank of Canada

1. INTRODUCTION

Since February 1991, the target for monetary policy in Canada has been the 12- month rate of change in the consumer price index (CPI). The current target for the CPI is 2 per cent, with a range of +/- 1 per cent. For operational purposes, the Bank of Canada has focused on a core measure of inflation, defined as the CPI excluding the eight most volatile components and the effect of changes in indirect taxes on the remaining components.

Due to the lags in the effect of monetary policy, the Bank of Canada aims at bringing inflation back gradually in the event of a shock that causes inflation to move away from the target. To implement inflation targeting, the central bank must be able to forecast the factors that will influence the future rate of inflation and to determine the effect of policy actions on the future.

Although information and analysis from various sources and perspectives is brought to bear on monetary policy decisions in Canada, the Staff Economic Projection (SEP) remains the reference point for discussion leading into monetary policy decision-making and the Bank's communications. Senior management at the Bank find the projection an extremely useful way of organizing their thoughts on the outlook for the economy and of analyzing the effect of important shocks on the economy including the path to be followed by monetary policy in order for it to reach the inflation target.

The objective of this paper is to discuss, from a highly practical perspective, the nature of the SEP at the Bank of Canada. More specifically, in section 2, we review the objectives of the SEP. In section 3, the key inputs used to produce the economic projection are reviewed, while in section 4, we focus on the projection process. Section 5 concludes by very briefly discussing some of the other key inputs into the policy-making process. Throughout, the paper pays particular attention to some of the important questions raised by the workshop organizers, such as the role of the ultimate decision-makers in the construction of the projection; whether to employ one core model or a suite of models; how to integrate the results from different models; and the role of the monetary and fiscal authorities in the projection apparatus.

2. OBJECTIVES OF THE STAFF ECONOMIC PROJECTION

The primary objectives of the SEP are (i) to construct a logically consistent forecast of key macro variables that is as accurate as possible; and (ii) to seek a dynamic setting for policy interest rates that will keep inflation as close as possible to the 2 per cent target without inducing excessive cycling in the economy. These objectives are determined simultaneously; that is, the outlook for the economy embodied in the SEP is conditional upon the policy setting and the policy setting is a function of the outlook and the structure of the model. The conditionality of the outlook gives rise to the use of the term projection rather than forecast.[8]

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8 This is different from pure forecasting exercises, which are unconditional statements about future outcomes in which the actions of the policy-makers do not play an important role.

In addition to producing quantitative estimates, a large part of the value added of the SEP comes from getting the economics right. For example, if inflation were to fall, it would be important that the staff be able to distinguish between possible competing explanations, such as a productivity shock, a demand shock, exchange rate pass-through, energy prices, cost shock, or a special factor. Based on the available evidence and a well-articulated view of how the economy functions, the staff interpret the source of the shock, trace the key channels through which the shock is transmitted to the economy, assess the implications for future inflationary pressure, and recommend an interest rate response to ensure that inflation returns to the target.

In practice, the economic projection can be thought of as the cumulative response to a number of shocks, all at play in the economy at the same time. To be able to explain recent developments as well as the economic outlook, the staff need to disentangle these shocks and highlight the most important ones. The resulting economic stories are important not only because they help the staff to organize their views on the economic outlook but also because they form the basis of the staff's communication with the monetary policy decision-makers, the Governing Council of the Bank of Canada, and provide an important starting point in the Bank's communications with external audiences.[9]

3. THE MAIN ELEMENTS OF THE SEP

To achieve these objectives, the staff at the Bank of Canada combine three main elements to produce the SEP: (i) a core model; (ii) tools for short-term forecasting; and (iii) staff judgment. In this section of the paper, we provide a brief overview of each of these elements and the individual roles they play in the SEP.

3.1 The core model

A key element in the SEP is the use of a single core model to ensure overall consistency. The core model gives the staff a lens through which to view economic data, interpret shocks, and form a view of how these shocks work their way through the economy and how monetary policy should respond.

The core model represents a consensus view held by the staff and the Governing Council of the key macroeconomic linkages in the economy. Although ownership of the projection and the associated interest rate recommendation remains with the staff, the establishment of a broad consensus regarding the key linkages in the economy is essential to ensure that the SEP and the "stories" it tells are useful to the decision-makers in helping them to form and communicate their views on the economy. In addition, having a broad consensus on the basic structure of the model also makes it easier to modify the staff's base case to better reflect the views of the Governing Council regarding the most contentious assumptions of the SEP.
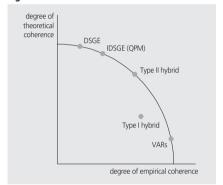
The design of the core model was heavily influenced by the twin goals that it be both theoretically coherent and able to track the data reasonably well. Unfortunately, the history of model development has illuminated the tension that exists between these two objectives. Theoretical rigour necessitates simplification in modelling that can compromise the model's ability to capture the complexity of short-term dynamics. Yet full exploitation of the information in the data requires adding detail to a model that cannot be rationalized

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9 The responsibility for monetary policy decisions at the Bank of Canada belongs to the Governing Council, which consists of the Governor and Senior Deputy Governor and four Deputy Governors. All members of the Governing Council are internal officials. The Council operates on a consensus basis, so that, although different views and interpretations are expressed, the process of debate and discussion moves towards a shared view that all Governing Council members can support (Macklem 2002).

within a tractable analytical framework (Coletti et al. 1994). The nature of this trade-off is discussed in Pagan's well-known *Report on Modelling and Forecasting at the Bank of England* (2003).[10]

Figure 1 shows the trade-off curve as depicted in Pagan (2003). At one end of the curve are the highly theoretical models that have never been brought to the data, while at the other end are the models that fit every peculiarity of the data but whose outcomes do not offer an obvious interpretation. Adopting Pagan's terminology, the Bank of Canada's core model, the Quarterly Projection Model (QPM) (Poloz *et al.* 1994) falls into the broad category of an incomplete dynamic stochastic general-equilibrium (IDSGE) model. In fact, the Bank of Canada was the first central bank to adopt this type of core projection model. IDSGE models can be easily distinguished from the competing approaches shown in Figure 1.

Figure 1

For example, IDSGE models differ from Type II hybrid models in that economic theory plays a larger role in their design. Not only is economic theory used to form the equilibrium paths for the economy as in the Type II hybrid models, but it is also used to describe the adjustment path from initial conditions to the equilibrium. Using this approach, IDSGE models such as the QPM can provide more economically meaningful stories to explain how the economy adjusts from one equilibrium to another. Unfortunately, the benefits tend to come at the cost of a reduction in the models' ability to match the data, particularly over the short term, when compared to Type II hybrid models.

On the other hand, IDSGE models are distinguished from more theoretically coherent dynamic stochastic general-equilibrium (DSGE) models. Unlike DSGE models that attempt to characterize all economic decisions as an optimal response to an uncertain economic environment, IDSGE models like the QPM include some rule-of-thumb and *ad hoc* behaviour to better replicate some of the features of the data. Relative to a DSGE model, this improvement in tracking the data is achieved at the expense of the coherence of the economic stories.

The QPM is a highly stylized model of the economy that emphasises key macroeconomic relationships rather than sectoral detail. At the heart of the QPM is a steady-state model (Black *et al.* 1994). The steady-state model

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10   The nature of this trade-off has changed over time, making it possible to achieve the same degree of empirical coherence with stronger theoretical constructs. Advances in theoretical macro-modelling, estimation, and computing power have been largely behind this development. For example, Smets and Wouters (2003) build a small dynamic stochastic general-equilibrium (DSGE) model that outperforms a simple vector autoregression (VAR) in out-of-sample forecasting. Work currently under way at the Bank of Canada to build a DSGE model to replace the QPM makes use of these new developments (see Murchison et al. 2003).

describes the determinants of the long-run choices made by profit-maximizing firms and successive generations of consumers, given the policy choices of the fiscal authority, all in the context of an open economy with important linkages to the rest of the world. The behaviour of these agents, given their long-run budget constraints and the market-clearing conditions of an open economy, determines the long-run equilibrium or steady state to which the dynamic model converges.

The dynamic version of the QPM (*Coletti et al*. 1994) describes the adjustment path of the economy to the steady state. Establishing a clear representation of the equilibrating forces in the economy was emphasized, in particular, how consumers and producers form their expectations about future economic conditions, including inflation. This type of behaviour stems from the assumption of costly adjustment. Although agents are assumed to have incomplete knowledge of the true structure of the economy when forming expectations, they incorporate the expected behaviour of monetary policy into their expectations.[11]

The role of the monetary authority in the model economy is to establish an anchor for inflation expectations. The instrument of monetary policy is the short-term nominal interest rate (R^S). Monetary actions are transmitted to real activity through the impact of changes in the short rate on the slope of the yield curve.

Policy is conducted using a simple, *ad hoc*, forward-looking policy rule that requires the monetary authority to adjust the short-term interest rate to bring model-consistent inflation expectations (π) k quarters ahead in line with the targeted inflation rate (π^T) and output (y) in line with potential output ($y*$).[12] R^L denotes the long-term nominal rate (10-year Government of Canada bond rate).[13]

$$R_t^S - R_t^L = \alpha_1 (R_{t-1}^S - R_{t-1}^L) + \alpha_2 (\pi_{t+k} - \pi^T) + \alpha_3 (y - y^*)$$

The parameters of the reaction function ($k, \alpha_1, \alpha_2, \alpha_3$) are chosen so as to minimize the expected loss associated with having inflation away from the target and output away from potential output, conditional upon the structure of the model and the magnitude and types of shocks seen over history. The calibration of the parameters in the monetary policy rule used in the SEP has been attenuated relative to those that optimize this particular class of rule, reflecting concerns about parameter and model uncertainty (Longworth and Freedman 2000).

Movements in the short-term interest rate affect aggregate demand through consumption and investment decisions. In addition, interest rates also affect the nominal exchange rate and, hence, import prices and inflation, through an uncovered-interest-parity-condition. In the QPM, inflation is influenced directly by the gap between actual and potential output and by expectations about future inflation.

Fiscal policy in the QPM, like monetary policy, is characterized by a set of objectives that are consistent with achieving a sustainable equilibrium. In particular, the fiscal authority picks a target level of government expenditures on goods and services, as well as a target debt-to-GDP ratio. Taxes (net of transfers to households) and the budget balance adjust to achieve these targets.

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11 Expectations in the QPM are modelled as a mixture of extrapolative and model-consistent expectations. The formation of expectations of this sort can be thought of as reflecting the average behaviour of differently informed agents, some of whom are "rational" and use the model to form expectations and others who use simple rules of thumb based exclusively on lags of the variable of interest.

12 It has been found, in addition, that putting a small weight on the contemporaneous output gap reduces the variability of output without increasing the volatility of inflation or interest rates (Amano et al. 1999). Adding the output gap allows the monetary authority to distinguish between price-level shocks and demand shocks and therefore to appropriately differentiate its response.

13 The monetary reaction function is expressed in terms of the yield spread. The yield spread has the attractive feature that it helps in isolating monetary influences on real interest rates. Movements in both long-and short rates reflect fluctuations in the equilibrium real interest rate as determined by productivity and thrift in the world economy (Coletti *et al*. 1994).

In contrast to most other macroeconomic models used for projections, the QPM is calibrated rather than estimated. In other words, the QPM's unrestricted parameters were not chosen to explicitly minimize a loss function, as in traditional estimation. Rather, they were chosen to replicate the impulse responses of econometrically estimated reduced-form models such as VARs, as well as certain stylized facts, such as temporal correlations between economic variables (i.e., detrended output and inflation).[14] Since the QPM was calibrated to capture the medium-term to longer-run dynamics of the data, the model's residuals tend to exhibit some persistence.

3.2 Tools for short-term forecasting

As discussed above, the QPM was designed with an important emphasis on theoretical coherence. To enhance the staff's ability to forecast short-term economic developments, Bank economists have developed a number of tools. Based on these tools, as well as informed judgment, the staff develop a detailed forecast for the Canadian economy for the first and second quarters of the projection period, known internally as the monitoring quarters. This forecast for the monitoring quarters is used as an input to the core projection model as if it were reporting actual historical outcomes.

To forecast GDP growth over the monitoring quarters, Bank economists analyze a wide variety of incoming monthly data that provide partial information on the state of the Canadian and external economies. This information includes high-frequency indicators such as employment, wages, manufacturers' shipments and inventories, retail sales, car sales and production, exports, imports, and even monthly GDP estimates. While very helpful, high-frequency data must be handled with care. These data are extremely volatile, partly because of sampling errors and, more importantly, because of very temporary special factors such as labour disruptions, unusual weather, and special promotions such as sales or temporary financing incentives. Moreover, some of the series are subject to substantial revisions. Thus, a key challenge is to determine whether the latest movement in the data simply reflects short-term volatility, is susceptible to revisions, or is indicative of the direction in which economic activity is headed (Macklem 2002).

The staff supplements the analyses of the high-frequency data with many other tools. Of particular note are two estimated reduced-form IS curves for forecasting real GDP growth over the monitoring quarters (Duguay 1994 and Murchison 2001). In these two equations, output growth is explained by the distributed lags of changes in real interest rates (lags of the slope of the yield curve in Murchison 2001), the real exchange rate, U.S. output growth, energy and non-energy real commodity prices (non-energy commodity prices only in Murchison 2001), and changes in the stance of fiscal policy.[15]

Simple error-correction models (ECMs) for forecasting some of the components of real GDP have also been used. For example, ECMs have been estimated for Canadian consumption spending (Macklem 1994, Côté and Johnson 1998).

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14 The idea behind calibration was that estimating a model as a complete system using full-information maximum likelihood would be technically infeasible. This belief was due in part to the lack of computing power at the time the model was developed, combined with the large number of parameters that required estimation. The approach used, while quite innovative at the time, lacked rigour for several reasons. First, time constraints meant that the set of parameter combinations considered was not exhaustive. Second, trade-offs in terms of model fit across different parameterizations had to be dealt with on a judgmental basis only. Finally, because no formal estimator was employed, it was impossible to obtain a measure of the uncertainty associated with each parameter value; hence, inference in the form of hypothesis testing was not possible. Recent advances in analytical techniques and computing power mean that a more sophisticated strategy can be employed to bring models to the data. Work currently under way to replace the QPM with a DSGE model of the Canadian economy makes use of full-information maximum likelihood as well as Bayesian techniques for model estimation.

15 The forecasts from these equations are constructed with interest rates and exchange rates held constant at their last known value. The IS-curve models are also simulated out for one year as a check on the outlook for real GDP growth in the SEP.

In addition to the models used to forecast real GDP growth, the staff uses several others. Several single-equation models of inflation have been estimated and are used to help the staff develop their short-term inflation forecast. Historically, much work has been done with expectations-augmented Phillips curves. Typically these equations relate inflation to inflation expectations (usually modelled as lagged inflation with a unit restriction), output gap, lagged changes in the real exchange rate, lagged changes in indirect taxes, food prices, and energy prices (Longworth 2000).

In the past few years, more attention has been paid to the issue of modelling inflation expectations. The main single-equation inflation model currently used is an updated version of a model developed by Fillion and Léonard (1997). In this model, core inflation is a function of expected inflation, the output gap, the output gap when positive (thus yielding a Phillips curve that is non-linear in the output gap), a distributed lag of changes in indirect taxes, oil prices, and the real exchange rate. Expected inflation is constructed to be consistent with the monetary policy regime, as determined in earlier work using Markov-switching models for the inflation process.

Recently, this work was extended to allow for a more flexible estimation methodology that allows researchers to estimate Phillips curves within a Markov-switching framework (Demers 2003). Other work on reduced-form Phillips curves has highlighted the use of survey measures of inflation expectations as well as the use of time-varying coefficient models (Kichian 2001; Khalaf and Kichian 2003; Dupasquier and Rickets 1998).

In addition to the battery of reduced-form Phillips curves, the staff also looks at the forecasts of numerous indicator models of core inflation. Dion (1999) provides a survey. These models use such explanatory variables as average prices for resale housing in four major cities, the ratio of unfilled orders to shipments in manufacturing, the Bank of Canada commodity price index in U.S. dollars, and several components of the CPI.

One of the Bank's most well-known, single-equation models is the one developed by Amano and van Norden (1995), which is used to forecast the Canada/U.S. real exchange rate. This model links the exchange rate to the terms of trade and to interest rate differentials across the two countries. Other equations, based on this work, are used as a check on the exchange rate that comes from the core model especially over the very near term of the projection.[16]

3.3 The role of staff judgment

The SEP is more than just the result of a short-term forecasting exercise and the simulation of the core model. The staff regularly exercises judgment within the projection to reflect: (i) the effect of factors excluded from the core model; (ii) information relevant to, but not explicitly included in, the core model; (iii) past performance problems; and (iv) information from other models.

The staff is very prudent with the use of judgment beyond the two monitoring quarters. The staff is tightly constrained when adding judgment to the projection by the need to be explicit about the economic reasoning used to support their interventions. As a matter of convention, the staff is prevented from using any judgment on the path of the reaction function of monetary policy because the SEP focuses on the economics behind the monetary policy decision rather than on tactical considerations.

Technically, judgment is usually included by adjusting the pattern of the run-off of the residuals of the model's stochastic equations relative to what would have been implied by history. The benefit of including staff

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judgment directly in the model is that the model determines the implications of the added judgment in a consistent manner.

The staff uses judgment when it can identify an important role for factors that have been omitted from the core model, usually because they are rarely important. Consider the case of the outbreak of severe acute respiratory syndrome (SARS) in the summer of 2003. First, based on the analysis of outside experts, the staff considered the expected duration of the outbreak and analyzed the economic consequences at a disaggregated level. The staff then decided how the shock should be interpreted in the context of the core model, treating it as a negative but temporary shock to aggregate demand in Canada. They then estimated the impact this shock would have on aggregate demand, based on the disaggregate analysis, and made adjustments to the model's equations for real consumption spending and real exports.

Another example of using judgment to reflect factors outside of the model can arise from the analyses carried out by sectoral experts. Since the main models used by Bank staff emphasize macro relationships rather than sectoral detail, the staff often imposes judgment on the QPM to reflect specific information coming from sectoral specialists.

In other instances, the staff could include judgment in the projection to reflect information that is not explicitly included in the core model. Inflation expectations are a good example here. Although the QPM has a clear representation for inflation expectations, the staff adds judgment to the core model's equations to reflect the evidence on inflation expectations provided by survey data.[17]

Staff also uses judgment to reflect problems with past performance in some of the model's equations. For example, the QPM has recently had difficulty predicting nominal wage growth over the past two years, and the staff is uncertain as to the reasons underlying the errors. Rather than have a projection that contains a relatively quick run-off of the residual in the wage equation and a strong rebound in wages, the staff may elect to slow the speed at which the residual for this equation returns to zero, thereby slowing the speed at which wages rise to levels suggested by the model.

Lastly, judgment is often used in the projection to reflect information from other models. For example, the QPM benefits from the conditioning information derived from structural models, such as the Terms-of-Trade Model (TOTMOD),[18] and from a small, reduced-form model of the Canadian economy (NAOMI)[19] designed with accurate short-term forecasting as its primary objective.

4. CONSTRUCTION OF THE STAFF ECONOMIC PROJECTION

The SEP is based on the quarterly national income and expenditure accounts, which are the most comprehensive measure of activity in the economy.[20] The actual production of the SEP has five steps: (i) forecasting exogenous

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17 The staff use survey evidence from professional forecasters to condition the path for inflation expectations, particularly over the first two years of the projection horizon.

18 The TOTMOD is a multi-sector, dynamic general-equilibrium model that is particularly useful for analyzing the medium to long-run aggregate and the sectoral implications of fluctuations in the relative price of resource-based commodity exports (Macklem 1992, 1993). Given the importance and prevalence of commodity price fluctuations in recent Canadian history, the TOTMOD is useful in informing the staff's judgment.

19 The Canadian portion of the NAOMI model consists of six behavioural equations that determine output growth, core and GDP price inflation, the real exchange rate, and short- and long-term interest rates (Murchison 2001). NAOMI was originally developed at the Department of Finance of the Government of Canada.

20 Since late 2000, the Bank of Canada has adopted a system of eight pre-announced dates per year on which it can adjust the target overnight rate of interest. The SEP is prepared four times per year and is organized around the release of the national accounts data. For the other four dates, either an update to the projection is conducted or a risk scenario around the previous projection is done.

variables; (ii) forecasting the near term (two quarters ahead);(iii) the no-judgment round;(iv) the base case; and (v) risk analyses and alternative scenarios.

4.1 Forecasting exogenous variables

The projection exercise begins by looking beyond Canada's borders. The Bank's International Department assesses developments and future prospects in the overseas economies, drawing out the analyses and forecasts of the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), and the private sector consensus forecast.[21]

The International Department also develops a more detailed projection for the United States. This is largely based on an in-house model of the U.S. economy; the United States Model (USM) (Lalonde 2000).[22] The USM is a small, estimated, reduced-form model of the U.S. economy. Its core consists of three equations: an expectations-augmented Phillips curve equation, an aggregate demand equation, and a monetary policy reaction function. A key input to the U.S. projection is the measure of U.S. potential output. For the USM, a structural VAR model is used to generate potential output (Lalonde 1998). This model-based forecast is combined with staff judgment that takes into account IMF, OECD, and consensus forecasts, as well as information from private sector consultants (Macklem 2002).

Projections for oil prices and non-energy commodity prices are also developed for the SEP. The staff use small models (Lalonde *et al*. 2003) combined with judgment based on the analysis of commodity market experts both inside and outside the Bank, as well as information from futures contracts, to determine its outlook. Key drivers of commodity prices include global economic activity and the U.S exchange rate. It is important to note that the commodity price projections and the macroeconomic outlook for the United States and the other G–7 economies are determined jointly, ensuring the overall consistency of the external outlook.

Assumptions about domestic fiscal policy are also included at this point. Bank economists regularly monitor fiscal developments and the plans of the Government of Canada and the provincial governments. Based on this information, as well as on the objectives announced for fiscal policy, Bank staff determines exogenous paths for government spending, transfers, and the level of indirect and corporate taxes. The model then determines the tax on labour income required to meet announced fiscal objectives, given the economic outlook contained in the SEP. Over the medium term, fiscal policy is anchored by a target debt-to-GDP ratio as well as a target government spending to GDP ratio. This approach is markedly different from the policy-held constant scenarios that are typically constructed in private sector forecasts.

Other key assumptions include those that determine potential output growth over the projection period.[23] Consider the case of trend total factor productivity growth. The current approach is based on a model of productivity convergence between Canada and the United States. In particular, the staff set the path for domestic trend total factor productivity growth based on similar assumptions made in the U.S. projection. Staff is careful to account for differences in the composition of the two economies. For example, much of the gain in U.S. productivity growth in the late 1990s and early 2000s was due to gains in the productivity associated with the production of information technology (IT) (Oliner and Sichel 2002). Since IT production represents a relatively

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21 Small models for Europe and Great Britain are currently under development.

22 A new model of the U.S. economy (MUSE—Model of the United States Economy) is currently under development and is expected to replace the existing model in 2004. The new model is based upon the FRBUS model of the United States economy developed at the Board of Governors of the U.S. Federal Reserve System.

23 Potential output is endogenous in the QPM to the extent that investment decisions (and hence the resulting capital stock) will vary with economic conditions.

larger share of the U.S. economy that it does of Canada's, we adjust down our assumption for domestic trend total factor productivity growth relative to that of the United States.

In the QPM, long-run labour supply is assumed to be exogenous. The staff input assumptions regarding long-run labour supply based on analysis that features the role of demographic factors and of other socio-economic factors not contained in the core model. Population projections are taken from Statistics Canada.

4.2 National accounts and the short-term forecast

The second step in developing the SEP is a detailed analysis of the most recent national accounts data. The staff pays particular attention to examining the extent and nature of any surprises in the national accounts relative to the previous projection, as well as to the magnitude and sign of the residuals of the behavioural equations of the core model.

One of the most important questions that arise concerns the interpretation of unexpected shocks to real GDP. In order to decompose GDP into potential output and the output gap, the staff use a technique called the extended multivariate filter (EMVF) (Butler 1996). Output is decomposed into the sum of labour productivity and labour inputs. Labour inputs, in turn, depend upon the unemployment rate, labour force participation, and hours worked. This implies that the output gap depends on the gaps between the actual levels of each of these variables and estimates of trend values. Each of these gaps is constructed by combining a time-series filter of the actual data with a variety of information derived from economic relationships. For example, hours worked is decomposed into its trend and cyclical components by taking a weighted average of an Hodrick-Prescott (HP) filter of hours worked and the estimate of the trend in hours worked coming from a structural vector auto regression (SVAR) that makes us of core inflation and U.S. output to identify demand conditions.

As discussed in Section 3.2, the staff compiles an outlook for the domestic economy for the first two quarters of the projection based on information from leading indicators, short-term forecasting models, sectoral analysis, and staff judgment. This forecast is input into the QPM as if these were actual historical outcomes. Historical residuals for the model's behavioural equations are then calculated. The model and the resulting historical residuals are used to check the internal consistency of the monitoring.

4.3 Producing the no-judgment round

The no-judgment round takes the exogenous variables and the near-term forecast as given and mechanically generates an economic projection and interest rate path using the QPM. A key issue in the production of the no-judgment round is how to treat the historical residuals of the behavioural equations. Recall that several of the behavioural equations in the QPM have serially correlated residuals. The residuals are modelled as simple statistical AR (1) models. In the no-judgment round, historical residuals are run off in a mechanical fashion, consistent with their historical roots.

4.4 The base case

Staff judgment about the economy is combined with the core model and the near-term forecast to produce the SEP. The base case represents the staff's assessment of the most likely path for the economy and includes an interest rate path for the overnight interest rate to bring inflation back to the 2 per cent target. Conceptually the base case should be thought of as the mode of the statistical distribution of possible outcomes.

The first step in building the base case is to decide how to handle the starting-point shocks to the model's behavioural equations. If the starting-point shocks are deemed typical, then they are run off according

to their historical root, as in the no-judgment round. If, on the other hand, the starting-point shocks are related to identifiable factors outside of the model, the staff can adjust how quickly the starting-point shocks decay over the projection. For example, the QPM models domestic exports as functions of its own lags, current and future expected external economic activity, and the current and future expected real exchange rate. Suppose that the level of exports suggested in the recent data and the first two quarters of the projection is higher than that suggested by the core model. Detailed sectoral analysis suggests that the composition of external demand has been skewed in favour of sectors that are particularly important for Canadian exports, thus explaining the stronger-than-expected export performance. Staff will have to include their judgment in the projection to reflect their opinion on how large the shock to exports will be and how long it will be expected to last.

The staff then proceeds to include other judgments in the base case, if required. For example, the staff typically includes their judgment in the model's representation of inflation expectations to make them consistent with survey evidence from private sector forecasts over the first two years of the projection. Finally, the staff includes judgments that are based on the shortcomings of individual equations and views about the projection that emerge from other models or analysis.

The base-case projection for Canada and the external economies is communicated to the Governing Council and other members of the staff through a written document known internally as the White Book, and through an oral presentation by members of the projection divisions in the International and Research departments. The SEP is compared to the average private sector outlook, the outlook of government departments, and those of international organizations.

Both the written document and the oral presentations are careful to highlight the new information and shocks since the last SEP. The staff carefully traces the economics of the most important shocks and assesses the marginal implication of each shock on the new projection. The staff is also careful to explain the dynamics of the projection, paying attention to the key aggregates.

Oral presentations are made to the Governing Council in a meeting that is open to all Bank staff. Governing Council members typically ask questions about the base case that highlights areas of interest or concern. Members of the staff not directly involved in the projection process are also invited to ask questions and to make comments. This forum has proven to be very useful for staff and the Governing Council to identify areas of interest not only for the economic outlook but also on subjects that need to be addressed with longer-term research.

4.5 Risks and alternatives

The SEP is the staff's view about the most likely path for the economy. There is, of course, considerable uncertainty around this outlook. The staff's economic model is used to assess the implications of the main risks to this outlook as chosen by the Governing Council, based partly on the staff's recommendation. The staff's suggestions for risk scenarios are based on the most uncertain assumptions made in the preparation of the base case.

The risk analyses are documented and presented to the Governing Council at another meeting similar to the one where the base case is presented. Typical examples of risks include different assumptions about the current amount of slack in the economy, the growth rate of potential output, different assessments of the prospects for the U.S. economy, and alternative views on the future path for the price of oil or other important commodities. For example, suppose Canada has just witnessed a rapid and significant fall in the price of its natural resource exports. Suppose further that the staff have assumed for the projection that this decline will be temporary but that they are, at the same time, highly uncertain about the expected duration of the shock. In such a circumstance, a risk scenario could be produced that treats the price decline as permanent. This would give the staff an idea of the range of possible output and inflation outcomes and therefore the range of

appropriate monetary policy responses. In general, these risk analyses provide an assessment of the sensitivity of the baseline forecast to various sources of uncertainty and provide Governing Council with a range of projections and associated policy recommendations (Coletti and Murchison 2002).

Risk analyses can also address uncertainties regarding how the economy functions. For example, suppose the central bank is considering changing the inflation target. There will be considerable uncertainty regarding the speed at which agents in the economy will adjust their inflation expectations to the new policy objective. It can be assumed that policy is more or less credible than is assumed in the base case. Agents would adjust their expectations more or less slowly, learning quickly or very gradually about the central bank's true policy objective. Consequently, the output losses associated with the move to the new inflation target will be smaller or larger than in the base case. These types of risk analyses give decision-makers an idea of how sensitive the economic outlook is to key assumptions regarding the functioning of the economy.

When conducting the risk analyses, it may become clear to the staff that the risks associated with the base-case projection are unbalanced. For example, consider the issue of exchange rate pass-through. Reduced-form Phillips curves estimated over the 1970s and 1980s detect an important degree of direct exchange rate pass-through into consumer prices in Canada, as in most industrialized countries. The evidence covering the 1990s and 2000s, however, suggests that the extent of exchange rate pass-through may have declined considerably (Kichian 2001). In response, the staff has significantly reduced the elasticity of consumer prices with respect to changes in the exchange rate in the core model relative to the average historical estimate. Despite this adjustment, it could be felt that the risks to exchange rate pass-through are more likely to be on the downside than the upside. This would, in turn, lead the staff to conclude that the balance of risks to the base case is skewed. After careful consideration of all the key risks to the projection and their associated probabilities, the staff comes up with an interest rate recommendation that is consistent with the mean outlook for the Canadian economy.

In addition to risk analyses, the staff also considers "alternative policy scenarios." These scenarios examine the implications for key economic variables, such as output growth and inflation, of changes in the timing and/or magnitude of interest rate changes relative to the staff's base-case projection. As well, they involve replacing the standard policy reaction function for setting the target overnight rate with an alternative policy reaction function; for example, a scenario in which interest rates are determined by a Taylor rule.[24] Such scenarios provide the Governing Council with alternative paths for interest rates that will bring inflation back to the target at various speeds, with different dynamics as well as different implications for output.

Many other central banks like to simulate scenarios under an assumption of constant nominal interest rates and/or interest rates consistent with market expectations. These scenarios are generally used as communication devices. In short, if the inflation projection remains below (above) the official target (at the relevant policy horizon), then the signal is sent that interest rates need to fall (rise) relative to the rates assumed.

The value of scenarios where the interest rate is held constant or that employ market expectations of interest rates is doubtful, however, in models where inflation expectations are (partly) consistent with the model, as in the QPM. To be more concrete, suppose that imposing the assumption of constant nominal interest rates leads to an inflation projection in which inflation remains below the inflation target for an extended period of time. The monetary authority's failure to lower interest rates despite the obvious policy error would lead agents in the economy to question the authority's commitment to the inflation target. As a result, inflation expectations would decline, further compounding the disinflationary situation in the economy. The fall in inflation expectations in turn would lead to an increase in the real interest rate, which would lead to

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24   The specific calibration of the Taylor rule used is one that has been found to work well across a number of different models of the Canadian economy (Côté et al. 2002).

a reduction in aggregate demand and more disinflationary pressure. In fact, in the limit, the monetary authority fails to act as the nominal anchor for the economy, leading to potentially explosive outcomes for the nominal variables in the economy.

It is possible, however, to preserve the nominal interest rate peg in a model with model-consistent expectations while technically preserving the role of the monetary authority as anchor to the nominal side of the model. Technically, this can be accomplished by exogenizing the nominal interest rate in period t, and solving the model forward. The model is simulated again, starting in period $t + 1$, once again exogenizing the nominal interest rate (period $t + 1$) and solving the model forward. This process is repeated for as long as the peg is required to hold. The resulting path for the economy is consistent with the notion that agents are continually surprised by the behaviour of the central bank but assume that it will return to following its model-based rule in the subsequent period.

The staff at the Bank of Canada often simulates such scenarios to assess the impact of holding nominal interest rates constant over a relatively short period of time (one to two quarters). The appropriateness of these scenarios comes into question if the period of the interest rate peg is long. As the length of the period over which the peg is held increases, it becomes increasingly difficult to believe that economic agents would continue to expect the monetary authority to return to the rule in the model in the subsequent period. In reality, we would expect the credibility of monetary policy to begin to suffer. Since these scenarios fail to capture this channel it is likely that they understate the resulting (dis)inflationary pressures.

5. CONCLUSIONS

Although the aim of this paper is to provide a more careful explanation of the SEP at the Bank of Canada, it is important to note that there are other analyses conducted by the staff that also figure prominently in the decision-making process. We conclude by briefly highlighting these other main inputs describing and how they are employed by the Governing Council.

One additional source of information is a survey of industry contacts. The staff at the Bank's regional offices gathers information on economic activity by visiting firms and conducting a regular survey of business conditions (Martin 2004). The information gathered through this exercise gives the Governing Council insight into what business people are seeing and planning, and provides insight into the real-world stories and business decisions that underlie the official statistics (Macklem 2002).

Since the SEP focuses on the links between interest rates and the economy, information on money and credit provides another view of how the economy may evolve and what the appropriate stance of monetary policy should be. Using small models, analysis of high-frequency data, and regular contacts with financial institutions, the staff of the Monetary and Financial Analysis Department assembles an alternative outlook for the Canadian economy, including a recommendation for interest rates.

The final product prepared by the staff is an assessment of market expectations for domestic and U.S. interest rates. The staff in the Financial Markets Department bases their assessment of market expectations on interest rate futures, expectations implicit in the term structure of interest rates, market commentary from polls, published reports of investment banks, and from the staff's own interaction with dealers and investors (Macklem 2002).

After further consultation with senior staff, the Governing Council reaches a common view on the economy, the underlying inflationary pressures, the key risks, and the overall balance of risks. With forecasts and analysis supplied by a wide variety of data, the Governing Council must decide how to integrate the different pieces of

information. Their decision will depend on the judgments of the members of the Governing Council as to which factors are the most relevant in the current situation, the track records of the various models and indicators, and the lessons Council members have drawn from past experiences (Macklem 2002).

The process ends with a consensus decision and a press release that outlines the reasons behind the decision. In addition, four times per year the Bank of Canada also releases its *Monetary Policy Report or Monetary Policy Report Update*. These documents provide details on the Governing Council's outlook for economic activity and inflation, the key risks around the outlook, and the reasons for the monetary policy decision.

References

Amano, R., van Norden, S. (1995) Terms of Trade and Real Exchange Rates: The Canadian Evidence. *Journal of International Money and Finance* 14: 83-104.

Amano, R., Coletti, D., Macklem, T. (1999) Monetary Rules When Economic Behaviour Changes. Bank of Canada Working Paper No. 99–8.

Black, R., Laxton, D., Rose, D., Tetlow, R. (1994) *The Bank of Canada's New Quarterly Projection Model, Part 1: The Steady-State Model: SSQPM*. Technical Report No. 72. Ottawa: Bank of Canada.

Butler, L. (1996) *The Bank of Canada's New Quarterly Projection Model, Part 4: A Semi- Structural Method to Estimate Potential Output: Combining Economic Theory with a Time-Series Filter*. Technical Report No. 77. Ottawa: Bank of Canada.

Coletti, D., Hunt, B., Rose, D., Tetlow, R. (1994) *The Bank of Canada's New Quarterly Projection Model, Part 3: The Dynamic Model: QPM*. Technical Report No. 75. Ottawa: Bank of Canada.

Coletti, D., Murchison, S. (2002) Models in Policy-Making. *Bank of Canada Review* (Summer): 19–26.

Côté, D., Johnson, M. (1998) Consumer Attitudes, Uncertainty and Consumer Spending. Bank of Canada Working Paper No. 98–16.

Côté, D., Lam, J. P., Liu, Y., St-Amant, P. (2002) The Role of Simple Rules in the Conduct of Canadian Monetary Policy. *Bank of Canada Review* (Summer): 27–35.

Demers, F. (2003) The Canadian Phillips Curve and Regime Switching. Bank of Canada Working Paper No. 2003–32.

Dion, R. (1999) Indicator Models of Core Inflation for Canada. Bank of Canada Working Paper No. 99–13.

Duguay, P. (1994) Empirical Evidence on the Strength of the Monetary Transmission Mechanism in Canada: An Aggregate Approach. *Journal of Monetary Economics* 33: 39–61.

Duguay, P., Poloz, S. (1994) The Role of the Economic projections in Canadian Monetary Policy Formulation. *Canadian Public Policy* 20: 189–99.

Dupasquier, C., Rickets, N. (1998) Non-Linearities in the Output-Inflation Relationship: Some Empirical Results for Canada. Bank of Canada Working Paper No. 98–14.

Fillion, J. F., Leonard, A. (1997) La courbe Phillips au Canada: un examen de quelques hypotheses. Bank of Canada Working Paper No. 97–3.

Khalaf, L., Kichian, M. (2003) Exact Testing of the Phillips Curve. Bank of Canada Working Paper No. 2003–7.

Kichian, M. 2001. On the Nature and Stability of the Canadian Phillips Curve. Bank of Canada Working Paper No. 2001–4.

Lafrance, R., van Norden, R. (1995) Exchange Rate Fundamentals and the Canadian Dollar. *Bank of Canada Review* (Spring): 17–33.

Lalonde, R. (1998) Le PIB potential des Etats-Unis et ses determinants: la productivité de la main d'oeuvre et le taux d'àctivité. Bank of Canada Working Paper No. 98–13.

——— (2000) Le modelé USM d'ànalyse et de projection de l'économie américaine. Bank of Canada Working Paper No. 2000–19

Lalonde, R., Zhu, Z., Demers, F. (2003) Forecasting and Analysing World Commodity Prices. Bank of Canada Working Paper No. 2003–24.

Longworth, D. (2000) The Canadian Monetary Transmission Mechanism and Inflation Projections. *In Inflation Targeting in Practice: Strategic and Operational Issues and Application to Emerging Market Economies*, 37–43, edited by M. Blejer, A. Ize, A. Leone, and S. Werlang. Washington: International Monetary Fund.

Longworth, D., Freedman, C. (2000) Models, Projections and the Conduct of Policy at the Bank of Canada. Paper presented at the conference, Stabilization and Monetary Policy: The International experience, organized by Banco de Mexico, 14–15 November. Proceedings forthcoming.

Macklem, T. (1992) Terms of Trade Shocks, Real Exchange Rate Adjustment, and Sectoral and Aggregate Dynamics. In *The Exchange Rate and the Economy*, 1–60. Proceedings of a conference held at the Bank of Canada, 22–23 June 1993. Ottawa: Bank of Canada.

——— (1993) Terms of Trade Disturbances and Fiscal Policy in a Small Open Economy. *Economic Journal* 103: 916–36

——— (1994) *Wealth, Disposable Income and Consumption: Some Evidence for Canada*. Bank of Canada Technical Report No. 71. Ottawa: Bank of Canada.

——— (2002) Information and Analysis for Monetary Policy: Coming to a Decision. *Bank of Canada Review* (Summer): 11–18.

Martin, M. (2004) The Bank of Canada's Business Outlook Survey. Bank of Canada Review (Spring): 3-18.

Murchison, S. (2001) NAOMI: a New Quarterly Forecasting Model. Part II: A Guide to Canadian NAOMI. Department of Finance Working Paper No. 2001–25.

Murchison S., Rennison, A., Zhu, Z. (2003) A Structural Small Open-Economy Model for Canada. Bank of Canada Working paper No. 2004–4.

Oliner, S., Sichel, S. (2002) Information Technology and Productivity: Where Are We Now and Where Are We Going? Federal Reserve Bank of Atlanta *Economic Review* 87: 15–44.

Pagan, A. (2003) *Report on Modelling and Forecasting at the Bank of England*. London: Bank of England.

Poloz, S., Rose, D., Tetlow, R. (1994) The Bank of Canada's New Quarterly Projection Model (QPM): An Introduction. *Bank of Canada Review* (Autumn): 23–38.

Smets, F., Wouters, R. (2003) An Estimated Stochastic General Equilibrium Model of the Euro Area. Working Paper No. 171, European Central Bank.

Forecasting at the Bank of England: A discussion of Don Coletti "Constructing the Staff Economic Projection at the Bank of Canada"

Gabriel Sterne - Bank of England

1. INTRODUCTION

The Bank of Canada have made a number of pioneering developments with regard to developing forecasting models, and in reading Don Coletti's paper it is clear to me that there are far more similarities in the approaches of our central banks than there are differences. Both central banks have pushed to develop models with a clearly specified economic structure, and both central banks have a rigorous forecasting process that draws in information from a range of sources and according to a structured timetable.

There are some differences too, which in part reflect ownership of the forecast. The Bank of Canada's forecast is a staff projection whereas the Bank of England's forecast is that of the Monetary Policy Committee (MPC); it is therefore particularly important that our MPC are deeply involved in the forecast process.

In this description of models and forecasting processes used at the Bank of England I draw very heavily from some recent Bank of England publications contained in the references. In what follows, some sections of these articles are reproduced in full.

2. SOME RECENT DEVELOPMENTS IN MODELLING AT THE BANK OF ENGLAND

Adrian Pagan's (2003) Report on 'Modelling and forecasting at the Bank of England' suggested a means of classifying models by assessing two broad properties; their theoretical and their empirical coherence. There is inevitably some trade-off between the two, but a model should ideally be on the technological frontier between these properties. In relation to the quarterly macroeconometric model (MM) that was the primary tool employed by the staff at the time of his report, Pagan concluded that greater theoretical coherence and consistency with the MPC's beliefs could be achievable without any sacrifice of empirical fit. Accordingly he argued that the MM did not represent the 'state of the art'.

The MPC's (2003) response to the Pagan report agreed with that assessment; the MPC had already recognised that the MM had deficiencies that limited its utility for analysis and forecasting. In particular, the underlying analytical structure was not fully articulated and there were some obvious linkages that are absent which at present have to be catered for through ad hoc adjustments. The Bank had therefore directed some of its research effort in 2001–02 into the development of a new macroeconometric model, the *Bank of England Quarterly Model* (BEQM) that has a more consistent and clearly articulated structure, and which better captures the MPC's vision of how the economy functions Details of the model have been published in Harrison et al (2005).

3. BEQM

The Bank uses numerous economic models to help produce its projections. No model can do everything—*all* models are imperfect, precisely because they are simplifications of reality. And each projection is produced by the MPC rather than as a mechanical output from any model. Nonetheless the Bank of England has found, like many other policy institutions, that, when producing its economic projections, it is helpful to use

a macroeconomic model as the primary organisational framework to process the various judgments and assumptions made by the Committee. This is the role now played by BEQM.

The general properties of BEQM are outlined in Bank of England (2004). The improved economic structure of BEQM is reflected in a number of specific features. First, it has a well defined steady state. This means that, in the long run, all variables in the model settle on paths that are growing consistently with each other in a sustainable equilibrium. This aids analysis of economic issues, since an understanding of the medium term requires an understanding not just of short-run forces, but also of where the economy is heading to in the long run.

Another important feature of the new model is that it contains more explicit forward-looking representations of agents' expectations about the future. Models with fully forward-looking agents can sometimes exhibit unrealistic dynamic properties; in particular, if households and firms are assumed to have perfect foresight, they might adjust their behaviour immediately in response to future anticipated events. But in reality the economy does not 'jump' about in this fashion. That partly reflects the fact that it is often costly for households and firms to change their behaviour very rapidly. In addition, firms and households do not have perfect foresight. Instead, they have to form expectations on the basis of limited information. BEQM incorporates both of these features. In particular, it is structured in such a way that assumptions about the speed of adjustment and the amount of information available to agents can be altered and changed in order to help the Committee to assess how these assumptions could affect the future path of the economy.

4. SUPPLEMENTS TO BEQM

Two general types of model supplement BEQM. First, there are quantitative theoretical models designed to illuminate particular issues that are not captured in BEQM. Examples include the consequences of technical progress concentrated in a particular sub-sector of the economy, and the role the banking sector may play in amplifying shocks at particular points in the economic cycle. Second, there are purely data-based models, which are used to provide alternative forecasts as a cross-check on the projections produced with BEQM. The projections are also systematically compared with those produced by independent forecasters.

This 'suite' of econometric models is an essential tool, but the quarterly projections are not simply the result of running either BEQM, or the suite, mechanically. All economic models are highly imperfect reflections of the complex reality that is the UK economy and at best they represent an aid to thinking about the forces affecting economic activity and inflation. The MPC is acutely aware of these limitations. Moreover, a considerable amount of judgment is required to generate the projections. In making those judgments, the MPC draws on a range of additional sources of information about economic developments. The published projections thus represent the Committee's best collective judgment about economic prospects in the light of all the information available to it, not the mechanical output of a particular econometric model.

The Committee thus draws on a whole range of information in preparing its projections, just as it does during the regular monthly MPC round. However, the quarterly forecast round provides the opportunity for more in-depth discussion of key issues in an explicitly quantitative framework. This provides an opportunity to stand back and look afresh at economic news over a run of months and review whether the level of interest rates remains appropriate. So the forecast process can result in the Committee modifying its view of economic prospects, and thus of the appropriate setting of interest rates, even though there may have been little news about the economy since the previous monthly policy meeting.

5. THE FORECASTING PROCESS

The MPC undertakes a quarterly forecasting exercise with the assistance of Bank staff. The models developed and used by the Bank staff are merely tools to help the Committee discuss issues in a structured and quantified way—there is no automatic link between BEQM and the MPC's projections for growth and inflation. Economic forecasting is not a mechanical process so judgments by the staff and the Committee have played a crucial role in generating sensible projections. Such judgments are required in respect of the interpretation of recent data, in the projection of exogenous variables and residual adjustments into the future, and from time to time in the explanation of why the relationship between certain variables may have shifted.

The forecast process at the Bank involves a high degree of interaction between the Bank's staff and the members of the Monetary Policy Committee. In particular, a key element of the forecast process is for Committee members to assess the extent to which different economic judgments and assumptions concerning the big issues affecting the economy could influence their view of future prospects. This process is critical to understanding the nature of the risks and uncertainties surrounding the central projection.

The structure of a typical forecast round is shown in Table A, taken from Bean and Jenkinson (2001). It would usually start as early as eight weeks before the date of the associated Inflation Report with the model review meeting. At this meeting between the Committee and the staff, the latter report back on any research work commissioned by the Committee at the conclusion of the previous forecast round. The Committee then agrees how the outcome of this research is to be taken on board in the economic models to be used in preparing the subsequent projections, as well as on any other factors that need to be resolved before the staff can begin preparing the projections.

Table 1: Timetable for a typical quarterly forecast round

	Date relative to MPC meeting	Content
Model review meeting	Seven weeks before	Staff report on research commissioned at conclusion of previous forecast round. Committee agrees on how the results are to be taken on board during the forecast round.
Benchmark forecast meeting	Three weeks Before	Staff provides updated projections incorporating latest data and identifies key issues for subsequent discussion by the Committee.
Two key issues Meetings*	Two to three weeks before	Discussion of major issues requiring the Committee's judgment. Staff provides detailed background notes on each issue.
Two draft forecast meetings	One week before	Staff provides revised projections incorporating judgments made at the Key issues meeting. Committee takes a 'top down' view of the plausibility of the projections and the attendant risks.
Inflation Report Published	One week After	Contains final projections, incorporating any policy changes made at the most recent policy meeting.

Note: The number of Key Issues meetings has been reduced from three since the publication of Bean and Jenkinson (2001)

In the four weeks leading to the benchmark forecast meeting , the members of the Bank's Conjunctural Analysis and Projections Division, in conjunction with other members of the staff of Monetary Analysis and other parts of the Bank, prepare a so-called 'benchmark forecast' with the aid of BEQM. This benchmark forecast is an update of the projections from the previous round incorporating the latest data and any model changes and associated adjustments already agreed by the Committee.

Further details of meetings described in Table 1 are provided in Bean and Jenkinson (op cit). They describe how the MPC's judgments are incorporated at various stages of the forecast process.

After the *Key Issues meetings*, the staff will have produced revised projections embodying the Committee's judgment on the key issues, as well as updating them for any new data that have been published since the benchmark forecast was prepared. The new projections, referred to as the draft forecast, are then presented to the Committee a few days before the associated MPC policy meeting. Up to this point, the forecasts have been built up on an issue-by-issue basis that is to say primarily from the 'bottom up'.

When the staff present the new draft forecast, they also provide systematic comparisons with forecasts produced using other models in the Bank's suite and with the forecasts of outside bodies. These comparisons help the Committee to take a 'top-down' perspective, and assess whether the overall shape of the forecast and the attendant risks is plausible. In implementing these judgments, it is helpful for staff to use a model with a relatively high degree of empirical congruence.

At the final stage the Committee again tries to reach a broadly common position on the overall shape of the forecast, but if this is not possible then the majority judgment again prevails. The outcome of this process constitutes the 'best collective judgment' of the Committee. Of course, sometimes individual members may feel that the Committee's collective view is sufficiently far from their own to wish to note that explicitly when the projections are published. Table 6.B in Section 6 of the Inflation Report provides illustrative calibrations of the possible impact of taking alternative judgments on certain key assumptions that might be preferred by a minority of Committee members. And the range of differences among the Committee on the central projections for growth and inflation, and for the balance of risks, is summarised in Section 6 and the Overview. For the associated MPC policy meeting, the staff provides near-final projections, based on the prevailing level of official interest rates. They also typically provide alternative projections based on other possible settings for official rates to help the Committee in its deliberations. The discussion at the policy meeting may lead the Committee to wish to modify its projections further, and if so the timetable offers scope for some last-minute amendments before the Inflation Report goes to press.

6. CONCLUSION

Forecasting models and processes at the Bank of England in many ways resemble those of the Bank of Canada and other central banks. An important aspect of the Bank of England's forecasting process is that the forecast is that of the MPC. The article has described how their judgments are implemented at various stages of the forecasting round.

References

Bean, C., Jenkinson, N. (2001) The formulation of monetary policy at the Bank of England, *Bank of England Quarterly Bulletin*, Winter, pages 434–41. www.bankofengland.co.uk/qb/mpc.htm

Bank of England (2004) The New Bank of England Quarterly Model, *Bank of England Quarterly Bulletin*, Summer pp 188-193 www.bankofengland.co.uk/mpc/qtlymodel.pdf

Bank of England (2003) Bank's response to the Pagan Report www.bankofengland.co.uk/ pressreleases/2003/paganresponse.pdf

Harrison, R, Nikolov, K, Quinn, M, Ramsay, G, Scott, A and Thomas, R (2005) The Bank of England Quarterly Model, *Bank of England, London*

Pagan, A. Report on modelling and forecasting at the Bank of England www.bankofengland.co.uk/ pressreleases/2003/paganreport.pdf

Forecasting and Policy Analysis System in the Czech National Bank

Petr Král – Czech National Bank

1. INTRODUCTION

In this paper the author describes the Forecasting and Policy Analysis System (FPAS) as it is applied in the Czech National Bank (CNB). The objective is to show the role the FPAS plays in the decision making process of the Bank Board (BB) who is responsible for monetary policy of the CNB. The other goal is to stress some similarities or on the contrary differences when comparing the CNB's approach with the attitude of the Bank of Canada.

The paper is organised as follows. The first chapter deals very briefly with general objectives of monetary policy and its regimes in order to create platform for a discussion of the monetary policy design under the inflation targeting regime in the Czech Republic. The next chapter is devoted to the actual FPAS, its role, objectives, and nature under the particular circumstances in the CNB. Based on this, the basic elements of the FPAS are described in this section. A description of the forecasting process and its organisation is an object of the third chapter. The fourth chapter is dedicated to highlighting main features of monetary policy recommendation of the staff and decision making of the BB. The final section provides some summary and conclusions and simultaneously pays attention to challenges the CNB faces when conducting its monetary policy and applying the FPAS.

2. MONETARY POLICY AND ITS REGIME IN THE CZECH REPUBLIC

It is known that central bankers focus on macroeconomic dynamics rather than on static description of an economy, its features and parameters of its equilibrium. Thus, monetary policy is interested in economic phenomena that are associated to long-run (equilibrium) trends and deviations from these trends that are referred to as cycles. Especially, deviations from the trajectory of long-run economic growth and their disequilibrium consequences (inflation, external imbalance etc.) are of a great relevance for monetary policy. Based on economic studies, central bankers believe that excessive fluctuations around the trend of economic activity may be harmful for the long-run growth trajectory itself by imposing uncertainty into the system and decision making of economic agents. Accordingly, economic instability, high inflation, monetary crisis, and similar pathological phenomena closely related to fluctuations around trends can undermine the ability of an economy to grow via sub-optimal allocation of scarce economic resources. Particularly, a negative impact of inflation on the pace of economic growth has been explored in many studies relatively recently see e. g. Barro (1995), Bruno and Easterly (1995) or Ghosh and Phillips (1998). For a comprehensive review of literature covering this topic see Král (2001).

From the reasons mentioned above, there is a need to have stabilisation authorities that would systematically smooth the cyclical movements of the economy and thus contribute to its efficient functioning and rapid growth. Theoretically, this task could be given in charge to various bodies (fiscal policy, monetary policy, and other general government policies). However, in the reality monetary policy is considered to be the most appropriate instrument for such a stabilisation effort. The reason lies in its high flexibility, relative independence on political preferences and pressures, which could solve problems with dynamic (time) inconsistency of such a stabilisation policy. A model with an independent central bank conducting monetary policy to stabilise an economy has proved to be a good solution of the needs of the society in this field.

The task to stabilise an economy is in the life of central banks expressed in terms of their primary objectives such as price stability, monetary stability (with an internal respectively external dimension of it), full employment, balanced economic growth etc. The way a central bank opts to pursuit of its primary objective is called monetary policy regime. Such a regime provides a structure for monetary policy decision-making. In addition to facilitating the decision-making itself, this structure enables the decisions to be interpreted more easily to the public. Implicit nominal anchor, money targeting, exchange rate targeting and inflation targeting belong among the basic monetary regimes.

The CNB's monetary policy objective is set forth in Article 98 of the Constitution of the Czech Republic and in Article 2 of Act No. 6/1993 Coll., on the Czech National Bank. The CNB is required to maintain in particular price stability. Without prejudice to its primary objective, the CNB shall support the general economic policies of the Government leading to sustainable economic growth.

The CNB has been fulfilling its objective under the inflation targeting regime since the end of 1997 after abandoning previously applied mix of money and exchange rate targeting regime.[25] The ground of inflation targeting consists in a public and explicit announcement of the CNB's commitment to provide an anchor for inflation and inflation expectations. In practice, this commitment means that the CNB will systematically react to various shocks hitting the economy to keep inflation in the inflation target expressed in terms of y-o-y consumer inflation. The reaction of the CNB ensuring bringing inflation to or keeping inflation in the target consists in changing its monetary policy instruments. The main monetary policy tool is two-week reportage as a basis for a variety of other interest rates influencing the actual decision making of economic agents in reality (deposits and loans interest rates).

The managed floating exchange rate regime is fully compatible and consistent with the above-mentioned core of the inflation targeting regime. The CNB has no target in terms of nominal or real exchange rate. It relies on a standard macroeconomic foundation of the exchange rate trajectory reflecting the development of all relevant variables such as inflation, interest rates, GDP, BoP etc. The only effort of the CNB in this field is to prevent the exchange rate market from huge disturbances resulting to excessively volatile movements of the exchange rate.

When pursuing to meet its inflation targets, the CNB also applies escape clauses or caveats, which are exceptions from the necessity to meet the target. Their ground stems from the relatively frequent occurrence of shock changes in exogenous factors that are completely or largely outside the purview of central bank monetary policy. The factors are (i) major deviations of world prices of raw materials, energy-producing materials and other commodities; (ii) major deviations of the koruna's exchange rate that are not connected with domestic economic fundamentals and domestic monetary policy; (iii) major changes in the conditions for agricultural production having an impact on agricultural producer prices; (iv) natural disasters and other extraordinary events having cost and demand impacts on prices; (v) changes in regulated prices whose effects on headline inflation would exceed 1-1.5 percentage points; (vi) step changes in indirect taxes.

There is a key role for the macroeconomic forecast and its communication in monetary policy of the CNB. The need for the forecast stems from a substantial time lag between a monetary policy decision and its response in the development of the economy[26]. Respecting this time lag in the transmission mechanism, the CNB tries to follow a forward-looking approach when focusing on its stabilisation role. And therefore an accurate forecast of the future development of the economy and well assessed monetary policy pressures are a prerequisite for an efficient conduct of monetary policy having an impact on inflation expectations of the economic agents.

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25 For a discussion about appropriateness of inflation targeting regime for developing countries see e. g. Masson, Savastano and Sharma (1998).
26 Estimates of the CNB suggest that on average the time lag in the transmission mechanism ranges from 12 to 18 months. This time span is often referred to as the monetary policy horizon.

There have been several major changes in the pattern of the policy regime since 2002. The two most important ones are connected to the targeted variable and the form of the target respectively. As for the targeted variable, since 2002 the CNB has been focusing on the headline CPI inflation instead of previously targeted net inflating (CPI excluding regulated prices, abolition of subsidies and impacts of indirect taxation changes). And as regard the form of the target, the target has been switched to the form of continuously declining corridor (band with upper and lower boundary) from previously applied individual targets set to the end of each year.

After we have defined the basic parameters of the environment in which the monetary policy is conducted in the Czech case, we are to proceed to a more detailed description of the actual forecasting and policy analysis system of the CNB.

3. OBJECTIVES AND MAJOR ELEMENTS OF THE FPAS

The forecasting and policy analysis system should serve as a support for monetary policy decision making of the Bank Board of the CNB within the inflation targeting regime. The staff of the CNB tries to keep the application of the FPAS as efficient and transparent as possible. Only then the Bank Board will take account of the monetary policy recommendation based on the forecast generated within the FPAS.

Introduction of the FPAS to the staff of the CNB and its implementation into activities concerning macroeconomic analysis and forecast was done with technical assistance of the International Monetary Fund and its experts.

The core of the FPAS consists in a regular quarterly macroeconomic projection exercise. Its timing of conduct coincides with the release of the national accounts data by the Czech Statistical Office. Similarly to the Canadian case, the staff of the CNB employs a medium term approach based on economic theory in order to provide their analyses and projections with a theoretical background and consistent framework of consideration. In order to identify monetary policy pressures the FPAS supposes reactive monetary policy and generates an unconditional inflation forecast. Analyses, projections and their interpretation should offer a macro story providing an insight into decision making of both economic agents and monetary authority.

This building-up a story with an explicit role of monetary policy determining behaviour of the economy evolves against the background of a relatively simple macro-model. This model is called as QPM (quarterly projection model) and serves as a core model around which all the discussions of the macro story evolve. More details about the QPM will be provided below.

A key element of the process is the existence of a departmental forecasting team who is responsible for successful conduct of the process and co-ordination and co-operation of all divisions involved. The role of the team is also more precisely described in the sequel.

For monetary policy decisions and their communication there is a necessity to have a consistent and clear method to derive the inflation forecast. From internal point of view, that is the major reason for the existence of the FPAS but the FPAS is important externally as well. It encourages forward-looking agents to form their expectations according to systematic reactions of the central bank. Therefore the CNB tries to be open and transparent towards the public and explains its procedures regarding macroeconomic forecasting and analysing by means of a variety of forms.[27]

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27 See CNB (2003)

The application of the FPAS leads to a macroeconomic forecast for policymakers as well as for the general public which basic message says (i) where the economy is and what the current trends are; (ii) what the likely evolution of the economy in the future is; (iii) what the implicit risks of the projection are and (iv) what the underlying monetary policy pressures are.

3.1 The core model (QPM)

There is absolutely no doubt about the importance and role of the core model in the process of deriving the macroeconomic forecast. Comparing to the model of the Bank of Canada then despite the fact that both the models have the same name, it is clear that the Canadian QPM is far more theoretically micro-founded, more desegregated and detailed. The small Czech QPM is theoretically based on the paradigm of new Keynesian economy. Its main feature is that it is a simple gap model that explicitly assesses the role of monetary policy in the development of macroeconomic variables. Using the concept of real monetary conditions the model provides an identification of monetary policy pressures.

The model contains reduced forms of behavioural structural economic relationships. In some cases a rule of thumb and ad-hoc behaviour approach have been used when building the actual design of equations. The core of the model consists of the following five equations:
• **IS curve** that represents relation between output gap and real monetary conditions
• **PC curve** that embodies a systematic relation between inflation and output gap
• **UIP equation** that relates the nominal exchange rate to movements of interest rates
• **Reaction function** representing a monetary rule for setting interest rates to minimise deviations of variables from their target (inflation, output gap) with respect to other preferences and limitations. However, this rule is derived without having a particular well defined monetary policy loss function.
• **Inflation expectations equation** capturing both backward (prevailing) and forward-looking agents.

The staff of the CNB believes that the core model provides a clear definition of the economy and offers a common language when thinking about the economic development, which is absolutely essential. In spite of the fact that the model supposes budget and behavioural constraints of the economic agents and distinguishes between short vs. long run logic, the users are aware that the model is a mere abstract and very simplified explanation of the reality. Therefore it cannot fit all the data movements and breaks caused by unsystematic phenomena and requiring an expert explanation.

Relevance of the model for analyses and projections of the Czech economy (in other words its empirical verification) is based on testing its dynamic simulation properties and by comparing with stylised facts. Thus statistics and econometrics have only restricted space when quantifying model relations and calibration prevails by far.

The model projection shows interest rates trajectory consistent with the overall macroeconomic forecast. This path of interest rates is conditional upon agreed assumptions of the forecast in terms of initial conditions, exogenous variables and economic mechanism. Expected trajectory of interest rates is in most cases able to bring inflation into the target in the horizon of the most efficient transmission with respect to other circumstances (output gap, interest rate stability etc.).

Besides the main use of the core model there are some more possibilities how to exploit the model such as simulations of alternative scenarios (see below), monetary policy experiments, stochastic simulations of shocks etc.

3.2 Near term forecast (NTF)

Since the QPM mechanisms are believed to be valid starting a medium-term horizon, there is a need to cover the nearest part of the forecast using an "expert" approach. For the consequent forecasting procedures and steps, the NTF outcomes are considered as if they were actual historical data for one (monitoring) quarter. This

is less than in the case of Bank of Canada which near term forecasters provides an economic outlook for two monitoring quarters. Despite this, the role of the NTF in the Czech case as a benchmark for the model projection beyond the time horizon of one quarter is very important. Maybe more important than in the Bank of Canada and its *Staff Economic Projection* because of specific historical reasons and experience of the CNB. Therefore, the NTF is available for 1 – 6 quarter's time span in the future for benchmarking vis-à-vis the QPM projection.

The near term forecast is focused on identification of short-run idiosyncratic shocks hitting the economy which resources and impacts cannot be analysed within the core model structure. Furthermore, the NTF provides high degree of detail and structural insight in its view on expected development of the economy in the future. Besides these, there is an effort to implement standard behavioural relations into instruments of NTF to be able to provide a consistent macro story comparable with the QPM projection.

As a main source of its comparative advantage, the NTF uses expert knowledge and practical economic intuition based on long-run experience of near term forecasters. Methods of the NTF include as in the case of the Bank of Canada leading indicator and coincident indicator approaches, univariate and multivariate econometric models, small-scale econometric macromodels, ECMs, VARs, structural approaches etc. In other words, there is a very important role of empirical evidence, statistical data and econometric methods in the approach of NTF to analyses and forecasts of the economic development. This contrasts with the QPM approach and its nature.

Unlike the QPM forecast as well, the NTF is based on constant nominal interest rate assumption or market rates assumption, as is the current practise of short term forecasting procedures of the Bank of Canada. However, endogenising of interest and exchange rates stemming from the unconditional QPM forecast is possible to be able to compare both stories under the same assumptions regarding the behaviour of monetary policy.

Altogether, the NTF has an irreplaceable task in providing an initial consistent macro story with numeric scenario that could serve as a benchmark for the model forecast. In addition, although the inflation forecast is based on the medium term approach and forecast of actual GDP is not necessary, desegregated outlook provided by NTF and included in the final version of the forecast (after some iterations mentioned below) is essential for communication purposes. For the sake of its credibility, the CNB has to show that it is able to forecast short-term economic developments in all details.

3.3 Departmental forecasting team

The actual application of FPAS in the form of quarterly projection exercise is given in charge to the departmental forecasting team. Its role is essential because the final forecast and monetary policy recommendation is (and have to be) made by the staff not by the model in order to reach a desired degree of persuasiveness, credibility and transparency. From this point of view, overall inclusively and collective view including both staff and management are substantial for interpretation of the forecast and its marketability.
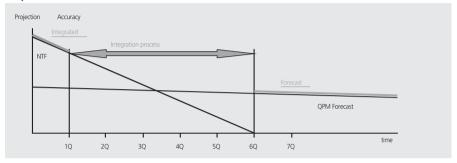
The forecasting team is responsible for a conduct of the forecasting process within which it specifies deadlines and responsibilities for particular tasks and activities. In order to be able to organise all the process and derive the final forecast, the team disposes with respective technical background with a seamless database and prediction system. The actual composition of the team looks like such as follows:

• Head of the team: The director of the Macroeconomic Forecasting Division (MFD)
• Deputy head: Chief of the Near-Term Forecasting Unit within MFD
• Representative of Monetary Policy and Strategy Division
• Representative of Fiscal and Structural Analyses Division.
• Representative of External Economic Relations Division
• 2 model operators from MFD
• Recording clerk and administrative support from MFD.

4. FORECASTING PROCESS AND ITS ORGANISATION

This chapter describes the actual forecasting process and its organisation during the quarterly projection exercise that is a core of the application of the FPAS in the Czech National Bank. A schematic description of the process organised by the forecasting team is depicted in the next graph.

Graph 1

The essence of the forecasting process lies in the integration of the NTF and QPM projection to derive a final medium-term forecast with consistent trajectory of interest and exchange rates. The integration is focused on exploiting all information carried by both approaches with respect to the dependence of their projection accuracy on the length of the forecasting horizon. This scheme is of course not able to explain every detail of the process. It just tries to show the key challenges the forecasting team faces when conducting the projection exercise and generating a reliable macroeconomic story that has a theoretical foundation and simultaneously is relevant from the data point of view.

As suggested above, the forecasting team builds up a macroeconomic forecast as a main support for monetary policy decision making. The team provides an unconditional medium term forecast using the model structure of QPM and NTF outcomes. To be able to include all relevant information and to compare NTF and QPM forecast on the horizon of 1 to 6 quarters the team has to allow for mechanisms that are not included in the model. Among such additional information that is included in the form of residuals to model equations belong for example:

• fiscal policy (fiscal impulse)
• indirect taxes and their immediate secondary effects
• sometimes occurring non-linearities in some behavioural economic relations
• or structural insight into the relation between output gap (expenditure side of GDP) and inflation etc.

All the process of deriving the final medium-term forecast evolves during several official meetings of the forecasting team with the management of the department and the Bank Board respectively. Besides these, there a number of working meetings among the members of the forecasting team when preparing stuff and staff for the official meetings.

4.1 Issue meeting

This is the first meeting in a line. It is closely related to the previous "small" Situation Report and its presentation to the Bank Board. During this meeting the forecasting team tries to obtain a collective and intuitive view among the staff where the economy is and what the current economic issues are. The meeting

is designed to address a wide range of questions and therefore it requires a broad participation of the staff to gain all plausible views and ideas.

4.2 Meeting on forecasting techniques

During this meeting properties of main forecasting tools are re-introduced and re-examined. It represents the last chance for the staff to question existing methods and/or to offer an alternative approach and its significance. The meeting also refreshes staff's and forecasting team's familiarity with the techniques and their drawbacks or pitfalls. Discussion during this meeting may include a variety of topics from fundamental properties of the core model to graphical arrangements of the outcomes.

4.3 Meeting on initial conditions and equilibrium variables

This is likely the most important meeting determining the basic message of the forecast. Since the forecasting team operates with the gap model, it has to have initial conditions in terms of gaps of the most important variables such as output gap, real exchange rate gap, and real interest rate gap. The forecasting team also questions whether the equilibrium trends have changed recently and what it means for their future developments.

Besides the discussion on the initial conditions and the equilibrium variables, there is another objective of this meeting, namely to collect external assumptions. These come from the domestic economy such as fiscal policy and associated variables or from abroad. Foreign variables important for the forecast are obtained from Consensus Forecast, which is a review of foreign economic projections of selected institutions provided by a special agency. Simultaneously, an initial exchange rate scenario CZK/EUR for the NTF procedures is derived using a mix of model-consistent UIP outcomes and order flow forecast within BoP approach.

There is a subsequent meeting with the members of the Bank Board concerning the same topics as mentioned above to obtain their view of the current economic trends and issues.

4.4 The first forecasting round

On this meeting, the first draft of the forecast is introduced to the management of the department. It already includes inputs from NTF (the first monitoring quarter and the standard residuals). The forecasting team presents this draft to obtain a response of the management and experts. Thus, the team offers a possibility to express other views and can tune or modify the message of the baseline scenario accordingly (also with respect to NTF). The team sharing its doubts about the base case of the forecast with the rest of the department offers possibilities in which equations the baseline might be consistently modified with respect to the prevailing view among the management.

After the discussion of the baseline, there is a space for examining a motivation for alternative scenarios. And also at this stage, a meeting with the Bank Board is organised to find out which risks it is worth to elaborate according to their view.

4.5 The final forecasting round

The objective of this meeting consists in deriving the final medium-term forecast on the basis of the QPM outcomes supplemented by the desegregated outlook broadly consistent with the NTF views. The final forecast is considered to be a mode of the statistical distribution of possible outcomes (the most likely scenario which balance of risks can be biased). After the baseline has been approved, the alternative scenarios and the monetary policy experiments (alternatives of the monetary policy reaction function) based on the previous discussions are prepared.

4.6 Post mortem meeting

This meeting is held a few days after the Bank Board meeting devoted to the actual monetary policy decision on setting the interest rates. The part of the process following the final forecasting round leading to the MP decision will be briefly described in the next chapter.

As for the Post Mortem Meeting, there is an opportunity for the involved staff to systematically asses what has gone wrong and what should be improved for the next quarterly projection exercise. There is a need for a broad participation of the staff in order to use this meeting as an efficient tool to transform fresh emotions into immediate measures for the next time. The staff typically decides on how to improve co-operation among divisions when preparing the forecast, what seminars need to be organised to solve specific theoretical or empirical problems that occurred, what should be strengthened regarding the administrative support and logistics of the *Situation Report* etc.

5. MONETARY POLICY RECOMMENDATION AND POLICY MAKING PROCESS

As stressed above, the forecast is considered as a support for monetary policy decision making of the Bank Board of the Czech National Bank. The baseline scenario brings a message what the most likely future development of the economy is. And simultaneously, it says what monetary policy pressures stem from the forecast taking account of the role of monetary policy in determining the economic variables, the need to meet the target, and the actual habit behaviour of the monetary policy. In this context, the alternative scenarios and monetary policy experiments serve as a means to deal with uncertainty. These provide the management of the department and consequently policymakers with an alternative view regarding initial conditions/equilibrium variables, external assumptions, and/or economic mechanisms. With respect to these alternative scenarios producing a modified trajectory of the consistent interest rates the management of the department proceeds to the monetary policy recommendation. Thus, the monetary policy recommendation is based on the baseline scenario of the forecast, on its balance of risks (alternative scenarios), and on other judgements, anecdotal evidence, and communication aspects etc. The actual suggestion of the recommendation is formulated by the Monetary Policy and Strategy Division and the management of the department takes a vote on it.

The final part of the process consists in writing and submitting the (Big) *Situation report* (containing the forecast) and presenting it along with the monetary policy recommendation to the Bank Board on its meeting. The actual decision on setting interest rates is taken after a discussion among the members of the Bank Board on a restricted part of the meeting.

A press conference in attendance of the Governor or Vice Governor is organised to explain the decision of the BB and to provide a brief introduction of the forecast. The journalists are also provided with an approximate and general outlook of the monetary policy for the future. Minutes from the meeting are released twelve working days after the Bank Board meeting containing several aspects of the discussion of the forecast, final risk balance assessment, personal views and other evidence, and the proportion of the members' votes in favour of and against the final decision. Some time after that, the forecast is introduced to the public in detail in the *Report on Inflation* and in some economic journals.

6. SUMMARY, CONCLUSIONS AND CHALLENGES

As this paper has attempted to show, the forecasting and policy analysis system of the Czech National Bank is designed to enable a structured debate about risks and policy issues. This is promoted by using the common

language offered by the core model structure. The staff provides the Bank Board and the public with the macroeconomic forecast against the background of the active monetary policy. However, the consistency cheque of the core model is partially an illusion since the final projection is not a pure model forecast but rather an internally (model) consistent assessment of various views and inputs.

Although the FPAS is quite sophisticated and efficient, there is a strong need for a more advanced and disaggregated discussion within a new framework. A favourable experience of the Bank of Canada with its incomplete stochastic dynamic general equilibrium model (ISDGE) encourages the forecasting team to develop a similar model of the same generation (G3 models). Such a model is currently under preparation and producing "shadow" forecasts based on this model is in the pipeline. This will probably be the most appealing challenge for the future.

As for other challenges, the management has to decide where to put the strongest effort of the staff, whether on doing analyses for *Situation Report* (and the forecast) or on writing reports for the BB and the public (*Report on Inflation*). Both these outcomes are very important and both are demanding in terms of time, human capital etc. A merger of both those reports (in the manner of e.g. Hungary) may be a solution of this challenge.

Similarly, the management has not come to a final conclusion yet how to organise the decision making in between quarterly projections. A reform of "*Small Situation Report*" is just being discussed.

At the very end of this paper, the author would like to express his strong belief that based on his own experience the inflation targeting and the forecasting and policy analysis system represent a good prerequisite for an efficient and successful conduct of monetary policy in the Czech Republic. And what should be stressed as well is that communication is an integral part of monetary policy and has been drawing an increasing attention of central bankers which is also the case of the Czech National Bank.

References

Barro, R. (1995) Inflation and Economic Growth. *Bank of England Quarterly Bulletin*, vol. 35 (May 1995), str. 166-76.
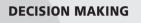
Bruno, M., Easterly, W. (1995) *Inflation Crisis and Long-Run Growth*. Working Paper, World Bank, September 1995.

Czech National Bank (2003) *The Czech National Bank's Forecasting and Policy Analysis System*. Edited by W. Coats, D. Laxton, and D. Rose. Prague, February 2003.

Ghosh, A., Phillips, S. (1998) *Warning: Inflation May Be Harmful to Your Growth*. Staff Papers, International Monetary Fund, Vol. 45 (December 1998), str. 672-710.

Král, P. (2001) Několik empirických poznatků o vztahu inflace a hospodářského růstu. *Národohospodářský obzor 3/2001*, str. 17 – 36. Brno a Opava 2001

Masson, P. R., Savastano, M. A., Sharma, S. (1998) Can Inflation Targeting Be a Framework for Monetary Policy in Developing Countries? *Finance&Development*, March 1998, str. 34-37.

DECISION MAKING

Preparing the Monetary Policy Decision in an Inflation-Targeting Central Bank: The Case of Sveriges Riksbank[28]

Per Jansson and Anders Vredin – Sveriges Riksbank

1. INTRODUCTION

Monetary policy can be described as a process consisting of a number of separate steps (see Figure 1).[29] Someone outside the bank provides the central bank's objectives. Inside the bank, analysis is followed by a monetary policy decision and then communication.

In practice, it is not so easy to separate these steps. For instance, a policy decision necessarily reflects an implicit objective, which usually is somewhat different, at least more precise, than the usually quite vague objective formally given to the central bank. This gives the central bank some room for discretionary policy and hence for deliberate or unintended "policy shocks". Furthermore, in a world of well functioning financial markets and well informed private agents, monetary policy essentially becomes a question of "management of expectations", since prices, interest rates; exchange rates etc. today are influenced by the levels of these variables expected for the future.[30] This makes communication, explanations of policy intentions, part of policy. Neither is there a simple causality from analysis to policy making. Policy makers determine the conditions for the analytical work by requiring certain topics to be investigated and also through the resources for research they make available.

In this paper, we will focus primarily on questions relating to the link between analysis and policy. Our main contribution is contained in Section 3, where we, on the basis of our experiences from Sweden, discuss what type of information about the economy the policy makers need in order to make appropriate decisions under inflation targeting.

We will however start, in Section 2, with a discussion of the role of other targets than price stability in an inflation-targeting regime. It is necessary to know what the aim is, and how to define "optimal monetary policy", before one can make the price-stability objective operational and put down requirements on information.

A central theme in our paper is that because policy makers' objectives are not exactly clear (in, e.g., legislation), because they do not know the links between monetary policy, inflation, and output exactly, and because they cannot make binding commitments to a desired policy rule, there is a large risk of policy mistakes and of low credibility for the central banks' intentions. This has led many central banks to express explicit inflation targets and to try to be as transparent in their communication as possible – as a way to minimise the risk of policy errors and low credibility. Many of the inflation-targeting central banks had a history of significant inflation bias before they moved to an inflation-targeting regime. Low initial credibility for the inflation target, combined

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28 The views expressed in this paper are the responsibility of the authors and are not to be regarded as representing the view of the Riksbank in the matters concerned.

29 This idea is also reflected in the programme for this conference.

30 This has recently been emphasised by Woodford (2003). The importance of expectations is however easy to understand already from a simple model of money market equilibrium. Using standard notation, the equality between money supply and money demand may be written as: $m(t) - p(t) = \alpha y(t) - \beta\{r(t) + E[p(t + 1) - p(t)]\}$ which can be used to solve the price level $p(t)$ as a function of future levels of the money stock m, aggregate income y, and the real interest rate r. Several interesting applications of this simple model are contained in Sargent (1992). See also the text book by Burda and Wyplosz (1997, Ch. 19) for open economy applications.

with the uncertainty about the exact objectives and the exact transmission mechanisms, have led the central banks to look for concrete and relatively simple principles that could serve as guidance when conducting monetary policy. The purpose of these simple principles has not been to make monetary policy optimal but to avoid the big policy errors of the past and promote the understanding of the ultimate intentions of policy.

Simplification however is a double-edged sword in this context. On the one hand, simple principles or rules imply more transparency in the sense that they are easy to understand and to evaluate. On the other hand, such rules are of course too simple to guide the conduct of monetary policy exactly in practice. Indeed, if the use of such rules leads to the conclusion that central banks intend to follow them exactly, then they probably will lower rather than enhance credibility and transparency.

This perspective leads to the conclusion that the policy of inflation targeting may be viewed as a compromise between simplicity and optimality (or, perhaps rather, avoiding doing what is obviously not optimal). In their general way of thinking, the inflation-targeting central banks are probably closer to the ideas embedded in the literature on optimal policy. They all stress that policy has to be pre-emptive, is endogenous, and contributes to good economic performance. But there are also elements of "simple rules"; no central bank has derived an optimal reaction function or said that it has ambitions to do so. If anything, something simpler is emphasised, often resembling a forward-looking Taylor-type rule. It is against this background that we discuss the information requirements that we think are appropriate in inflation targeting.

2. THE ROLE OF OTHER TARGETS THAN PRICE STABILITY

Explicit inflation targets are seldom part of the formal legislation for central banks, and when such targets are formulated in other documents they usually refer to targets for the "medium run" or the "long run". Central banks thus typically have considerable room to consider other targets than low inflation, at least in the short run.

The Riksbank's explicit inflation target is defined as an annual increase in the CPI of 2 per cent. The target is not part of the Riksbank Act decided by the parliament but has been defined by the bank itself. The Riksbank Act includes the following statements:

"… the Riksbank is responsible for monetary policy. The Riksbank may issue regulations within this area of responsibility. The objective of the Riksbank's operations shall be to maintain price stability. In addition, the Riksbank shall promote a safe and efficient payment system."

Among the OECD countries, Mexico's central bank has similar objectives, emphasising both price stability and an efficient payment system. In about half of the OECD countries, price stability is declared as the primary goal for monetary policy, while the remaining countries have laws implying broader objectives (see Pringle and Courtis, 1999).

When it comes to the practical implementation of monetary policy, it is generally agreed that policy – both in countries with and without explicit inflation targets – is affected by other variables than inflation. Central banks have however not been very transparent about the importance of price stability vis-à-vis other targets. The following critique was expressed by Fischer (1996):

"Central bankers have a tendency to say that price stability should be the only goal of monetary policy, and to shrink from the point that monetary policy also affects output in the short run. That is not hard to understand, for explicit recognition of the powers of countercyclical monetary policy encourages political pressures to use that policy, with the attendant risk that inflation will rise. But it is also problematic and destructive of credibility to deny the obvious, as well as to undertake countercyclical policies while denying doing so."

A similar critique against monetary policy and communication in inflation-targeting countries has recently been expressed by Faust and Henderson (2003).[31] In the case of Sveriges Riksbank, policy makers have however explicitly expressed that short-run deviations from the inflation target may be justified by concerns for real stability (Heikensten, 1999). The bank has nevertheless experienced some difficulties when trying to explain why the interest rate has been kept unchanged despite large fluctuations in the inflation rate. This happened for instance when the CPI fluctuated heavily during 2003–2004 because of shocks to electricity and oil prices. We will discuss such matters in more detail in Section 3. In that section we will discuss more generally how a central bank with an inflation target deliberately may choose to accept deviations from that target, i.e., how the development of other variables than inflation can be taken into account when conducting monetary policy.

Two distinctions are important to keep in mind in discussions of the role of other targets than price stability. The first concerns the difference between an *objective function* and a *reaction function*. It is well known that even if the central bank pursues "strict" inflation targeting in the sense that its only objective is to minimise fluctuations in inflation, monetary policy decisions should be affected by other variables than inflation. For instance, the central bank may want to raise the interest rate when GDP grows unusually fast if this is associated with expectations about higher future inflation. For an outside observer it will, however, in practice, be difficult to tell whether a response to GDP is consistent with "strict" inflation targeting or whether it reflects that the central bank is "flexible" in the sense that it also has other objectives than price stability. Another important distinction concerns whether the objective of the central bank should be to *maximise welfare* of the representative individual, or whether it should have a much less ambitious goal to just *minimise policy errors*. The former optimal control approach is characteristic of much recent academic work on monetary policy and inflation targeting, e.g., Giannoni and Woodford (2003) and Svensson (2003). The latter approach seems to lie behind the simple policy rules advocated by, e.g., Friedman (1948, 1959) and Taylor (1993).

The differences between objective functions and reaction functions and between optimal control and simple rules are crucial for practical policy. Policy makers frequently face the question whether they should let the policy instrument respond to the development of other variables than inflation, such as GDP, unemployment, wages, stock prices, exchange rates, and credit. The optimal control approach typically leads to the conclusion that the central bank should "look at everything" (even if it has an objective function characterised as "strict" inflation targeting). If, on the other hand, it is believed that the risk of policy mistakes is large, one may recommend simple reaction functions according to which the money supply or the interest rate should respond only to a very limited set of macro variables. It is not difficult to understand that a policy that may be optimal under ideal circumstances may not be feasible in practice.

It should be stressed that the optimal control approach has produced many important insights that are of practical value for monetary policy. (Any normative discussion of course has to be based on an assumed objective function and not on a given, necessarily rather arbitrary, simple reaction function.) It has been used to show how different assumptions about the economy affect the conclusion about what is an optimal policy. It has also been used to suggest ways to bring policy as close to the optimal as possible, if the ideal strategy is for some reason not feasible.

For instance, Giannoni and Woodford (2003) suggest that even if the central bank wants to maximise the welfare of the representative individual, the relative weight given to output stability in the central bank's objective function should probably be very low. On the other hand, the strong preference for interest

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31 An earlier version of this paper had a section that discussed the Faust-Henderson critique of inflation targeting at some length. Because the discussion was based on an early draft of their paper (which now has been considerably revised, see Faust and Henderson, 2004) and because it did not directly relate to our main contribution we decided on deleting that section from this version of our paper.

rate smoothing that central banks typically reveal can be justified on welfare-theoretic grounds.[32] Giannoni and Woodford derive their conclusions from a model where it is assumed that the central bank can make binding commitments to the first-best optimal policy. This implies a large degree of "history dependence" in policy, and optimal policy may be described as price-level targeting, rather than inflation targeting. The reason is that credible promises about future policy stabilise the private sector's expectations today, and therefore (with the usual assumptions about how the economy works) the whole economy.

The question whether central banks can, in practice, make credible promises to adhere to certain policy rules (simple as in the case of, e.g., Taylor, 1993, or complex as in the cases of, e.g., Giannoni and Woodford, 2003, and Svensson, 2003) is somewhat controversial. The rules-versus-discretion analyses undertaken by Kydland and Prescott (1977) and Barro and Gordon (1983) were based on the assumption that policy makers are unable to commit their course of future actions. This inspired a large literature about how one may create incentives for a central bank that pursues a discretionary policy to act as if it were following the first-best policy under commitment.[33] Rogoff (1985) interpreted the practice to appoint "conservative" central bankers (with a larger weight on price stability in their objective function than society at large) as an attempt to lower the costs of discretionary policy. The current practice of inflation targeting has received much inspiration from this type of research. The use of explicit inflation targets and the emphasis on transparency and accountability has been ways to bring actual policy closer to the policy that would have been optimal if commitment were possible.

One problem that probably is very important for policy makers in practice is that if the optimal policy under commitment is not, for various reasons, a feasible option, there are numerous ways to bring policy closer to the optimal strategy. Targets for nominal variables like the money stock, nominal wages, or exchange rates may for instance increase the degree of "history dependence" in policy (for some work done at the Riksbank in this area, that also contains further references, see Adolfson, 2002, Söderström, 2004, and Nessén and Vestin, 2004). One strand of the academic literature makes the following thought experiment: suppose the central bank is forced to follow a very simple instrument rule defined in terms of only a few explanatory variables. Which simple rules are preferable, given that we know which objective function that describes society's welfare? Rudebusch and Svensson (1999) compared various inflation-targeting rules using this approach.[34] This is obviously a compromise between the two extreme strategies of maximising the representative individual's welfare and minimising policy errors. We also believe that this comes close to describing what central banks are trying to do in practice. They are looking for rules that are simple enough to follow and verify, yet sophisticated enough to come close to the policy that would be optimal under ideal circumstances. Inflation targeting must be evaluated against this background. To criticise inflation-targeting practices on the grounds that they do not maximise the welfare of the representative individual misses the point that history is full of examples of how high ambitions for central banks (many targets) have led to bad outcomes (see, e.g., Orphanides, 2004).

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32 Interestingly, Söderström, Söderlind, and Vredin (2002) suggest that the Fed's policy can be characterised as a policy which attaches relatively large weight to interest rate stability and relatively low weight to output stability.

33 Somewhat paradoxically, some of the proposed "solutions" to the problem that central banks cannot make binding commitments have been to suggest that central banks should make binding commitments! This inconsistency was pointed out by Barro and Gordon (1983): "The rules-type equilibrium … is often referred to as the optimal, but time-inconsistent solution … On the other hand, the discretionary equilibrium … is often called the suboptimal, but time-consistent, solution. This terminology is deceptive in that it suggests that these decision rules represent alternative solutions to the same problem. Though the objective function and decision rules of private agents are identical, the problems differ in the opportunity sets of the policymaker. In one case, constraints on future policy are infeasible, by assumption. In the other case, rules are enforceable, so that the policymaker can commit the course of future policy (and thus of expectations). In the former case the time-inconsistent solution is not equilibrium, given the problem faced by the policy maker. In the latter case, the incentives to deviate from the rule are irrelevant, since commitments are assumed to be binding. Thus, the time-inconsistency of the optimal solution is either irrelevant – when commitments are feasible – or else this solution does not solve the problem actually faced by the policymaker."

34 Note that this exercise runs into the problem mentioned in the previous footnote, since the central bank is assumed to be able to commit to a simple Taylor-type rule.

Inflation targeting may thus be viewed as a way to (i) increase the credibility of the price-stability objective in a situation where fully binding commitments are not feasible; and (ii) allow some room for short-term targets for other variables than inflation. Fischer (1996) emphasised that the goal should be long-run price stability and that temporary deviations from the inflation target should be connected to supply shocks in particular:

"The statement that *long-run* price stability is the sole goal of monetary policy is best understood as an attempt to deal with some of the logical and political difficulties raised by the existence of the short-run tradeoff. Policymakers do two things by emphasizing the long-run: they allow themselves a little leeway for short-term countercyclical policy; and they remind proponents of short-term expansionary policies that the short- and long-run consequences of monetary expansion differ … Targeting inflation does not have to mean targeting only inflation. Countercyclical monetary policy should be allowed to work … It is necessary in the case of supply shocks to find a mechanism that will permit a temporary deviation from target."

This discussion leads us to the following conclusions. First, the policy of inflation targeting has been developed to emphasise the central banks' responsibility for price stability and to increase the credibility of that objective. It has not been designed as a solution to a situation where the central bank is trying to find the optimal way to maximise the representative individual's welfare. Second, optimal control models are nevertheless of practical use, since they can help us evaluate various more realistic, but sub-optimal, alternative policy strategies. The literature on optimal control, e.g., suggests that the weight given to output stability should be relatively low, in relation both to price stability and interest rate stability. Third, neither academic research nor practical experiences suggest that central banks should have targets for inflation only. But neither is it absolutely clear exactly how central banks with explicit inflation targets should take other variables than inflation into account. In the next section we describe the Swedish experiences and ways we believe would improve the analytical basis for policy decisions and communication.

3. INFORMATION REQUIREMENTS IN INFLATION TARGETING

Having described inflation targeting as a compromise between simplicity and optimality (or, perhaps rather, avoiding doing what is obviously not optimal), the question is what this implies regarding the information that is required to conduct the policy. On the one extreme we have the "Friedman case" where monetary policy follows a very simple rule and essentially is exogenous with respect to the development of the economy. In that case, and in the case of slightly more complicated (but still simple) Taylor-type rules, there is rather little information requirement. On the other extreme we have the full-fledged optimal control approach where a considerable amount of information (including a very good understanding of how the economy works) is required.

In their general way of thinking, the inflation-targeting central banks are probably closer to the optimal control framework.[35] They all stress that policy has to be pre-emptive, is endogenous, and contributes to a good economic development. But there are also elements of "simple rules"; no central bank has derived an optimal reaction function or said that it has ambitions to do so. If anything, something simpler is emphasised, often resembling a forward-looking Taylor-type rule.

Sveriges Riksbank is a good example. It has on several occasions stressed that monetary policy under normal circumstances is based on the inflation forecast one to two years ahead. The following quotation is from the Inflation Report in October 1999, but similar formulations have been expressed both before and after that:

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35   This is in line with Archer's (2003) description of monetary policy in New Zealand.

"… if the overall picture of inflation prospects (based on an unchanged repo rate) indicates that in twelve to twenty-four months' time inflation will deviate from the target, then the repo rate should normally be adjusted accordingly."

When examining the relation between the policy rate and the bank's forecast of inflation two years in the future, it indeed turns out that there is a clear correspondence between these quantities (see Figure 2). But in policy discussions it is also often asked whether the decisions should take other variables into account, e.g., unemployment, productivity, wages, stock prices, house prices, etc. It should thus come as no surprise that it turns out that other variables, over and above the forecasts of inflation one and two years ahead, contain information that explains the Riksbank's policy moves (see Table 1; see also Kuttner, 2003).

So, as concerns information requirements the optimal control framework probably tells more about what the inflation-targeting central banks need than the simple rule (Friedman-Taylor) framework. But, as will become clear, we believe that central banks have a tendency to look at too many variables and that it is possible to narrow down the information set that is relevant for the policy decision. This again reflects our belief that inflation targeting is best described as a procedure in-between an ambition to maximise the representative individual's welfare and avoiding big policy mistakes.

In describing the information that we believe is necessary to undertake good monetary policy we will emphasise the importance of forecasts, derived from an approach that integrates models and judgements by sectoral experts. These forecasts are conditional on a certain policy choice that is (most likely) not optimal but perceived as reasonable in light of the banks' targets. Also, the forecast horizon is long enough to illustrate the trade-offs that the policy implies and to make sure that the target variables converge smoothly to their desired levels. And, the robustness of the forecast with respect to alternative policy choices and other important conditioning assumptions is investigated.

3.1 Forecast-based monetary policy

As mentioned previously, all inflation-targeting central banks emphasise that policy has to be forward-looking. Empirical work supports this since it turns out that simple policy rules that are based on the current state of the economy are too aggressive relative to what the central banks actually do (see Figure 3). Also, to get a good empirical description of policy (ex post) it is important to allow for interest rate smoothing and to estimate (rather than calibrate) the (forward-looking) policy rule.[36]

There are several reasons why the central banks look at forecasts. One is that it takes some time for policy to affect the economy. This seems clear although the banks often give an impression to know more about the time lags than they actually do (see Figure 4). Another is that this is a way to implicitly put some weight on real stability; looking at the inflation forecast rather than actual inflation allows some temporary supply shocks to occur without any policy response.

But the forecast horizon that is used is often too narrow to take care of all the temporary effects that affect inflation but that the central banks do not wish to counteract. The banks therefore sometimes use measures of inflation that exclude certain specific components of the headline index, so-called core inflation measures. Figure 5 depicts three different measures of core inflation that are repeatedly used by the Riksbank (the measures

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36   While the importance of being forward-looking seems undisputed at a general level, not all inflation-targeting central banks actually publish their real-time forecasts of inflation and other macro variables. Doing so is important for making analyses and evaluations of monetary policy possible (see Jansson and Vredin, 2003). In the longer run, it may also have negative effects on credibility not to do so.

used by other central banks are similar). To base policy on core inflation measures is thus another way of putting some weight on the stabilisation of the real economy (as are escape clauses and target intervals of the kind used by, e.g., the Reserve Bank of New Zealand).

But there are some problems with measures of core inflation. Central banks often wish to identify how different shocks affect inflation but these shocks are seldom in a straightforward manner related to the components of the inflation index (which are removed or re-scaled when constructing measures of core inflation). Furthermore, the procedure of excluding certain components of inflation only will contribute to stabilising the real economy under certain circumstances. This is the case if the excluded component is related to a supply shock but not if it is related to a demand shock, in which case the procedure instead will have a destabilising effect on the real economy (the changed demand pressure would have been counteracted by a change in the interest rate if the component would not have been excluded from the index). Matters become even more complicated if we allow for the possibility of an initial disequilibrium situation. In that case, the procedure may not have any stabilising effects on the real economy even if the change is related to a supply shock. If for example a negative supply shock occurs in a situation when the economy is overheated, then it may be better to raise the interest rate in order to bring the real economy even closer to equilibrium. As an illustration of the different problems we have computed the difference between Swedish CPI inflation and one of the core measures used by the Riksbank (UND1X excluding energy and food) and plotted this difference along with a measure of demand pressure (see Figure 6). As is vividly depicted by the figure, the correlation between the two series varies a lot over time, lending support to our presumption that the removed components are related both to changes in demand and supply.[37]

At a general level, the basic problem boils down to judging whether a particular change in inflation is predominantly temporary or permanent. The question then is whether measures of core inflation help the central bank in that analysis. We think that there are reasons to deal carefully with such measures in this context. The strategy of identifying "permanent" inflation by removing different sub-components of the overall inflation index obviously runs the risk of removing too much. This is the case under the very general assumption that different prices in the economy are affected by both short-lived and more long-lasting shocks. An interesting example is the development of CPI inflation in Sweden 2001–2002. During that period, inflation increased from around 1.5 per cent to more than 3 per cent. The Riksbank's analysis suggested that the upturn was due to specific events such as mad cow and foot and mouth diseases, and that inflation soon would decrease again (see Figure 7). As it happens, inflation indeed decreased after a few months, but not to the extent anticipated by the Riksbank (the forecast was lower than the outcome even after the decrease). The Riksbank thus correctly analysed the inflation upturn as being basically a temporary phenomenon, but somewhat over-estimated the temporary component. As is obvious from Figure 5, measures of core inflation were not very useful in this particular case; these measures all identified the upturn as a persistent phenomenon.

3.2 Models and forecasting

It is an empirical fact that many macro variables can be rather successfully forecasted using a random walk. But the problem with a random walk model, and other models that do not make assumptions about the structure of the economy, is that it is very difficult to explain and understand the forecast. It is therefore also difficult to define and explain desired policy on the basis of these forecasts. Pure forecasting models that are known to generate forecasts with small errors are a complementary tool in good monetary policy analyses but cannot substitute for equilibrium models that make explicit assumptions about the structure of the economy and give suggestions about what should be done with the interest rate. Such models are also needed if we wish to analyse the effects of alternative policy choices.

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37   The concept of core inflation (and various problems associated with it) is discussed in Apel and Jansson (1999) and Söderström and Nessén (2000).

There are also other reasons why the forecasting process should use a good general equilibrium model as an aid. Purely judgemental forecasting procedures quickly become very inefficient. They involve many people of the staff, imply difficult coordination problems, and become intractable when many scenarios (e.g., based on different assumptions about policy) need to be handled. In contrast, if the benchmark forecasts are derived using an economically interpretable model, this involves only very few of the staff members, ensures theoretical consistency by construction, and implies that alternative scenarios are computed easily and quickly. Moreover, a good model will serve as a learning and communication device for the staff, constantly challenging the prevailing mode of thinking and forcing the staff to review crucial assumptions and relationships that are underlying the forecast.[38]

But models cannot, of course, replace judgements and sectoral experts, who have special information about the economy that cannot be captured in any specific model. Indeed, the full benefits of a model are probable gained when it is used in combination with judgements. A forecasting procedure that emanates from an interpretable model forecast has a solid ground to stand on, a broad consistent picture of expected economic developments. This can be used by the sectoral experts, who may adjust the model forecast using their special knowledge of different events.

The judgements by the experts can be stored in a database and be analysed later to see if they contributed to improve the quality of the forecast. In this way, the model-based analyses and sectoral experts are integrated in a useful way, and the forecasting procedure becomes structured and documented. This procedure also acknowledges the evidence that model-based forecasts and judgements seem to have complementary characteristics; while model-based forecasts appear to be less biased than judgemental forecasts in environments where the macro economy evolves in a stable manner, i.e. when it is affected by normal business cycle fluctuations, judgements seem to be more useful after unusual events, such as regime shifts (see Figure 8).

The efficiency gains of using a model are also clear when it comes to the issue of the forecasting horizon. If the forecast is purely judgemental, then it becomes very difficult to make predictions at longer horizons. The sectoral experts often have strong views on short-run developments but seldom express opinions about the longer run. Usually, the central banks motivate their rather short forecasting horizon (typically around two years) with their belief that this is the horizon at which monetary policy can affect inflation. But as previously argued the empirical evidence is not very conclusive as concerns the lags in the effects of monetary policy. Furthermore, the argument becomes inconsistent when the view is taken that monetary policy has multiple targets (more variables than just inflation in the objective function) that create trade-offs in the conduct of policy. With concerns for real stability, good monetary policy should not aim at fulfilling a specific inflation target at some horizon exactly, but should make sure that inflation converges smoothly to the target rate in the long run.[39] Thus, even if it is true that the maximum effect of policy occurs, say, two years ahead, the optimal policy is not to hit the target exactly in two years time. As it happens, if the forecasting procedure is model-based, it is (at least technically) very easy to extend the forecasting horizon to any desirable length. Moreover, there are reasons to believe that equilibrium models have interesting messages to tell about economic developments in the longer run.

In addition, extending the forecasting horizon decreases the need of using measures of core inflation in combination with forecasts. The full path of expected (headline) inflation contains all the information needed to get a clear picture of what the temporary effects are that currently affect, and are expected to affect, the inflation rate. Needless to say, this does of course not mean that analyses of various sub-components of the headline index become superfluous. Such analyses may still generate important information that is useful, in particular for purposes of better understanding price developments at the disaggregate level.

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38 Our impression is that models are used in a very efficient way for such purposes at the Reserve Bank of New Zealand.
39 See also Faust and Henderson (2003) and Apel, Nessén, Söderström, and Vredin (1999).

As discussed previously, a model also makes it possible to vary the assumptions that are made about monetary policy. With the view taken that monetary policy reacts endogenously to changes in the economy, there must be a policy reaction function that specifies how this occurs. Although this reaction function may not describe the optimal way to design monetary policy, it should give a "reasonable" description of policy and summarise the bank's beliefs about what is good monetary policy. That reaction function can of course be varied, either by changing the response coefficients or including/excluding certain response variables. In this way, different scenarios with different assumptions about policy are easily generated. Figure 9 gives an example using an equilibrium model recently developed at the Riksbank (see Adolfson, Laséen, Lindé, and Villani, 2004). Again, this is a point on which purely judgemental procedures often fall short. It becomes very complicated to derive many scenarios based on different assumptions about policy.

The assumption of an unchanged policy rate may at first glance appear rather innocent and natural from the point of view of decision making (the forecast becomes predetermined with respect to the policy rate). But the assumption is actually quite problematic. First, over a time period that is long enough (e.g., one to two years), it is a very unnatural path for policy. That the assumption indeed is quite unnatural is underscored by the fact that many models (eventually) break down if a constant policy rate is imposed. If the assumption is imposed temporarily (that is, policy is allowed to react to the economy after some time), then the model may not break down but the results often look very strange, even if the assumption is only maintained for a relatively short period of time (see Figure 10 for an illustration).[40] This makes forecasting of inflation and other variables very difficult. Since it is very hard to condition a forecast on a particular policy assumption (or any other assumption) without the use of a formal model, the difficulties can be expected to be even greater if the forecasting procedure is largely judgemental.

Furthermore, it becomes hard to undertake evaluations of the forecasts ex post. Since the policy assumption is unnatural, the forecasts are expected to be biased and are not intended to minimise any MSE. Therefore, to assess the quality of the forecasts, it is necessary to somehow adjust them in light of the changes of the policy rate that actually have occurred (or assume that monetary policy does not have any effects at all). But this requires detailed knowledge of the effects of monetary policy, which – as emphasised previously – is something that we do not possess.

Finally, a model is a useful device in helping identifying the relevant variables to be forecasted. Typically, central banks report a huge array of statistics in their Inflation Reports (see Leeper, 2003). Anybody who has participated in, or has had the opportunity to listen to, a policy discussion by policy makers knows that the information that eventually is important for the decision on the policy rate is far more limited than that presented in the banks' Inflation Reports. Svensson's model of optimal monetary policy implies that the policy rate is a function of everything that affects the target variables (inflation and the output gap). But this does not mean that it is necessary to report outcomes and forecasts of every single variable of the macro economy. In principle, a focused discussion related to the expected development of the target variables (inflation and some measure of real activity) as well as the policy rate should cover most aspects that are of interest when analysing and explaining policy. Interestingly, there is information that should be very important for deciding on, and understanding, policy that is not given much attention in the banks' Inflation Reports. This information relates to alternative scenarios for policy and important determinants of the target variables. It is clear that information of this type is discussed internally during the preparation of the forecasts, but including at least some of it in the Inflation Report would certainly make it easier for outsiders to understand the bank's reasoning and policy choices. All this is facilitated once a good equilibrium model is an integral part of the forecasting process.

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40   See Honkapohja and Mitra (2004), Vredin (2003), and Leeper and Zha (2003) for related discussions.

While we believe that the tradition of deriving the forecast judgementally (that is, without any model that helps in identifying the most relevant variables) is one reason why central banks look at so many variables, we also believe that there are other reasons. "Conservative" central banks are often subject to criticism by the Press, politicians, economists, and business people. This may be one reason why the central banks historically have been rather opaque and reluctant to reveal "secrets of the temple". It may also, at least to some extent, be an explanation for the banks' tendency to report so many statistics. Of course, being well informed about the development of only a couple of macro variables in some model is not to the purpose either (and would certainly affect the banks' credibility in a negative way). But, given the number of variables that is at present covered in the typical Inflation Report, it should certainly, in the case of most banks, be possible to narrow down the information set considerably. To the extent that there is a need to discuss and report facts about data that are not directly relevant for the decision on monetary policy, there is also the possibility of handling this in other kinds of reports, e.g., in internal staff reports or special statistics reports.

3.3 Decision making and procedural aspects

To summarise the discussion so far, many central banks use a forecasting procedure that relies heavily on judgements of sectoral experts, conditions the forecast on an assumption of an unchanged policy rate, emphasises a particular, rather short, forecast horizon (typically two years), and discusses and makes forecasts of a huge number of macro variables in one single scenario. As is clear from our discussions, we believe that this procedure has drawbacks and does not constitute the best possible way of informing policy makers. Instead, we emphasise a procedure that relies both on models and judgements, in particular good equilibrium models that can be used to derive economically interpretable benchmark projections which serve as a starting point for the sectoral experts when they use their judgements.[41] In this procedure, monetary policy is endogenous and the forecasts are derived using different reasonable assumptions of policy choices. Furthermore, the forecast horizon should be prolonged so that the policy trade-offs become clear and that it is possible to judge if the target variables converge smoothly to their targets. Also, the discussion should be more focused, concentrating on the variables that matter most and considering different scenarios where policy assumptions and other important assumptions are varied.[42]

As mentioned previously, one reason why forecasting procedures based on unchanged policy rates have become popular is that they create a logical structure in the process of relating the forecast to policy; the forecast is computed first, and then the decision on policy is made and there is no feedback to the forecast. If the forecast instead were based on endogenous monetary policy, this would make the process more complicated. The main scenario in the Inflation Report would presumably be the scenario for policy that the bank perceives as being the one that best fulfils the bank's targets.[43] This probably requires an iterative process between policy makers and forecasters (provided the policy makers do not themselves construct the forecast) adjusting both the policy choice and the forecast until "convergence" is reached.[44]

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41 As discussed earlier, other kinds of models should be useful in this procedure as well; e.g., Bayesian VARs or more forecast-oriented time-series models. As shown in Jacobson, Jansson, Vredin, and Warne (2001, 2002) VAR models are useful not only for forecasting purposes but also for analyses of structural issues, e.g., related to monetary policy. Villani (2001) uses the VAR of Jacobson, Jansson, Vredin, and Warne (2001) to show that its forecasting performance can be improved by imposing Bayesian prior restrictions.

42 Svensson (2003) and Sims (2002) discuss similar aspects.

43 Here we thus assume that the information used by the central bank in *communication* (externally) and in *decision making* (internally) coincides. Although we believe that this indeed should be the case under ideal circumstances (more on this below), it should be stressed that it in principle is possible to separate the information used in communication and decision making. The important thing from our perspective is that *internal decision making* is based on at least one forecasting scenario that uses an (empirically) realistic policy assumption that comes close to what the bank conditionally expects future policy to look like.

44 This is approximately the procedure applied at the Reserve Bank of New Zealand. There, the procedure is facilitated by the fact that the policy decisions are made by a single person, the Governor. At the Riksbank, the policy decisions are made by an Executive Board that has six members. This makes the procedure somewhat more complicated.

Although this is indeed a more complicated process we do not believe that the problems become unbridgeable. The process could look something like the following. At the beginning of the forecasting round the staff meets with the policy makers to broadly identify some reasonable trends for policy and other crucial conditioning assumptions (e.g., economic growth in other countries, assumptions regarding the oil price, fiscal policy, etc). Based on this, the staff computes full paths for policy (using different reaction functions and other information to "fill in the gaps") together with corresponding forecasts (possibly judgementally adjusted) for the key macro variables (the most important ones being inflation and real activity, e.g. the output gap or unemployment). At this stage, the staff also computes a number of alternative scenarios that highlight the effects of varying the other crucial conditioning assumptions (if necessary in combination with changes to the policy assumption). The results are explained and reported to the policy makers (possibly in a special staff report) who pick a preferred scenario, possibly making some further adjustments to policy and/or forecasts. This scenario is the main scenario of the Inflation Report. The alternative scenarios (at least some of them) could (and indeed should) also be presented and discussed in the Inflation Report.

A potential problem, often emphasised by policy makers, is that conditioning a forecast on something else than an unchanged policy rate makes it necessary to be explicit about ones expectations of future policy. This is perceived as a problem because these expectations will change over time, as the economy is hit by different shocks. The policy choice will thus need to be adjusted over time and this may be difficult to explain to market participants. While it is true that the policy choice will need to be adjusted over time, it is not clear – at least not to us – why this is a problem. Like the forecast, the policy choice is conditional and there is no reason to believe that it is more difficult to explain why the policy choice changes over time than why the forecast does. Indeed, a few years ago, the same arguments occurred against publishing the forecast. As far as we know, no market participant found it particularly difficult to understand that the forecast was revised in light of changing economic conditions. Furthermore, complementing the expected paths of the target variables with the associated expected path of policy is the essence of "management of expectations". By doing this, the discussions about how "signals" and "biases" indicating plans for future policy should be formulated become redundant. Nevertheless, if the policy makers really find it that problematic to show their expected path for policy, there are methods that during a transitional period could be used to inform the market gradually. Such methods involve, e.g., showing only a truncated path for the policy rate (perhaps only for the current quarter) or averages over time to make shifts appear less dramatic (mean values of the policy rate or interest rates for maturities at somewhat longer horizons[45]).

Another aspect that may deserve special attention concerns how policy makers pick their "preferred scenario". At the Riksbank, the procedure of looking at a forecast at a certain horizon (under the assumption of an unchanged policy rate) has been used for purposes of bringing order and clarity into the monetary policy decision process. It may be argued that a procedure that instead looks at the whole expected path of inflation (and perhaps real activity) runs the risk of making the policy discussion unfocused and less to the purpose. Under such circumstances, there may even be a risk that policy makers feel tempted to undertake inflationary "policy shocks" (i.e., to create an inflation bias in the Kydland-Prescott, Barro-Gordon sense). It is however possible that these risks are somewhat exaggerated, for several reasons. First, the traditional time-inconsistency problem may not be that relevant for the modern, politically independent central banks. For these banks, price stability over the medium term is a genuine objective and there is little reason to believe that they are striving after some other goals that are inconsistent with that objective. Second, the argument that the policy discussion would become confused and unfocused "forgets" that these paths are derived conditional on a certain assumption regarding policy; that is, once policy makers have agreed on the desired paths for inflation (and real activity), they implicitly also have agreed on what policy they should conduct today and expect themselves to conduct in the future. If anything, the connection between the forecast and policy is in this case tighter, since the policy measures are

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45 The Reserve Bank of New Zealand shows the 90-day interest rate. We do not know, of course, if the reason for this is related to the aspects that we discuss.

numerically quantified and it is recognised that both current and future policy matters. This being said, the question of how to bring order and clarity into a monetary policy decision that is made by a board that consists of several members is in practice not a trivial issue and probably needs to be resolved in light of specific circumstances that prevail (e.g., the country's historical experiences in the field of stabilisation policy).

4. CONCLUDING REMARKS

In this paper we take the perspective that the policy of inflation targeting reflects a compromise between simplicity and optimality (or, perhaps rather, avoiding doing what is obviously not optimal). In their general way of thinking, the inflation-targeting central banks are probably closer to the ideas embedded in the literature on optimal policy. They all stress that policy has to be pre-emptive, is endogenous, and contributes to good economic performance. But there are also elements of "simple rules"; no central bank has derived an optimal reaction function or said that it has ambitions to do so. If anything, something simpler is emphasised, often resembling a forward-looking Taylor-type rule.

The tension between simplicity and optimality is well illustrated by the fact that the inflation-targeting central banks constantly ask themselves whether they should let policy respond to other variables than inflation, such as output, unemployment, wages, asset prices, credit, etc. This is in line with the principle of "looking at everything" that is central in the theory of optimal monetary policy. On the other hand, "looking at everything" makes policy very complicated and difficult to understand. It also makes the analysis that is needed as an input to the policy decisions very complex and eventually perhaps less focused.

These types of considerations lead us to conclude that the information that is required in inflation targeting should be rich enough not to make the policy decisions obviously non-optimal but, at the same time, focused enough not to make the decisions intractable and hard to understand. In describing this information we emphasise the importance of forecasts, undertaken for the variables that are at the centre of the policy discussion. These forecasts are derived from an approach that combines models and judgements by sectoral experts in a structured and documented way, and are conditional on a certain policy choice that is perceived as reasonable. Furthermore, the forecast horizon is long enough to illustrate the trade-offs that the policy choice implies and to make sure that the target variables converge smoothly to their desired levels. Also, the robustness of the forecast with respect to alternative policy choices and other important conditioning assumptions is investigated.

References

Adolfson, M. Implications of Exchange Rate Objectives under Incomplete Exchange Rate Pass-Through, Sveriges Riksbank Working Paper Series, No. 135, 2002.

Adolfson, M., Laséen, S., Lindé, J., Villani, M. Derivation and Estimation of a DSGE Open Economy Model with Incomplete Pass-through, work in progress, Sveriges Riksbank, 2004.
Apel, M., Jansson, P. A Parametric Approach for Estimating Core Inflation and Interpreting the Inflation Process, Sveriges Riksbank Working Paper Series, No. 80, 1999.

Apel, M., Söderström, U., Nessén, M., Vredin, A. Different Ways of Conducting Inflation Targeting – Theory and Practice, *Sveriges Riksbank Economic Review* 4, 1999.

Archer, D. Are the Policy Rules Proposed in the Literature Good Enough for Practical Use? unpublished manuscript, Reserve Bank of New Zealand, 2003.

Barro, R., Gordon, D. A Positive Theory of Monetary Policy in a Natural Rate Model, *Journal of Political Economy* 91, 1983.

Berg, C., Jansson, P., Vredin, A. How Useful Are Simple Rules for Monetary Policy? The Swedish Experience, work in progress, Sveriges Riksbank, 2004.

Burda, M., Wyplosz, C. *Macroeconomics – a European text*, Oxford University Press, second edition, 1997.

Faust, J., Henderson, D. Is Inflation Targeting Best-Practice Monetary Policy? Unpublished manuscript, Federal Reserve Board, 2003.

Faust, J., Henderson, D. Is Inflation Targeting Best-Practice Monetary Policy? Federal Reserve Bank of St. Louis Review 86(4), 2004.

Fischer, S. Why Are Central Banks Pursuing Long-Run Price Stability?, in *Achieving Price Stability*, A Symposium Sponsored by The Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, 1996.

Friedman, M. A Monetary and Fiscal Program for Economic Stability, *American Economic Review* 38, 1948.

Friedman, M. *A Program for Monetary Stability*, Fordham University Press, New York, 1959.

Giannoni, M., Woodford, M. Optimal Inflation Targeting Rules", NBER Working Paper 9939, 2003.

Heikensten, L. The Riksbank's Inflation Target – Clarification and Evaluation, *Sveriges Riksbank Quarterly Review* 1, 1999.

Honkapohja, S., Mitra, K. Performance of Inflation Targeting Based on Constant Interest Rate Projections, forthcoming, *Journal of Economic Dynamics and Control*, 2004.

Jacobson, T., Jansson, P., Vredin, A., Warne, A. Monetary Policy Analysis and Inflation Targeting in a Small Open Economy: A VAR Approach, *Journal of Applied Econometrics* 16, 2001.

Jacobson, T., Jansson, P., Vredin, A. Warne, A. Identifying the Effects of Monetary Policy Shocks in an Open Economy", Sveriges Riksbank Working Paper Series, No. 134, 2002.

Jansson, P., Vredin, A. Forecast-Based Monetary Policy: The Case of Sweden, *International Finance* 6:3, 2003.

Kuttner, K. The Role of Policy Rules in Inflation Targeting, unpublished manuscript, Federal Reserve Bank of New York, 2003.

Kydland, F., Prescott, E. C. Rules Rather than Discretion: The Inconsistency of Optimal Plans, *Journal of Political Economy* 85, 1977.

Leeper, E. Inflation Reports Report, Sveriges Riksbank Economic Review 3, 2003.

Leeper, E., Zha, T. Modest Policy Interventions, *Journal of Monetary Economics* 50:8, 2003.

Nessén, M., Vestin, D. Average Inflation Targeting, forthcoming, *Journal of Money, Credit and Banking*, 2004.

Nilsson, C. RIXMOD – The Riksbank's Macroeconomic Model for Monetary Policy Analysis, *Sveriges Riksbank Economic Review* 2, 2002.

Orphanides, A. Monetary Policy Rules, Macroeconomic Stability and Inflation: A View from the Trenches, forthcoming, *Journal of Money, Credit and Banking*, 2004.

Pringle, R., Courtis, N. *Objectives, Governance and Profits of Central Banks*, Central Banking Publications, London, 1999.

Rogoff, K. The Optimal Degree of Commitment to an Intermediate Monetary Target, *Quarterly Journal of Economics* 100, 1985.

Rudebusch, G., Svensson, L. Policy Rules for Inflation Targeting, in J. Taylor, ed., *Monetary Policy Rules*, Chicago: University of Chicago Press, 1999.

Sargent, T. *Rational Expectations and Inflation*, New York: Harper and Row, second edition, 1992.

Sims, C. The Role of Models and Probabilities in the Monetary Policy Process, *Brooking Papers on Economic Activity* 2, 2002.

Smets, F., Wouters, R. An Estimated Stochastic Dynamic General Equilibrium Model of the Euro Area, Working Paper, No. 171, European Central Bank, 2003.

Svensson, L. What is wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules, *Journal of Economic Literature* 41, 2003.

Söderström, U. Targeting Inflation with a Role for Money, forthcoming, *Economica*, 2004.

Söderström, U., Nessén, M. Core Inflation and Monetary Policy, Sveriges Riksbank Working Paper Series, No. 110, 2000.

Söderström, U., Söderlind, P., Vredin, A. Can a Calibrated New-Keynesian Model of Monetary Policy Fit the Facts? Sveriges Riksbank Working Paper Series, No. 140, 2002.
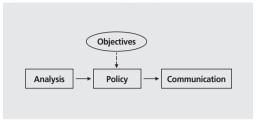
Taylor, J. Discretion versus Policy Rules in Practice, *Carnegie-Rochester Conference Series on Public Policy* 39, 1993.

Villani, M. Bayesian Prediction with Cointegrated Vector Auto regressions, *International Journal of Forecasting* 17, 2001.

Vredin, A. Comments on Performance of Inflation Targeting Based on Constant Interest Rate Projections by Seppo Honkapohja and Kaushik Mitra, unpublished manuscript, 2003.
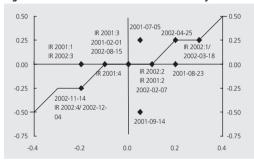
Woodford, M. Inflation Targeting and Optimal Monetary Policy, Federal Reserve Bank of St Louis, 2003.
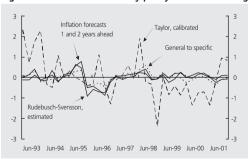
Fig 1: Activities in monetary policy

Source: The Riksbank.

Fig 2: The Riksbank's inflation forecasts two years ahead and the repo rate changes in 2001–2002

Notes: The changes of the repo rate are on the vertical axis and the forecasted deviations from the inflation target are on the horizontal axis. The monetary policy meetings in connection with the publication of Inflation Reports are designated IR200X:X. Monetary policy meetings not coinciding with the publication of a report are only designated a date. There are no published forecasts for the latter. Therefore, in those cases, an approximation has been made using the mean value of the immediately preceding and immediately following published forecast. Source: The Riksbank.

Fig 3: The Riksbank's monetary policy shocks according to simple rules

Notes: For details of the different simple rules, see Berg, Jansson, and Vredin (2004).
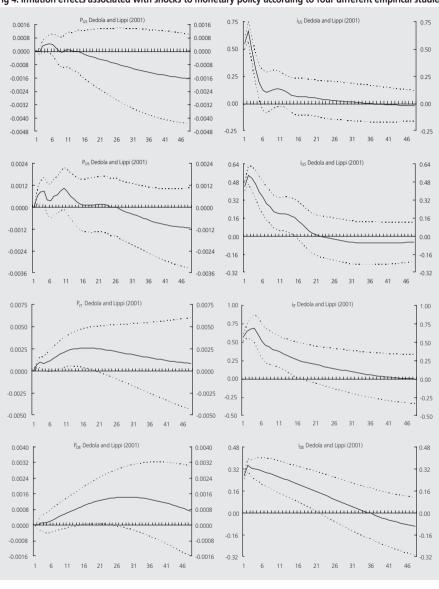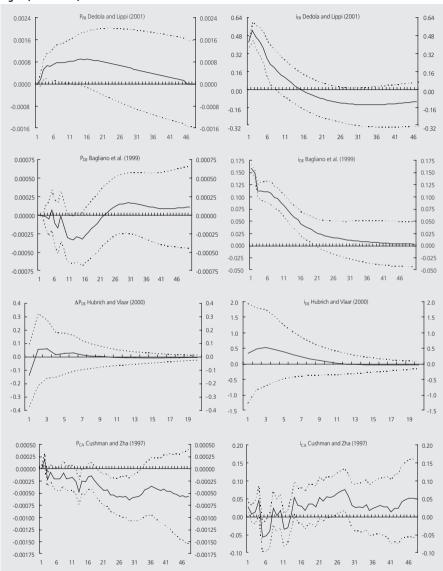Source: Berg, Jansson, and Vredin (2004).

Fig 4: Inflation effects associated with shocks to monetary policy according to four different empirical studies

Fig 4: (Continued)

Notes: The figure has been re-produced from Jacobson, Jansson, Vredin, and Warne (2002). For details of the empirical studies, see their reference list.
Source: Jacobson, Jansson, Vredin, and Warne (2002).

Fig 5: Headline inflation and different measures of core inflation

Notes: UND1X excluding energy and food is CPI inflation excluding household mortgage interest expenditure, indirect taxes and subsidies, energy, and food. UND24 re-weights the components of the CPI so that the weights are inversely proportional to the components' historical standard deviations. In trim85, the 7.5 per cent most extreme (positive and negative) price changes are excluded from the CPI index.
Sources: Statistics Sweden and the Riksbank.
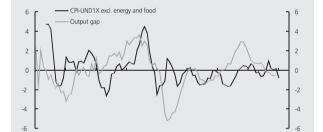
Fig 6: The output gap and the difference between CPI and UND1X excluding energy and food
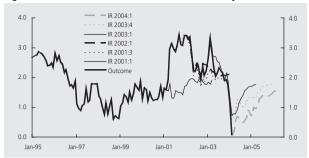
Notes: See Fig 5. The output gap is computed using the Hodrick-Prescott (HP) filter.
Sources: Statistics Sweden and the Riksbank.
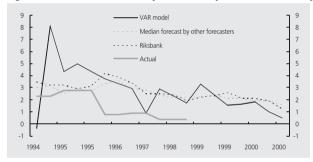
Fig 7: Actual CPI inflation and real-time forecasts by the Riksbank

Notes: The Riksbank's forecasts are designated IR200X:X.
Sources: Statistics Sweden and the Riksbank.

Fig 8: Forecasts of inflation two years ahead by the Riksbank and by other forecasters and models
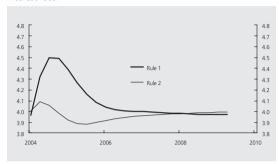
Notes: For details, see Jansson and Vredin (2003).
Source: Jansson and Vredin (2003).
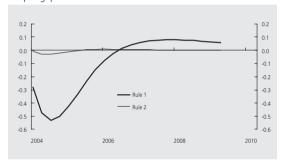
Fig 9: The effects of monetary policy according to a new general equilibrium model at the Riksbank

Interest rate:
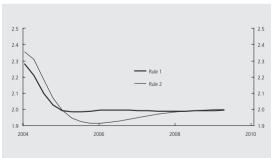
Output gap:
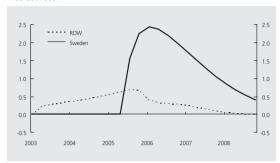
Inflation:
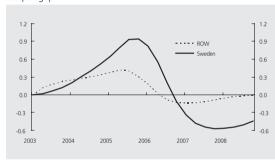
Notes: For a preliminary and incomplete description of the model, see Adolfson, Laséen, Lindé, and Villani (2004). The experiment shows the effects on the output gap and inflation from implementing two different rules for monetary policy when the economy is hit by a mark-up shock. The rules differ with respect to the reaction coefficients on the output gap and inflation. Rule 1 implies a more (less) aggressive policy with respect to inflation (output) deviations than rule 2. The basic policy rule is similar to the one in Smets and Wouters (2003). Source: The Riksbank.

Fig 10: The effects of an unchanged policy rate according to a model

Interest rate:
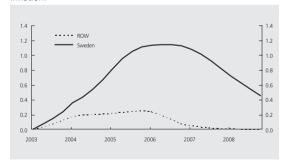
Output gap:

Inflation:

Notes: The experiment shows the effects (deviations from baseline) on the output gap and inflation in Sweden and the "rest of the world" (TCW weighted) when the Swedish policy rate is kept unchanged for 8 quarters after an international business cycle improvement (cf. the output gap for the "rest of the world"). The simulation is undertaken with RIXMOD, which is one of the Riksbank's equilibrium models. For details of the model, see Nilsson (2002).
Source: The Riksbank.

Table 1: Goodness of fit and error term diagnostics of simple rules of the Riksbank's monetary policy

	Fit	Diagnostics		
Rule	R^2	Autocorr.	Normality	ARCH
Taylor, calibrated	0.28	0.27	0.37	0.09*
Taylor, calibrated, with smoothing	0.49	0.18	0.83	0.97
Taylor, estimated, with smoothing	0.63	0.02**	0.85	0.35
Rudebusch-Svensson, calibrated	0.38	0.19	0.30	0.75
Rudebusch-Svensson, estimated	0.60	0.09*	0.03**	0.01**
Inflation forecasts one and two years ahead	0.63	0.03**	0.01**	0.02**
General to specific	0.77	0.16	0.75	0.59

Notes: Numbers in columns 2 - 4 are *p* values (* means that the test is significant at the 10 per cent level while ** means that it is significant at the 5 per cent level). The details of the various rules are given in Berg, Jansson, and Vredin (2004). Autocorr., Normality, and ARCH are tests that check whether the "policy shocks" are serially uncorrelated, normally distributed, and conditionally homoskedastic, respectively.

Source: Berg, Jansson, and Vredin (2004).

Addressing Uncertainty in Monetary Policy Decision Making at the Bank of Canada

Don Coletti – Bank of Canada

1. INTRODUCTION

In their paper "Preparing the Monetary Policy Decision in an Inflation-Targeting Central Bank: The Case of Sveriges Riksbank", Jansson and Vredin highlight some of the key aspects of the decision-making process at the Sveriges Riksbank. Overall, there are far more similarities than differences in the approaches followed at the Sveriges Riksbank and the Bank of Canada. Consequently my comments focus on an aspect of decision-making that is not extensively discussed in the Jansson and Vredin paper but has received much attention in recent years at the Bank of Canada, namely the role of uncertainty in the decision making process.[46]

2. THE BROAD STRATEGY

The central piece in policy deliberations at the Bank of Canada is a model-based Staff Economic Projection (SEP)[47]. The model, combined with staff judgment, is used to produce an outlook for the Canadian economy. A key aspect of the SEP is that the economic outlook and the policy setting are determined simultaneously. In practice, this is accomplished by including an endogenous monetary policy rule in the core model.

Although the SEP is an important part of monetary policy decision making at the Bank of Canada, several other inputs play key roles. These other inputs are designed, in part, to address the inherent uncertainty associated with monetary policy decision-making. In particular, uncertainty regarding the nature and duration of the shocks hitting the economy, uncertainty about the data (including the fact that some of the data, such as potential output, are unobservable), and uncertainty about the model itself, add to the complexity of monetary policy decision-making.

In an attempt to deal with this uncertainty, the staff uses a number of different approaches. First, the staff addresses shock uncertainty by routinely conducting a sensitivity analysis of the base-case SEP. These risk analyses usually involve changing a key assumption in the base-case scenario and revisiting the economic outlook and the interest rate recommendation.

Data uncertainty is also addressed. As a general strategy, the staff tries to bring together as wide a range of information as possible. This information comes from a variety of sources and not only includes quantitative measures of economic developments and projections but also qualitative information from a cross-section of economic agents (individuals, enterprises, and governments). Of particular interest is the role of the Bank's regional offices, which are engaged in a regular and extensive program of information gathering through a quarterly survey of Canadian businesses (Martin 2004).

In addition, the staff pays particular attention to the measurement of key unobservable variables like the output gap. The output gap is particularly important since it is key to the dynamics of inflation in the Bank's core

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46 For a more thorough discussion of monetary policy decision making at the Bank of Canada see Jenkins and Longworth (2002), Macklem (2002), Coletti and Murchison (2002) and Côté *et al.* (2002).
47 For more on the Bank of Canada Staff Economic projection see Coletti (2004).

projection model. Unfortunately, the output gap is notoriously difficult to measure with a high degree of accuracy (Cayen and van Norden 2002). Consequently, the Bank does not come to a view on the degree of slack in the economy solely on the basis of one measure.

Model uncertainty is addressed by drawing information from different models, including those representing different paradigms. The models routinely used for this purpose include the core model QPM (Black *et. al.* 1994, Coletti *et. al* 1994), a calibrated model in which expectations are partly forward-looking; NAOMI (Murchison 2001), a fully estimated reduced-form macroeconomic model in which expectations are formed adaptively; and a vector error-correction model with an important role for money in the transmission mechanism (Hendry 1995). In addition, the implication of model uncertainty on the appropriate monetary policy rule is also addressed by alternative scenarios that replace the base-case QPM rule with a Taylor-type rule that has been calibrated to perform relatively well across several different models of the Canadian economy (Côté *et al.* 2002).

3. THE VARIOUS PRODUCTS

In order to implement the broad strategy outlined above, the Bank staff prepares a number of products that feed into the policy decision-making making process. The remainder of this note is designed to provide the reader with some additional details regarding each of these products.

3.1 Risks scenarios

The SEP is the staff's view about the most likely path for the economy. Its preparation involves making a number of assumptions regarding the nature and expected persistence of shocks that have hit the economy. Often it can be difficult to isolate the source of a shock as well as to anticipate its likely duration.

In order to address shock uncertainty the staff typically runs risk scenarios. These scenarios involve altering one important assumption embodied in the base-case and examining the implications on the economic outlook and the recommended policy response. Typical examples of risks include different assumptions about the current amount of slack in the economy, the growth rate of potential output, different assessments of the prospects for the U.S. economy, and alternative views on the future path for the price of oil or other important commodities.

3.2 Alternative policy scenarios

Monetary policy in the SEP is represented by a simple, *ad-hoc*, forward-looking policy rule that requires the monetary authority to adjust the short-term interest rate, so as to bring model-consistent inflation expectations (π) k quarters ahead in line with the targeted inflation rate (π^T) and output (y) in line with potential output (y*). R^L denotes the long-term nominal rate (10-year Government of Canada bond rate)[48].

$$R_t^S - R_t^L = \alpha_1 (R_{t-1}^S - R_{t-1}^L) + \alpha_2 (\pi_{t+k} - \pi^T) + \alpha_3 (y - y^*)$$

The parameters of the reaction function ($k, \alpha_1, \alpha_2, \alpha_3$) are chosen so as to minimize the expected loss associated with having inflation away from the target and output away from potential output, conditional upon the model structure and the magnitude and types of shocks seen over history.

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48 The monetary reaction function is expressed in terms of the yield spread. The yield spread has the attractive feature that it helps in isolating monetary influences on real interest rates. Movements in both long-and short rates reflect fluctuations in the equilibrium real interest rate as determined by productivity and thrift in the world economy (Coletti *et. al.* 1994).

Although the parameterization of the base-case rule was found to be relatively robust to different assumptions about the variances of the shocks, it can be quite sensitive to different assumptions regarding the underlying nature of the economy (Amano *et al. 1999*).

To address the uncertainty associated with the choice of policy rule, the staff replace the standard monetary policy reaction function for setting the target overnight rate with a Taylor-type rule. The specific calibration of the Taylor rule used is one that has been found to perform well across a number of different models of the Canadian economy (Coté et. al. 2002). Such scenarios provide the Governing Council with an alternative path for interest rates that may be more robust to different representations of the economy than the base-case rule embodied in QPM.

3.3 NAOMI

The staff at the Bank prefers to use several economic models, rather than just one. One reason for a pluralistic approach to economic modeling stems from the fact that, being a simplification of a complex reality, no one model can answer all questions. A model's structure varies according to its intended purpose.

The NAOMI (North American Open-Economy Macroeconometric Integrated) model differs from the staff's core model QPM in several key dimensions (Murchison 2001). Most importantly is that the NAOMI model was built with a greater emphasis on out-of-sample forecasting performance than was QPM. Another key, but more conceptual difference, is the treatment of expectations in the two models. While inflation expectations in QPM are a mix of adaptive and model-consistent expectations, inflation expectations in NAOMI are modeled as fully adaptive.

The NAOMI model is a fully estimated reduced-form macroeconomic model that was originally developed at the Government of Canada's Department of Finance. The Canadian portion of the NAOMI model consists of six behavioural equations that determine output growth, core and GDP inflation, the real exchange rate, and short- and long-term interest rates. Prices are determined using the expectations-augmented Phillips curve paradigm. The staff regularly produces an economic projection complete with an associated interest rate path with the NAOMI model as an alternative to the SEP prepared with the QPM.

3.4 Money and credit

Uncertainty regarding the underlying structure of the economy and the monetary transmission mechanism lead the staff to consider alternative models based on alternative economic paradigms. Since the monetary policy transmission mechanism in the SEP focuses on the links between interest rates and the rest of the economy, information on money and credit provide another view of how the economy may evolve and what the appropriate stance of monetary policy should be. Using small models, analysis of high frequency data, and regular contacts with financial institutions, the staff of the Monetary and Financial Analysis Department put together an alternative outlook for the Canadian economy, including an interest rate recommendation.

One of the tools used by the staff is a small model based on an "active money" paradigm, in which changes in the supply of money and credit are thought to be critical to price-setting behaviour (Laidler 1999; Maclean 2001). This view of the transmission mechanism is embodied in the M1-Vector-Error-Correction Model (M1-VECM). The M1-VECM is based on Hendry (1995), who finds a unique long-run relationship between M1, real GDP, the consumer price index, and the overnight (one-day) rate of interest. The model explains changes in these four variables by lagged changes in these variables, the error-correction term (called the M1 gap), and a set of other short-run explanatory variables.

3.5 Regional survey

One additional source of information comes from industry contacts. The staff at the Bank's regional offices gather information on economic activity by visiting industry and conducting a regular survey of business conditions. Typically this involves about 100 visits per quarters. The information gathered through this exercise gives the decision-makers a very different perspective on the economy from those contained in formal economic models. These face-to-face discussions inform monetary policy decision makers of what business people are seeing and planning, and provide insight into the real-world stories and business decisions that underlie the official statistics (Macklem 2002).

As part of these visits, the Bank staff asks a regular set of questions. These questions cover key areas of interest like expected future sales growth, investment and hiring intentions, wage pressures, and plans for product prices. Other issues like capacity pressures and overall inflation expectations are also addressed. On occasion the staff may also ask industry contacts about special topics like the effect of the recent appreciation of the Canadian dollar on their businesses. The staff has recently begun regular publication of the survey results in a document called the Bank of Canada Business Outlook Survey (Martin 2004).

3.6 Alternative measures of capacity

One of the most important uncertainties in monetary policy deliberations is the uncertainty associated estimates of the output gap. Particular attention is paid to the measurement of the output gap and alternative measures of the economy's productive capacity since this is considered the key determinant of inflation pressure and therefore important for monetary policy decision-making.

In the SEP, the historical output gap is estimated using a technique called the extended multivariate filter (EMVF, Butler 1996). Essentially, this technique combines a time series filter of the data with certain economic relationships in order to decompose real GDP into aggregate demand and long-run aggregate supply (or potential output). For example, one of the key economic relationships used to condition the staff's estimate of the output gap is inflation itself. Inflation that is high relative to inflation expectations, everything else being equal, likely implies an economy in excess demand.

Since it is quite difficult to accurately measure the output gap, the staff also considers alternative measures of the economy's productive capacity. These include measures of activity and capacity in the goods, real estate and labour markets. In particular, the staff considers Statistics Canada's capacity utilization measure, the ratio of unfilled orders to shipments in manufacturing sector (excluding aerospace products and parts), aggregate stock to sales ratio, as well as questions on capacity pressures from the Bank of Canada Business Outlook survey. All of these alternative measures of productive capacity can be found on the Bank's website.

4. CONCLUSION

A key aspect to monetary policy decision making is that it is necessarily made in an environment of uncertainty. The uncertainty can arise from many factors, including uncertainty about the shocks hitting the economy, uncertainty about the data, and uncertainty about the economic model (formal or informal). In broad terms, the Bank's strategy in dealing with uncertainty is to diversify as much as possible. This means considering alternative interpretations of the shocks hitting the economy, alternative data sources and measurement techniques, as well as alternative models of the economy and the monetary policy transmission mechanism. In the end, the decisions taken depend on the judgement of the decision-makers as to which factors are the most relevant in the current situation, the track records of the various models and indicators, and the lessons drawn from past experiences.

References

Amano, R., Coletti, D., Macklem, T. (1999) Monetary Rules When Economic Behaviour Changes. Bank of Canada Working Paper No. 99-8.

Black, R., Laxton, D., Rose, D., Tetlow, R. (1994) The Bank of Canada's New Quarterly Projection Model, Part 1: The Steady-State Model: SSQPM. Technical report no. 72. Ottawa: Bank of Canada.

Butler, L. (1996) The Bank of Canada's New Quarterly Projection Model, Part 4: A Semi- Structural Method to Estimate Potential Output: Combining Economic Theory with a Time-Series Filter. Technical report no. 77. Ottawa: Bank of Canada.

Cayen, J. P., van Norden, S. (2002) La fiabilité des estimations de l'écart de production au Canada. Bank of Canada Working Paper No. 2002-10.

Coletti, D. (2004) Constructing the Staff Economic Projection at the Bank of Canada. (this volume)

Coletti, D., Hunt, B., Rose, D., Tetlow, R. (1994) The Bank of Canada's New Quarterly Projection Model, Part 3: The Dynamic Model: QPM. Technical report no. 75. Ottawa: Bank of Canada.

Coletti, D., Murchison, S. (2002) Models in Policy-Making. Bank of Canada Review (Summer): 19-26.

Coté, D., Lam, J. P., Liu, Y., St-Amant, P. (2002) The Role of Simple Rules in the Conduct of Canadian Monetary Policy. Bank of Canada Review (Summer): 27-35.

Hendry, S. (1995) Long-Run Demand for M1. Bank of Canada Working Paper No. 95-11.

Jenkins, P., Longworth, D. (2002). Monetary Policy and Uncertainty. Bank of Canada Review (Summer): 4-10.

Laidler, D. (1999) Passive Money, Active Money and Monetary Policy. Bank of Canada Review (Summer): 15-25.

Longworth, D., Freedman, C. (2000) Models, Projections and the Conduct of Policy at the Bank of Canada. Paper presented at the conference. Stabilization and Monetary Policy: The International experience, organized by Banco de Mexico, 14-15 November. Proceedings forthcoming.

Macklem, T. (2002). Information and Analysis for Monetary Policy: Coming to a Decision Bank of Canada Review (Summer): 11-18.

Maclean, D. (2001) Analyzing the Monetary Aggregates. Bank of Canada Review (Summer): 31-43.

Martin, M. (2004). The Bank of Canada's Business Outlook Survey. Bank of Canada Review (Spring): 3-18.

Murchison, S. (2001). NAOMI: a New Quarterly Forecasting Model. Part II: A Guide to Canadian NAOMI. Department of Finance Working Paper No. 2001-25.

Comments on Per Jansson and Anders Vredin

Guy Debelle – BIS and Reserve Bank of Australia

Let me give a slightly different perspective on decision-making from that provided in the very stimulating paper by Anders and Per. Indeed some might call it a less rigorous perspective, but I think it is one which acknowledges the realities of decision-making under uncertainty. To put my conclusion upfront: we, as policy makers, need to be very modest about what we know and what we don't know.

1. RULES V DISCRETION

I will start with a few words on the rules versus discretion debate in the context of inflation targeting. If one has a rule to follow, then clearly decision-making is very simple: follow the rule!

But I think the general conclusion, and certainly my own, is that rules aren't that effective for the monetary policy decision. The uncertainty is just too great. One cannot specify a rule ex ante that deals with all the possibilities that can arise. The rules cannot be made completely state-contingent because there are too many states. While following a rule can in theory boost credibility, the errors that result from blindly following a rule, that may be 'wrong', can seriously undermine a central bank's credibility.

We should also bear in mind that we are not just talking about some vague theoretical construct here. The policy-makers in this debate are we, so there is a strong element of self-flagellation here!

Inflation targeting takes a somewhat different approach to the rules versus discretion debate by shifting the focus to outcomes rather than actions. The inflation target itself constrains the actions of the central bank rather than an instrument rule. Hence Bernanke et al (1999) characterise inflation targeting as 'constrained discretion' rather than a rules-based approach to monetary policy. The outcomes in terms of the track record on inflation are what predominantly influence the credibility of the central bank, rather than its adherence to any particular monetary rule. While the lags in monetary policy may imply that it is much more difficult to monitor the central bank's performance than following a rule, the large increase in transparency of inflation-targeting central banks has served to mitigate this problem.

But in much of the academic literature, inflation targeting is characterised as a more complicated interest rate rule.

In simple (and even not so simple) models of inflation targeting, the optimal policy can be characterised as inflation forecast targeting, 'setting the instrument so that the corresponding conditional inflation forecast, conditional on all relevant information and judgment, is consistent with the inflation target and the output-gap forecast not indicating too much output-gap variability' Svensson (2003a, p. 466).

In other words, the inflation target acts as a filter for all the information available to the central bank on the current and future state of the economy. Regarding the inflation target as an information filter for the policy decision is, in my opinion, a very useful way of describing the decision-making process. The inflation target provides an organising framework in which to consider the input of detailed analysis, the output of models and the forecasts. However, characterising the policy decision in terms of a rule linking the policy setting to the inflation forecast is not useful. That is, inflation targeting is often portrayed as an interest rate rule of the form

$$i = f(\pi_{t+n}).$$

And then a lot of the discussion focuses on the appropriate choice of n: is it two years for example? But still the reality is much more complex than this.

While it is possible in these frameworks to derive the optimal rule (reaction function) for monetary policy, in practice none of the inflation-targeting regimes stipulate a commitment to a particular rule. The primary reason is that central banks are facing a much larger information set, a much more complicated economic structure than the models assumed in the monetary policy rules literature and much greater uncertainty. Rules of this sort may be useful initially in conveying some of the essential elements of inflation targeting but it soon becomes too simplistic.

Simple Taylor-type rules may approximate the reaction function of the central banks in many circumstances, and hence may be a useful input into the policy discussion. They will not be able to explain monetary policy actions in circumstances that lie outside the structure of the model (such as the effect of the Asian crisis on the Australian economy discussed below).

Why is such a rule too simple?

In an inflation targeting regime, one needs to focus on the whole path of inflation outcomes, not just on the inflation outcome at a fixed horizon. The focus is forward-looking because of the lags between monetary policy and its effect on inflation, which is also reflected in the inflation-forecast rule shown above. But, as Milton Friedman famously said, the lags of monetary policy are not only long, they are also variable. The practical import of this in an inflation targeting regime is that one needs to take account of the whole path of future inflation outcomes and also the distribution.

That is, attention needs to be given to both the mean and the variance. This is the main message I take away from the Faust and Henderson (2003) paper that Per and Anders discuss. The point I think Faust and Henderson are making is that much of the internal policy discussion focuses on the tolerance for variance which is determined to a large extent by one's preference for output stabilisation, so in central bank's communication, a lot of time should also be spent talking about the variance, not just the mean. Moreover, much of the communication should acknowledge and discuss the goal of output stabilisation. It is arguable that such admissions on the part of the central bank may be seen as 'softness', but I think the inflation targeting framework has moved well past that stage.

Moreover, a lot of the time the variance is not symmetric. Therefore the monetary policy decision needs to take into account higher moments of the distribution of future outcomes of inflation and output. This is often characterised in the common parlance as the "balance of risks" (see Stevens 2004).

Do considerations of the higher moments imply a minmax approach to policy-making? Such an approach can sometimes be characterised as disaster avoidance, or following the path of least regret. That is, the appropriate decision is to set monetary policy that is likely to achieve the least bad outcomes.

An interesting and critical question that arises under this approach is how broad should be the range of possible outcomes that enter such calculations. For example, consider the risk of deflation and assume it has (non-linearly) large economic costs. If there is a 10% chance of deflation, should policy be set to reduce that likelihood, even if such a policy setting creates a greater risk of inflation or other imbalances emerging? What if the risk of deflation is 1%? What is the relevant threshold? I don't have the answer, but am just highlighting the sort of questions that need to be asked in such a decision-making framework.

While Lars Svensson (2003b) has done some work recently looking at the effect of different objective functions that can take account of the sort of minmax strategies I was talking about above, he has not (yet) been able

to come up with an objective function which really captures the problems which often faces the decision-makers in practice.

Let me try and illustrate this using some examples. First, think of an exchange rate which according to all reasonable models is a long way from its equilibrium value. Should the policymaker assume in their forecast that the exchange will return to its equilibrium over the policy horizon or should they adopt a random walk model and assume that the exchange rate will remain around its current level? If policy is set on the basis that the exchange rate will return to equilibrium but it doesn't, the consequences for the economy from this policy 'mistake' could be quite severe. How should one assess the balance of risks around the exchange rate? Such a dilemma has faced the Bank of England at various times in recent years with the apparent overvaluation of the pound and also faced us in Australia in the late 1990s early and 2000s with the apparent undervaluation of the $A (associated with the overvaluation of the $US) which persisted for a considerable period of time.

Another example comes from the recent Australian experience: the monetary policy decisions following the Asian crisis. At the onset of the Asian crisis, the Australian economy was growing at around trend rates, with domestic demand beginning to accelerate, and underlying inflation at 1.6 per cent. Monetary policy had been eased over the past year or so in anticipation of the decline in inflation that subsequently occurred. Thus the shock of the Asian crisis hit the Australian economy at a time when it was in reasonable shape with the stance of monetary policy already relatively expansionary.
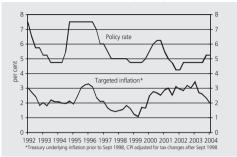
Exports to East Asia accounted for around one-third of Australia's exports at the time. In the year following the onset of the crisis, Australia's exports to the region declined by nearly 20 per cent, directly subtracting around one percentage point from aggregate growth. Thus the decline in output in the East Asian region represented a significant negative demand shock to the Australian economy. Australia's terms of trade also fell sharply as commodity prices declined, further exacerbating the decline in export demand.

At the same time, the Australian dollar depreciated by around 20 per cent. In the past, such a large depreciation of the exchange rate would have led to a rise in inflation expectations, a pick-up in inflation due to higher import prices and would have necessitated a sharp increase in interest rates to bring about a disinflation. This policy response was contemplated at the time but ultimately rejected because it was considered that the inflation target in the medium term was not expected to be in jeopardy, even though in the short term, inflation was forecast to rise above 3 per cent as the depreciation was passed through to consumer prices. The forecast rise in inflation was not expected to be permanent, because the contractionary impulse from the decline in export demand, combined with the credibility of the inflation target was expected to keep inflation expectations in check.

The consideration in terms of the balance of risks was that the risk that a rise in interest rates to mitigate the forecast rise in inflation would exacerbate the contractionary effect of the decline in export demand, would outweigh the risk to the medium term inflation target. In addition, it seemed that a depreciation of the exchange rate was part of the necessary adjustment to the contractionary external shock. The ability to take such a decision was aided by the credibility that had built up since the adoption of the inflation-targeting regime. If policy had been set to ensure that inflation did not rise above 3 per cent, the rise in interest rates would have exacerbated the contractionary shock to foreign demand. With the benefit of hindsight, given the lower than expected inflation outcomes, this would have resulted in a significant undershooting of the inflation target.

In the event, inflation rose by less than was forecast, in part because of the decline in the pass-through of the exchange rate depreciation, as well as a greater than expected disinflationary impulse from the Asian region which put downward pressure on import prices. There was much agonising about the decision, which ultimately was to do nothing (which reminds us that doing nothing is still a decision, and potentially a hard one). Ex post, luck also played a non-trivial role, particularly in terms of the disinflationary impact on imported prices.

Graph: Inflation and Monetary Policy in Australia

*Treasury underlying inflation prior to Sept 1998, CPI adjusted for tax changes after Sept 1998

Source: Australian Bureau of Statistics, Reserve Bank of Australia

2. INPUTS TO THE POLICY DECISION [49]

The monetary policy decision involves translating economic analysis to a final policy decision.

What information is needed for the policy decision?

The three main tangible inputs to decision-making can be classified as detailed economic analysis, forecasts, and models. By detailed analysis, I mean data description and analysis of recent trends in economic series by staff who are sector experts. The use that is made of these three inputs has important implications for the resource allocation within the economic unit of the central bank. Most central banks use all three inputs extensively. Let me provide some cautionary words on the over-use or mis-use of all three.

First, models should be taken for what they are. Estimated models are simply the summation of the average of past experience with particular economic relationships. In interpreting and using the output of such models there is a trade-off between the following extremes: firstly, echoing the words of my thesis adviser Rudi Dornbusch, there is nothing new under the sun; second, every time things are different. The first means that the model will be a key input in the decision, the second means the model is useless. It is always important to remember when interpreting models that we know something about the residuals, and often the residuals are the critical issue. That's where the detailed analysis comes in. For example it is very hard to model business fixed investment in Australia where much of it occurs in the mining sector, where decisions are taken over a 5 to 10 year horizon, and the projects are large and discrete. Once the projects are underway, the sectoral analysts have a good idea of their flow-through to investment in the national accounts.

Calibrated models should also be used with care, the priors and biases of the models are hard-coded into the model. This is fine (and unavoidable), as long as that feature is recognised. Such models can be useful guides but can be poor communication devices, including with the decision-makers. Questions along the following lines are useful to ask: Is the model capturing all the relevant elements of the current conjuncture? Are the long-run properties of the model having a significant impact on the near-term outcome, and are we comfortable with those long-run constraints?

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49   For a thorough description of the inputs to the policy decision in Australia, see Stevens (2001).

On forecasts, and in line with my earlier discussion, the forecasts are not a summary statistic that can easily determine the policy decision. The distribution really matters, as does the objective function.

In terms of the detailed data analysis, our experience in Australia has shown that information from other sources can be very useful to provide colour to the data. We have found the outcomes from our business liaison program to be particularly helpful in this regard. However, care needs to be taken to avoid the use of such information from descending into a battle of anecdotes. Anecdotes help explain the residuals and data after all can be regarded as a formalised collection of anecdotes. Models can help control battling anecdotes. Secondly, in presenting the information provided by the sector experts, one must ensure that the forest is being seen for the trees (which is sometimes not the case when the daily focus of the sector experts is necessarily narrow).

A nice summary of all of this comes from Alan Blinder (1998, p.12): "use a wide variety of models and don't ever trust any one of them too much." Do not become wedded to one particular model, or as Don Coletti put it earlier: diversify, diversify, diversify.

My final conclusion in terms of presenting all the information to the decision-makers: we need to be modest about what we know and particularly what we don't know. Conveying the uncertainty can be as important as conveying the certainty.

One small postscript on the practicality of an MPC style decision-making body for all inflation targeting regimes. In a small country (and here I would include Australia), a critical question is whether there are enough economic experts in the country that lie outside the central bank/finance ministry? There may be enough to fill the positions on the committee initially. But the pool may be quickly exhausted in a few years time once there has been some rotation.

References

Bernanke, B., Laubach, T., Mishkin, R., Posen, A. (1999) *Inflation Targeting*, Princeton University Press.

Blinder, A. (1998) *Central Banking in Theory and Practice*, MIT Press, Cambridge MA.
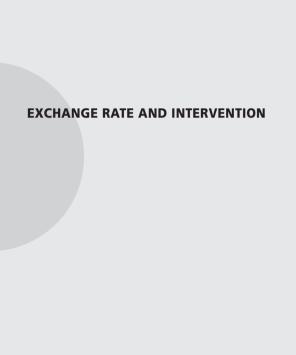
Faust, J., Henderson, D. (2003) Is Inflation Targeting Best-Practice Monetary Policy?, paper presented at the Federal Reserve Bank of St Louis Conference on Inflation Targeting, October. http://research.stlouisfed.org/conferences/policyconf/papers2003/faust_henderson.pdf

Stevens, G. (2004) Recent Issues for the Conduct of Monetary Policy, *Reserve Bank of Australia Bulletin*, March, pp 1-8.http://www.rba.gov.au/PublicationsAndResearch/Bulletin/bu_mar04/bu_0304_1.pdf

Stevens, G. (2001) The Monetary Policy Process at the RBA, *Reserve Bank of Australia Bulletin*, October, pp 19-26. http://www.rba.gov.au/PublicationsAndResearch/Bulletin/bu_oct01/bu_1001_4.pdf

Svensson, L. (2003a) What Is Wrong With Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules, *Journal of Economic Literature*, vol 41, pp 426-477.

Svensson, L (2003b) Optimal Policy with Low-Probability Extreme Events, NBER Working Paper No. 10196

EXCHANGE RATE AND INTERVENTION

Foreign Exchange Interventions under Inflation Targeting: the Czech Experience

Tomáš Holub – Czech National Bank

Abstract

This paper discusses the role of foreign exchange interventions in the inflation-targeting regime, focusing on the Czech experience since 1998. It concludes that the case for foreign exchange interventions is not clear in an inflation targeting regime both from the theoretical and empirical point of view. First, the stylised facts on the effectiveness of Czech interventions suggest that sometimes these might have had an effect lasting up to 2 or 3 months, but no strategy can be identified that would work in all episodes. Moreover, even many of the "successful" interventions were not able to prevent quite prolonged periods of exchange rate overvaluation in 1998 and in 2002. Second, the sterilisation costs of interventions are shown to have been quite substantial in the Czech Republic, which had in certain periods affected their credibility and effectiveness. Third and most importantly, the interventions may lead to tensions with the philosophy of the inflation targeting regimes on the procedural and communication level, which might have a negative impact on the credibility of the policy regime. The paper proposes some criteria for assessing whether the interventions are not in a conflict with the inflation targeting regime, and applies these criteria to the Czech case. From an ex post view, all the interventions episodes are judged to be consistent with the inflation targets and output developments, but there may be some doubt in other respects concerning the intervention episodes in early-1998 and late-1999.

1. INTRODUCTION

This paper discusses the role of foreign exchange interventions in the inflation-targeting regime, focusing on the Czech experience since 1998. It does not aim to provide an exhaustive analysis using econometric techniques, but rather to summarise the major stylised facts. This may be useful on several grounds. First, the Czech National Bank's (CNB's) approach to managing the exchange rate float as part of the inflation targeting framework has gone through a process of evolution. It is thus important to ask where it stands at present, and what the policy recommendations should be if the CNB was supposed to face another period of exchange rate volatility in the future. Second, summarising the stylised facts may be a useful first step towards further research, including an econometric one. Third, the Czech experience may contribute as an important case study to the growing international literature on managed floating, and in particular combining it with the inflation targeting framework. The operational issues of the foreign exchange interventions are an important aspect of this debate. Finally, there may also be some lessons for the future membership in the ERM II mechanism, in which foreign exchange interventions are likely to gain on importance.

I discuss the direct interventions only. It must be noted that verbal interventions are also used frequently by many central banks including the CNB to influence the exchange rates. I believe that the verbal interventions should follow broadly similar principles that I propose in this paper for assessing the appropriateness within the policy regime for the direct interventions. There is one natural difference, of course, in terms of communication openness, as the verbal interventions are by definition public and fairly transparent (at least provided that the "do-not-lie" principle is observed), while the direct interventions might be more secretive (see below).

The paper is organised as follows. After a brief theoretical introduction in section 2, the current monetary policy framework of the CNB is explained briefly in section 3. Section 4 describes the exchange rate developments in this regime. Section 5 presents the major policy steps in the exchange rate management. Section 6 summarizes some stylised facts on the effectiveness of the foreign exchange interventions. Section 7 analyses the sterilisation

costs of the intervention policies. Finally, the consistency of the interventions with inflation targeting is discussed in Sections 8 and 9. Section 10 summarises and concludes.

2. SOME THEORETICAL BACKGROUND

In the past, exchange rate pegs used to be very popular as the operating regime of monetary policy. This automatically meant an important role for foreign exchange interventions among the instruments of central banks pursuing exchange rate pegs. A bit more controversial was the use of foreign exchange interventions among the major floating currencies. These interventions were sometimes carried out, occasionally even in a co-ordinated manner (such as in 1985), but the theoretical and empirical arguments on their desirability and effectiveness have been inconclusive (see Sarno and Taylor, 2001; Schwartz, 2000). The only mainstream consensus that emerged, and has in fact survived since that period, is that non-sterilised interventions (i.e. those accompanied by interest rate changes) are more effective then the sterilised ones, if the latter can achieve anything at all (see Rogoff, 1984; Schwartz, 2000).

The traditional arguments in favour of the sterilised interventions' effectiveness have included the signalling channel (Mussa, 1981) and portfolio-balance channel (see Branson, 1976; Kouri, 1976; Edison, 1993), but most empirical analyses that were carried out during the 1980s did not support the quantitative importance of these channels. There are some more recent econometric studies, though, which benefited from better data availability since the 1990s, supporting the effectiveness of the traditional channels of sterilised interventions (see Dominguez and Frankel, 1993; Kearns and Rigobon, 2002). On the theoretical front, the case for sterilised interventions has been also strengthened by the order-flow channel ("market microstructure") literature (see Lyons, 1997; Popper and Montgomery, 2001). Finally, some authors have argued that the interventions' effectiveness may be greater in the developing and transition economies compared with the advanced countries whose data have been typically used in the empirical analyses (Canales-Kriljenko, 2003).

In any case, the ongoing liberalisation of capital flows and numerous currency crises during the 1990s have changed the world's map in terms of the exchange rate regimes. Most importantly, they have led to a more cautious approach to fixed exchange rates. The "bipolar view" has emerged in the economic literature as the mainstream opinion on exchange rate regimes.[50] While many countries have in the recent decade or two moved to floating exchange rates, some other economies have adopted currency boards, dollarized/euroized their economies, or formed monetary unions (see Fischer, 2001). On the contrary, the number of countries with intermediate exchange rate regimes ("soft pegs"), which are now viewed as inherently unstable, has declined significantly.

Within the group of those countries that choose, for one reason or another, to pursue independent monetary policy with a large degree of exchange rate flexibility, the inflation targeting has been rapidly increasing its "market share" since the 1990s. As reported by Mahadeva and Sterne (2000), 54 countries in the world had an explicit inflation target in 1998, of which 11 had it as a sole policy goal. And since then, many other countries have joined the club, or have been thinking about that possibility seriously (see e.g. Truman, 2003). As part of this trend, the number of small open economies that operate the inflation targeting regime has grown substantially. For these countries, it is a crucial question what approach the central bank should use to deal with possibly large exchange rate fluctuations under the inflation targeting. Their economies may be quite vulnerable to exchange rate shocks and may thus exhibit a "fear of floating" (Calvo, Reinhart, 2000). We thus need to ask to what extent a central bank pursuing the inflation targeting should use foreign exchange interventions, i.e. whether it should let the exchange rate float freely or try to manage the float to some extent.

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50 Although a mainstream view, it is by far not consensual. Williamson (2000) is one of the examples arguing in favour of the intermediate options (the so-called "basket, band and crawl" system).

The theory of inflation targeting (see e.g. Svensson, 1998; 1999) gives quite a clear answer. In most models, it is assumed that the exchange rate behaves according to the uncovered interest rate parity (UIP). In other words, it is assumed that perfect arbitrage exists in the liberalised foreign exchange markets. The elasticity of short-term capital flows to yield differentials is believed to be infinitely high. There is thus no use trying to influence the supply or demand of foreign exchange, because all central bank's interventions would be countervailed by an equally strong flow of private capital in the opposite direction. On the other hand, interest rate changes should be very effective in influencing the exchange rate.

To be less strict, one may argue that even with the UIP the central bank might be able to affect the current exchange rate with foreign exchange interventions by influencing the market expectations on the future exchange rate path, or by influencing the risk premium. The transmission mechanism between interventions and the exchange rate is, however, likely to be very uncertain and unstable in such a world, implying a great difficulty in using the interventions as a systematic monetary policy tool. Moreover, it is not clear, whether the same signal cannot be sent by the central bank in another way, which would be more consistent with the inflation targeting framework (see Svensson, 2001). The theory of inflation targeting thus typically assumes, or even recommends, a purely floating exchange rate. The only instrument that the central bank then has is its short-term interest rate. To the extent that the exchange rate fluctuations influence the targeted inflation rate and the output gap, interest rates are used to respond to the exchange rate shocks. Their changes are transmitted to the economy both through the interest rate and exchange rate channels.

Nevertheless, some recent literature has started to argue in favour of managing the floating exchange rate as part of the inflation targeting regime (Bofinger and Wollmershaeuser, 2001; Goldstein, 2002; Truman, 2003).[51] Moreover, it is a matter of fact that some of the inflation-targeting countries do use foreign exchange interventions more or less frequently.[52] This is in line with a general observation that the de facto practice often differs from the declared exchange rate strategies, typically in the direction of tighter management (Calvo and Reinhart, 2000). There is thus not a general consensus on the "fall of foreign exchange market intervention as a policy tool" (Schwartz, 2000).

Besides the disagreement on whether to use the interventions or not, we also lack generally recognised best practices on the procedural and operational issues for the interventions policies, in spite of some recent attempts to establish these (see Canales-Kriljenko, et al., 2003). This may often create challenges for the central banks that can not resist being occasionally unfaithful to the inflation targeting literature and pure floating.

3. THE CZECH REPUBLIC – HISTORICAL BACKGROUND AND POLICY REGIME

The Czech Republic belongs to the cases that try to combine inflation targeting with a managed float. The aim of this paper is to provide a case study of the so-far Czech experience, as well as to contribute to the debate on the best intervention practices, focusing specifically on the inflation targeting regime. But before doing so, let me first briefly describe the general characteristics of the CNB's monetary policy regime. The Czech situation has some specific characteristics that are useful to understand before moving on to discuss the exchange rate management issues (see also Hrnčíř and Šmídková, 1998).

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51 Goldstein (2002), for example, argues in favour of a managed floating plus system, in which the managed floating is supplemented with inflation targeting as a nominal anchor and with financial stability policies. In my opinion, it would be better to call this monetary policy regime "inflation targeting plus", because I view the inflation targeting as the principal anchor and the other two aspects as its supplements.

52 Most recently, the Reserve Bank of New Zealand has joined this club.

First, the inflation-targeting regime was introduced in the Czech Republic in late-1997 after an enforced floating of the exchange rate in May 1997, which ended the period of a fixed exchange rate regime introduced at the beginning of economic transition.[53] At that time, the economy and market expectations were destabilised due to the economic overheating of the mid-1990s, currency depreciation after a currency turmoil, increased speed of price deregulations in early-1998, pro-cyclical fiscal policies, etc. In contrast to the advanced countries, the inflation targeting regime was designed as a strategy of disinflation – not just maintaining low inflation – after a turbulent period.

Second, the Czech Republic was the first transition country to adopt inflation targeting. The range of transition-specific issues includes, among other things, the challenges of the long-run convergence and trend real exchange rate appreciation, sharp volatility of foreign capital flows , gradual – but often not smooth – decline in the risk premium over time, and so on.[54] At the same time, the Czech Republic has a high share of volatile items in its consumer basket, implying larger cost-driven shocks to its inflation compared with the advanced countries.[55] These are factors that have influenced the inflationary and exchange rate developments, and thus also central bank policies.

Third, the Czech Republic is a very open economy. This makes it potentially vulnerable to exogenous and exchange rate shocks. The exports of goods and services reach 65 % of the GDP (imports are 67 % of GDP), meaning that the demand transmission channel as well as the supply-side channel of the exchange rate are potentially quite significant. At the same time, the share of imported goods in the consumer basket is estimated at around 25 % (see Beneš, et al., 2003), implying a strong direct price channel of exchange rate transmission.

All the above factors contributed to the fact that the CNB's record in terms of hitting the announced inflation targets has been quite poor so far. In particular, the CNB undershot its targets for net inflation in all the first three years from 1998 to 2000 (see Figure 1), hitting the target in December 2001 only.[56] The sharp disinflation in this period was primarily a result of an unexpected decline in food and oil prices during 1998-99, combined with a surprising exchange rate appreciation in 1998 and an economic recession in 1997-98. Similarly, the headline inflation was below the announced target range from mid-2002 till early-2004 (see Figure 1). Among the factors that have caused this development one can point to important exogenous price shocks, but exchange rate appreciation and a negative output gap have played a role in this episode as well.

53　The Czech experience thus fits into the global trend of moving from soft pegs to the corner exchange rate regimes as a response to increased capital mobility and currency crises of the 1990s.

54　One can identify two major waves of foreign capital inflows. The first one was primarily driven by short-term capital and took place in 1994-1996. The second one, peaking in 2002, was caused mainly by the FDIs.

55　The share of foodstuffs in the basket is around 28 %, regulated prices 18 % and fuels about 5 %.

56　Net inflation is defined as the CPI inflation net of regulated prices and primary impacts of the indirect tax changes.

Figure 1: Czech Inflation: Actual vs. Targets
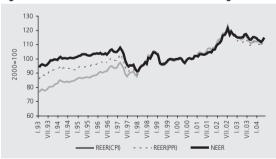
Source: Czech Statistical Office

The biggest achievement is a stabilisation of inflation expectations at low levels and the credibility of the monetary policy regime, which has been gained despite the frequent target misses. Credibility has been facilitated by a gradual evolution of the regime (longer-term orientation, switch to headline inflation targeting, and so on) in response to the accumulated experience and changing situation. A high degree of transparency, which has been achieved in monetary policy and other areas of the CNB's activities, is crucial for the credibility as well.

4. EXCHANGE RATE DEVELOPMENTS

In this section, I briefly describe the exchange rate developments of the Czech crown (CZK). Figure 2 shows the CZK's monthly nominal and real effective exchange rate, based both on CPI and PPI, since 1993.

Figure 2: CZK's Nominal and Real Effective Exchange Rate

Source: Czech National Bank

As one can see, the real effective exchange rate has exhibited an appreciating trend over the whole period since 1993 (both in CPI and PPI terms), regardless of the exchange rate regime changes. Before 2001, the real appreciation was mainly driven by an inflation differential, since then is has gone through strengthening of the nominal exchange rate. The appreciating trend might be explained by a combination of several factors, including the Balassa-Samuelson effect, terms-of-trade gains, deregulations of administered prices, etc. (see e.g. Halpern and Wyplosz, 2001; Čihák and Holub, 2003). It can thus be considered an equilibrium phenomenon unless it

exceeds some "reasonable" speed. This speed is, however, difficult to determine precisely, as only some of its factors can be quantified relatively easily (most analyses focus on the Balassa-Samuelson effect only). A challenge potentially stemming from this real trend is that it may co-ordinate the exchange rate expectations in one direction, i.e. towards appreciation.[57] The price convergence process may also contribute to excess volatility of the exchange rate if the market expectations concerning the long-run trend change substantially over time. It is moreover difficult to find an appropriate monetary policy response to such developments if the central bank is itself fairly uncertain on what the equilibrium real exchange rate might be.

Figure 2 also shows that the medium-term volatility of both the nominal and real exchange rate has increased substantially since the exchange rate's fluctuation band was widened in February 1996, and abolished in May 1997. The CZK has experienced two waves of rather sharp appreciations in recent years, which were only with some time lag followed with depreciations to (or below) the trend level. The first one took place in 1998, when the CZK appreciated above its pre-floating level, in spite of the crises in Russia and Latin America. The second and more pronounced one started in 2001 and lasted till late-2002. Although these two periods were both affected by other strong external influences, it is probably more than a coincidence that both these two cases were marked with sub-trend economic growth and undershooting of the CNB's inflation targets (see section 3).

The short-term volatility is summarised in Figure 3 by a moving 60-day standard deviation of the CZK/EUR exchange rate both in absolute level and daily percentage changes. From this figure, one can see that the short-run volatility of the exchange rate was, as expected, greatest in the turbulent year 1997, but was also fairly high throughout 1998 and early 1999. After stabilising at quite modest levels since mid-1999, another increase in the short-term volatility was observed during the appreciation episode of 2002, even though its magnitude remained – perhaps a bit surprisingly – well below the previous peaks.[58]
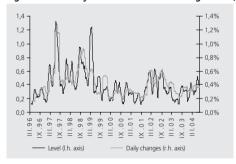
Figure 3: Volatility of the CZK/EUR Exchange Rate (60-day standard deviation)

5. MANAGEMENT OF THE EXCHANGE RATE

When the floating exchange rate was introduced in May 1997, it was announced that the exchange rate regime would be a managed float, the DEM (EUR at present) serving as a reference currency. The CNB thus retained the possibility to intervene in the foreign exchange market "in the event of excessive volatility or unjustified

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57 It might thus be one alternative explanation why the interventions have been biased towards purchases of foreign exchange in the Czech case (see below).

58 The short-term volatility of the CZK's exchange rate is analysed econometrically in Bulíř (2003).

exchange rate trends". This section summarizes the CNB's policy measures responding to the exchange rate developments.

In line with the announced managed floating policy, the CNB intervened occasionally in the foreign exchange market. With the exception of the turbulent year 1997 (which does not belong to the period of inflation targeting), though, the interventions de facto always concerned purchases of foreign exchange to slow down the exchange rate appreciation (see Figure 4).[59] It might be questioned, of course, if this asymmetry in the interventions does not represent a departure from floating exchange rate, signalling that the central bank has been trying to influence the exchange rate trend rather than just respond to volatility, which should go both ways. I address this issue in section 8.

Figure 4: The Foreign Exchange Interventions (spot)

Source: Czech National Bank

The periods of high intervention activity were typically followed by quite long periods of no interventions. The most active periods were (i) February 1998 - July 1998; (ii) October 1999 - March 2000; and (iii) October 2001 - September 2002. In the first and third case, this coincided with the periods of fast nominal effective exchange rate appreciation (Figure 2), which peaked above 15 % year-on-year. It also coincided with periods of relatively high short-term volatility of the exchange rate (Figure 3). In the second case, the CZK appreciated against the EUR, but it depreciated quite strongly against the USD at the same time, due to the EUR/USD exchange rate developments. As a result, there was no strong nominal effective exchange rate appreciation (Figure 2). This might be interpreted as an indirect 'confirmation' of the euro's reference-currency role in the Czech managed floating.

Besides the direct interventions in foreign exchange market, the CNB has also adopted other measures responding to the exchange rate developments. A special account for the government's foreign exchange privatisation revenues was established at the CNB in early-2000, which has been intended to reduce the exchange rate impact of large privatisation sales. This step was explained by the fact that massive privatisations represented a one-off influence on the exchange rate driven by the government's actions, which might distort the market equilibrium. From this point of view, it has been regarded by the CNB as justifiable to offset this influence with a co-ordinated non-standard action of the authorities.

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59 In 2004 the CNB has started selling earning on its FX reserves to prevent them from growing further (see the end of data sample in Figure 4). This step, however, has not been intended as a monetary policy measure, but as a balance-sheet adjustment step.

An important aspect of this privatisation account has been facilitating of communication between the CNB and government on the exchange rate issues. Apart from this positive role, however, the effectiveness of the account was limited till 2001 by the fact that the government never kept its privatisation revenues on the account for long, as it needed the money to improve the weak fiscal situation. Facing the largest privatisation sales to come (electricity, gas, telecommunications etc.), which were cited by the market participants as the main reason for the exchange rate appreciation in late-2001, the CNB and the government reached an agreement in January 2002. This agreement has kept all of the government's foreign exchange revenues out of the market and at the same time allowed financing the fiscal needs out of privatisation revenues. Direct purchases of the government's foreign exchange revenues by the CNB have been the most important element of the agreement. So far, the CNB has purchased over EUR 4.2 billion from the state. Besides that, a decision was taken to postpone the issues of the government's eurobonds, an aim was intensified to match public foreign exchange revenues and outlays (and to match the foreign exchange assets with liabilities), etc.

It is also important to keep in mind that the interventions can not be viewed in isolation from changes in the main monetary policy instrument, i.e. the short-term interest rates. The Czech nominal interest rates were on a declining trend since the introduction of inflation targeting, with an exception of three minor interest rate hikes (by 0.25 % in March 1998, July 2001 and June 2004). The first period of interest rate cuts started in July 1998 and lasted till late-1999. It thus de facto followed the first wave of foreign exchange interventions (coinciding with it in July 1998 only), and its last stage coincided with the beginning of the second intervention wave. Another period of interest rate cuts started in November 2001 and went on till mid-2003, thus coinciding with (and extending beyond) the last episode of intervention activity.

6. STYLISED FACTS ON THE EFFECTIVENESS OF EXCHANGE RATE MANAGEMENT

It would require a detailed econometric analysis to judge whether and to what extent the foreign exchange interventions and other policy measures were effective in influencing the exchange rate developments. Moreover, one would need to analyse not only what actually happened after the interventions, but also compare this to what would have happened without them (i.e. to know the counterfactual). This is however extremely difficult to do, not least because we lack a reliable model describing the short-run dynamics of the exchange rates. It would also be necessary to study in detail the microstructure of the CZK's market (see Derviz, 2003 for such an analysis), which goes beyond the scope of this paper. I thus limit myself to a discussion of some stylised facts. These are summarized in Table 1.

In some cases, the interventions seem to have had a visible immediate impact on the exchange rate. A typical example is March 2000, when interventions of slightly less than EUR 400 million took place. The exchange rate depreciated almost by 2 % and remained at a weaker level till mid-2000. Another similar case is February-April 1998, even though this time the weakening of the CZK was more short-lived (till the beginning of May 1998) in spite of a relatively high volume of interventions. In October 1999, the interventions reached almost EUR 1 billion, and the exchange rate depreciated by more than 3 %, and remained weaker till mid-December 1999. In some other situations, though, the impact was much less clear. For example in June - July 1998, the CNB bought about EUR 500 million, but the crown depreciated only with some lag, which coincided with the break-out of the Russian crisis. There were even cases in which the short-term impact of interventions was quite weak and non-lasting, such as in December 1999 or in late-2001 (even though it may be true that without these interventions the exchange rate might have went on appreciating further).

The immediate impact of the interventions thus looks quite uncertain, but occasionally might last up to 2 or 3 months according to the Czech experience. No particular "ideal" intervention strategy (e.g. open vs. undisclosed; large vs. smaller; etc.) can be identified at first sight, though. Something that did work in one situation may have had little effect in another one. Moreover, even many of the "successful" interventions

were not able to prevent relatively prolonged periods of exchange rate overvaluation in 1998 or in 2002 (see section 4). A key issue for the effectiveness seems to be how the interventions interact with the market expectations, which may be very different in different periods. This is, unfortunately, quite hard to tell before an intervention is actually carried out; and the term "market expectations" may in fact serve just as an ex-post explanation for the previous predictions on the interventions' effectiveness having gone wrong.

Table 1: Effectiveness of Foreign Exchange Interventions – Some Stylised Facts [60]

Starting month	Final month	Overall volume	CZK/EUR (ECU prior to 1999)						
(t)	(T)	EUR million	t-3M average	t-1M average	Start of t	Low of [t;T]	End of T	T+1M average	T+3M average
02/1998	04/1998	1285	37,87	38,50	38,37	36,30	36,46	36,11	35,11
06/1998	07/1998	508	36,95	36,11	36,49	34,35	34,35	35,47	35,17
10/1999	10/1999	966	36,52	36,36	35,72	35,68	36,62	36,40	36,03
12/1999	12/1999	229	36,36	36,40	36,08	35,83	36,13	36,03	35,60
03/2000	03/2000	394	36,05	35,71	35,65	35,53	35,63	36,31	36,02
10/2001	01/2002	643	33,86	34,19	33,91	31,46	31,92	31,79	30,36
04/2002	04/2002	1 009	32,08	31,39	30,62	30,06	30,63	30,56	29,75
07/2002	09/2002	954	30,36	30,30	29,25	28,97	30,30	30,65	31,19

Source: Czech National Bank

As concerns the most recent experience in late-2001 and during 2002, it fits rather well into this picture. When the exchange rate started to appreciate abruptly in the second half of 2001 (see Figure 2 in section 4), it was usually being attributed by analysts and market participants to expectations of future foreign exchange privatisation revenues. The CNB tried to resist this tendency with foreign exchange interventions in October 2001 (EUR 240 million) and December 2001 (EUR 100 million). At the same time, from October 2001 the CNB had signalled to the market its intention to reach an agreement with the government on the privatisation revenues. Nevertheless, the market seemed to be discounting this information heavily, and the expectations remained biased towards appreciation. When the agreement was approved on 16 January 2002, it had surprisingly little effect on the market, even though its mechanisms were quite strong (unprecedented) and removed the major alleged source of appreciation.[61] The major explanation for the continued strengthening shifted from the privatisation revenues to the long-run real appreciation trend of the Czech crown.

Therefore, the CNB Board held an extraordinary meeting on 21 January 2002, at which it decided to carry out open foreign exchange interventions (altogether EUR 305 million in January 2002) and an interest rate cut of 0.25 % points. The CZK weakened by slightly less than 1.5 % on that day, but was back to its pre-intervention level in four days and continued strengthening at an even accelerated pace till the beginning of April 2002. On 4 April, the CNB thus started to openly intervene again. Overall, the volume of interventions reached EUR 1 billion during April 2002. The exchange rate ended this month where it stood at its beginning (see Table 1),

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60 To get a feeling of the relative scope of the CNB's interventions, note that the average daily turnover in the CZK foreign exchange market was about USD 700-800 million (EUR 800-820 million) in 2002. The Czech yearly GDP is roughly equivalent to EUR 75 billion.

61 The minutes of the 21 January extraordinary Board meeting state: "The rapid strengthening of the koruna observed at the end of 2001 was primarily linked to the anticipation of converting a significant part of the state's foreign exchange incomes into Czech koruna. It was stated that considering the extent of the approved measures (i.e. the agreement with the government), the exchange rate was likely to shift back to a level corresponding to the economic fundamentals. However, the exchange rate did not react in this way, and as a result, monetary conditions were disproportionately tightened." (see www.cnb.cz)

which was perhaps a bit disappointing result given the high intervention volume, even though the appreciation tendency was at least halted till late-June 2002. This experience suggests that even relatively large interventions may have a modest effect at best when the market expectations are set in one direction and the central bank tries to "lean against the wind".

Nevertheless, the "undisclosed" interventions that the CNB used in July-September 2002 (together roughly EUR 1 billion) seem to have had an important effect. The CZK/EUR exchange rate ended the year 9 % weaker compared to its all-time high of 10 July 2002, and remained relatively weak in 2003 as well. The apparent effectiveness of these interventions can be explained by a combination of several factors. These included: (i) a change in the market expectations, supported by some adverse macroeconomic news; (ii) negative interest rate differential, making the CZK less attractive for investors; (iii) change in the market's perception on the sterilisation costs after the interest rate differential became negative; (iv) implementation of the agreement with the government in practice, combined with delays in further privatisation.

The changed market expectations were probably the most important factor. Once the market expectations ceased to be skewed towards appreciation and the one-sided bets became less interesting due to a combination of zero interest rate differentials with more exchange rate uncertainty, it was perhaps a matter of time only when some negative fundamental news would initiate a correction. And to the extent that the policy measures (interest rate cuts, interventions and the agreement) contributed to this change, we can say that they might have had a medium-term impact on the exchange rate. This medium-term effect was – perhaps surprisingly – stronger than the immediate impact. This highlights the signalling role of foreign exchange interventions as opposed to their "market-equilibrating" effect. At the same time, it is very difficult to assess the contribution of interventions in isolation from other factors and policy steps (such as interest rate changes), and it is therefore not possible to arrive at a clearly positive judgement on their role in the Czech inflation targeting framework.

On balance, the Czech experience does not shed too much light on the inconclusive debate on the interventions' effectiveness, and both critics and supporters of the interventions can find their favourite bits in the overall evidence. Nonetheless, it is fair to note that the apparent instability of transmission between the interventions and their outcomes casts a serious doubt on the possibility to use them more systematically as a policy instrument under the inflation targeting regime.

7. STERILISATION COSTS

It is widely accepted that the monetary policy goals must not be subordinated to profit considerations. Nonetheless, when considering the use of foreign exchange interventions, which are supposed to be a complementary policy instrument at best, and are not crucial for achieving the main goal of long-run price stability, the sterilisation costs should be taken into account. This section presents a simple estimate of these costs for the Czech Republic.

The foreign exchange interventions and purchases from the government within the special agreement have resulted in a growth of the CNB's foreign exchange reserves. The volume of foreign exchange reserves was growing rapidly during the period of fixed exchange rate and fast capital inflows till 1996. After declining during 1997, they started to grow gradually again due to the occasional interventions from 1998 till early-2000. Since late-2001, the reserves have increased considerably, though, to over EUR 22 billion (CZK 700 billion).

This has import implications for the structure of the CNB's balance sheet, and consequently for its financial results. The volume of foreign exchange reserves exceeds the currency in circulation almost 3-times. The liquidity is sterilised using reverse repo operations, the volume of sterilisation reaching about CZK 480 billion in mid-2004. This means that the "sterilisation costs" may be substantial compared with the monetary income (seigniorage)

the CNB can earn due to its monopoly to issue currency. Indeed, there are accumulated losses from the past in the CNB's books that reached CZK 72 billion at the end of 2003. [62]

The overall sterilisation costs **(SC)** can be estimated as a difference between the CZK yield on net foreign exchange reserves and the yield the central bank could earn by investing the same amount of money in the domestic money market (or by reducing the volume of reverse repo operations by the same amount), i.e.

$$SC=[i^d-(i^f+e)]FXR$$

where i^d denotes the domestic interest rate, i^f foreign interest rate, e percentage exchange rate depreciation, and FXR (net) foreign exchange reserves.[63] Large net foreign exchange reserves mean that the central bank is exposed to exchange rate losses/gains due to exchange rate appreciations/depreciations, making the central bank's profits quite volatile. Another part of the sterilisation costs is given by the interest rate differential between the domestic and foreign interest rates.

Table 2 shows an estimate of the CNB's sterilization costs calculated in line with equation (1) for the period of 1993-2003.[64] As we can see, the estimated sterilisation costs were increasing from 1993 to 1996. The central bank accumulated more and more foreign exchange reserves, which were sterilised by issuing the CNB's treasury bills that had to pay a higher interest rate than the foreign exchange reserves were earning. In 1996, in addition, the costs of foreign exchange reserves were increased by an appreciation of the exchange rate within its widened fluctuation band. Since 1997, i.e. under the floating, the estimated costs have been very volatile due to exchange rate changes, but were still negative on average. As a result, the total sum of these costs since 1993 has reached about CZK 190 billion (8-10 % of yearly GDP).

We can thus see that the CNB's sterilisation costs have indeed had a strong empirical relevance, even though the computations presented here are only a rough measure of these costs based on many simplifications (for detail see Holub, 2004). These financial costs of interventions should be taken into account – and compared with the expected macroeconomic benefits – when discussing the exchange rate management, swinging the balance further towards being faithful to the pure floating.

It should be also mentioned that the sterilisation costs may have important implications for the effectiveness of interventions, as the Czech experience illustrates. They may undermine the interventions' credibility in those circumstances when the sterilisation costs are potentially high, which might further increase them, as unsuccessful interventions tend to be more costly than the successful ones (there is thus a self-fulfilling element in the interventions' financial credibility).[65] If the financial credibility is low, it might be helpful to strengthen it by making the interventions more sustainable. For example, the CNB's agreement with the government has included as its crucial part the government's participation on sterilisation costs incurred by the CNB due to the direct purchases of public foreign exchange revenues. This provision has made the agreement financially

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62 These accumulated losses, however, do not reflect the sterilisation costs only, but also past quasi-fiscal operations of the central bank, such as its involvement in the clean-ups of ailing banks (Holub, 2001) or the cost of federation split up. These transformation costs alone had the same order as the CNB's accumulated loss.

63 For a more detailed discussion of the sterilisation costs, see Holub (2001).

64 For the period since 1997, I used the interest earnings and exchange rate gains/losses on the CNB's foreign exchange reserves that were stated in its annual reports. For the earlier period, I approximated these earnings and gains/losses only. I used a weighted average of short-term money market interest rates in Germany (65 %) and the USA (35 %) as a proxy for foreign interest rates, and weighted percentage changes of the CZK's exchange rate against the DEM (65 %) and USD (35 %) to calculate the exchange rate gains/losses. I used the CNB's two-week repo-rate (and 2W PRIBOR for the period before 1996) as the domestic interest rate.

65 Note that this credibility aspect is exactly opposite to what has been suggested by Mussa (1981). He has argued that the possibility of central bank's losses is positive for credibility, because it can work as a commitment device. In our case, it was the reduction of the possible losses that helped, by causing the interventions to be viewed as financially sustainable.

sustainable for the CNB, and thus more credible. Similarly, the credibility of the CNB's foreign exchange interventions increased when the interest-rate differential vis-à-vis eurozone became negative, which led to the interventions being viewed as profitable by the market.

Table 2: Estimated "Sterilisation Costs" (CZK billion)

(CZK billion)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Net foreign assets	24	112	248	342	359	378	439	488	510	630	706
Domestic int. rate (%)	11,1	8,6	10,9	12	14	13,8	6,6	5,3	5,1	3,5	2,2
Foreign int. rate (%)	5,9	4,9	5	4	4	4,1	3,5	5,1	5,5	4,3	2,9
ER gains/losses	-0,3	0	0,2	-8,6	44,7	-35,6	31,8	-3,5	-40,1	-26,2	-29,8
Estimated SC	-1,6	-4,1	-14,5	-36,1	8,6	-72,1	18,5	-4,4	-38,1	-20,9	-25,3

Source: Czech National Bank; own computations

8. CONSISTENCY OF INTERVENTIONS WITH INFLATION TARGETING

The authors who propose supplementing inflation targeting with managed floating (e.g. Bofinger and Wollmershaeuser, 2001; Goldstein, 2002) typically assume implicitly that this can be done quite easily, without adverse consequences for the credibility of the monetary policy regime. Nonetheless, there is abundant experience showing that trying to "chase two rabbits" with monetary policy can be very harmful for credibility. And this possibility can not be dismissed simply by claiming that this danger does not apply for managed floating in which no exchange rate goal is announced.

There is no generally accepted set of criteria for assessing if the foreign exchange interventions are not in conflict with the inflation-targeting regime (besides the orthodox belief that they are inconsistent with the inflation targeting by definition). I thus propose some simple criteria myself and then assess how the CNB past interventions perform on these. The consistency with the inflation targeting may be assessed on three levels:

1) **Target consistency:** The exchange rate policy should not be in conflict with (or preferably be supportive for) achieving the policy goals of inflation targeting. The supplementary monetary policy tool (i.e. interventions) should not send confusing signals compared with the main one (interest rates). The primary goal should be the inflation target, and without compromising it the central bank may also take into account stabilisation of the real economy if the inflation targeting is interpreted in a flexible manner (which, I believe, is the Czech case). Interventions against appreciation/depreciation are target-consistent only when the inflation forecast points below/above target and/or the output gap is negative/positive. In other words, they should be limited to cases when a monetary easing/tightening is consistent with the inflation targeting.

2) **Regime consistency:** The use of interventions should not be in conflict with the underlying philosophy of inflation targeting. This includes the belief that the central bank can not systematically follow policies that are not consistent with free international capital mobility (the "impossible trinity"). The central bank does not have two independent policy instruments, i.e. it can not choose the mix of monetary conditions at its will. In particular, the foreign exchange interventions should not push against the UIP logic. They should be rather viewed as an attempt to restore the UIP relationship in periods of exchange rate disturbances that are causing inflation target undershooting and macroeconomic instability. On the practical level, this criterion can be assessed by looking at the monetary conditions developments. For interventions against appreciation/depreciation to be regime-consistent the exchange rate should be judged as seriously overvalued/undervalued in comparison with the fundamentals and the interest rate parity, or moving in that direction quickly. At the same time, interest rates should be relaxed/tight and/or declining/rising, reflecting

that the primary tool has been used in line with the inflation targeting. As a result, interventions against appreciation/depreciation should be considered mostly in those situations in which the mix of monetary conditions includes a loose/tight interest rate component and tight/loose (and/or quickly appreciating) exchange rate component.

3) **Procedural consistency:** The procedures governing the interventions – such as the decision-making rules, communication to the public, etc. – should be consistent with the constraints imposed on the interest rate decision-making under the inflation targeting.

To make sure, I do not suggest that these criteria should be adhered to rigidly when deciding on the interventions. There may be specific circumstances that are not encompassed very well by the proposed criteria. For instance, the central bank may wish to react to short-term volatility of the exchange rate and/or disorderly market conditions as a pre-emptive measure to reduce the probability of running into a situation described in the above consistency-criteria. Another example (specific to transition economies) might be a presence of large and volatile privatisation revenues, such as in the Czech Republic. In these cases, an action of the central bank, such as "technical" interventions to sustain market liquidity or the Czech agreement on the privatisation revenues, might be justified. Personally, though, I would view these instances as exceptions from the above "rules" rather than as arguments for giving up the consistency checks altogether. An analogy can be made with the interest rate decisions. The inflation targeting rules are often interpreted in a flexible manner and many escape clauses are defined to accommodate periods of clearly identifiable, exceptional shocks.

I am also far from proposing that compliance with these criteria should automatically (or in majority of case) lead to an actual use of interventions. They are rather to be viewed as almost necessary, but not sufficient conditions. Additional factors such as constraints on further cuts of the interest rates (danger of bubbles, low "substitutability" of the interest rate and exchange rate component of the monetary conditions, low sensitivity of exchange rate to interest rates changes in the particular situation, etc.), expected effectiveness of interventions (market conditions), and sterilisation costs (section 7) should be considered before giving up to one's temptations to intervene. As a result, the "interventions reaction function" with respect to the variables described in the above consistency criteria is likely to be quite weak and unstable, compared with the interest rate reaction function.

In the rest of this section, I try to apply the first two criteria for assessing the Czech experience since 1998. The procedural issues are left for section 9. In the first step, let me discuss whether the interventions had a direction that was in line with the required changes in the overall monetary conditions. Table 3 presents for each intervention period the deviation of inflation forecast from the target (ex ante consistency), the actual deviation of inflation from target (ex post consistency), the output gap, and the direction of interest rate changes (which should reflect the CNB's overall assessment of the situation, including the risks).

Table 3: Consistency of Interventions with Inflation Targets and Business Cycle

Month	Deviation from target [1]	Ex post deviation [2]	Output gap [3]	Interest rate trend	Target consistency [4]
02-03/1998	+0.5 %	-4.3 %	-1,8 %	→;↑	?
06/1998	+0.2 %	-4.3 %	-2.3 %	→	? (Y)
07/1998	-0.2 %	-4.3 %	-3.3 %	↓	Y
10/1999	-0.9 %	-1.5 %	-2.9 %	↓	Y
12/1999	-1.4 %	-1.5 %	-2.9 %	↓	Y
03/2000	-1.2 %	-1.5 %	-2.2 %	→	Y
10/2001	+0.3%	-3.2 %	-0.4 %	→	? (Y)
12/2001	-0.5 %	-3.2 %	-0.4 %	↓	Y
01/2002	-0.9 %	-4.1 %	-0.4 %	↓	Y
04/2002	-1.0 %	-3.8 %	-0.9 %	↓	Y
07-09/2002 [5]	-1.3 %	-3.7 %	-1.5 %	↓	Y

Source: Czech National Bank; own computations

Notes: 1/ Deviation of the CNB's inflation forecast from centre of the target twelve months ahead (for net inflation targeting the announced targets closest to the twelve months horizon were used). 2/ Deviation of actual inflation after one year (or closest to that) from centre of the target. 3/ Ex post assessment in July 2004 (the CNB's forecasts did not work explicitly with the output gap till July 2002, so no ex ante assessment is available). 4/ Author's subjective assessment of the ex ante consistency (ex post consistency given in brackets in indecisive cases). 5/ Unconditional inflation forecast, including an explicit assessment of the current output gap.

From the ex ante view, we can see that most interventions against the CZK's appreciation were carried out during periods in which the inflation forecast was pointing below the target and the output gap was negative, which is consistent with the logic of inflation targeting. The only exceptions were the interventions during the first half of 1998, when the inflation forecast was heading towards the upper band of the indicative target for December 1998, and the intervention in October 2001 when the forecast was more or less on target.[66] The output gap, though, was negative even in these months. Moreover, in most cases the interventions happened during periods of falling interest rates, which indicates that the CNB assessed monetary easing to be an appropriate policy response. The period till mid-1998 is again an exception in this respect, as the interest rates were in fact increased once during this period. Other exceptions are the interventions in early 2000 and October 2001, which fall into the relatively long period of stable interest rates. From the ex post view, all the interventions are consistent with the logic of inflation targeting, as the actual inflation fell significantly below the target, even in those cases when the forecast was on target or above its midpoint.

On the other hand, we could hardly find periods in which interventions to support the CZK would have been target-consistent, as the whole period since 1998 has been characterised by subdued economic activity and frequent inflation target undershooting. This addresses the question of asymmetry in the CNB's interventions (see section 4). According to the criteria applied here, this asymmetry was in fact consistent with the inflation targeting regime – as the conditions were asymmetrically biased towards monetary easing – and does not signal a departure from managed floating.

In the second step, let us look at the developments of the monetary conditions mix to judge the regime consistency of the interventions. In particular, we are asking if the interventions were carried out in periods of

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66 The forecast in October 2001 was slightly above the centre of targeted corridor in the four-quarter outlook, but was heading towards its lower band for the remaining part of the monetary policy horizon.

lax interest rates and an overvalued exchange rate (or at least in periods when the situation was moving in that direction quickly). The assessment is made hard by the fact that the ex post judgement on the equilibrium real interest rate and exchange rate is often very different from the ex ante assessment, which is however not available for most of the analysed period. Moreover, there is a range of alternative theories to derive the equilibrium trajectories, which may often give contradictory results. For this paper, I use the ex post assessment by the CNB's staff responsible for inflation forecasting from July 2004 (Beneš and N'Diaye, 2003). [67]

Figure 5: Composition of Real Monetary Conditions

Source: CNB, Monetary and Statistics Department, July 2004

As we can see, the exchange rate appears to have been overvalued in two periods: in the last three quarters of 1998 and from late-2001 till early-2003. At the same time, the real interest rate conditions we relaxed in those periods. Therefore, the interventions pass easily the regime consistency criterion in these two instances. For the other periods, the judgement is more uncertain.

In early-1998, the exchange rate was probably close to equilibrium from the ex post view. The real interest rates were still rather high, giving room for easing through the interest rate component of monetary conditions. There are three possible explanations for using the interventions instead in this period. First, the exchange rate equilibrium was assessed differently at that time than at present. This is quite possible, taking into account the short time that had passed since the turmoil of May-1997 and the still high (even though falling) current account deficit. Second, the speed of change in the exchange rate might have been viewed as too fast by the CNB, and the interventions could be explained as a pre-emptive measure, trying to fight against possible future overvaluation. With a benefit of hindsight, this would be a valid argument. Third, the CNB might have been more or less satisfied with the overall monetary conditions (as indicated by Table 3), but it also liked its mix and tried to prevent it from changing. A preference of restrictive interest rates and depreciated exchange rate could have been motivated by a desire to stabilise the current account after the currency crisis, and to avoid a spill-over of capital flows volatility from the emerging market crises (see also Holub and Tůma, 2001). In other words, the policy may have followed the goal of external stabilisation, which is perhaps understandable for that turbulent period, but questionable in terms of the regime consistency with the inflation targeting. From an ex-post point of view, faster interest rate cuts might have been more appropriate in that period.

In late 1999 and early 2000, the exchange rate appears to have been undervalued in the ex-post point of view, while the interest rates were restrictive. The ex-post regime consistency of the interventions is thus fairly questionable for this period. A possible ex-ante motivation for the decision to intervene can be found in the

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[67] This expert assessment, however, should not to be interpreted as an official policy view of the CNB.

minutes of the Bank Board meeting of October 4, 1999, which suggest that at that time, the exchange rate's appreciation against the euro was not viewed as a modest correction of the previous marked undervaluation, but as a risk to the economic growth and the inflation target. In relation to this, it is important to note that the CNB did not use the "gap-methodology" in its forecasting process at that time, which means that it was concerned with changes in the exchange rate rather than its deviations from the equilibrium. Another question is why the CNB did not use interest rate cuts rather than interventions to address this risk. The explanation can be again found in the same minutes. First, the Board thought that "short-term capital motivated by the interest rate differential was not a source of appreciation pressure," and that the shock was coming from – possibly exaggerated – market expectations of a future appreciation related to the FDI inflows. Second, a concern was expressed that the appreciation could be later on replaced with a sharp depreciation with negative consequences for the overall stability. Third, the time lag between the exchange rate and inflation was believed to be shorter than the transmission of interest rates changes. And last, the interest rates were viewed as "in principle consistent with the level achieved in the economic cycle", i.e. not restrictive. Taking these arguments into account, the judgement of the interventions' ex ante consistency might perhaps be more positive than the ex post assessment. [68]

9. PROCEDURAL ISSUES

As already mentioned at the beginning of the previous sub-section, the consistency of foreign exchange interventions with the inflation targeting regime can also be assessed in terms of procedures that are followed in the decision-making process and its public communication. After all, the main constraint that the inflation targeting places on the policy makers consists in the need to observe such procedural rules. An open question, which the literature on managed floating has not addressed so far in most cases, is to what degree the same procedural principles can – and should – be applied also to foreign exchange interventions under the inflation targeting regime.

Typically, the procedures governing the decisions on interventions are much less clearly defined than the rules for interest rates. The international standards on the transparency of exchange rate management policies are rather vague, compared with other policy areas. On the one hand it is argued in favour of clarity on the mandate, rules and procedures for the authorities carrying out the interventions. On the other hand, it is acknowledged that "there are circumstances in which it would be inappropriate for central bank to disclose their near-term monetary and exchange rate policy implementation tactics and provide detailed information on foreign exchange operations" (IMF, 1999; see also Chiu, 2003). The international practice is also quite diverse, and there are considerable differences in the disclosure policy even among countries practising the same exchange rate regime (Chiu, 2003). The same is true even if one looks on the subset of inflation targeting central banks.

The lack of clear procedures may be a source of problems, as the credibility of the inflation targeting crucially depends on observing its key principles. Therefore, some central banks have tried to make the rules for interventions clearer and the decisions more transparent.[69] Nevertheless, the rules have typically remained fairly

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68 Personally, though, I can still see some open questions here. For example, one may ask whether it was appropriate to pay so much attention to the short-run primary effects of the exchange rate changes. Moreover, it is not clear if the expectations of future FDIs did not represent a fundamental factor at that time, meaning that the appreciation was not a destabilising shock coming from the foreign exchange market. At the same time, the fact that real interest rates were in principle not viewed as restrictive does not in itself constitute a sufficient argument that the interest rates could not have been lowered further. Finally, note that the short-term exchange rate volatility does not appear to have been exceptionally high during that period.

69 The Sveriges Riksbank (2002) has been one of the leaders in this respect. Chiu (2003) argues that the Canadian system has also become quite transparent in terms of its objectives and openness since 1998, but it has not been tested by any actual intervention episode so far.

general and "discretionary". As argued in Chiu (2003), "the relationship between transparency in monetary policy and that in foreign exchange interventions is by no means straightforward".

The difficulty in defining clear procedures may be partly connected to the fact that the economic literature gives no clear guidance in this respect. The inflation targeting literature is silent on this issue (see Section 2), and the literature on the effectiveness of the interventions leads to differing conclusions, based on which channel of their transmission is emphasised. Speaking for example about the transparency procedures, if one relies on the signalling effect, a logical recommendation would be to carry out open foreign exchange interventions. On the other hand, if one bets on the order flow effect, policy announcements may be counterproductive (see Canales-Kriljenko, et al., 2003; Chiu, 2003).

The lack of transparency and other operational rules may also be justified by the fundamental difference in the central banks' position in the foreign exchange market compared with the domestic money market. While in the money market, central banks have almost a perfect control over the short-term interest rates, in the foreign exchange market they are only one of many players, too weak to lean against the market. A central bank can afford to discuss openly the pros and cons of its interest-rate decisions and possibly signal the likely direction of its future actions. This does not weaken its impact on the short-end of the yield curve, and may only increase – and make more predictable – its impact on longer-term interest rates. On the other hand, foreign exchange interventions may be ineffective when anticipated by the market, as they may have no further signalling effect or impact on the risk premium. It could also be strongly counterproductive if the central bank expressed any doubts about the interventions' effectiveness or appropriateness, as this could weaken their signalling effect. Publishing the voting ratios or dissenting views in the real-time thus might be damaging.[70]

Let me now look at the communication of foreign exchange interventions in the Czech Republic. Sometimes, the fact that the CNB was intervening was announced immediately (e.g. on 31st March 1998, 4th October 1999, 21st January 2002, or most recently 10th April 2002; see Table 4), but on other occasions the CNB carried out "undisclosed" interventions (e.g. in December 2001 or in July-September 2002). Discussions of the exchange rate issues appeared in the minutes of the regular monetary policy meetings or extraordinary monetary policy meetings at which interest-rate decisions were discussed. Only sometimes, however, the minutes did also include clear information on interventions. This happened either in the case of extraordinary meetings called due to the exchange rate developments (such as on 21st January 2002 or 11th July 2002) or in the case of some regular meetings (e.g. 4th October 1999, 30th March 2000, and 25th October 2001). But information on the voting ratio was given only in some of those cases when the decision was unanimous.[71] The CNB also published its agreement with the government, including the alternatives that had been considered; in this exceptional case the exchange rate policy was very transparent.

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70 It might still be possible and advisable, though, to publish the Board discussions with rather a long time lag for the sake of accountability.

71 In mid-2001, the CNB's Board decided to publish full transcripts of its monetary policy meetings with a lag of six years. This means that the details of the interventions' debates from these meetings will also become public. Nevertheless, the transcripts are produced from those meetings only at which interest rate changes are discussed.

Table 4: Communication of the Interventions

Starting month	Final month	Short description
02/1998	04/1998	Open interventions on 31 March announced by a press release (but interventions already in February), no minutes
06/1998	07/1998	Open entry to the market on 14 July; stated in minutes of the monetary policy Board meeting of 16 July
10/1999	10/1999	Open interventions on 4 October, published in minutes (detailed explanation; unanimous voting)
12/1999	12/1999	Minutes only mention a consensus view on the necessity to prevent excessive appreciation (+warning against interventions was given already in November)
03/2000	03/2000	Open interventions on 30 March, announced by press release, published in minutes (unanimous decision)
10/2001	01/2002	25 October: regular MP meeting, decision to intervene published in minutes (unanimous); 20 December: regular meeting, interventions discussed, but no decision announced; 21 January 2002: extraordinary meeting, interventions announced and published in separate minutes (unanimous decision)
04/2002	04/2002	4 April: extraordinary MP meeting, interventions announced by press release; 10 April: interventions with a press release
07/2002	09/2002	11 July: extraordinary meeting, no decisions announced immediately, minutes include decision on interventions (no voting ratio); subsequent interventions not disclosed directly

The monthly volume of interventions is published with a lag of two months (since July 1998), which is the main regular channel for communicating the interventions. As reported by Canales-Kriljenko (2003), interventions volumes are published only by 25 percent of all central banks that responded to a survey's questions concerning the transparency of their interventions policy. This means that the CNB belongs to the minority group of more transparent central banks in this respect (even though some other banks publish daily intervention volumes, which is a step further in transparency). It can be thus concluded that some minimal communication standards are in place concerning the CNB's decisions on foreign exchange interventions, but a considerable degree of discretion remains in this area, unlike for the interest-rate decisions.

Other institutional aspects of interventions also differ from the interest-rate decisions. While the interest rates are adjusted based on comparing the inflation forecast with the targets in a pre-specified time horizon (and taking into account escape clauses), no such clear rules exist for the interventions. No sufficiently clear written opinion has been explicitly given – either externally or at least internally – under what circumstances are the foreign exchange interventions consistent with the current policy regime. In contrast with the Situational Reports used at the regular monetary policy meeting to decide on the interest rates, no standardised material for the Board's discussions on interventions exists, etc.[72] All of this may sometimes create challenging tensions in the monetary policy regime.

These challenges are, in my opinion, a strong argument for the central banks pursuing inflation targeting in the less open economies to avoid using the foreign exchange interventions altogether and let the currency float

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72 Spoken opinion is given to the Bank Board by the financial markets department on the motivations for interventions and the prevailing market conditions. Typically, the motivation was described as creating two-way risk in the situations of one-sided market expectations. While not in conflict with my suggestions, I believe that this mechanism is not sufficiently systematic.

freely. In very open economies, however, it is not clear whether the central banks can afford to do this just due to procedural consistency and related credibility reasons. In their case, the decisions on the frequency of interventions thus needs to take into account other factors as well, such as their effectiveness, sterilisation costs, etc. (see above). Once the central bank decides to use the interventions, however, it should set at least some minimal rules and procedural steps to make the interventions more transparent, which should include a clearer definition of the interventions' consistency with the policy regime and their public communication strategy. An open communication of dissenting views on the interventions, though, should not be a part of this communication strategy, in my opinion, as it could weaken their effectiveness (if there is any at all).

10. SUMMARY AND CONCLUSIONS

In this paper, I discussed the role of foreign exchange interventions in the inflation-targeting regime, concentrating on the Czech experience since 1998.

I stressed that the inflation targeting literature gives little guidance on how to use the interventions under this regime. The theory usually assumes – and often explicitly recommends – pure floating under which the central bank influences the exchange rate via the interest rates only. If we assume perfect capital mobility, there are few channels through which the interventions could have a systematic and predictable impact on the exchange rate. However, there is also an alternative view, proposing that small open economies can successfully combine the inflation targeting with managed floating.

Since May 1997, the Czech Republic has operated a managed floating exchange rate with the euro (previously the DEM) serving as a reference currency. In line with that, the CNB has intervened occasionally in the foreign exchange market. With the exception of the year 1997, the interventions were directed against the CZK's appreciation only. The periods of intervention activity included December 1997 to July 1998, October 1999 to March 2000, and the period from late-2001 till September 2002.

Moreover, a special account for the government's foreign exchange privatisation revenues was established at the CNB in early-2000, and strengthened by an agreement between the CNB and the government in January 2002. This agreement has kept all the government's foreign exchange revenues out of the market and at the same time allowed the government to finance its fiscal needs out of the privatisation revenues. So far, the CNB has purchased over EUR 4.2 billion directly from the state. The agreement includes the government's participation on sterilisation costs of the CNB due to these direct purchases.

The stylised facts do not give any clear answer concerning the effectiveness of the interventions. It seems that sometimes they might have had an immediate impact, lasting up to 2 or 3 months. However, no particular "ideal" intervention strategy can be identified at first sight. Something that did work in one situation may have had little effect in another one. Moreover, even many of the "successful" interventions were not able to prevent quite prolonged periods of exchange rate overvaluation in 1998 and in 2002. The initial impact of the CNB's agreement with the government was also disappointing. Nevertheless, the undisclosed interventions that the CNB used in July-September 2002 (together roughly EUR 1 billion) seem to have had an important effect thanks to a combination of several factors, a change in the market expectations being probably the most important of these. And to the extent that the policy measures contributed to these changed expectations, one could say that they had a medium-term impact on the exchange rate. In sum, the experience so far seems to favour a signalling role of foreign exchange interventions, which however implies a rather unstable transmission between the central bank actions and the market reactions. The strategy that worked in the second half of 2002, for example, cannot be thought of as a universal effective recipe for any future turbulent period.

An important aspect of the interventions that must not be overlooked is the sterilisation costs. These have indeed had a strong empirical relevance in the Czech Republic. Their total sum since 1993 has reached 8-10 %

of the yearly GDP, partly as a heritage of the fixed exchange rate regime till May-1997 and partly due to the interventions under floating. The sterilisation costs had a negative impact on the interventions' credibility and effectiveness till 2002, when the interest-rate differential vis-à-vis eurozone became negative and the interventions started to be viewed as profitable by the market.

To judge whether the foreign exchange interventions are not in a strong conflict with the inflation targeting regime, I propose three basic criteria, which look at the consistency of the interventions with the inflation targets (target consistency), at the mix of monetary conditions (regime consistency) and the clarity and transparency of decision making (procedural transparency). In my opinion, central banks that want to use foreign exchange interventions as part of the inflation targeting regime should define and communicate such criteria of their target and regime consistency, even if these criteria should be used as "flexible rules" for the interventions allowing for possible escape clauses. It also needs to be stressed that the criteria must be viewed as necessary, but not sufficient conditions for the actual use of interventions.

Using the proposed criteria to assess the CNB's interventions, I found out that they can be all judged as ex-post target-consistent, as the whole period since 1998 has been characterised by frequent target undershooting, negative output gap and falling interest rates. From the ex-ante perspective, the judgement is less clear for the interventions in early-1998, when the inflation was expected to be in the upper half of the targeted interval, and in October 2001, when the inflation forecast was on target. In these periods, however, the interventions could be justified at least by a negative output gap.

The monetary conditions mix was consistent with the proposed criteria in mid-1998 and from late-2001 till 2002. The combination of restrictive interest rate conditions and loose exchange rate conditions in early-1998 suggests that the CNB might have followed the goal of external stabilisation besides the inflation target, which is understandable for the given circumstances, but questionable in terms of consistency with the newly introduced inflation targeting regime. Similar questions arise also about the interventions in late 1999 and early-2000, as there is no reliable evidence of an exchange rate overvaluation for that period.

An issue that has been often overlooked by the literature on managed floating is the difficulty in defining clear procedural rules for the foreign exchange interventions. This may be quite important, though, when managed floating is combined with the inflation targeting regime. The lack of clear rules and transparency typically surrounding the foreign exchange interventions contrasts with the clearly defined procedures guiding the interest rate decisions, which may occasionally create tensions in the monetary policy regime. The Czech experience has been in line with this general conclusion.

References

Beneš, J., Hlédik, T., Vávra, D., Vlček, J. (2003) *The Quarterly Projection Model and its Properties*. In: Coats, W., Laxton, D., Rose, D. (eds.), "The Czech National Bank's Forecasting and Policy Analysis Systém", Prague, Czech National Bank, 2003.

Beneš, J., N'Diaye, P. (2003) *A Multivariate Filter for Measuring Output and the NAIRU*. In: Coats, W., Laxton, D., Rose, D. (eds.), "The Czech National Bank's Forecasting and Policy Analysis System", Prague, Czech National Bank, 2003.

Bofinger, P., Wollmershaeuser, T. (2001) *Managed Floating: Understanding the New International Monetary Order*. London, CEPR Discussion Paper no. 3064.

Branson, W.H. (1976) *Asset Markets and Relative prices in Exchange Rate Determination*. Stockholm, Institute for International Economic Studies, Seminar Paper No. 66.

Bulíř, A. (2003) Some Exchange Rates Are More Stable than Others: Short-Run Evidence from Transition Countries. Prague: CNB Working Paper Series, no. 5/2003.

Calvo, G. A., Reinhart, C. M. (2000) *Fear of Floating*. Cambridge, MA, NBER Working Paper, no. 7993.

Canales-Kriljenko, J. I. (2003) Foreign Exchange Intervention in Developing and Transition Economies: Results of a Survey. Washington, D.C., IMF Working Paper, WP/03/95 (May).

Canales-Kriljenko, J. I., Guimarães, R., Karacadağ, C. (2003) *Official Intervention in the Foreign Exchange Market: Elements of Best Practice*. Washington, D.C., IMF Working Paper, WP/03/152 (July).

Chiu, P. (2003) Transparency versus Constructive Ambiguity in Foreign Exchange Intervention. BIS Working Papers, No. 144 (October).

Čihák, M., Holub, T. (2003) *Price Convergence to the EU: What Do the 1999 ICP Data Tell Us?* Prague: CNB Working Paper Series, no. 2/2003.

Derviz, A. (2003) Components of the Czech Koruna Risk Premium in a Multiple-Dealer FX Market. Prague: CNB Working Paper Series, no. 4/2003.

Dominguez, K. M., Frankel, J. A. (1993) *Does Foreign Exchange Intervention Matter? The Portfolio Effect*. American Economic Review, vol. 83 (December), pp. 1356-1369.

Edison, H. J. (1993): *The Effectiveness of Central Bank Intervention: A Survey of the Literature after 1982*. Special papers in International Economics No. 18, Princeton University, Princeton.

Fischer, S. (2001) *Exchange Rate Regimes: Is the Bipolar View Correct?* A Lecture Delivered at the Meetings of the American Economic Association, New Orleans, January 6 (http://www.imf.org/external/np/speeches/2001/010601a.pdf).

Goldstein, M. (2002) *Managed Floating Plus*. Washington, D.C., Institute for International Economics, Policy Analyses in International Economics, No. 66.

Halpern, L., Wyplosz, C. (2001) *Economic Transformation and Real Exchange Rates in the 2000s: The Balassa-Samuelson Connection*. In Economic Survey of Europe 1, Geneva: UN Economic Commission for Europe, Chapter 6: p. 227–240.

Holub, T., Tůma, Z. (2001) *Managing Capital Inflows in the Czech Republic: Experiences, Problems and Questions*. Paper prepared as part of the project "Managing Capital Flows in the Transition Economies of Central and Eastern Europe", Budapest: ICEG European Centre.

Holub, T. (2001) *Ražebné a financování centrální banky*. Finance a úvěr, vol. 51, no. 1/2001, pp. 9-32.

Holub, T. (2004) *Foreign Exchange Interventions under Inflation Targeting*. Prague: CNB, Internal Research and Policy Note, 1/2004 (http://www.cnb.cz/en/pdf/IRPN_1_2004.pdf).

Hrnčíř, M., Šmídková, K. (1998) *The Czech Approach to Inflation Targeting*. Prague: CNB, Workshop on Inflation Targeting, proceedings of a conference held on September 14-15.

IMF (1999) Code of Good Practices on Transparency in Monetary and Financial Policies. Washington, D.C, International Monetary Fund

Kearns, J., Rigobon, R. (2002) Identifying the Efficacy of Central Bank Interventions: the Australian Case. NBER Working Paper, no. 9062 (July).

Kouri, P. J. K. (1976) The Exchange Rate and the Balance of Payments in the Short Run and in the Long Run: A Monetary Approach. Scandinavian Journal of Economics, vol. 78, pp. 280-304.

Lyons, R. K. (1997) *A simultaneous trade model of the foreign exchange hot potato*. Journal of International Economics, vol. 42, p. 275–298.

Mahadeva, L., Sterne, G. (2000) *Monetary Policy Frameworks in a Global Context*. London: Routledge and Bank of England.

Mussa, M. (1981): *The Role of Official Intervention*. Occasional Paper No 6, Group of Thirty, New York.

Popper, H., Montgomery, J. D. (2001) *Information Sharing and Central Bank Intervention in the Foreign Exchange Market*. Journal of International Economics, vol. 55, pp. 295-316.

Rogoff, K. (1984) *On the Effects of Sterilized Intervention: An Analysis of Weekly Data*. Journal of Monetary Economics, vol. 14 (September), p. 133-150.

Sarno, L., Taylor, M. P. (2001) *Official intervention in the foreign exchange market: Is it effective and, if so, how does it work?* Journal of Economic Literature, vol. 39, iss. 3 (September), p. 839-868.

Schwartz, A. J. (2000) *The Rise and Fall of Foreign Exchange Market Intervention*. Cambridge, MA, NBER Working Paper, No. 7751 (June).

Svensson, L. E. O. (1998) *Open-Economy Inflation Targeting*. London, CEPR Discussion Paper No. 1989 (October).

Svensson, L. E. O. (1999) *Inflation Targeting as a Monetary Policy Rule*. Journal of Monetary Economics, vol. 43, pp. 607–654.

Svensson, L. E. O. (2001) *Independent Review of the Operation of Monetary Policy in New Zealand: Report to the Minister of Finance*. Reserve Bank of New Zealand.

Sveriges Riksbank (2002) *The Riksbank's interventions in the foreign exchange market – preparations, decision-making and communication*. Stockholm, 31 January 2002 (http://www.riksbank.se/).

Truman, E. M. (2003) *Inflation Targeting in the World Economy*. Washington, D.C., Institute for International Economics.

Williamson, J. (2000) *Exchange Rate Regimes for Emerging Markets: Reviving the Intermediate Option*. Washington, D.C., Institute for International Economics, Policy Analyses in International Economics, No. 60.

Comments Prompted by: Foreign Exchange Interventions under Inflation Targeting: The Czech Experience

David Archer – Reserve Bank of New Zealand

In New Zealand, a change was recently announced to the long-standing policy to not intervene in the foreign exchange market except in the extremely rare circumstance of near-complete breakdown of the functioning of the market. No actual intervention has taken place since the announcement of a change in policy, but the announcement itself was a significant event. The experience of other countries – especially small open economies that practice inflation targeting – with respect to intervention is accordingly of considerable interest to New Zealand policy makers.

The situations of New Zealand and the Czech Republic are similar in many respects. Both are small open economies, both practice inflation targeting, and both approach that task in a principled fashion. However, the Czech Republic is in a transitional phase with respect to the development and opening of financial markets, the exposure of product and factor markets to global competition, and the achievement of sustained macro stability. New Zealand, in contrast, completed its transition more than a decade ago.
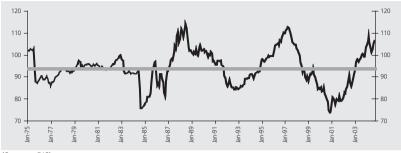
Against that background, it is interesting to observe that the choices made with respect to foreign exchange market intervention during that transition phase were quite different in the respective countries. Since the float of the New Zealand dollar in 1985, there has been no intervention[73] by the Reserve Bank. During New Zealand's transition to open and integrated capital markets under a floating exchange rate regime, significant volatility in the exchange rate was experienced from time to time. A sustained real appreciation also accompanied efforts to disinflate, as seems commonplace in such situations (a point which is emphasised in debates on sequencing of reform).

In New Zealand the choice to abstain from intervention was the product of a number of considerations, not the least of which was a concern to allow market signals to flow through to economic agents. It was recognised that market signals are imperfect, especially in newly liberalised markets. However, it was expected that the degree of imperfection would diminish over time, the more so if the authorities refrained from sheltering agents from the new circumstances.

Subsequently, although New Zealand financial markets, firms and individuals have learned to live with market-determined exchange rates, the scale of the swings in the exchange rate has not diminished, at least on a business cycle frequency (see figure, next page). It is the continuing scale of those swings that has led to the announced change in policy. The degree of movement in the exchange rate through the business cycle continues to be large relative to the scale of swings in underlying macro-economic variables. Moreover, whereas the amplitude of the business cycle seems to have diminished – in real terms and especially nominal terms – since monetary policy became directed primarily to inflation control, the amplitude of the exchange rate cycle has not.

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73 "Intervention" is used here to refer to transactions or actions taken in the foreign exchange market with the purpose of influencing the exchange rate. The Reserve Bank regularly transacts in the foreign exchange market for domestic liquidity management, using foreign currency swaps; and occasionally buys and sells foreign currency in connection with government current transactions and its own foreign reserve portfolio management. While the latter class of transactions does have a net foreign exchange effect, they are undertaken without regard to the exchange rate level or direction on the basis of timetables determined by the underlying business.

Exchange rate cycles are large relative to underlying fundamentals and likely unobserved shifts in equilibrium (NZ cpi-based effective real exchange rate)

(Source: BIS)

These "excessive" (relative to fundamentals) movements in the exchange rate are likely to harm economic efficiency in much the same way that excessive price level variance harms efficiency. This gives rise to the policy case for seeking opportunities to diminish the extremes of exchange rate variance, if possible and achievable without simply causing offsetting efficiency losses elsewhere.

This chain of reasoning has led to the development of four criteria for intervention. These have been publicly announced. They are:

1. that the exchange rate is exceptionally high or low levels relative to historical experience, *and*
2. that the level is unjustified in terms of economic fundamentals, *and*
3. that intervention would be consistent with monetary policy interests, as defined by the Policy Targets Agreement between the Reserve Bank and Government, *and*
4. that there are reasons to expect the intervention will be effective.

These are demanding conditions, especially when considered jointly, as the schema requires. If history is anything to go by, it is very likely that the first three conditions (for example) might be fulfilled at the peaks and troughs of exchange rate cycles[74] without any intervention taking place because the fourth condition is unable to be satisfied. My reading of the literature and my observation of other central banks' experiences leads me to believe that under relatively rare conditions interventions can shift exchange rates for more than just a few days. More numerous are the failed attempts to change the course of the exchange rate when the conditions were not propitious. The Czech Republic's mixed record on this score, as reported in Holub's paper, seems consistent with this assessment.

It is interesting to compare the thinking behind the establishment and likely use of these criteria in New Zealand with the thinking enunciated by Holub. Two areas of possible contrast are immediately apparent.

First, Holub's assessment is that consistency of exchange market intervention with inflation targeting objectives is much more likely to be assured if the exchange rate developments that follow intervention take inflation towards target, not away from it. Such an assessment has a long pedigree. It fits well with the argument that unsterilised intervention is more likely to be successful than sterilised intervention. And it fits well with the idea that foreign exchange market intervention can have an effect on the exchange rate through signalling a future change in monetary policy.

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74 Though the issue of policy consistency remains somewhat controversial – see below.

I would agree with Holub on this, up to a point. In my experience, from time to time there comes a point when the level of monetary conditions over- or undershoots the desired level as the exchange rate continues to appreciate or depreciate after the peak or trough of the interest rate cycle. One could argue that it is at this point that intervention becomes consistent with the inflation target as well as being desirable in terms of altering the mix of monetary conditions.

In addition, however, the history of exchange rate cycles and monetary policy management that initiated the change in thinking about intervention in New Zealand points often in the *opposite* direction. Often, the exchange rate has dominated the transmission channels from policy interest rates to economic effect, rather than having played too weak a role. It is this excessive degree of exchange rate cycling, this dominance of the exchange rate transmission channel, in sympathy with rather than counter to interest rate cycles, that originally motivated the search for an additional monetary policy instrument.

Thus, the policy objective of exchange market intervention would sometimes be to alter the *mix* of monetary conditions in a way that generates larger interest rate cycles and smaller exchange rate cycles. Moving towards the (ex ante) peak of the exchange rate cycle, intervention would be seeking to constrain further appreciation, replacing the contractionary effect of foregone appreciation with the contractionary effect of higher interest rates. And likewise, moving towards the trough of the exchange rate cycle, intervention would be seeking less exchange rate weakness and more interest rate stimulation. If that outcome were able to be achieved, the income cycles of the tradable sector and non-tradable sectors would be more evenly balanced.

How consistent would such intervention be with inflation targeting? Fully, in my view, so long as the overall mix of monetary conditions continued to keep inflation in line with the target. Indeed, the underlying objective function of monetary policy makers would be better achieved if the incidence of monetary policy transmission were less lop-sided as between the tradable and non-tradable sectors. Holub quite appropriately raises the issue of sending confusing signals about the intention of monetary policy with respect to the inflation target. It may well be that confusion could arise, especially in situations of relatively weak policy credibility. The potential for confusion would be all the greater when interventions were secretive. However, at least in the New Zealand case, the consistency of intervention with the inflation target, including any intervention aimed at altering the mix rather than the level of monetary conditions, would be well understood. This follows from the likelihood that the willingness – indeed keenness – to take offsetting interest rate action would be both understood and believed.

It has to be recognised that it might be difficult to depreciate the exchange rate through intervention at the same time as shifting interest rates upwards relative to foreign rates. Equally it might be difficult to appreciate the exchange rate while shifting interest rates down. These are, however, matters that impinge on the *probability* of achieving the desired outcome, not the consistency of that desired outcome with public policy interests.

In my experience, there comes a point when the level of monetary conditions over- or undershoots the desired level as the exchange rate continues to appreciate or depreciate after the peak or trough of the interest rate cycle. One could argue that it is at this point that intervention becomes consistent with the inflation target as well as being desirable in terms of altering the mix of monetary conditions.

The second potential area of contrast with Holub's articulation of the Czech experience relates to the assessment of the consistency of exchange rate developments with economic fundamentals. Such an assessment is a critical component of the four criteria for intervention set out above. In my view, we have a tolerably good conceptual understanding of exchange rate determination, over the medium to longer term horizon. That standard economic fundamentals play their expected roles in shaping the evolution of the equilibrium exchange rate and

of the medium term dynamics of the exchange rate around equilibrium can be shown empirically. And we even have some handle on the short run dynamics that lead to exchange rate overshoots and a breakdown in conventionally-measured uncovered interest rate parity. [75]

However, there are two crucial practical difficulties in using this information to assess when intervention is likely to be consistent with fundamentals – or, put differently, when the exchange rate is likely to be inconsistent with fundamentals. First, the empirics give us very imprecise estimates of the equilibrium processes. And second, even if we had more precise estimates, most of the relevant processes are forward-looking. Judgements as to the consistency or otherwise of the exchange rate with economic fundamentals necessarily involves assessments of the plausibility of the forecasts of those fundamentals that are embedded in the current exchange rate.

Holub's documentation of intervention in the Czech Republic highlights this issue. Measures of the exchange rate gap computed by Czech National Bank staff differ substantially as between ex ante and ex post calculations. Over the – admittedly relatively short – period evaluated by Holub, intervention has been substantially one-sided, which is in principle at variance with most floating exchange rate intervention strategies supported by economic theory. At the same time, the fiscal cost of interventions has been high, consistent with their one-sided nature. Thus far at least, one can conclude that successive judgements (whether explicit or implicit) made at each point of intervention as to the future path of the exchange rate equilibrium have not been proven correct.

This is a warning signal for implementation of the new policy in New Zealand. The force of that warning is probably diminished by the different circumstances of each economy noted at the outset of these comments. The Czech Republic is in transition, a stage of evolution in which the future earnings potential of productive assets is unclear. As the exchange rate is in some sense the price of a claim on that earnings potential, it is not surprising that forecasts of the path of the exchange rate are difficult to make with accuracy. In contrast, New Zealand's transition has passed, and the trend real exchange rate seems to have been roughly constant for 30 or more years. Nonetheless, the warning signal remains relevant for New Zealand policymakers. As developments in equity prices in the US over the last decade well illustrate, making accurate predictions of the earnings potential of liberalised, open economies that are well integrated into global capital markets is not a straight-forward task.

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75 See, for example, the research summarized in Munro in What drives the New Zealand dollar?, Reserve Bank of New Zealand Quarterly Bulletin, June 2004, Vol 67 No 2.

Foreign Exchange Market Intervention through Option: the Case of Colombia [76]

Juan M. Ramirez – Bank of Colombia

The current scheme of intervention in the foreign exchange market in Colombia was developed after the economy suffered a balance of payment crises in 1999. It implied the abandonment of an exchange rate band system and the adoption of a floating exchange rate regime. Colombia had formally adopted a monetary policy of inflation targeting since 1998. As a consequence of the crisis, the country was left with a low level of international reserves, and started an adjustment program with the IMF (Stand-By-Arrangement).

The main objectives of the exchange rate intervention scheme were first, to build up international reserves to avoid future volatility in output and interest rates; second, to avoid extreme volatility around a given exchange rate trend (since the Central Bank does not have an exchange rate target); and finally, to avoid movements in the exchange rate that could put under risk the achievement of the inflation targets.

The key question was how to intervene in a floating exchange rate regime in which the market has to determine the equilibrium path of this variable. The framework that was adopted by the Central Bank was to build up international reserves with a minimum effect on the market through put options, and to deal with extreme volatility through put and call volatility options[77]. This mechanism was extended through call options to decumulate international reserves as will be explained below. Currently, the Central Bank (CB) of Colombia is the only CB that uses options systematically to intervene in the foreign exchange market (FOREX).

1. PUT OPTIONS

Initially, these options were used to meet the targets of international reserves agreed with the IMF. Later on, the mechanism was used to increase international reserves, in a situation in which a large part of the supply of foreign exchange was associated with a strong increase in the external debt of the government, rather than with exports or foreign direct investment flows.

The Central Bank decides discretionally the amount of intervention. These options (with a maturity of 30 days) can be exercised whenever the exchange rate is more appreciated than its 20-day arithmetic moving average. In a five year horizon, total put auctions have been US$4.3 billion from which US$2.5 billion have been exercised (compared with a level of foreign exchange reserves of US$8.1 billion at the end of 1999).

2. VOLATILITY OPTIONS

Under conditions of extreme volatility the market does not provide a hedge to private agents which can create bubbles and exacerbate volatility. Therefore, there is a case for intervention under which the Central Bank provides limited hedging to private agents, without affecting the fundamental trends of the exchange rate.

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76 Preliminary draft.
77 An option is the right that is given to the buyer of an option to sell (put) or to buy (call) international reserves to the Central Bank, specifying a condition under which the buyer can exercise the option.

Thus, the objective of these interventions is to mitigate excessive exchange rate volatility through call (put) options with a maturity of 30 days that are auctioned whenever the exchange rate is more than 4% depreciated (appreciated) than its 20-day arithmetic moving average. The amount of intervention is fixed (US$180 million compared with a daily volume in the market between US$300 million to US$600 million). To date, only call volatility options have been auctioned (US$540 million, from which US$414 million have been exercised).

3. CALL OPTIONS

In the context of a monetary policy of Inflation Targeting, the Central Bank defined three main criteria to use call options in order to decumulate international reserves:

First, the only reason to decrease international reserves (besides volatility), is to deal with a depreciating exchange rate that put under risk the achievement of the inflation targets. Second, intervention cannot substitute the use of interest rates as the primary instrument of monetary policy. And third, the auction of these options can be done only after an inflation report and after (or accompanied by) movements in the interest rate with the same purpose.

As with put options, the amount of intervention through call options is discretionally decided by the CB's Board. Call options have a maturity of 30 days and can be exercised whenever the exchange rate is more depreciated than its 20-day arithmetic moving average. To date, total auctions of call options have been US$600 million from which US$345 million have been exercised.

Overall, since December 1999 the Central Bank has intervened 50 times in the FOREX market (Table 1). There have been 44 auctions of put options, 3 auctions of call options, and 3 auctions of call volatility options.

4. EXTERNAL SHOCKS AND FOREIGN EXCHANGE INTERVENTION 2002-2004

In the last three years foreign exchange interventions by the Central Bank have taken place in a high volatile external environment broadly characterized by a period of strong exchange rate depreciation in 2002, followed by a substantial appreciation since the end of 2003 [78].

Table 1: Central Bank interventions in the FOREX market
December 1999 – July 2004

	Put options to accumulate int. reserves	Call options to decumulate int. reserves	Volatility (call) options
Number of auctions	44	3	3
Amount per auction	US$30 m - US$250 m	US$200 m	US$180 m
Total amount in period	US$4,325 m	US$600 m	US$540 m
Total exercised amount	US$2,205 m	US$ 345 m	US$ 414 m
Net int. reserves (NIR) atJuly 12, 2004		US$11,828 m	
Exercised amount / NIR	21.2%	2.9%	3.5%

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78 Exchange rate is measured as domestic currency per dollar.

Between July and September of 2002 a strong depreciation of the currency took place (15% in real terms) and it extended by more than a year. It was a generalized phenomenon in Latin America associated with the called "Lula effect" but also (and perhaps more directly) with the corporate scandals in the US and the move toward safer assets by international investors. These changes were also reflected in the evolution of the sovereign spreads (the EMBI Plus raised by 400 basis points). The changes in the exchange rate transferred immediately to the producers' inflation of imported goods, and after a lag of about one quarter, to consumer inflation. Although the pass-through was relatively low (of around 0.04), it was large enough to jeopardize the achievement of inflation targets, despite a negative output gap of 2.5% (Table 2).

Table 2: Deviations of inflation forecasts from targets

Month at which forecast was made:	Forecasted year	Deviations of inflation forecast from target
06-07/2002	2003	-46 bp
10/2002	2003	-65 bp
01/2003	2003	+122 bp
	2004	+68 bp
05/2003	2003	+56 bp
	2004	-36 bp
12/2003-01/2004	2004	-77 bp
06-07/2002	2005	-16 bp

Among Latin American inflation targets, policy responses to the shock went from (partially) accommodating the shock through a higher inflation target (Brazil, Colombia), raising policy interest rates, and to intervene in the FOREX market by decumulating international reserves.

In the case of Colombia modifications to the inflation target was reflected in the change from a point inflation target to a range target (which made explicit the higher uncertainty associated with the inflation path in the following two years), and to slowdown the convergence speed toward the long run inflation target (3%). With respect to interest rates, Brazil started to increase them substantially, while Chile and Colombia kept interest rates unchanged, although it implied a modification with respect to the policy of lower interest rates they had in the first half of the year (Table 3). Colombia only raised interest rates six months after the shock.

Finally, all countries decreased international reserves in a different extent (Table 4). In the case of Colombia, in February 2003 the Board announced its disposition to decumulate up to US$1 billion (9.2% of total international reserves), without specifying any period of time. From this amount, the Central Bank effectively auctioned US$400 million, from which US$345 were exercised. It has been considered that in this intervention the most important effect was associated with the announcement rather than with the intervention itself.

Table 3: Intervention Interest Rates - Central Banks
       Monthly changes in basis points

	Colombia	Brasil	Chile
Feb-02	0	-25	-50
Mar-02	-75	-25	-75
Abr-02	-100	0	0
May-02	-50	0	-75
Jun-02	-50	0	0
Jul-02	0	-50	-75
Ago-02	0	0	-25
Sep-02	0	0	0
Oct-02	0	300	0
Nov-02	0	100	0
Dic-02	0	300	0
Ene-03	100	50	-25
Feb-03	0	100	0
Mar-03	0	0	0
Abr-03	100	0	0
May-03	0	0	0
Jun-03	0	-50	0
Jul-03	0	-150	0
Ago-03	0	-250	0
Sep-03	0	-200	0
Oct-03	0	-100	0
Nov-03	0	-150	0
Dic-03	0	-100	-50
Ene-04	0	0	-50

Since the second quarter of 2003 the situation has been the opposite: the ample liquidity in the international markets translated into lower spreads over sovereign debts in emerging markets, and into an appreciating trend of the exchange rates for these economies. In the Inflation Reports has been considered that this appreciating trend is temporary while the Federal Reserve of the US initiates a period of upward adjustments in the interest rates, and also for some reasons associated with local factors (an expected decrease in both, the volume of oil exports and the external financing of the public sector for the following years).

Table 4: Change in international reserves
       %

	Colombia	Brasil	Chile
Jul-Nov 02 1/	-1,1%	-13,4%	-0,3%
Dic 02-Ene 03 2/	3,5%	8,9%	8,2%
Feb-Abr 03 3/	-4,3%	-2,8%	-3,3%

Change in reserves as a percentage of int. reserves at the beginning of each period.
Data for Brazil do not include IMF loan.

As shown in Table 2, inflation forecasts at the beginning of 2004 showed an under shooting of the inflation target for 2004 and 2005. In this context, the Central Bank intervened several times since December 2003 through auctions of put options to accumulate international reserves for US$ 1.3 billion, from which US$1 billion have been exercised (a 9.2% increase over the level of international reserves at the end of 2003). The objective of this substantial intervention has been to prevent abrupt changes in the exchange rate when returning to its long run trend that could generate higher inflation and increasing inflationary expectations.
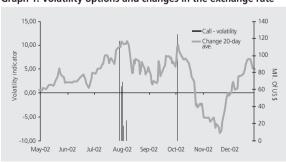
An accumulation of international reserves in such a large scale has monetary implications (if it is not sterilized), that could set interest rates at levels that are incompatible with the inflation targets for the next two years. For that reason the Central Bank has sterilized around 50% of the monetary expansion through the sell of treasury bills in the secondary market.

5. HOW EFFECTIVE HAVE BEEN THE INTERVENTIONS IN THE FOREX MARKET?

There is not enough data to test possible effects of interventions with standard time series techniques like GARCH models, or to use implied volatilities of currency option prices. Therefore, we follow Mandeng (2003) and Edison et. al. (1999) to study possible effects based on event analysis and simple analysis-of-variance models.
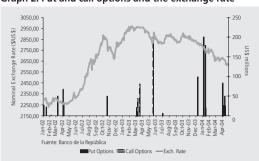
As shown in Graph 1, volatility options were automatically triggered at the two most volatile events, measured by the absolute change in the 20-day average exchange rate. The intervention episodes lasted 6 days and amounted to US$414 which, by no means can be considered excessive, in a three-year period.

On the other hand, call options to decumulate international reserves were used when the exchange rate achieved its maximum levels (between February and March of 2003) -Graph 2-. These interventions were aimed to curb the increasing depreciation trend, and to affect the level of the exchange rate which was judged to be incompatible with the achievement of the inflation target. In contrast, most of interventions through put options to accumulate reserves were not intended to affect exchange rate movements. Put options took place at low levels of the exchange rate (at the beginning of 2002), and during phases of significant exchange rate appreciation.

Graph 1: Volatility options and changes in the exchange rate

source: Banco de la República

Graph 2: Put and call options and the exchange rate

Fuente: Banco de la República

Table 5 shows the depreciation of the currency 20 days before, during, and 20 days after the intervention episodes. It also evaluates the short-term and long-term success of the intervention. An intervention is said to be successful in the short term if the change in the exchange rate in the episode of intervention reverses the trend in the exchange rate from previous 20 days. An intervention is said to be successful in the long run if the change in the exchange rate 20 days after intervention reverses the trend in the exchange rate prior to the intervention. An intervention fails (both in short and long run) if there is no reversal in the trend of the exchange rate.

Table 5: Effectiveness of FOREX interventions by the Central Bank

Dates	Intervention (mill US$)		Level Exch. Rate	Dev 1/ . Before interv.	Dev 2/ . Durin event	Dev 3/ . After interv.	Days of interv	Days of episode	Short-Term Succes 4/	Long-Term Succes 5/	Overall Assessment 6/
	Inicial	Total									
Put (acumulation of International Reserves)											
02/01/02	27,5	27,5	2291	-0,75	-0,08	-1,10	1	1	yes	no	SS
15/01/02	22,5	22,5	2297	-0,40	-0,31	-0,31	1	1	yes	yes	DS
05/02/02	1,5	1,5	2267	-1,02	-0,03	1,19	1	1	yes	yes	DS
08/03/02	50,0	50,0	2290	1,55	-0,01	-1,40	1	1	no	no	F
02/04/2002 - 05/04/2002	68,0	100,0	2265	-2,10	0,36	0,72	2	4	yes	yes	DS
21/10/02	50,0	50,0	2836	1,81	-0,62	-5,80	1	1	no	no	F
02/07/03	6,2	6,2	2818	-1,99	0,01	2,23	1	1	yes	yes	DS
10/12/03	100,0	100,0	2823	-0,72	0,51	-2,42	1	1	yes	no	SS
06/01/2004 - 15/01/2004	200,0	400,0	2779	-1,36	-1,11	-1,71	3	10	yes	no	SS
02/04/2004 - 14/04/2004	82,8	200,0	2671	0,40	-1,47	-2,14	5	13	no	no	F
Call (decumulation of International Reserves)											
03/03/2003 - 10/03/2003	20,0	65,0	2958	1,07	0,06	-0,72	3	8	yes	yes	DS
19/03/03	79,6	79,6	2956	0,72	-0,02	-1,21	1	1	yes	yes	DS
20/05/03	199,9	199,9	2875	-1,53	2,07	-1,58	1	1	no	yes	LS
Call (Volatility)											
29/07/2002 - 06/08/2002	117,0	289,5	2596	8,53	3,24	1,91	5	8	yes	yes	DS
02/10/02	124,5	124,5	2885	7,69	1,22	-3,70	1	1	yes	yes	DS

1/ Percent change in exchange rate 21-days before episode

2/ Percent change in exchange rate during the episode

3/ Percent change in exchange rate 21-days after episode.

4/ Short-Term effectiveness determined by whether direction of change in exchange rate in day of intervention reverses trend in exchange rate from previous 21-days.

5/ Long-Term effectiveness determined by whether direction of change in exchange rate 21 days after intervention reverses trend in exchange rate from trend prior to intervention

6/ Assessment: DS = Definitely successful; F = Failure (no reversal of exchange rate trend); SS = Short-Term success (reverses exchange rate trend over episode); LS = Long-Term success (trend in exchange rate reverses after intervention)

Source: Banco de la República

Given these criteria, it can be said that volatility options and call options to decumulate international reserves have been successful both, in the short and in the long run. In contrast, most of the times put options have failed or have been successful only in the short run. However, as stated before, the put options were designed explicitly to minimize their effect on the exchange rate trend. From this point of view, they have achieved their goal.

Even though volatility and call options seem to have been effective in changing the exchange rate depreciation speed and even the depreciation trend, two caveats are in order: first, the movement of the exchange rate during and after interventions was many times accompanied by a similar movement in the exchange rates and in the sovereign spreads of other economies in the region (see Table 6). Therefore, success in changing the exchange rate trend can be the result of a change in the trends of regional or global markets, rather than a result of interventions themselves. In the same way, failures can illustrate the limits of intervention when trends in the global markets are in the opposite direction.

Second, econometric exercises do not find a statistically significant effect of interventions. For example, in Table 7 the dummy variable for volatility interventions through call options has a negative sign but not statistically significant over a volatility indicator (mvol) defined as the annualized standard deviation of inter-day exchange rate movements over a 20-day period.

Table 6: Interventions and global market trends

Dates	Correlation Embi (Col vs. Brazil)	Correlation of changes in exch. rate (Col vs. Brazil)
Put (acumulation of international reserves)		
02-01-02	0,02	-0,12
15-01-02	0,42	-0,19
05-02-02	0,10	-0,31
08-03-02	0,61	0,24
05-04-02	0,55	0,26
21-10-02	0,87	0,77
02-07-03	0,64	0,76
10-12-03	0,87	0,09
15-01-04	0,92	0,67
14-04-04	0,80	0,39
Call (decumulation of international reserves)		
10-03-03	0,89	0,14
19-03-03	0,91	0,23
20-05-03	0,86	0,65
Call (volatility)		
06-08-02	0,77	0,38
02-10-02	0,68	0,47

The same is true for call options for decumulating international reserves when the dependent variable is defined as the change in the 20-day moving average of the exchange rate. Surprisingly, the sign of the coefficient for the put options is significant but in the opposite direction.

Table 7: Effect of Interventions

Dependent Variable: MVOL
Method: Least Squares

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Ec. (1)	C	6,26	0,40	15,67	0,00
	CALLVOL	-2,76	4,27	-0,65	0,52
Ec. (4)	C	6,31	0,41	15,42	0,00
	CALLVOL310	-1,29	1,76	-0,74	0,46

Dependent Variable: DPROM20

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Ec. (5)	C	0,60	0,15	4,07	0,00
	CALLDEC	-0,37	1,57	-0,24	0,81
Ec. (8)	C	0,64	0,15	4,26	0,00
	CALLDEC310	-0,83	0,65	-1,29	0,20
Ec. (9)	C	0,65	0,15	4,34	0,00
	PUTACCU	-1,62	0,86	-1,89	0,06
Ec. (12)	C	1,05	0,16	6,73	0,00
	PUTACCU310	-2,49	0,37	-6,80	0,00

Source: Calculations Banco de la República

6. CONSISTENCY OF FOREX INTERVENTIONS WITH INFLATION TARGETING

As discussed by Holub (2004) consistency of FOREX interventions with inflation targeting has several dimensions: one is "target consistency", i.e., whether or not the intervention is supportive for achieving the goals of IT. A soft criterion proposed by Holub is that interventions should loose/tight monetary conditions when the inflation forecast is below/above the inflation target, and/or the output gap is negative/positive. Moreover, the interest rate has to be the principal instrument of the monetary policy and possible interventions in the FOREX market are only a complementary tool, and just in exceptional circumstances (high volatility, serious misalignments and/or disorderly market conditions)[79].

From this point of view, as shown in Table 8, interventions in Colombia have been "target and regime consistent". Most of the time policy interest rates moved in the same direction, and changes in the monetary policy stance came first through changes in the interest rates and then through interventions in the FOREX market.

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79   This is called "regime consistency" by Holub (2004).

Table 8: Consistency of FOREX market interventions

Month at which forecast was made:		Deviation from target	Ex-post deviation	Output gap	Interest rate trend	Target consistency
Interventions for volatility reasons:						
06-07/2002	2003	-46bp	150/50 bp	-2.43%	Flat	?
10/2002	2003	-65bp	150/50 bp	-2.34%	Flat	?
Interventions to decumulate int. reserves:						
03/2003	2003	+122bp	50 bp	-2.42%	Up	Yes
	2004	+68bp		-1.45%		
05/2003	2003	+56bp	50 bp	-2.30%	Flat	Yes
	2004	-36bp		-1.22%		
Interventions to accumulate int. reserves:						
10/2002	2003	-65bp	150/50 bp	-1.64%	Flat	Yes
12/2003-	2004	-77bp		-0.36%	Down	Yes
01/2004	2005	-16bp		-0.78%		
04/2004	2004	-15bp		-1.12%	Down	Yes
	2005	-10bp		-0.86%		

This was not the case with the intervention through volatility call options in 2002, but then the purpose of these interventions was different and cannot be judged with the same criteria. In other cases, interventions to accumulate international reserves were taken when the inflation forecasts pointed below target, and interventions to decumulate international reserves occurred in the opposite situation. Moreover, in each episode the Inflation Reports explicitly identified the exchange rate movements, as one of the direct causes for target under or over shooting[80].

Another issue is what Holub calls "procedural consistency". It refers to the transparency of intervention, decision-making rules, communication to the public, disclosure or open interventions, etc. At this respect, and in open contrast with interventions in the money market, there is no clear "best practices". There are reasons to have open interventions in the FOREX market, but secretive interventions and the lack of transparency can also be justified (see for example Canales-Kriljenko et al., 2003). In practice, central banks are far from being transparent: only 25% of them report the volume of their interventions according to Canales-Kriljenko (2003). In the case of Colombia the CB intervenes mostly in a discretionary way, but once it decides to intervene, interventions are rather transparent. This implies that for the CB the exchange rate interventions are not primarily oriented to "surprise the market". They act much more as a signalling channel of current and future stance of monetary policy, or they serve to smooth exchange rate volatility or to strength the external position of the country without affecting the exchange rate trend. From this point of view, the exchange rate regime in Colombia is more transparent than many other floating economies.
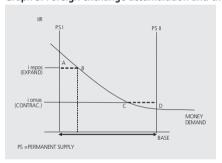
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80 Of course, there is also the case of interventions to accumulate international reserves in order to build investor confidence and to strength the external liquidity position of the country. This was the original objective of the put options as explained before. However, in these cases there have been no conflicts with the inflation targets even though they do not necessarily represent situations of target undershooting.

7. LIMITS OF INTERVENTIONS

Since most of interventions have to be sterilized (assuming that the policy interest rate is in a level compatible with the inflation target), there is a clear limit on reserve accumulation by the central bank. With a large intervention the bank could become a net borrower in the money market as shown in Graph 3.

A large accumulation of reserves could increase permanent sources of liquidity from PS I to PS II in the graph, which implies (with no sterilization) an interbank interest rate lower than the contraction rate. But, since the level of the interest compatible with the inflation target was the rate of repo operations, in practice intervention (including sterilization by an amount CD), would imply a decrease in the interest rate perhaps violating target consistency. Unless, of course, sterilization were much larger, and the whole structure of interest rates move up. Besides that, when the bank becomes a net liquidity borrower, monetary policy could become more volatile.

In addition, intervention to accumulate international reserves with sterilization has detrimental effects on the financial balance of the central bank because it has to change treasury bills for international reserves that yield a lower return. In an extreme situation (once the budget reserves disappear) the central bank would need to be financed by the government which would be in open contradiction with central bank independence.

Graph 3: Foreign exchange accumulation and the money market

8. CONCLUSIONS

The main objectives of the FOREX market intervention in Colombia through options is to o build up international reserves to avoid future volatility in output and interest rates with a minimum effect on the market, and to avoid extreme exchange rate volatility. Later the scheme was extended to call options to avoid movements in the exchange rate that could put under risk the achievement of the inflation targets.

In more than four years the central bank has intervened 50 times in the FOREX market, 44 of them to build up international reserves through auctions of put options. Therefore, interventions are uncommon, they do not have an exchange rate target, and only in sporadic events they have intended to affect the level of the exchange rate, when it has put under risk the achievement of the inflation targets. For these reasons, it can be said that interventions in Colombia have been consistent with inflation target and with the monetary policy regime. Moreover, the Central Bank intervenes mostly in a discretionary way, but once it decides to intervene, interventions are rather transparent.

So far, it can be said that interventions to accumulate international reserves through put options have worked properly in the sense that they have met their goal without disturbing the exchange rate trends. On the other

hand, volatility and call options might have been effective in changing the exchange rate depreciation speed and even the depreciation trend. However, this could be related to changes in the trends of regional and global markets, rather than with the interventions themselves. Clearly, interventions tend to be ineffective when the trends of the global markets are in the opposite direction.

Sterilization put also a constraint to intervention. Especially problematic are situations when the central bank becomes a net borrower in the money market, because interest rates might become highly volatile.

Another aspect that was not discussed here is the effect of different ways of sterilization, i.e., through permanent or temporary sources. Sterilization with government bonds affects different segments of the yield curve. It is possible for a policy to be more effective if sterilization takes place through repo operations rather than through permanent sources. But it is needed more analytical and empirical work on these mechanisms.

References

Canales-Kriljenko, J. I. (2003) Foreign Exchange Intervention in Transition Economies: Results of a Survey. IMF Working Papers, May.

Canales-Kriljenko, J. I., Guimarães, R., Karacadağ, C. (2003) Official Intervention in the Foreign Exchange Market: Elements of Best Practice. IMF Working Papers, July.

Edison, H., Cashin, P., Liang, H. (1999) Foreign Exchange Intervention and the Australian Dollar: Has It Mattered? IMF Working Papers, May.

Holub, T. (2004) Official Intervention in the Foreign Exchange Market: Elements of Best Practice. IMF Working Papers, July.

Mandeng, O. (2003) Central Bank Foreign Exchange Market Intervention and Option Contract Specification: The Case of Colombia. IMF Working Paper, June.

COMMUNICATION WITH THE PUBLIC

Communication with the Public

David Archer – Reserve Bank of New Zealand

1. COMMUNICATION WITH THE PUBLIC

Over the last 2-3 decades, central banks have become considerably more transparent about the motivation and thinking behind policy choices. Secrecy was once a hallowed concept, especially amongst central banks that managed fixed-but-adjustable exchange rates. Transparency is now prized, for its value in:

• persuading price setters that commitments to a no-surprise pursuit of price stability are being honoured;
• shaping the expectations of financial market participants in a way that brings longer term interest rates into line with policy interests; and
• providing a basis for accountability.

Whereas three decades ago a conference of this sort might have contained papers attempting to identify the optimal degree of secrecy, now-a-days one finds debates over how effective are the ECB's or Federal Reserve's communication practices, debates that seem to get as much airplay as quite fundamental questions such as how to set monetary policy in the dual presence of inflation stability and asset price instability.

Whether the elevation of central bank communications to such a level of importance genuinely reflects the substantive role of communications in achieving policy effectiveness or, alternatively, reflects modern day fashion is, to my mind, not yet clear. Let me first make the case for good communications being central to effective policy, before posing the alternative hypothesis.
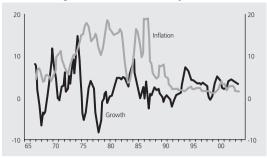
During the 1990s and the first part of the current decade, a remarkable degree of price stability has been achieved in many different countries. Less than a decade ago, numerous simulation experiments cast considerable doubt on the feasibility of achieving the tight inflation target ranges that were then coming into prominence. One archetypical experiment suggested that the standard deviation of inflation around target would be in the order of $3^1/_2$ per cent.[81]

Just as remarkable, in this context, has been the fact that the degree of price stability that has been shown feasible has been achieved without an increase in the amplitude of growth cycles. Indeed, if anything the growth process appears to have become a little more stable in many countries (see graph below for the New Zealand experience), including in countries where the pace of trend productivity growth seems to have increased. Far from being a pipedream, or an outcome that would be won only at the cost of instability and lower trend growth, inflation stability is achievable and has been consistent with great outcomes. Indeed, as Blinder and Taylor have cogently argued, monetary policy aimed at stabilising inflation is stabilising in general.[82]

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81   Haldane, A G and C K Salmon, (1995).
82   Blinder (1998), Taylor (1998).

Inflation and growth - renewed stability

How it is that such result have been achieved against the flow of expert opinion? Logically, there are only six possible ways through which such changes could have been effected:

1 The 1990s and beyond has been a particularly benign period.
2 Better policy instruments have been found.
3 Forecasting and current assessment capability has been improved, such that policy choices are now made with a better understanding of the economic scenario that will likely unfold over the time frame in which policy choices have their effect.
4 Policy is now targeted on variables that can be affected sustainably.
5 The behaviour of economic agents has changed in a favourable way.
6 Expert opinion, and the analysis on which it was based, was flawed all along.

While the scale of terms of trade swings might have diminished during the 1990s and 2000s relative to the 1970s and early 1980s, I do not believe it is possible to describe the more recent period as benign overall. Major disruptions occurred as the Soviet Union self-destructed, as the ERM was tested, as Japan entered a period of deflation, as the Asian financial crisis and Russian debt crisis combined to shock financial markets, as Argentina went through another debt default episode, and as the Nasdaq bubble burst.

Nor do I believe that we have discovered and implemented better policy instruments – the interest rate adjustment procedures commonly used now are not very new. Nor have we become better forecasters. We still find it difficult to beat a random walk by very much, with respect to forecasting developments over the next couple of quarters. We find it even more difficult to beat a random walk with respect to forecasting developments over the one to two year time frames most relevant to today's monetary policy decisions.[83]

It is almost certainly true that policy is now better targeted. In most countries, monetary policy is now regarded as the best policy instrument for influencing inflation outcomes, and monetary policy's influence on real economic developments is properly treated as predominantly temporary in nature. However, as an explanation for why we expected much weaker inflation control than has been achieved, this falls short – that superior targeting approach was allowed for in the above-mentioned experiments.

Which, assuming that the expert opinion that said it could not be done was valid – and I have no reason to believe that it was not – leaves a change in agents' behaviour as the remaining reason for the unexpectedly

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83 See Juhn and Loungani (2002) and Glück and Schleicher (2004), for two views on this subject. Our own recent inflation forecasting record is reported in McCaw and Ranchhod (2002).

superior results. If so, the power of expectations and credibility could be rather larger that we typically allow, and hence the power of communications could also be rather more important that is usually believed.

That is the case for communications being central to effective policy. It is difficult to explain the success of inflation control without allowing a very substantial role for changes in agents' behaviour. Thus it is very difficult to explain the success of inflation control without allowing a very substantial role for expectations and policy credibility. There is accordingly a prima facie case for power of communications in the policy process.

The alternative case also allows that expectations and policy credibility have played a central role in achieving superior inflation outcomes, but attributes behavioural modifications to agents' observation of *past* outcomes rather than central bank communications about *future* outcomes. My reading of the evidence somewhat favours the latter hypothesis. This is an important issue for central banks, since large mistakes can be made if we mistakenly believe that our rhetoric can somehow substitute for continued delivery of good quality policy outcomes.

With these introductory comments out of the way, I want to concentrate on two aspects of New Zealand monetary policy communications practice which provides lessons that might be of value to others. The first of these relates to the power, and limitations, of "open mouth operations". The second relates to signalling future policy intentions, or policy bias, via a published forward track for interest rates.

2. OPEN MOUTH OPERATIONS

From the mid-1980s until early 1999, the Reserve Bank of New Zealand exerted leverage over financial market conditions in a manner that, while idiosyncratic and probably not worthy of emulation, nonetheless provides some interesting insights into the potential power of communications.

The essential features of the system, which came to be known as "open mouth operations", were:

1 A floating discount rate, indexed mechanically to market rates, hence essentially unanchored.
2 The Reserve Bank's ability to affect the supply of bank settlement cash (reserves) by altering the settlement cash target used in daily open market operations. (In many respects, the target volume of settlement cash was equivalent to the non-borrowed reserves target used by the Fed.)
3 Very unpredictable influence over interest rates arising from changes in the settlement cash target.
4 The use of statements released via the media or directly on trading screens – "open mouth operations" – to guide interest rate and exchange rate outcomes towards those consistent with policy objectives.

One remarkable feature of this system was that following an open mouth operation, interest rates and the exchange rate tended to move instantaneously in the desired direction, before any change in the settlement cash target. Indeed, in the mid-1990s a full business cycle occurred with only two changes in the settlement cash target (really one, since both changes happened within a short period of time). Yet during this cycle, interest rates and the exchange rate moved through a very wide range, broadly consistent with the policy guidance being provided (see graph on next page). Thus between 1994 and 1996 short term interest rates doubled from around 5 to around 10 per cent, and the exchange rate appreciated by about 25 per cent, as open mouth operations conveyed the Reserve Bank's wish to have monetary conditions tighten. In the middle of 1995 the settlement cash target was cut twice in short order, but was otherwise unchanged. Although anticipation of that reduction in the availability of settlement cash might have been relevant to the tightening in monetary conditions that occurred over this period, the subsequent easing in conditions was achieved without any change in the settlement cash target. Thus between mid-1997 and early 1999, short term interest rates fell back to 5 per cent and the exchange rate depreciated to the 1994 level, with no change in the formal policy instrument.

The power of open mouth operations

A full interest rate & exchange rate cycle despite a mostly-unchanged policy instrument

NB For presentation purposes, the settlement cash target has been divided by 10. The scale should be read in units of $10 million.

When first encountered, this seems an implausible outcome, and indeed many international observers were confounded by the system and its outcomes. It is well known that policy announcements can be market moving when they are indicators of future policy action. The promise or threat of policy action leads to portfolio adjustment and re-pricing in anticipation, such that when the anticipated action occurs, no further market adjustments are required. But in this case, there was essentially no action by way of a change in the settlement cash target as a follow-up the succession of announcements, yet initial interest rate and exchange rate reactions did not retrace.

To be sure, by virtue of the indexation mechanism that automatically implemented an adjustment of the discount rate as market interest rates reacted to the policy statement, the new market rates were validated by a change in the conditions on which the Reserve Bank offered to supply liquidity. Nonetheless, because under this type of system the discount rate is unanchored, that a roughly policy-consistent path of interest rates and the exchange rate resulted remains a remarkable outcome, and attests to the power of communications when wielded by a credible central bank.[84]

3. SIGNALLING POLICY BIAS VIA A PUBLISHED FORWARD INTEREST RATE TRACK

To set the scene for the subject of using a published forward interest rate track to signal policy bias, a few words on the general question of publishing forecasts.

An increasingly-used vehicle for conveying the thinking behind policy choices is the publication of forecasts. Because of the lags with which monetary policy actions affect the economy, policy choices are in principle forward looking. As a consequence, forecasts are always considered – whether explicitly or implicitly, formally or informally – as a part of analysis of policy options. Publishing policy-relevant forecasts thus seems a natural way of making the policy process transparent.

However, publication of forecasts is not the only route to policy effectiveness. Some highly effective central banks do not publish explicit, quantitative forecasts (e.g. the Reserve Bank of Australia). And many highly effective central banks choose not to publish explicit, quantitative forecasts as part and parcel of explaining the rationale for the policy decision, at the time that the policy decision is announced.

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84 This approach to influencing financial market prices was dropped in 1999, not because of a lack of effectiveness in shifting market prices, but instead for other reasons. See Archer, Brookes and Reddell (1999) for further information.

Publishing explicit quantitative forecasts involves the down-side that the world rarely turns out as projected. For a start, we only have limited insights into the current state of the economy, and a limited understanding of how current influences on the economy will play out. Our knowledge of how the economy behaves in general – let alone in any particular set of circumstances – is partial. And (by definition) we know absolutely nothing about events which have not yet happened. In a recent Bulletin article, we reviewed our own forecasting performance, confirming for ourselves the general proposition that the future is very uncertain and predictions of the future will likely be wrong.[85]

Publishing explicit, quantitative, point-precise forecasts therefore runs certain risks.

• If the forecasts are interpreted as accurate predictions, and acted on, mistakes will be made.
• Readers might infer a higher state of knowledge, and stronger capability to affect economic outcomes, than is realistic.
• Policy might appear to be driven by (inevitably flawed) technical wizardry.
• In general, the central bank's competence, and hence credibility, could be called into question.

It would be possible to avoid or diminish at least the first three of these risks by not publishing quantitative projections, or significantly disassociating published forecasts from policy. Whether such an approach would substantially undermine transparency once one allows for the noise associated with inaccurate forecasts is disputable. The current majority opinion is that transparency is degraded, an opinion that the Reserve Bank of New Zealand would share.

And now to the question of publishing a projected interest rate track, or forward path for interest rates, in the course of publishing a forecast ….

Provision of a signal about policy bias is common. Indicating the likely future direction of interest rates allows markets and price setters to differentiate between one-off and complete, versus ongoing policy reactions to new information. This is important because central banks generally restrict interest rate adjustments to standard steps (typically 25 basis points) with a maximum size (50 or 75 basis points). Without an indication of bias, therefore, it is difficult for markets to ascertain whether an announced interest rate adjustment of 50 basis points, say, is likely to be the end, or the beginning of a sequence of adjustments.

An understanding of the likely future path of short term interest rates is crucial for influencing longer term interest rates, which embed interest rate expectations. Much has been made recently of the possible role of interest rate smoothing in achieving influence over the longer part of the yield curve.[86] However, while interest rate smoothing might have such a beneficial effect, ideally there would be a better way of influencing the yield curve than systematically holding back on adjusting interest rates to the full extent thought to be warranted by existing inflation pressures.

On the face of it, it would seem logical to provide an *interest rate projection* to fulfil this need for additional information about the likely future path of interest rates. A projected forward track is substantially more transparent than a qualitative bias statement with no indication other than likely direction. Yet I believe that

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85 McCaw, S and S Ranchhod (2002), "The Reserve Bank's Forecasting Performance", Reserve Bank of New Zealand: Bulletin, Vol. 65, No. 4, December 2002
86 See, for example, Woodford (2003).

the Reserve Bank of New Zealand remains unique in publishing such a forward track. Why might this be? From discussions with fellow central bankers, the most common reasons appear to be:

1 In order to publish an interest rate projection that is consistent with the rest of the forecast and with the broad intent of policy, one needs an agreed model and an agreed policy reaction function (whether that is formal or informal).

For some central banks, the idea of approximating a standard policy response by way of a policy reaction function is even more difficult that the idea of agreeing a standard interpretation of how the economy works in the form of a central model.

For others, it is the perceived difficulty of getting a policy committee to agree the standard response that gets in the way. Either way, there is often a reluctance to codify one's understanding of the economy, and of the nature of policy objectives (the loss function), to that extent.[87]

2 A second commonly-stated reason for not projecting a time-varying path for monetary policy is the fear that the conditionality of the forward path will not easily be recognised by financial markets and price setters. A forward interest rate path might be interpreted as a policy plan, which if not followed could lead to the charge of misleading the public. The credibility of the central bank might be damaged.

3 Projecting interest rates requires complete treatment of the exchange rate determination process, and inflation expectations. Projecting a time varying forward path for interest rates against a static, no-change nominal exchange rate path would be internally inconsistent. Likewise, projecting *nominal* interest rates requires explicit allowance for the path of inflation expectations.

Projecting interest rates brings the issue of internal consistency of forecasts to the fore. That is especially true for the relationship between policy, inflation expectations and the exchange rate. Standard no-policy change projections, with static nominal exchange rate forecasts are almost always internally inconsistent. In principle, no-policy change forecasts should lead to explosive (or implosive) inflation paths, unless real interest rates throughout the projection are just right to maintain the inflation target. In practice, it would be rare indeed for monetary policy to be perfectly aligned over a period of two to three years[88], without any change in nominal interest rates. Yet standard no-policy change projections rarely, if ever, project explosive or implosive inflation paths.

Is the absence of explosive or implosive inflation paths in no-policy change forecasts a product of short time frames for those forecasts, as is sometimes argued? Possibly, although I find it implausible that inflation and inflation expectations would remain anchored over a two to three year period in which the central bank steadfastly refused to adjust interest rates even as real interest rates moved further and further away from those needed to keep inflation under control. Surely in such circumstances markets and price setters would have long concluded that the policy regime had changed.

However, an internally-consistent treatment of inflation expectations, interest rates and the exchange rate generally leads to much stronger dynamics than the standard, internally inconsistent no-policy change forecasts. Inflation paths, or alternatively interest rate paths – in the context of projections that allow policy

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87 Goodhart (2001) argues that it would be constitutionally improper for a central bank to specify and act on a loss function without reference to elected representatives.

88 While forecasts often extend only two years into the future, at a year of the past is relevant to inflation outcomes projected two years ahead.

to change through time – are much more variable. This is clearly illustrated by the New Zealand experience, as discussed in the next section. This apparent variation, or instability, in the policy signals provided by internally-consistent forward interest rate paths creates issues for central banks that prefer to provide attenuated signals. Policy attenuation is especially common in the context of uncertainty. Despite ultimately unsatisfactory attempts in the literature to provide rational explanations for the degree of interest smoothing that seems common, central banks seem to have a heightened fear of policy reversal, anticipating significant loss of credibility. Setting out numerical forward paths recreates the potential for loss of credibility by generating signals of policy reversals, even if the policy being reversed was hypothetical and actual interest rate adjustments continue to be smoothed.

These expressed concerns about the projection of forward interest rates paths are extensions of the more general concern associated with being explicit about one's interpretation of economic developments in the context of uncertainty. The publication of forecasts, as already discussed, brings with it increased transparency, including greater clarity about the limitations of the central bank's knowledge. By "summarising" the forecast in a single variable – which is the effect of projecting a forward track for interest rates – limitations to knowledge are made even more transparent.

4. THE NEW ZEALAND EXPERIENCE WITH PUBLISHING A FORWARD INTEREST RATE TRACK

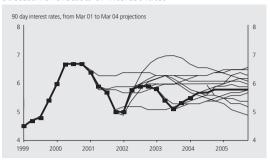Against these concerns, what has been the record from the New Zealand experience?

For a start, it has proved relatively straightforward to generate forward tracks for interest rates that capture the policy maker's assessment of the balance of probabilities around future monetary policy action. The fact that the bank has a single decision maker no doubt helps. However, that is insufficient. Policy projections generally require the assistance of expert staff and some form of model with a standard policy reaction embedded. It is difficult for the policy maker to assess whether the interaction of the stylised policy reaction and the specifics of the model structure and forecaster input produces a result that reasonably reflects the situation or otherwise.

In order to generate forward interest rate tracks that are acceptable to the policy maker on an intuitive level *and* consistent with the projected tracks for other key variables such as inflation, growth, external balance etc., a considerable investment in the internal policy advice process is required. A process that allows the policy maker to obtain a sufficient degree of comfort with the logic of the projection and its implications for policy involves strong internal transparency, the willingness of staff systematically to incorporate judgement drawn from extra-model analysis and experience, and a high degree of trust all round.

Getting to the point where the projection both satisfies the policy maker and provides the desirable degree of discipline on the process has not always been easy, but it has almost always been achieved. On the rare occasions where it has not fully been achieved, the discussion in the relevant Monetary Policy Statements of the balance of probabilities for future monetary policy actions has explicitly contrasted that balance with the projected interest rate track. It is noteworthy that on all such occasions, market analysts and position takers expressed frustration at the inconsistency – albeit a transparent inconsistency – between the policy message contained in the words and the policy message contained in the forward interest rate picture.

The graph below shows the succession of projected interest rate paths from a sequence of Monetary Policy Statements from 2001 through to March 2004. The actual, realised interest rate path is indicated by the square boxes. The spread of interest rate paths projected through this period was about 200 basis points wide, whereas interest rates themselves moved through half that range. That is the inverse of the usual experience, where actual interest rate variance greatly exceeds the variance contained in successive forecasts, reflecting the conservative bias associated with standard, no-policy change forecasts.

Successive forecasts of interest rates

90 day interest rates, from Mar 01 to Mar 04 projections

This record nicely illustrates the strongest point of difference between publishing projections based on unchanged policy with internally-inconsistent inflation outcomes, and projections based on time varying policy with internally-consistent inflation outcomes. The former approach reveals the new world progressively, with actual interest rate decisions evolving in a smoothed fashion to news and updated assessments, and without much revelation of the ebb and flow of the central bank's state of mind. For most intents and purposes, the central bank can create an image of having been confident in its evolving view all along. Against this background of a confidently-evolving official view, market predictions of how policy will evolve tend to show greater instability. Market players react to new information which, although it has a low signal-to-noise ratio, potentially contains persistent signals. Aversion to reversal of view, should the innovation prove to be more temporary than allowed for, seems to be lower for market participants than for central bankers.
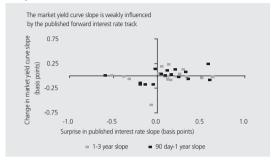
In contrast, publishing forward interest rate tracks reveals some of the central bank's internal ebb and flow of assessment of emerging information. As can be seen from the projected policy paths, our own predictions of how policy will evolve have shared some of the instability that characterises market predictions.

What are the consequences of projecting internally-consistent inflation paths and in so doing revealing an apparently unstable view of the future? A number of possible consequences can be conjectured, but unfortunately as yet we have no way of evaluating their practical importance. On the plus side:

1 Uncomfortable issues are forced into the open in internal discussion, in the context of a framework that focuses continuously on inflation outcomes. By virtue of having established the precedent of publishing both inflation and interest rate paths, the issues cannot be ducked.

2 Market specialists have considerably more insight into the nature of the Bank's analytical approach and typical policy reaction than would be the case without published interest rate paths. Even on occasions where there is no change in the Official Cash Rate, there may well be a change in the forward track. Thus many more observations of policy reaction – hypothetical in addition to actual – are available to analysts. As a consequence, the Bank's actions are easier to interpret and anticipate, and the credibility of the stated policy target reinforced.

3 Some leverage is obtained over the yield curve shape, which is as noted one of the purposes of providing information about the future path of interest rates. However, as can be seen from the graph below, that leverage is tempered by the market's understanding that the Bank's projections may well not come to pass. Markets will only adjust rates fully to match the Bank's just-published forward path if the underlying view conforms to their own (as affected by any new information provided by the Bank). The scatter-plot relates the change in yield curve slope – along two segments of the curve – consequent on an unanticipated change

in the Bank's forward interest rate path. Clearly, the relationship is not very tight, for either the shorter segment of the curve evaluated – 90 days to 1 year – or the longer segment – 1 to 3 years. But on average, for the shorter segment a 50 basis point surprise change in the slope of the Bank's forward interest rate path leads to a 20 basis point change market yield curve slope, and a smaller change for the longer segment.
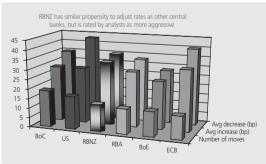
The power of forward interest rate tracks?

On the down side:

1 The transparent revelation of the Bank's progressive change in view consequent on the arrival of new data (and reinterpretation of old data in the light of the new) comes at the cost of a tarnished image. To mix metaphors, to some extent observers are awakened to the limited coverage provided by the emperor's clothes. How much damage to "credibility" follows is difficult to assess. On the one hand, the Bank's limited ability to predict the future becomes better known – although for keen observers this would not be new information. On the other hand, the repeated reminder that the Bank would be prepared to adjust interest rates to keep inflation under control as circumstances change could be a useful reinforcement of that vital message. On balance, in my view, the Bank's credibility is enhanced.

Aggressiveness? - perception & reality

2 Apparent instability in the forward interest rate path becomes apparent instability in the Bank's policy bias signal, which can give the impression of a greater readiness to alter interest rates than intended. In short, the Bank can convey a more aggressive image than is consistent with reality. There is little doubt that the Reserve Bank of New Zealand has a reputation as a relatively aggressive central bank, perhaps partly for this reason. As can be seen from the graph above, that reputation is not deserved. The Bank adjusts interest rates no more often than do other central banks, and in no larger steps than is typical.

3 Given that the forward path for interest rates is model-driven, using a representative policy reaction function, the technology of monetary policy analysis becomes more prominent than otherwise. There is a danger that it becomes too prominent, leading to a public sense that policy is driven by black-box computer models, rather than experienced decision makers fully aware of the nature of the uncertainties and risks inherent in the business. Nor can all of the relevant elements of policy targeting be incorporated in a representative policy reaction function. Acquiring a reputation as ivory tower technologists, out of touch with the real world, would most certainly not help credibility.

5. COMMUNICATING UNCERTAINTY

We have spent many hours thinking about the most effective way of conveying the uncertainty inherent in forecasting and policy-making based on forecasts. The objective is twofold. First, it is desirable that the public understands the lack of precision inherent in any assessment of the economic situation and in any forecast, and makes appropriate allowance for risk in decisions. Second, it is important to convey sufficient authority and expertise that the public retains its faith in the quality of the people charged with conducting monetary policy.

In a 2003 review of our approach, we concluded that we had placed too much emphasis on the central track of a comprehensive quantitative projection during the course of explaining policy actions. The roles of risk, uncertainty, and judgement in the formulation of policy had inadvertently been masked. We made several changes, including:

- de-emphasising the quantitative projection by reducing the number of items projected and shifting the write-up and associated tables to the back of the document;
- emphasising the nature of the policy risk assessment and policy judgements being reached in the course of setting policy, by focusing the explanation of policy choices on those questions, using the projection as an aid to the analysis rather than as the dominant component;
- rounding projections to the nearest $\frac{1}{2}$ or $\frac{1}{4}$ percentage point, depending on the context; and
- using alternative scenarios selectively to illustrate possible alternative outcomes.

We have developed fan charts along Riksbank lines, but have to date only used them as aids to our own deliberations rather than as a communications device.

6. CONCLUSION

Communication with the public involves a difficult balancing act. Quite naturally, central bankers are keen to provide the impression of assurance, dependability, and reliability. Part of the motivation for this is entirely reasonable. Associated credibility gains improve the efficiency of policy, reduce the need for overt policy action, and thereby reduce the economic costs of achieving targeted outcomes. Part of it may be unreasonable – almost certainly the desire for secrecy and a veil of mystery that was prevalent two or more decades ago had stronger roots in bureaucratic self-interest than in the economic efficiency of policy implementation.

The recent trend has been to improve the transparency and understandability of the underlying motivations of policy makers. There are good reasons for this, and they are rooted in the search for economic efficiency in policy implementation. The problem, and source of the need for a balancing act, is that the desire for credibility and transparency can come into conflict as a result of the very real limitations to central bankers' knowledge of the state of the economy and its likely future evolution. Full transparency reveals those limitations.

It will be for each central bank to arrive at a balance that is appropriate for the context, given the norms and expectations of the community. The Reserve Bank of New Zealand is towards one end of the spectrum in terms of central banking practice, but we have pulled back from complete disclosure of all elements of policy deliberation. Nonetheless, with the publication of a forward path of interest rates to signal policy bias, we provide a "test bed" available for others to observe. Although the publication of a forward interest rate path has it strengths and weaknesses, I am of the view that on balance it strengthens the Bank's credibility and thereby reduces the extent of policy action required to achieve targeted outcomes.

References

Archer, D., Brookes, A., Reddell, M. (1999) A cash rate system for implementing monetary policy, *Reserve Bank of New Zealand: Bulletin*, Vol 62, No 1

Blinder, A. (1998) *Central Banking in Theory and Practice* (MIT Press, Cambridge, MA).
Glück, H., Schleicher, S. (2004) Forecast Quality and the Operationally of Simple Instrumental Rules - A Real-Time Data Approach, forthcoming in *North American Journal of Economics and Finance*.

Goodhart, C. (2001) Monetary transmission lags and the formulation of the policy decision on interest rates, *FRB St Louis Review*, Vol 83, No 4

Haldane, A. G., Salmon, C. (1995) Three Issues on Inflation Targets, *Bank of England Conference on Inflation Targeting*, March 1995

Juhn, G., Loungani, P. (2002) Further Cross-Country Evidence on the Accuracy of the Private Sector's Output Forecast, *IMF Staff Papers*, Vol 49, No 1

McCaw, S., Ranchhod, S. (2002) The Reserve Bank's Forecasting Performance, *Reserve Bank of New Zealand*: Bulletin, Vol. 65, No. 4

Taylor, J. B. (1998) Monetary Policy Guidelines for Employment and Inflation Stability in R Solow and JB Taylor, *Inflation, Unemployment, and Monetary Policy* (MIT Press, Cambridge, MA), 29-55.

Woodford, M. (2003) Optimal Interest-Rate Smoothing, *Review of Economic Studies*, October 2003

Comments on David Archer "Communication with the Public"

Gabriel Sterne – Bank of England

1. INTRODUCTION

David Archer's paper is a must-read for all central bankers interested in the issue of how far to go in developing communication practices. The paper illustrates that the Reserve Bank of New Zealand (RBNZ) has for a number of years been innovative and fearless in its introduction of various innovative forms of transparency. Their recent experience with publishing a forward interest rate path highlights the very important question of 'how far should transparency go'?

The question of 'how much transparency?' may be divided into two parts. The first relates to motivating transparency through the desire to build credibility by anchoring inflation expectations. This issue is relatively straightforward and I shall argue that a high degree of transparency can help the process of building credibility in economies with a record for pursuing low-inflation policies. The second relates to optimal transparency once credibility for low-inflation policies is established; here the issues are more complicated.

2. TRANSPARENCY AND ANCHORING INFLATION EXPECTATIONS

The issue of how transparent should a central be in order to convince agents it is serious about pursuing non-inflationary policies is, in my opinion, fairly clear-cut. Within broad limits, I think it is the case that greater transparency is helpful. Speaking at the 1999 Central Bank Governor's Symposium at the Bank of England, Mervyn King reflected on the UK experience in the early years of inflation targeting:

> *We wanted to acquire credibility and you cannot do that easily without a track record. But you can do something on the way to developing a track record. We felt that by being transparent – by explaining not only what the target was but also how we thought about the economy – we could actually acquire some credibility. So if we were doing things privately, we should say what we were doing. Our motto became 'do as you say and say as you do', and that guided the construction of our framework with an inflation target and a high degree of transparency.*   *King (2000)* [89]

King's explanation of the motivations for transparency could be equally applicable to a number of inflation targeting countries. It is consistent with theoretical evidence that has outlined how a central bank's incentive to pursue low inflation policies increases as it becomes more transparent, since greater transparency makes its reputation more sensitive to its actions (Faust and Svensson, 2001, Geraats, 2000).

The motivation for transparency is also consistent with cross-country empirical evidence that transparency is associated with lower inflation. Across a broad range of economies, Chortareas et al, (2002) find that central bank transparency in publishing forecasts is associated with policies that lead to lower inflation. The effect is most pronounced for countries with higher inflation, and becomes weaker once inflation is already low. This is consistent with the view that transparency is most helpful in building credibility when the initial credibility-endowment is low, but that marginal impact of greater transparency becomes smaller as low-inflation-credibility becomes more established.

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[89] In Mahadeva and Sterne (2000), page 184

On average, inflation targeting central banks were endowed with less credibility for delivering low inflation and stable inflation than other central banks at the time, such as the Bundesbank, the Federal Reserve and the Bank of Japan. It is therefore to be expected that a number of the transparency innovations in the 1990s originated from inflation targeters.

3. DOES TRANSPARENCY MATTER AS MUCH ONCE INFLATION EXPECTATIONS ARE WELL ANCHORED?

Across many countries, inflation expectations are better-anchored now than they were in the early 1990s. And although maintaining credibility for low inflation remains an issue of great important to central banks, it is arguably the case that the need to make *further* innovations in transparency and communications in order to reduce and maintain low inflation is – in a number of countries – a less pressing need than in the past.

Putting credibility concerns to one side, there is no single obvious theoretical framework that informs us clearly about the optimal degree of transparency. There is some consensus that providing the market with some information about the policymaker's reaction function and its interpretation of data may help to reduce volatility.

Yet there is also some consensus that there exist some limits to the amount of information that should be provided. Being transparent about *everything* could be akin to bombardment and might confuse markets by reducing the clarity of the message (Winkler, 2000). And there is a possibility that very high degrees of transparency might on occasion stifle internal debate. Meade and Stasavage (2004), for example, use a very detailed dataset that calibrates the degree of dissent in the deliberations of the Federal Reserve Board before and after members realised full transcripts would be published. Their work suggests that publishing full transcripts altered incentives for participants to voice dissenting opinions.

So even aside from considerations relating to anchoring inflation expectations, the above arguments provide a loose framework for considering some benefits and costs of transparency. But the framework is unlikely to provide firm answers to the question 'How much transparency is too much?'

An important motivation for transparency has been to provide a clear signal to markets and a number of papers have tried to assess the appropriate degree of transparency by looking at how markets react to economic news. One argument might be that where central banks are very transparent, markets will react less to news. But UK evidence provides mixed evidence. Haldane and Read (2000) showed that yield curve responses on the day of policy announcements were lower after 1992 than they had been previously. But, Clare and Courtenay (2001) and Moessner et al. (2004) find that the reaction of short-term market rates to monetary policy announcements have diminished only slightly following Bank of England independence in May 1997.

In short, there are good grounds for supposing that by keeping markets well informed about the policy reaction function and its interpretation of shocks, a central bank may help agents to form accurate expectations. Nevertheless, most economists would agree that there should be some limit to the degree of transparency. In my opinion there is in practice sufficient uncertainty about the gains and costs of various transparency practices such that there remains ample scope for debate about where is the exact optimal mix of communication practices.

4. THE BANK OF ENGLAND'S COMMUNICATION WITH THE PUBLIC

UK financial markets pay close attention to a number of conduits of Bank of England communication.[90] The

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90 Here, I concentrate on communications with financial markets, although I acknowledge that innovative communication initiatives include a broader programme to build public understanding - through regional media, schools and the general public.

Bank is required by the 1998 Bank of England Act to publish a quarterly report on inflation prospects, and the *Inflation Report* remains one of the most important means through which the Bank presents a description and analysis of the current state of the economy, as well as describing the Committee's assessment of economic prospects as embodied in the projections. Markets also focus attention on MPC minutes, particularly the policy discussions contained within. Gerlach-Kristen (2003) shows that the MPC's voting record are useful in predicting future policy changes.

As in many other economies, markets also focus on verbal communication by the Governor and other members of the MPC. There was extensive market and press coverage, for example, when the Governor recently argued "[the ratio of house price to earnings] is now at levels which are well above what most people would regard as sustainable in the longer term."[91] Financial markets also pay close attention to statements and responses to questions at the *Inflation Report* press conference, which take place on the day of publication of the Inflation Report, and to appearances at the Parliamentary Select Committees.

In contrast to the RBNZ, the Bank of England has never published a forward interest path; it has since February 1996, however, published in the *Inflation Report* projections for GDP and inflation based on constant interest rates. The fan chart has proved a very useful vehicle to describe the risks to the forecast, and skews. The language used in the *Inflation Report* has complemented the visual description of risks portrayed in the fan chart. An example is illustrated below:

"The Committee has raised the central projection for world activity in successive Reports as the global recover has gathered pace. However, there remain a number of risks to the projection, and the Committee continues to judge that the risks to activity are weighted to the downside. A sharper-than-expected slowdown in the United States, perhaps in response to a marked fall in equity prices, is one such risk. "

May 2000 Inflation Report, p50-51

Since the February 1998 Inflation Report, the Bank has also published the MPC's projections based upon market interest rates. Governor King recently stressed the Bank publishes these "two photographs of the same forecast [….] so that people can get a better feel for what is underlying our forecast and what is our judgement."[92] The projections based upon constant and market interest rates may each be important aids to the MPC forming a judgment for policy, as illustrated in the May 2004 minutes, when it was noted:

The Committee agreed that a rise in interest rates was appropriate this month. On the May central projection, and assuming the existing repo rate of 4.0%, inflation two years ahead was projected to be somewhat above the target. On the market rate assumption, which entailed a rising repo rate through the forecast period, inflation would be a little above the target at the forecast horizon. Risks were broadly balanced around the central projection. It was therefore appropriate to raise the repo rate now, withdrawing some of the current monetary stimulus to demand.

Minutes of MPC meeting, May 2004

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91 King (2004a)

92 King (2004), speaking at Inflation Report Press Conference, May 12.

5. CONCLUSION

Evidence across a broad range of central banks suggests that increased transparency has contributed to delivering lower inflation. But with inflation expectations now anchored to a similar degree in numerous economies, communications practices remain diverse. This in itself suggests that it is not easy to pinpoint the optimal degree of transparency and means of communication. And since there does not exist a clear theoretical framework available that can inform us as to the optimal degree of transparency subject to any particular constraints, papers like David Archer's are invaluable. They describe the pros and cons of innovative communication practices and add to the collective experience from which all central banks can learn.

References

Chortareas, G., Stasavage, D., Sterne, G. (2002) Does It Pay to be Transparent: International Evidence from Central Bank Forecasts, *Federal Reserve Bank of St Louis Review,* Vol. 84, No. 4, pp. 99–117.

Clare, A., Courtney, R. (2001) Assessing the impact of macroeconomic news announcements on securities prices under different monetary policy regimes, *Bank of England Working Paper*, no 165.

Faust, J., Svensson, L. (2001) Transparency and Credibility: Monetary Policy with Unobservable Goals, *International Economic Review*, Vol. 42, No. 2, pp. 369–397.

Geraats, P. (2000) Why adopt transparency? The Publication of Central Bank Forecasts CEPR Discussion Paper 2582 October

Gerlach-Kristen, P. (2004) Is the MPC's voting record informative about future UK monetary policy? Forthcoming in the *Scandinavian Journal of Economics.*

Haldane, A. G., Read, V. (2000) Monetary policy surprises and the yield curve, *Bank of England* working paper No. 106,

King, M. (2004) Speaking to the *CBI Scotland Dinner*, 14 June

Mahadeva, L., Sterne, G. (Editors) (2000) Monetary *Frameworks in a Global Context,* Routledge, London www.bankofengland.co.uk/ccbs/ publication /pdf/mpfagcabstract.htm

Meade, H., Stasavage, D. (2003) Publicity of Debate and the Incentive to Dissent: Evidence from the US Federal Reserve Meade, E and Stasavage, *mimeo*, London School of Economics

Moessner, R., Gravelle, T., Sinclair, P. J. N. (2003) Measures of Monetary Policy Transparency and the Transmission Mechanism in *how monetary policy actually works: comparing estimates of the transmission mechanism in developing, transitional and industrialised countries*. Mahadeva, L. and Sinclair, P.J.N. eds (2004), Routledge.

Winkler, B. (2000) Which Kind of Transparency? On the Need for Clarity in Monetary Policy-making *ECB Working Paper No. 26*, August.

Comments on David Archer "Communication with the Public"

Anders Vredin – Sveriges Riksbank

Monetary policy involves not only determining the money supply and the interest rate charged on loans to private banks. It also involves communicating to the general public, and financial markets in particular, how such decisions are reached. The Reserve Bank of New Zealand (RBNZ) has during the last decade been at the frontier when it comes to improving central bank communication and transparency. The Riksbank has had many useful contacts with the RBNZ over the years and personally I have benefited tremendously from discussions with David Archer and his colleagues. Therefore, I cannot offer very critical views on David's paper, but I hope I will be able to add some dimensions.

1. ON THE ROLE OF COMMUNICATION

Why is communication necessary and why do central banks feel the need to send "signals" or express "biases" indicating what monetary policy steps they intend to take in the future? One argument for transparency is based on the fact that central banks are politically powerful institutions that today have a large degree of operational independence. Therefore, it is of interest for democratic reasons that the central banks can be held accountable for their policies, and for the same reason it is also in the central banks' self-interest to provide adequate information for external evaluations. At the Riksbank we have also stressed that transparency can increase the quality of the internal analyses. By forcing ourselves to be clear about our analyses, we also create internal incentives to make continuous improvements. But transparency is also required for monetary policy to be efficient. Central banks want to stabilize the macro economy and do not want to be an extra source of uncertainty and volatility, i.e., monetary policy decisions should not come as a surprise to the private sector (or to politicians, for that matter). Michael Woodford has expressed this idea in the following way:

"A central bank should seek to minimize the extent to which the markets are surprised, but it should do this by confirming to a systematic rule of behaviour and explaining it clearly … these points up to the fact that *policy should be rule-based.*" (M. Woodford, "Monetary Policy in the Information Economy, NBER Working Paper No. 8674, 2001)

It is important to stress that good policy requires both systematic (and, of course, purposeful) policy *and* clear explanations of that policy. In a hypothetical world of perfectly informed and rational actors in the economy it would perhaps be sufficient to behave systematically so that predictions of future policy could be inferred from actions today and in the past. But the private sector does not have perfect information about the central bank's information (its data and its views on the economy) or about the central bank's objectives (since central bank legislation usually allows large room for a "flexible" policy). This is why communication and transparency are necessary ingredients in monetary policy. Both systematic behaviour and explanations are necessary. It is not sufficient to express "biases" and "signals" that are not later confirmed by actions, and communication must be consistent with policy decisions. It is important that central banks do what they say, and say what they do. That systematic actions and communication are complements is expressed by David Archer in the following way:

"Large mistakes can be made if we mistakenly believe that our rhetoric can somehow substitute for continued delivery of good policy outcomes."

Against this background, it may be surprising that so few central banks have chosen to publish forecasts of short term interest rates, like the RBNZ does. Although I personally believe that there are important advantages to such a strategy, I here feel the need to be the devil's advocate and try to come up with some arguments against publishing such forecasts. David presents some arguments he, but hopefully I can shed some additional light on the issues involved.

2. ON THE PUBLICATION OF INTEREST RATE FORECASTS

My first argument against publication of a forecasted interest rate path from the central bank is that if this is to be done rigorously it has to be based on explicit assumptions about the central bank's reaction function (and/or objective function). Any function that is used is necessarily an inexact description of policy. This of course limits the value of the central bank's (as well as others) forecasts of other variables too, but there are reasons to believe that the errors in the reaction function used have larger effects on the forecasts of interest rates than on the forecasts of, e.g., inflation and GDP growth. (This hypothesis is of course possible to test formally, e.g., with a VAR model.)

My second argument is that the production of a meaningful interest rate path is human-capital intensive. It is well known that many macro variables are well approximated by random walks. Forecasting is therefore not necessarily very human-capital intensive. But if the forecast is intended to provide something more than a good guess about future outcomes - which it obviously is, at least for central banks - it will have to be supplemented by a convincing model or story. Central banks apparently find it more difficult to produce such models or stories when it comes to their own policy variables than when it comes to other macro variables. It is probably especially difficult at central banks where, unlike the RBNZ, there is more than one person that is responsible for the policy decision. Gathering and processing information is generally costly, and therefore it is also costly to produce transparency. And it may be more costly at central banks with more decision makers. (On the other hand the decisions may be better if there is more than one decision maker. There are no free lunches, and the more it costs, the more it's usually worth.)

A third argument against the publication of the central bank's interest rate forecast is that it may give rise to a false impression of "social engineering" from the central bank. David Archer mentions that people outside the central bank may come to believe that the bank has a "higher state of knowledge" than it actually has, and even that it is involved in some kind of "technical wizardry". This can potentially create two kinds of problems for the central bank. Often both problems are felt at the same time, which is somewhat paradoxical since they seem to be mutually exclusive. On the one hand, the "higher state of knowledge" may create political pressure on the central bank to "fine tune" the economy. On the other hand, published forecasts may also reveal that the central bank does not in fact have a "higher state of knowledge". Rather, forecast errors may reveal "the limited coverage of the emperor's clothes", as David has put it. Personally I think these problems are highly relevant today in many countries, but that they can be overcome. The RBNZ's experience suggests so.

The final argument that I would like to mention here is that forecasting based on a reaction function for monetary policy introduces policy considerations very early in the forecasting process. At the Riksbank, the governors have stressed that they want to get an independent view on the economy (forecasts) from the staff before they enter into discussions about policy and their own forecasts. Nonetheless, if the staff uses an explicit reaction function there is, potentially, a risk that certain highly probable outcomes for the economy are rejected by the staff because the staff feels that the policy implications will not be appreciated by the policy makers. Also this problem can be overcome, of course, and the problem is probably less severe if the forecasts are derived from relatively theoretical models like VAR models, than if more structural models are used. One possibility would be to condition the first forecasts (from the staff) in each forecasting round on the projected interest rate path published in the previous inflation report. This is an alternative way of conditioning on an "unchanged policy".

I have presented these arguments against publication of interest rate forecasts from central banks, not because I find them entirely convincing, but because I think they are relevant when trying to understand why central banks are reluctant to publish such forecasts. Let me now turn the argument around. If the central bank does not want to explain its intentions through explicit interest rate forecasts, what can it do instead? The Fed's rhetoric provides some good examples. During 2003 and 2004, the Fed has made declarations about a certain level of the policy rate being "maintained for a considerable time period", about the bank being "patient in removing its policy accommodation" or about interest rate changes "at a pace that is likely to be measured". Similar examples can be found in the communication from other central banks. It is an empirical question whether the advantages of such a less transparent communication outweigh the possible disadvantages of publishing an explicit interest rate forecast.

3. THREE MORE DETAILED QUESTIONS

Let me; finally, raise three more detailed questions to David Archer about the RBNZ strategy. First, if the publication of the interest rate path is intended to create transparency about expected future policy moves, why does the RBNZ publish forecasts of the three-month interest rate rather than the policy rate, the official cash rate (OCR)?

My second question is related to the fact that interest rate changes, by the RBNZ and other central banks, are implemented in discrete steps. The most common decision is to leave the interest rate unchanged. If there is a change, it is usually made in steps of 25 basis points and sometimes 50 basis points. This suggests that the policy rule can be formalized as follows:

$$i(t) = i(t-1) \text{ if } -c_0 \leq X\beta \leq c_0$$

$$i(t) = i(t-1) + 0.25 \text{ if } c_0 < X\beta \leq c_1$$

$$i(t) = i(t-1) - 0.25 \text{ if } -c_1 \leq X\beta < -c_0$$

etc.

Here, $i(t)$ denotes the policy rate in period t, X is a vector of variables that the central bank responds to, _ a vector of elasticities characterising the reaction function, and the c's denote the threshold levels (tolerance intervals) that determine whether the interest rate should be changed and by how much. Although this seems to be a realistic model of the step-wise monetary policy decisions, it is difficult to describe policy in this way in any forecasting model. And even central banks that would like to publish forecasted interest rate paths presumably would not want to forecast such discrete moves in the future, even when it is a good description of policy in the past. Perhaps "signals" and "biases" are used to indicate the levels of the thresholds, the c's?

My third question to David is what is gained by rounding the forecasts to nearest $1/2$ or $1/4$ percentage point? I fully understand that "the degree of emphasis that had been placed on the central track of a comprehensive quantitative projection … was excessive". That this can happen has also been shown by the Swedish experiences, and our problems may occasionally even have been worse given that we have an exact point target for inflation (2%) rather than an interval only as in New Zealand. (The reason why the RBNZ has a less precise target, given the bank's strive for transparency, is also an interesting question.) But to justify such small interest rate changes as 25 percentage points, the change in inflation should normally be less than 25 basis points (if the purpose is to change the policy rate in real terms). If the inflation forecast is rounded, there is a risk that important information about the policy decision is hidden to observers outside the central bank.

To conclude, I wish to stress that I find the RBNZ's strive for transparency about its policy admirable and that other central banks have much to learn from their experiences. Over the years David Archer and his colleagues have generously provided information that has been very useful. I have nevertheless tried to come up with some suggestions for why most central banks are reluctant to publishing their own interest rate forecasts. These suggested explanations can surely be questioned, but I don't find them illogical in principle. I have also tried to raise some questions to David that show that there is need for further discussions about these issues.

A VIEW FROM OUTSIDE

Inflation targeting: Why not? A personal view from the ECB *

Bernhard Winkler - European Central Bank

1. INTRODUCTION

Since its inception in New Zealand at the beginning of the 1990s the concept of inflation targeting has rapidly spread across the globe and has become an impressive success story. Not long after the first central banks had started to focus on controlling inflation directly – abandoning the widespread earlier use of intermediate targets such as money growth or the exchange rate as a nominal anchor – an increasingly sophisticated intellectual machinery in support of inflation targeting developed in the academic literature. As a result inflation targeting seems to have become the dominant benchmark for discussions of monetary policy, both among practitioners and in academic circles.

Against this background it may appear a bit of a puzzle why the three major central banks in the world, the U.S. Federal Reserve, the Bank of Japan and the European Central Bank, have not jumped on the bandwagon of inflation targeting or, at any rate, resist the label "inflation targeting" to characterise their own distinct approaches to monetary policy making. To some extent the issue may look like purely one of semantics and depends on the chosen definition of inflation targeting. If the fashion of inflation targeting simply reflects today's broad consensus that monetary policy should give clear priority to the objective of price stability (or low and stable inflation) then the German Bundesbank and the Swiss National Bank – incidentally the principal pioneers of monetary targeting in the 1970s – have set high standards long before inflation targeting was invented. If, instead, inflation targeting is seen to entail specific procedures or policy rules for interest rate setting, e.g. in relation to inflation forecasts at specific horizons or in the context of specific models or communication practices, then agreement on the appropriate choices becomes much harder to establish. Indeed, upon closer inspection, variations among inflation targeting central banks seem in many respects no less significant than differences with central banks outside that camp.

This short essay offers some reflections on inflation targeting from the perspective of the ECB's monetary policy strategy. Within a few months after the ECB was established in 1998, and before it took over responsibility for monetary policy for a newly created currency area, the ECB announced its monetary policy strategy. For a new institution without its own track record it was regarded as especially important to adopt an explicit strategy in order to establish credibility right from the beginning. The ECB decided not to simply copy any of the pre-existing strategies, be it monetary targeting or inflation targeting, but to devise its own approach. This allowed the ECB to best confront the particular challenges and uncertainties for a new currency, while, at the same time, incorporating the wealth of experiences of national central banks in Europe. Setting out a novel, distinct strategy which also incorporated some features similar to well-established strategies nevertheless presented a difficult communication task for the ECB, especially in the early years (Issing 1999, 2000).

The remainder of my remarks is organised as follows. Section two briefly comments on the evolution of the concept of inflation targeting in the academic literature on monetary policy rules and proposes

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* The views expressed are the author's and do not necessarily reflect the views of the European Central Bank.

a looser notion of a monetary policy strategy. Section three presents the main elements of the ECB's monetary policy strategy, highlighting both common features and distinctions vis-à-vis inflation targeting. Section four concludes.

2. WHICH KIND OF INFLATION TARGETING?

The contributions to this conference volume bear witness to the fact that inflation targeting in practice is anything but a homogenous, monolithic concept and that it has evolved in different directions and according to country-specific circumstances. While in the early years inflation targeting central banks had to conduct policy initially without any ready-made intellectual apparatus at their disposal, close interaction with the academic world soon produced an influential range of theoretical contributions. This symbiosis with academic sophistication was certainly helpful for the promotion of inflation targeting together with the highly attractive, apparent simplicity in the explanation of monetary policy decisions to the public and the financial markets.

It is worth noting, however, that the theoretical representation of inflation targeting has undergone significant mutations since the first papers appeared in the mid-1990s. The early work, to some extent, reflected the practical genesis of direct inflation targeting as a response to the failure of previous strategies of exchange rate (or monetary) targeting, in a number of relatively small and open economies. Given the long and complex transmission lags between interest rate adjustments and the final effects on the inflation rate, the new "default" strategy of direct inflation targeting looked inherently more difficult to make transparent, since the impact of the central bank's actions is more difficult to monitor compared to the immediate visibility of an exchange rate commitment.

It is therefore not surprising that the search was on for a new surrogate "intermediate target" that could provide focus and discipline to the internal decision making process and that could provide a suitable communication device with the public. This gave rise to the earliest and simplest characterisation of inflation targeting as inflation forecast targeting (Svensson, 1997). Interest rates would adjust in response to forecast deviations from a numerical inflation target at some specified horizon, where the self-constructed inflation forecast would play the role of the missing intermediate target. This representation can be seen to be equivalent to a forecast based instrument rule, i.e. a special case of a forward-looking Taylor rule. This line of interpretation was, however, not pursued much further since it did not satisfy optimality conditions and was shown to be prone to suffer from indeterminacy problems in forward-looking models (Benhabib et al., 2001). Emphasis among academic proponents instead turned to the notion of an optimal target rule, which seeks to derive monetary policy decisions from the first order conditions of a fully spelt-out optimisation problem within a specific model (Svensson, 1999). In further extensions the possibility of adding extra-model judgement was introduced as well as a suggestion to implement the optimal rule via a model simulation procedure (Svensson, 2003). Period-by-period optimisation was later recognised to suffer from time inconsistency problems, so that some form of history dependence (or optimisation from a "timeless perspective") had to be incorporated (Svensson and Woodford, 2004), which effectively introduces elements of price level targeting. The role of inflation forecasts in implementing optimal policy rules is much less straightforward under these representations of inflation targeting compared to the earlier idea of a simple feedback to deviations of forecasts from targets (Faust and Henderson, 2004). The technical difficulties related to the internal consistency of the conditioning assumptions (such as on interest rates or exchange rates) have also increasingly come to the fore recently. Overall, this seems to confirm a healthy degree of caution vis-à-vis any exclusive reliance on forecasts in the policy process.

What are the lessons from this strand of the literature? The quest to represent inflation targeting as the implementation of a fully optimal monetary policy rule, while fully consistent with the theoretical frontier of New

Keynesian Macroeconomics, at the same time casts some doubt on the earlier promise of inflation forecast targeting as a practical, simple and transparent communication device. In addition, any optimal target rule will be optimal only within the confines of the specific model from which it is derived. These shortcomings have led to a backlash in the literature by the advocates of simple feedback rules, who tend to stress robustness of outcomes across a range of plausible models as a key criterion for suitable policy guidance (McCallum and Nelson, 2004, Levin and Williams, 2003). The animated debate among monetary economists over simple vs. optimal, instrument vs. target or "simple feedback" vs. "forecast-based rules" in the words of Bernanke (2004) is ongoing and remains inconclusive.

What does this discussion hold for monetary policy practice? Obviously, no central bank can rely in any sort of mechanical way on simple rules, where monetary policy only reacts to a small number of relevant variables. At most such rules can serve as rough guideposts or reference points in a much broader discussion involving much larger sets of considerations. Similarly, no central bank can afford to put all its eggs in one basket and set policy on the basis of a single model, however sophisticated and refined, yielding a particular "optimal" rule or a single inflation forecast. At the same time the use of one (or several) core model(s) and the construction of a main forecast can help to provide discipline and a consistent framework for discussion. As Jansson and Vredin (2005) argue in this volume there is scope for some sort of compromise in the debate between simple and optimal rules, reconciling the need for robustness and the need for coherence.

Both approaches to monetary policy rules involve some degree of simplification with its attractions and drawbacks. All central banks look at a vast array of information but an unstructured "looking at everything" would be neither beneficial for internal decision making nor for external communication. Simple policy rules like the Taylor rule would, in many circumstances, be misleading. Simplification is also applied to the role of inflation forecasts under an inflation targeting regime, even though they are sometimes portrayed as an all-encompassing summary device capturing all relevant information and thus a sufficient statistic to determine policy action.

Monetary policy has to steer a middle course avoiding both misleading simplification and losing its way in a constant flood of data and an ever changing, complex environment. This is a challenge under any given monetary policy strategy and may also explain the choice of strategy. Some degree of simplification is needed especially when it comes to communication, both to the outside world but – to a lesser degree – also for internal communication in the decision-making process of the central bank.
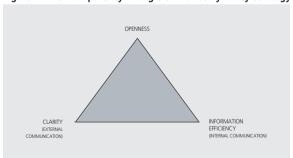
Figure 1: The Transparency Triangle of Monetary Policy Strategy

Figure 1, taken from Winkler (2002), illustrates possible trade-offs faced for transparency in reconciling the need to make efficient use of all relevant information internally and to simplify in the interest of clear and consistent external communication. In such a context, promoting a high degree of transparency, defined as common understanding of monetary policy between the public and the central bank, may involve more than openness and

the indiscriminate release of information. Inflation targeting is often identified with a commitment to transparency but is also not immune to the trade-offs involved in the communication of monetary policy as more recently emphasised by Faust and Henderson (2004), who refer to the possible presence of a "simplicity constraint" and the problem of characterising the role of objectives other than inflation in monetary policy decisions.

One lesson to draw from this discussion is that the notion of monetary policy strategy as policy rule of either type (simple or optimal) is not helpful in practice. Instead, a monetary policy strategy is better conceived as a framework, i.e. a set of procedures that process and structure information in a way that is conducive to effective decision-making and to effective external communication. This has also been recognised in the looser, less academic, definition of inflation targeting as "constrained discretion" rather than as a monetary policy rule (Kuttner, 2004). However, under such a broader notion of inflation targeting as only involving a definition of a long-run objective and striving for transparency when going about achieving this objective, all stability-oriented central banks would tend to qualify and certainly the ECB.

The ECB's two-pillar strategy can indeed be seen as a good example of a more procedural notion of a monetary policy framework (ECB, 2001). It is hard to fit in any category in the spectrum of simple vs. optimal rules and thus has certainly not proved easily digestible to academics. It shuns the notion of a dominant model or all-encompassing forecast often associated with inflation targeting as well as of simple, mechanical rules of the Taylor type or as under traditional monetary targeting. The ECB's strategy puts a premium on the notion of robustness and the need for complementary perspectives and approaches to inform the policy process. This makes it certainly look more complicated and more difficult to communicate than at least the simpler representations of inflation targeting. At the same time, the strategy acknowledges the need for an effective structuring of information, as in the two-pillar framework. It also gives a role to simple guideposts, like the medium-term reference value for money and regular staff projection exercises as a way to condense a large (but not all-encompassing) amount of information. The strategy emphasises procedural notions, such as the stress on "cross-checking" of information coming from the two pillars.

3. THE MONETARY POLICY STRATEGY OF THE ECB VS. INFLATION TARGETING

Any discussion of the ECB's strategy has to start with the mandate as assigned by the Maastricht Treaty and take into account the broader, more complex institutional set-up in the euro area, which at present comprises 12 sovereign states. The competence for monetary policy is allocated to the Union level and delegated to the ECB as an independent institution with the primary objective of maintaining price stability. By contrast, responsibilities for fiscal policies, labour market policies and structural policies largely remain rooted at the national level. At the same time, the Treaty – in conjunction with the Stability and Growth Pact – subjects national fiscal policies to a set of common rules and surveillance procedures. This reflects the need for a common framework for sound public finances inside the currency union as an essential complement to lasting monetary stability (Artis and Winkler, 1998).

While the Treaty defines price stability as the primary objective of the ECB, it does not provide a more exact specification of what is meant by price stability. In October 1998 the ECB as the first element of the strategy therefore announced a quantitative definition of price stability. Price stability was defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2% to be maintained in the medium term. The ECB's pursuit of price stability over the medium term recognises that monetary policy cannot control price developments in the short run and that attempts to fine-tune inflation or economic activity would be destabilising.

In common with the thinking behind inflation targeting the ECB regarded it as important to provide a numerical benchmark for accountability and as a firm anchor for inflation expectations. However, the ECB's definition –

like other aspects of its approach – does not fit neatly into the way academics and inflation targeting central banks are accustomed to think about an inflation target. It provides neither an explicit range nor a conventional point target. To some observers the definition appeared excessively ambitious and, in particular, it was criticised as asymmetric since no numerical lower bound was specified. The use of the term "increase", however, implied that deflation was not regarded as compatible with price stability. The upper bound of the definition at 2% provided a significant safety margin against risks of deflation as well as taking into account the possibility of a measurement bias in the HICP.

On the occasion of the Governing Council's evaluation of the monetary policy strategy, concluded on 8 May 2003, the quantitative definition of price stability was confirmed. At the same time it was made clear that, over the medium term, its monetary policy would seek to achieve an inflation rate of "below, but close to, 2%" (ECB, 2003). This further underlined the requirement to maintain a sufficient safety margin to guard against possible risks of deflation. This additional clarification was in line with long-term inflation expectations in the euro area, which from the outset have been well anchored around 1.7 to 1.9%. Overall, the evidence across a range of central banks suggests that the exact formulation of a price stability objective or inflation target (e.g. range vs. point, degree of precision) has relatively little bearing on the ability to anchor expectations effectively and on the degree of volatility as shown in Figure 2, taken from Castelnuovo et al. (2003).

Figure 2: Anchoring of inflation expectations under different specifications of the objective

Summary statistics on long-term inflation expectations over the period 1999-2002*

	Quantification of the objective	Average of inflation expectations	Standard deviation of inflation expectations	Covariance between past inflation and inflation expectations	Standard deviation of realised inflation
Euro Area	below but close to 2%	1.82	0.09	0.0057	0.63
United States	not specified	2.56	0.07	0.0021	0.85
Japan	not specified	0.88	0.34	-0.0103	0.35
United Kingdom	2.5%	2.33	0.1	0.0022	0.89
Canada	1-3%	1.99	0.1	0.0065	0.62
Australia	2-3%	2.48	0.07	-0.0133	1.73
Sweden	2%	1.96	0.05	0.0086	0.95
New Zealand	0-3%(**)	1.86	0.19	0.0256	1.38

(*) source: Castelnuovo, Nicoletti-Altimari and Rodriguez Palenzula (2003) "The anchoring of long-term inflation expectatins" (published on the ECB website), except for covariance between past inflation and inflation expectatins, which is based on ECB staff calculations. Inflation expectatins reflect survey evidence relating surveyed experts' views on inflation rates in a period between six and ten years ahead, as published by Consensus Economics.
Countries are ordered according to size of population.
(**) The target was 0-3% until November 2002. It has then been changet to 1-3%.

The ECB's quantitative definition of price stability, together with the medium-term orientation with which it is pursued, has been very useful, especially at times when shocks to prices had led current inflation rates significantly away from inflation rates consistent with the definition. The definition provides a clear numerical benchmark while, as a kind of soft ceiling, allowing for temporary deviations.

The clarification of May 2003 has introduced an additional, qualitative, indication ("below, but close to 2%") to supplement the quantitative ceiling established from the outset. The ECB's definition, while

reflecting the shared desire for a quantitative benchmark as commonly used by inflation targeters, also allows for some remaining room for judgement. In conjunction with the medium-term horizon over which the objective is pursued, the definition helps to avoid any (misleading) impression of an automatic feedback from a numerical target at a particular horizon. This underlines the fact that the appropriate monetary policy response in any given situation is not sufficiently determined by a particular numerical value for current or expected inflation (at any specific horizon) but needs to be tailored to the source and nature of shocks that are hitting the economy.

In addition, the formulation of the objective in terms of a (soft) ceiling may also be seen to reflect the historical experience that pressures on monetary policy on the whole tend to be skewed to the upside in normal times. Conversely, allowing for some limited room for a zone of indifference below the upper bound could be seen as an honest reflection of the inability of economists to pin down any particular number for the optimal long-run inflation rate with great precision. Allowing for some limited flexibility in the specification of the objective may be preferable to adjusting a fully precise target at discontinuous intervals, e.g. with changes in the definition of the preferred measure of the consumer price index.

Moreover, there are a number of circumstances, such as favourable supply shocks for which a prolonged (but contained) undershooting of an inflation target should be condoned as an equilibrium phenomenon, while seeking to force inflation back up "artificially" could build up imbalances elsewhere in the economy, e.g. with regard to asset prices. Such prolonged undershooting of the inflation target seems to have been associated with a perceived need for policy tightening coming from a longer-term perspective in a number of inflation targeting countries recently, including the UK, Sweden, Norway and New Zealand. More generally, a medium-term orientation of policy instead of the specification of a fixed policy horizon (and/or a less than fully precise point target) allows the price level more room to "breathe" around its longer-term average, while possibly posing greater risks for inflation expectations to drift. Again, there is no obvious answer to this potential trade-off. The ECB's approach seems to be holding the middle ground in between the – possibly slightly spurious – precision of the more rigorous inflation targeters (regarding both target and horizon) and the reluctance of the Federal Reserve's FOMC to provide any explicit numerical definition of its long-run objectives.

The second main element of the ECB's strategy, describing how the ECB goes about achieving its defined objective, was also confirmed in the strategy evaluation in May 2003. The assessment of the risks to price stability is based on both an economic analysis and a monetary analysis, i.e. two complementary perspectives which have early on been dubbed the "two pillars" of the ECB's strategy (ECB, 2000; ECB 2004). The economic analysis focuses mainly on the assessment of current economic and financial developments from the perspective of the interplay between supply and demand in the goods, services and factor markets. In this context the macroeconomic projections serve to structure and synthesise a large amount of economic data. However, they are not seen as an all-encompassing tool for the conduct of monetary policy. In this vein, the projections are produced under staff responsibility as an input into the deliberations of the Governing Council. Twice a year they involve a broad exercise involving extensively also all the national central banks in the Eurosystem, while the remaining two exercises are produced at the ECB. These staff projections are now published four times a year.

The monetary analysis serves as a means of cross-checking, from a medium to a long-term perspective, the short to medium-term indications coming from the economic analysis. In October 1998 the ECB assigned a prominent role to money in recognition of the close association between monetary growth and inflation in the medium to long run. Information from money and credit may help to identify risks to price stability also at time horizons beyond those usually covered by conventional macroeconomic projections (Nicoletti-Altimari, 2001).
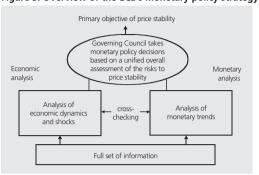
Figure 3: Overview of the ECB's monetary policy strategy

The prominent role assigned to money in the ECB's strategy is signalled by the announcement of a reference value for monetary growth. It specifies the growth rate of money regarded as consistent with price stability over the medium term. The monetary aggregate used to define the reference value should therefore exhibit a stable (or at least predictable) relationship with the price level. In the euro area, the broad aggregate M3 satisfies this criterion, as shown by numerous money demand studies (Calza and Sousa, 2003). Prolonged and/or substantial deviations of monetary growth from the reference value should, under normal circumstances, signal risks to price stability. The reference value provides a rough benchmark around which a much broader set of analyses of money credit is conducted. Grouping the monetary analysis under a distinct pillar helps to ensure that information on monetary developments is given appropriate weight in the decision-making process and is not crowded out by shorter-term considerations.

From the outset, the Governing Council has stressed the medium-term horizon of the monetary perspective and emphasised that there is no direct link between short-term monetary developments and monetary policy decisions. Furthermore, in May 2003 the Governing Council also decided that it would no longer conduct a review of the reference value on an annual basis. This had been misinterpreted by some observers as implying that the reference value referred to the specific calendar year ahead, as in the tradition of monetary targeting.

The two-pillar structure of the strategy, in particular the distinct role for money, as well as the emphasis on the medium-term orientation of monetary policy are interrelated key features that set the ECB's approach somewhat apart from the inflation targeting paradigm (Issing, 2004). The ECB's approach underscores the importance to consider price stability at longer horizons and to take into account a broad range of transmission channels, not least in the context of monetary factors driving price trends and/or financial imbalances, for example, in conjunction with asset price cycles (Borio and Lowe, 2002; Masuch et al. 2003). The build-up of financial imbalances and large swings in asset prices pose a challenge to conventional inflation targeting frameworks (Bean, 2004) pointing either to the need to extend the relevant policy horizon or to make use of escape clauses from inflation targets under exceptional circumstances (which is the route followed by the Reserve Bank of New Zealand).

The ECB's two-pillar strategy is one way to organise a broad-based analysis in a systematic and transparent manner. Under inflation targeting most analysis would tend to be channelled via the forecast process. However, conventional forecasting exercises are typically conducted in the context of models where inflation is, to a large part, driven by short-run cyclical developments in activity and other real variables, with a limited role for money and financial variables. These models and forecasts do not assign a role to money and credit in influencing risks to price developments at longer horizons and at lower frequency. They also increase the temptation to

engage in demand management, which may, in the end, prove destabilising in the face of significant uncertainty and limited knowledge about the "true model" and underlying relationships and concepts like potential output, the output gap or the NAIRU (Ehrmann and Smets, 2001). Inflation forecasts based on the output gap are particularly prone to suffer from the inaccuracy of data and estimates available in real time as highlighted by Orphanides and van Norden (2004).

While, of course, also many inflation targeting central banks look at the information coming from money and credit, up to now it has not proved possible to integrate the monetary side into the inflation forecast in a convincing manner, just as attempts to integrate monetary phenomena into New-Keynesian models have proved challenging (Nelson 2002, Gerlach 2003). Thus, in order to avoid that this information is crowded out in conventional forecast exercises, there may be some merit in providing a distinct avenue to bring monetary analysis to bear in the policy process as in the approach chosen by the ECB.

From this perspective the two pillars of the ECB's strategy offer a way to bring together and compare different analytical perspectives and to use – and present – all the information relevant to decision-making in a systematic way. The two-pillar structure of analysis and communication is, admittedly, more complex than the unitary, monolithic message conveyed by inflation targeting. At the same time it arguably provides a more explicit and stable framework than an eclectic multi-indicator approach along the lines pursued by the Federal Reserve. As explained in the discussion of transparency in section 2 it is hard to pass judgement on the appropriate trade-off in terms of flexibility and information efficiency, on the one hand, and clarity, simplicity and coherence, on the other hand.

In the final analysis the success of a monetary policy strategy, obviously, has to be measured against the results that it delivers. The average annual increase in the HICP over the first five years of the euro has been slightly below 2%, despite substantial adverse price shocks during that time. Moreover, following the disinflation and convergence process in the run-up to Monetary Union, long-term inflation expectations have been stable and anchored at levels broadly consistent with the definition of price stability (as shown in Figure 4).
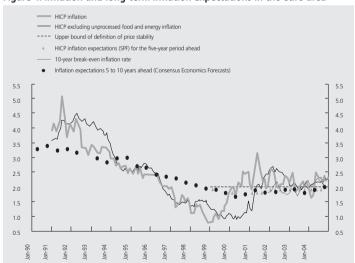
Figure 4: Inflation and long-term inflation expectations in the euro area

4. CONCLUDING REMARKS

Today, there is a high degree of consensus on the appropriate goals and tasks of central banks. Both inflation targeting central banks and major central banks following a distinct approach, like the Federal Reserve and the European Central Bank, have had considerable success in achieving stable prices in recent years. For the ECB, taking over responsibility for a new currency area, this success could not be taken for granted. Given the good results across the board one may conclude that the choice of different monetary policy strategies does not really matter or that in practice major central banks have indeed followed very similar policies. While differences certainly should not be exaggerated, they are more than just matters of presentation, and such differences could matter more in more testing circumstances (as shown, for example, by Gerberding et al. (2004) in their analysis of past Bundesbank policies based on real-time data).

The evolution both in the theory and practice of inflation targeting points to an increasing acknowledgement of complexity. For example, the importance of a medium-term orientation is emphasised more and the need to consider a longer time path of inflation into the future. This can be interpreted as moves in the direction of the approach taken by the ECB from the start, which eschewed any exclusive or prominent focus on a particular time horizon. Also the increasing need to take into account large swings in asset prices seems to call for some adaptation of the conventional inflation targeting approach.

Nevertheless, the idea of a single "best practice" or textbook recipe to monetary policy and communication across the globe seems misleading. Monetary policy strategies continue to show some significant differences in a number of respects. This is to be welcome for a number of reasons. First, there are many specific circumstances supporting diversity, e.g. different structures and transmission mechanisms in the economy, different institutional settings and traditions matter. Strategy pluralism may also provide an element of insurance against fads and fashions in the economics profession. Finally, there should be an element of caution against overconfidence in the ability of monetary policy to engineer economic developments. The key to successful and credible monetary policy has always been not to promise more than central banks can deliver.

The rise of inflation targeting has no doubt contributed to raising the quality of analysis and the profile of public debate about monetary policy. It has also led to highly successful results. At the same time, one should be wary of excessive consensus and be aware of the longer cycle of history. It is perhaps worth remembering that the heydays of macroeconomic management in policy as well as academic circles were the 1960s, when the Phillips Curve seemed uncontested. The return to a more modest attitude towards monetary policy in the 1970s and 1980s was associated with the re-discovery of the role of money in the economy. The legacy of these more distant lessons from history is well worth preserving and re-examining (Orphanides, 2003). More testing times may, again, lie ahead.

References

Artis, M., Winkler, B. (1998) The Stability Pact: Safeguarding the Credibility of the European Central Bank, *National Institute Economic Review*, 87-98.

Bean, C. (2004) Asset Prices, Financial Instability, and Monetary Policy, *American Economic Review* 94 (2), 14-18.

Benhabib, J., Schmitt-Grohé, S., Uribe, M. (2001) Monetary Policy and Multiple Equilibria, *American Economic Review* 91, 167-186.

Bernanke, B. S. (2004) *The Logic of Monetary Policy*, Remarks before the National Economists Club, Washington D.C., December 2, 2004.

Borio, C., Lowe, P. (2002) Asset Prices, Financial and Monetary Stability: Exploring the Nexus, *BIS Working Paper* 114.

Calza, A., Sousa, J. (2003) Why Has Money Demand Been More Stable in the Euro Area than in Other Economies? A literature review, in: O. Issing (ed.), *Background Studies for the ECB's Evaluation of its Monetary Policy Strategy*, ECB, pp. 229-244.

Castelnuovo, E., Nicoletti Altimari, S., Rodríguez-Palenzuela, D. (2003) Definition of Price Stability, Range and Point Inflation Targets: The Anchoring of Long-Term Inflation Expectations, in: O. Issing (ed.), *Background Studies for the ECB's Evaluation of its Monetary Policy Strategy*, ECB, pp. 43-90.

ECB (2000) The Two Pillars of the ECB's Monetary Policy Strategy, *Monthly Bulletin*, November 2000, 37-48.

ECB (2001) Issues Related to Monetary Policy Rules, *Monthly Bulletin*, October 2001, 37-50.

ECB (2003) The Outcome of the ECB's Evaluation of its Monetary Policy Strategy, *Monthly Bulletin*, June 2003, 79-92.

ECB (2004) *The Monetary Policy of the ECB*, European Central Bank, Frankfurt, http://www.ecb.int/pub/pdf/other/monetarypolicy2004en.pdf

Ehrmann, M., Smets, F. (2001) Uncertain Potential Output: Implications for Monetary Policy, *European Central Bank – Working Paper Series*, No. 59.

Faust, J., Henderson, D. (2004) Is Inflation Targeting Best-Practice Monetary Policy?, *Federal Reserve Bank of St. Louis Review 86*(4), 117-143.

Gerlach, S. (2003) The ECB's Two Pillars, *CEPR Discussion Paper* No 3689.

Gerberding, C., Worms, V., Seitz, F. (2004) How the Bundesbank Really Conducted Monetary Policy: An Analysis Based on Real-Time Data. *Deutsche Bundesbank Discussion Paper* 25/2004.

Issing, O. (1999) The Eurosystem: Transparent and Accountable or Willem in Euroland, in: *Journal of Common Market Studies*, 37, 503-519.

Issing, O. (2000) Communication Challenges for the ECB, speech delivered at the 2nd ECB Watchers Conference, Frankfurt, http://www.ecb.int/press/key/date/2000/html/sp000626_2.en.html

Issing, O. (2004) Inflation Targeting: a View from the ECB, *Federal Reserve Bank of St. Louis Review 86*(4), 169-179.

Jansson, P., Vredin, A. (2005) Preparing the Monetary Policy Decisions in an Inflation-Targeting Central Bank: The Case of the Sveriges Riksbank, this volume, 73-96.

Kuttner, K. (2004) The Role of Policy Rules in Inflation Targeting, *Federal Reserve Bank of St. Louis Review* *86*(4), 89-111.

Levin, A., Williams, J. (2003) Robust Monetary Policy with Competing Reference Models, *Journal of Monetary Economics* 50, 945-975.

Masuch, K., Nicoletti Altimari, S., Pill, H., Rostagno, M. (2003) The Role of Money in Monetary Policy Making, in: O. Issing (ed.), *Background Studies for the ECB's Evaluation of its Monetary Policy Strategy*, ECB, pp. 187-228.

McCallum, B. T., Nelson, E. (2004) Targeting vs. Instrument Rules for Monetary Policy, *Federal Reserve Bank of St. Louis Working Paper 2004-011A.*

Nelson, E. (2002) The Future of Monetary Aggregates in Monetary Policy Analysis, *Journal of Monetary Economics* 50, 1029-1059.

Nicoletti-Altimari, S. (2001) Does Money Lead Inflation in the Euro Area?, *ECB Working Paper* No 63.

Orphanides, A. (2003) The Quest for Prosperity without Inflation, *Journal of Monetary Economics* 50, 633-663.

Orphanides, A., Norden, S. (2004) The Reliability of Inflation Forecasts Based on Output Gap Estimates in Real Time, *Finance and Economics Discussion Series* 2004-68, Federal Reserve Board, Washington, D.C.

Svensson, L. E. O. (1997) Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets, *European Economic Review* 41, 1111-1146.

Svensson, L. E. O. (1999) Inflation Targeting as a Monetary Policy Rule, *Journal of Monetary Economics* 43, 607-654.

Svensson, L. E. O. (2003) What is Wrong with Taylor Rules? Using Judgement in Monetary Policy through Targeting Rules, *Journal of Economic Literature* 41, 426-477.

Svensson, L. E. O., Woodford, M. (2004) Implementing Optimal Policy through Inflation-Forecast Targeting, *CEPR Discussion Paper* 4229.

Winkler, B. (2002) Which Kind of Transparency? On the Need for Effective Communication in Monetary Policy Making. *Ifo Studien* 48, 401-427. (revised version of ECB Working Paper No. 26, August 2000)