

A Snapshot of Inflation Targeting in its Adolescence

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Abstract

The paper first seeks to clarify the definition of inflation targeting (IT), comparing ‘practical’ versus ‘theoretical’ definitions of the term, and how they relate to one another. Second, the paper reviews the range of IT practice across the 20 or so current inflation targeters and discusses the ways in which that practice has evolved in the past 10–15 years. Third, it assesses the criticism that IT is insufficiently ‘flexible’, considering both what inflation-targeting central banks *say* they do, and how they have responded in practice to output fluctuations. At least for New Zealand, the United Kingdom, Sweden and Canada, the implementation of IT appears to be relatively flexible – more so than one might suspect on the basis of many inflation-targeters’ (ITers) rhetoric.

1. Introduction

It is not every day that one gets to observe the diffusion and evolution of a new monetary policy framework. However, the development, and subsequent spread, of inflation targeting, beginning in the early 1990s, has created just such an opportunity. Inflation-targeting central banks now number upwards of 20, and it seems likely to become the monetary policy framework of choice for a wide range of countries, displacing more problematic alternatives, such as money targeting or exchange-rate-based frameworks.

The popularity of inflation targeting should not be too surprising. At the most basic level, IT offers the possibility of a nominal anchor, free of the vagaries of the foreign exchange market, and the often-capricious behaviour of monetary aggregates. Many central banks have found IT to be a useful organising principle for focusing research, disciplining policy discussions, and communicating policy actions to the general public. And for a transition or emerging market economy, adopting IT provides an opportunity for the central bank to clearly define its objectives and delineate its responsibilities *vis à vis* other official policy institutions.

But IT, as a policy framework, is only 15 years old – quite young, compared with other, more seasoned policy frameworks, and still very much in its adolescence. Like many teenagers, IT is often misunderstood. And also like many teenagers, it still has some issues it needs to work out.

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Any developmental issues IT might have are certainly not caused by a lack of attention. Following something of a lull, during which many macroeconomists were preoccupied by Y2K, asset-price bubbles, and the ‘new economy’, the pace of research on inflation targeting appears to have accelerated in recent years with a string of major conferences and the publication of a comprehensive book on the topic (Truman 2003). Ironically, given its origins as a strategy to contain inflation, some of the current wave of interest in IT may be attributable to *deflation* in Japan, and the perceived threat of it in the United States. But whatever the cause, the recent flurry of research means that the already-large literature on IT has become truly vast. This paper will therefore not even attempt to cover it in its entirety, choosing instead to focus selectively on a few key misunderstandings and unresolved issues.

First, the paper takes on the deceptively simple question of how to define inflation targeting, considering both the common, practically-minded definition – if a central bank says it targets inflation, it is an inflation targeter – and a more theoretically-minded definition in terms of a policy rule. Second, it describes the ways in which the practice of inflation targeting has evolved over the past 15 years, concluding that most inflation targeters’ frameworks have remained relatively static. There has, however, been something of a trend in recent years towards the publication of more explicit, longer-horizon forecasts.

Third, the paper considers some common critiques of inflation targeting, focusing primarily on the oft-heard charge (at least in the US) that IT is insufficiently ‘flexible’. Reviewing both central banks’ published statements and the conduct of policy in New Zealand, the UK, Sweden, and Canada, the paper concludes that IT is more flexible in practice than many inflation targeters’ rhetoric would suggest. But this flexibility has yet to be seriously tested by persistent, adverse supply shocks. The paper concludes with some thoughts on how inflation targeting is likely to evolve in the future.

2. Defining ‘Inflation Targeting’

Even after 15 years of inflation targeting, a certain amount of confusion persists as to exactly how to define the term and which countries to classify as inflation targeters. As Kohn (2003) remarked, ‘one difficulty in assessing whether the United States has been practising inflation targeting is in defining the term’. This section reviews two alternative, but not mutually exclusive, ways to think about IT: the first is in terms of the observed characteristics of the policy framework, and the second is in terms of an optimal (or otherwise) policy rule.

2.1 A practical definition of inflation targeting

The easiest way to identify inflation targeters, of course, is by self-declaration: if a central bank says it targets inflation, it is an ITer. The problem with this way of defining the term, however, is that a declared objective for inflation is neither a necessary nor a sufficient condition for qualifying as a bona fide inflation targeter. Some central banks have a target for inflation but lack some of the other features

associated with inflation targeting; others insist they are *not* ITers, but nonetheless possess most (or all) of the characteristics associated with other self-declared inflation targeters. Thus, while self-declaration may be a good starting point, it is surely not definitive.

As a result, practical definitions of inflation targeting have tended to emphasise a number of key features associated with established inflation-targeting frameworks. Based on the country experiences summarised in Bernanke *et al* (1999) and elsewhere, there seems to be broad agreement that ‘real’ ITers all share, at least to some extent, the following four characteristics:

- A stated commitment to price stability as a principal goal of monetary policy. However, price stability need not be the *only* goal; many ITers acknowledge, to varying degrees, a role for output stabilisation and other objectives.
- An explicit numerical target for inflation. Often, but not always, a time span will also be specified for returning to the target after any deviation.
- A high degree of transparency with regard to monetary policy formulation. ITers regularly publish extensive reports on economic conditions and the outlook for inflation. Often, but not always, the reports include the central bank’s forecasts of inflation, GDP growth, and other macroeconomic variables.
- Some mechanism for accountability. Often, failure to fulfil the inflation target requires the central bank to take specific steps, such as publishing an explanation, or submitting a letter to the government.

A sensible definition of inflation targeting (or at least a reasonable algorithm for distinguishing ITers from non-ITers) would be any monetary policy framework that bore these four hallmarks.²

These criteria still leave a number of grey areas, however. The European Central Bank (ECB), for example, has a numerical inflation objective; but because that objective is still somewhat unclear, and because of a general lack of transparency in its policy-making, the ECB is not generally considered an inflation targeter (see Svensson 2000).³ On the other hand Switzerland, by most accounts, comes close to satisfying all four criteria, and for that reason it often appears on lists of inflation targeters – despite Swiss National Bank officials’ insistence that it is *not* an ITer.⁴

The US Federal Reserve presents an even more difficult taxonomic dilemma. Kohn (2003), among others, has noted that the US Federal Reserve has successfully achieved low and stable inflation, and seems to take price stability seriously as a primary objective of monetary policy – a commitment that has been strengthened

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2. Truman (2003) lists ‘time horizon for reaching the target’ as a distinct criterion, but since a majority of ITers leave this unspecified, I have consolidated this feature with the numerical target. Unlike Truman, however, I include ‘transparency’ and ‘accountability’ as distinct attributes.
 3. On 8 May 2003, the ECB’s governing council announced a change in the target from ‘below 2%’ to below but ‘close to’ 2% – hardly a step forward in terms of clarity.
 4. The Swiss National Bank maintains that because it omits any ‘escape clauses’, it has a tougher commitment to price stability than that of most ITers. See Truman (2003, p 30).

over the past 16 years in a series of speeches by Federal Reserve Chairman Alan Greenspan.⁵ This has prompted some to label the Fed a ‘covert’ (Mankiw 2002), ‘implicit’ (Goodfriend 2003), or ‘eclectic’ (Carare and Stone 2003) inflation targeter.⁶ And yet Kohn (2004) maintains that whatever it is that the Fed is doing, it is *not* inflation targeting.

How does the Fed rate on the four criteria? It is true, as noted above, that the Fed has repeatedly reaffirmed its commitment to the goal of price stability, even if that commitment has not been formally codified. It does operate under a dual mandate, but so do other inflation targeters – notably the Reserve Bank of Australia (RBA). The Fed still lacks the *sine qua non* of IT, an explicit numerical inflation target, however, and this alone might be enough to disqualify it.⁷ It also falls short of the standards set by other ITers on other dimensions of transparency and accountability.⁸ The Federal Reserve does publish a *Monetary Policy Report to the Congress* twice a year, which includes an extensive review of economic conditions and recent policy actions. It even reports a crude twice-yearly projection consisting of the ‘range’ and ‘central tendency’ of Board members’ and Reserve Bank presidents’ inflation, GDP and unemployment forecasts for the current year and, in the July report, for the year ahead. But in the absence of an explicit assumption about monetary policy, such forecasts are hard to interpret. And more importantly, there is no way to assess the Fed’s performance in meeting its objective since it *has* no clear objective. For these reasons, the Federal Reserve is usually not included on lists of inflation targeters, despite some superficial similarities and its good inflation record.

2.2 Defining inflation targeting as a ‘policy rule’

The practical definition of inflation targeting, summarised above, takes its cue from the view articulated by Bernanke *et al* (1999) that IT is best described as a monetary policy ‘framework’, rather than as a ‘rule’. More recently, however, there have been efforts, spearheaded in large part by Lars Svensson (for example, Svensson

5. In what may be the first of these pronouncements, Greenspan (1988) stated: ‘We should not be satisfied unless the U.S. economy is operating at high employment with a sustainable external position and *above all* stable prices ... By price stability, I mean a situation in which households and businesses in making their saving and investment decisions can safely ignore the possibility of sustained, generalized price increases or decreases’ [emphasis added].
6. Carare and Stone (2003) start from the premise that any central bank lacking an explicit exchange rate or money-based nominal anchor is, by default, an inflation targeter. Those with a ‘clear commitment’ to an inflation target – in practice, a declared IT framework – are classified as ‘full-fledged’ ITers. Those without such a commitment, but possessing a certain degree of anti-inflationary credibility are deemed ‘eclectic’ ITers; the remainder are assumed to follow a policy of ‘IT lite’. Truman (2003) dismisses the value of this classification scheme, calling it ‘dressed-up self-declaration’.
7. Its behaviour in recent years seems to be consistent with an implicit target of roughly 2 per cent. The Fed may have had a higher implicit inflation target prior to the 1990–91 recession, but reduced its target as the inflation rate fell in an application of the principle of ‘opportunistic disinflation’.
8. It is worth making a distinction between transparency in policy *formulation* versus transparency in *implementation*. The Federal Reserve has, of course, become much more transparent in the implementation of policy, especially since the practice of announcing changes in the funds rate target began in February 1994.

1997, 1999) to define IT in terms of a policy rule. However, the theoretical literature has never meshed particularly well with the more practically- and institutionally-oriented approaches. Truman (2003), for example, observes that ‘inflation targeting in practice involves both more and less than’ a reaction function. Surely this is partly because inflation targeting as a policy framework predates the beginning of the policy rules literature by several years; it is worth recalling that the first six inflation targeters adopted the framework before the appearance of Taylor’s influential article (Taylor 1993), and Svensson’s subsequent work relating IT to optimal policy rules (Svensson 1997).⁹

Clearly inflation targeting represents *some* sort of a rule, defined broadly as a guiding principle for formulating monetary policy. But what *kind* of a rule, exactly? And does it matter?

One source of confusion that arises in relating the practice of IT to the rules literature is, as noted by Kuttner (2004), that the word ‘rule’ is itself used in so many different ways. One useful distinction is between *optimal* and *ad hoc* rules – that is, those based on an explicit optimisation problem, versus those that are not. Typically, the objective function underlying any optimal rule is the conventional quadratic loss function,

$$E_t \sum_{\tau=0}^{\infty} \delta^\tau \left[(\pi_{t+\tau} - \pi^*)^2 + \lambda x_{t+\tau}^2 \right] \quad (1)$$

involving the output gap x_t and the deviation of inflation from its target, $\pi_t - \pi^*$; the parameter λ is the weight on output fluctuations, relative to inflation deviations.

Another distinction is between *targeting* and *instrument* rules – that is, whether the rule is specified entirely in terms of the targets of monetary policy (inflation and output), or solved out for the optimal setting of the monetary policy instrument (typically the short-term interest rate under the central bank’s control). Table 1

Table 1: A Classification of Policy Rules

	Ad hoc	Optimal
Instrument	Taylor rule Inflation forecast-based (IFB) rule	$i_t = \pi_t + \tilde{b}_1 (\pi_t - \pi^*) + \tilde{b}_2 x_t$
Targeting	Set $E_t \pi_{t+k} = \pi^*$	$E_t \sum_{\tau=0}^{\infty} \delta^\tau \left[(\pi_{t+\tau} - \pi^*)^2 + \lambda x_{t+\tau}^2 \right]$ $E_t [\pi_{t+1} - \pi^*] = -\frac{\lambda}{\kappa} E_t x_{t+1}$

Notes: The optimal instrument rule example is from Svensson (1997, Equation 6.11). The examples of optimal targeting rules are from Svensson (2003b, Equations 5.1 and 5.7). Throughout, π represents the inflation rate, π^* the inflation target, x is the output gap, and κ is the coefficient on the output gap in the inflation equation (Phillips Curve).

9. One is reminded of Goldfeld’s (1984) quip – ‘An economist is someone who sees something working in practice and asks whether it would work in principle’.

illustrates how policy rules can be classified on these two dimensions. Taylor's eponymous rule is, of course, the best-known example of an ad hoc instrument rule, a category that would also include Batini and Haldane's (1999) inflation forecast-based (IFB) rule. An optimal targeting rule could be represented by the objective function (Equation 1), or by the first-order condition expressing a linear trade-off between the deviation of inflation from its target and the output gap:

$$E_t [\pi_{t+1} - \pi^*] = -\frac{\lambda}{\kappa} E_t x_{t+1} \quad (2)$$

Simply put, rules of this form express the imperative to balance the expected marginal benefit of reducing inflation (the deviation of inflation from its target) with the expected marginal cost of the inflation reduction (the negative of the output gap, divided by the Phillips Curve coefficient κ , multiplied by the weight on the output gap in the objective function, λ). A larger λ (or a smaller κ) means the inflation reduction comes at a greater cost, and as a result the optimising policy authority will be willing to tolerate larger deviations of inflation from its target. Although the precise form of the targeting rule will depend on the model, it can always be expressed as an analogous trade-off between costs and benefits.¹⁰

Svensson (1999) unequivocally defines IT as an *optimal* targeting rule of this sort – derived from a 'reasonably explicit objective function'. While agnostic as to whether IT necessarily involves pre-commitment, he argues that IT can, at least, help reduce or eliminate any inflation bias resulting from an above-equilibrium output target. Svensson is not alone in regarding optimisation as the essential element distinguishing ITers from non-ITers: Woodford (2004) and Walsh (2002) also describe it in these terms. That would put IT in the right-hand column of Table 1, if not in the lower right-hand corner.¹¹

But this is not the only way to map IT into a policy rule. Others prefer to think of IT simply in terms of an ad hoc instrument rule characterised by some fixed (but not necessarily announced) target of inflation π^* , and an inflation coefficient in excess of unity, thus ensuring that eventually inflation returns to π^* . Such a reaction function may, of course, also include a response to the output gap. Galí (2002) and McCallum (2002), among others, describe inflation targeting in this way.¹²

10. The form of the rule will also depend on whether the central bank is assumed to be able to commit to a future path for policy, or if it is free to re-optimize in each period.

11. In principle, it should be possible to test for optimising behaviour on the part of a central bank, just as the null of optimal consumption behaviour has been tested against an alternative that includes rule-of-thumb consumption. (The assumed existence of an interest-rate smoothing term in the objective function obviously means the interest rate, unlike consumption, will not follow a random walk.) To my knowledge, no econometric test of central bank optimisation in the context of IT has yet been performed.

12. McCallum and Nelson (2004) argue that optimal rules can be highly model-dependent, and that central banks would be better advised to select a rule that works well for a variety of different model specifications. They also object to Svensson's view that the objective function by itself represents a policy rule. Svensson (2004) rebuts.

Inflation targeting, as currently practised, maps only imperfectly into these theoretical characterisations. IT *does*, of course, involve setting an objective for a key target variable, namely inflation. Typically, policy is described as setting the interest rate in such a way that the annual inflation rate returns to its target at some specified horizon. Expressing things in terms of the behaviour of the target variable, rather than a specific reaction function for the interest rate, is what gives IT the ‘look and feel’ of a targeting rule.

But are ITers’ simple targeting rules optimal? Clearly not – if ITers are optimisers, they generally do not reveal it in the targeting rules used to describe their policies. The reason is, as Woodford (2004) argues, that merely specifying a medium-term inflation objective fails to characterise *optimal* monetary policy; doing so would involve much nearer-term, one- and two-quarter-ahead projections of output and inflation, which is where the relevant trade-off between output and inflation stabilisation would occur. In the same vein, Svensson (2003a) has urged central banks to disclose the numerical values of the weight they place on output fluctuations in their objective functions. One potential criticism of IT is that it is not sufficiently optimising – ITers need to be more explicit about their objective function, and the economy’s near-term transition path back to the target. (This critique, and others, will be discussed later in the paper.) In this light, IT perhaps belongs in the lower left-hand corner of Table 1, as an ad hoc targeting rule.

In any case, it is not clear why defining IT as an optimal targeting rule necessarily excludes central banks that are not generally thought of as ITers. After all, why would ITers have a monopoly on optimisation? Is there a reason to think that the Fed, with its legions of well-trained PhD economists, would be either unable or unwilling to conduct policy in an optimal manner? Apparently not, since Giannoni and Woodford (2003) model the Fed as an ITer (in the sense of following an optimal policy rule derived from the timeless perspective) and find – in contrast to Kohn (2004) – that such a rule is a good description of the Fed’s behaviour.

And just to confuse matters further: while ITers tend to frame policy in terms of a targeting rule, some also employ ad hoc instrument rules – both in internal discussions, and in communicating their policies to the public. Since 2000, the March issue of the Sveriges Riksbank’s *Inflation Report* has included an assessment of monetary policy using an econometrically estimated ‘rule of thumb’, based on the Riksbank’s own inflation forecasts.¹³ According to Archer (2003), a Taylor-style rule is used internally at the Reserve Bank of New Zealand (RBNZ) for assessing various policy options, and one issue of the *Monetary Policy Statement* (May 2001) actually included such a rule-based assessment. Nikolov (2002) reports that Bank of England staff and the Monetary Policy Committee periodically review the implications of a variety of policy rules, although neither the rules, nor the output gap data used to implement them, are published. Even the Norges Bank presents the interest rate path from a Taylor-style rule as a ‘cross-check for interest rate setting’. One possible rationalisation for this informal use of instrument rules is

13. The reaction function published in the *Inflation Report* is described in detail in Jansson and Vredin (2000) and Berg, Jansson and Vredin (2002).

that the typical ITers' simple targeting rule, referring only to the medium-term, gives little or no guidance as to how the central bank is to go about achieving its objective in the *near* term.

The practical and theoretical definitions of IT do share common ground, of course: broadly speaking, both involve specifying an explicit inflation objective for monetary policy, and holding the central bank accountable for achieving that objective. But a careful look at the practice of IT confirms Truman's (2003) observation that IT is both *more* than and *less* than a policy rule, narrowly defined. It is more than a rule, in the sense that inflation-targeting frameworks involve a number of elements (for example, a strong emphasis on transparency and communication) that are not easily modelled in the optimal control theory from which policy rules are derived. But at the same time, the simple rule implied by the typical IT framework falls far short of completely specifying central bank behaviour, optimal or otherwise, hence the informal use of ad hoc reaction functions. On this dimension, the practice of IT is quite eclectic. But the literature on optimal policy rules does nonetheless provide a useful theoretical insight into the objectives of, and trade-offs facing, ITers, even if the practice of monetary policy only approximates that ideal.

3. Origins and Evolution of Inflation Targeting

The adoption of inflation targeting has occurred in two distinct waves. The first began with New Zealand in December 1989 (or March 1990, dated from the first of its Policy Targets Agreement, or PTA) and ends with Spain in January 1995. This was followed by a three-year lull, with no further adoptions. Then, beginning with the Czech Republic in January 1998, an additional 14 countries have become inflation targeters. It is not clear exactly what prompted the second wave, although some countries (for example, Korea and Thailand) were clearly eager for a nominal anchor to replace failed exchange rate pegs.

Table 2 lists the 21 countries currently practising IT, distinguishing between the 7 'early adopters' and the 14 'recent adopters'.¹⁴ The table also summarises some of the key features of each framework, including the structure of the target, the previous policy framework, and the nature of the central banks' published forecasts. The key characteristics of the inflation targets are also summarised graphically in Figure 1.

As shown in the second column of the table, IT has replaced a variety of other monetary frameworks. For three of the early adopters, Australia, Canada, and New Zealand, IT replaced what might be described as an 'ad hoc' policy framework with no explicit nominal anchor. The other four countries in this group all relied on an exchange rate anchor prior to adopting IT. And two of these – Israel and Chile – combined IT with a crawling-band exchange rate for a lengthy transitional

14. The list includes Switzerland, as the sole 'undeclared' ITer. While one might debate whether the Swiss National Bank should be classified as a true ITer, clearly its abandonment of money as an intermediate target, its embrace of an explicit numerical inflation objective, and its publication of an inflation forecast, have all moved it a considerable distance in that direction.

Table 2: Current Inflation Targeters and their Key Characteristics (continued next page)

Country/ Adoption date	Prior policy framework	Current target	Forecasts	
			Official	Fan? Unofficial
A. Early adopters				
New Zealand Dec-89	Ad hoc	1–3% annual CPI inflation ‘on average over the medium term’	GDP growth Inflation Output gap Policy rate 2+ years 2+ years 2+ years endogenous	1–4 years (S)
Chile Jan-91	Soft peg (crawling band)	2–4% annual CPI inflation, centred on 3%, 24-month horizon	GDP growth Inflation Output gap Policy rate 8 quarters 8 quarters constant	✓ ✓ 2 years (S) 2 years (S)
Canada Feb-91	Ad hoc	1–3% for annual CPI inflation, midpoint of 2%, 6–8 quarter horizon	GDP growth Inflation Output gap Policy rate 1+ year 1+ year current	2 years (S)
Israel Jan-92	Soft peg (crawling band)	1–3% annual CPI inflation, 12-month horizon	GDP growth Inflation Output gap Policy rate 1 year (1 year)	1 year (S, M)
UK Oct-92	Soft peg (ERM)	2% for annual CPI inflation, 8-quarter horizon; letter for deviations >1%	GDP growth Inflation Output gap Policy rate 8 quarters 8 quarters constant, market	✓ ✓ 2 years (S) 2 years (S), 5 years (M) 2 years (M)
Sweden Jan-93	Soft peg (ERM)	2% ± 1% for annual CPI inflation, 1–2 year horizon	GDP growth Inflation Output gap Policy rate 2+ years 2+ years current constant	✓ 1–5 years (S)
Australia Mar-93	Ad hoc	2–3% annual CPI inflation ‘on average over the cycle’	GDP growth Inflation Output gap Policy rate (1 year) 1+ year	1 year (S)

B. Recent adopters (Table 2 continued next page)

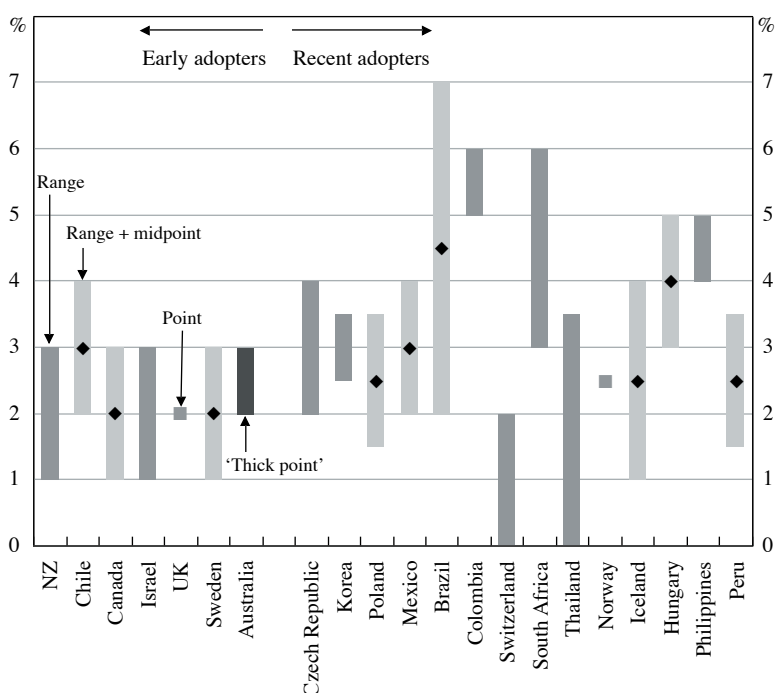
Country/ Adoption date	Prior policy framework	Current target	Forecasts		
			Official	Fan?	Unofficial
Czech Republic Apr-98	Soft peg (abandoned in May 1997) + money	2–4% annual CPI inflation, becoming 3% ± 1 % in 2006; unspecified horizon	GDP growth Inflation Output gap Policy rate	✓ ✓	1–3 years (S, M) 1 year (M)
Korea Apr-98	Ad hoc	2.5% to 3.5% annual core CPI inflation, 3-year horizon.	GDP growth Inflation Output gap Policy rate	✓	(1 year) 3 years
Poland Oct-98	Money-based	2.5% ± 1% annual CPI over a 'medium-term horizon'	GDP growth Inflation Output gap Policy rate		(1+ years) (1+ years) constant 3 months (M)
Mexico Jan-99	Soft peg, followed by 'weak' IT, 1995–98	3% ± 1% annual CPI inflation, unspecified horizon	GDP growth Inflation Output gap Policy rate		(1+ years) (1+ years) constant 3 months (M)
Brazil Jun-99	Soft peg	5.5% ± 2.5% (2004), 4.5% ± 2.5% (2005) annual CPI inflation, unspecified horizon	GDP growth Inflation Output gap Policy rate	✓ ✓	8 quarters 8 quarters constant, market 2 years (S)
Colombia Sep-99	Soft peg + money	5% to 6% in 2004, reduced gradually to 3%	GDP growth Inflation Output gap Policy rate	✓	12 quarters 12 quarters 12 quarters endogenous 1 year
Switzerland Jan-00	Money-based	Less than 2% annual CPI, unspecified horizon; deflation prevention => de facto 0–2% range	GDP growth Inflation Output gap Policy rate		(1+ years) 12 quarters 12 quarters endogenous 1 year

B. Recent adopters (Table 2 continued)

Country/ Adoption date	Prior policy framework	Current target	Forecasts		
			Official	Fan?	Unofficial
South Africa Feb-00	Ad hoc	3 to 6% for annual CPIX inflation (continuously), 18–24 month horizon	GDP growth Inflation Output gap Policy rate 8 quarters constant	✓	1+ years (S) 2+ years (S)
Thailand May-00	Money-based	0 to 3.5% quarterly core CPI, unspecified horizon	GDP growth Inflation Output gap Policy rate 8 quarters 8 quarters constant	✓ ✓	1+ years (S) 1+ years (S)
Norway Mar-01	Soft peg	'Approximately' 2.5% for annual CPI inflation over 'a reasonable time horizon, normally 1–3 years'	GDP growth Inflation Output gap Policy rate 3+ years 3+ years 3+ years market	✓	current year (S) 1+ years (S), 6–10 years (M) 3+ years (M)
Iceland Mar-01	Hard peg	2.5% ± 1.5% annual core CPI inflation, unspecified horizon	GDP growth Inflation Output gap Policy rate 2+ years 9 quarters 2+ years constant	✓	1+ years (S) 1+ years (S) 2 years (S)
Hungary Jul-01	Soft peg (crawling band)	4% ± 1% for annual CPI inflation as of year-end 2005, unspecified horizon	GDP growth Inflation Output gap Policy rate 1+ years 1+ years constant	✓	1+ years (S) 1+ years (S)
Philippines Jan-02	Money-based	4% to 5% annual CPI inflation, unspecified horizon	GDP growth Inflation Output gap Policy rate 8 quarters constant	✓	1+ years (S) 1+ years (S)
Peru Jan-02	Ad hoc	2.5% ± 1% for annual CPI inflation, unspecified horizon	GDP growth Inflation Output gap Policy rate 1+ years 1+ years constant	✓	current year (S) 1+ years (S)

Notes: Forecast horizons given in parentheses are qualitative, or reported at semi-annual (or longer) intervals. Unofficial forecasts reported can be from surveys (S), market-based measures (M), or both. Australia's adoption date corresponds to the declaration of the 2–3% target by then-Governor Fraser (see Stevens 1999 for a discussion). Bermanke *et al* contend that inflation targeting was not fully in place until September 1994.

Sources: Fracasso, Genberg and Wyplosz (2003, Tables 1.1 and 3.6); Mishkin and Schmidt-Hebbel (2002, Table A.1); Truman (2003, Table 2.3); updated and expanded from central bank sources

Figure 1: Characteristics of ITers' Inflation Targets

Sources: See Table 2

period as the inflation target was ratcheted down. The same goes for the recent adopters, whose prior monetary regimes included soft pegs (Brazil, Colombia, the Czech Republic, Hungary, Mexico and Norway), hard pegs (Iceland), money-based anchors (Philippines, Poland, Switzerland and Thailand), and ad hoc policies (Korea, Peru and South Africa)

3.1 How have inflation-targeting frameworks evolved?

The early adopters listed in Table 2 have by now had IT policies in place for 10–15 years. What is striking about these countries is how *little* the basic outlines of the frameworks have changed over the years.¹⁵ All state their targets in terms of annual overall ('headline') CPI inflation, and except for Chile's 2–4 per cent range, the targets all are somewhere in the 1 per cent to 3 per cent range; the modal midpoint is 2 per cent. No central bank has modified the form of its target: point targeters have remained point targeters, and range targeters have remained range targeters. Except for Chile and Israel, which went through extended transition periods, the numerical targets themselves have remained largely unchanged. (The Bank of England's target changed in December 2003, but the reduction in the target

15. As an aside, it is worth noting that two countries – New Zealand and Canada – experimented with, but abandoned, monetary conditions indices (MCIs) as operating targets. Svensson (2001) contains a detailed review of New Zealand's experience.

to 2 per cent from 2.5 per cent resulted from a switch to a new, harmonised CPI price index, whose average inflation rate was somewhat lower than the old RPIX.) And for those central banks that give a targeting horizon, that horizon has remained constant, typically in the 1–2 year range.

Among ‘non-transitional’ ITers, the salient exception to the pattern of stability is New Zealand, which has modified three key parameters of its framework. Until September 1997, the RBNZ used an index of ‘underlying’ inflation as its target. Between September 1997 and June 1999 it used a measure of ‘core’ CPI inflation, and since June 1999 it has simply used overall CPI inflation. And having begun with a target range of 0–2 per cent, the RBNZ in early 1997 raised the upper bound to 3 per cent, and in late 2002 it raised the *lower* bound to 1 per cent. In these two dimensions, the RBNZ has moved towards the best (or at least most common) practice of a target for overall CPI inflation with a non-zero lower bound. In a slightly more subtle modification, the September 2002 PTA changed the target to ‘between 1 per cent and 3 per cent *on average over the medium term*’ [author’s emphasis]. This shift in language, reminiscent of the RBA’s ‘on average over the cycle’, might be interpreted as signalling a shift towards placing somewhat greater weight on output fluctuations (‘flexibility’) in formulating its policy.

New Zealand notwithstanding, the lack of any significant modifications in these countries’ IT frameworks is revealing – one might have expected somewhat more evolution towards a uniform set of characteristics. One explanation is that the frameworks really differ only in the details; that these details have remained largely unchanged suggests that they simply don’t matter all that much. It seems that any relatively low (but non-zero) target will do. Similarly, point, range, and range-with-midpoint targets all appear satisfactory, or at least the perceived benefits from moving to a ‘better’ inflation target are sufficiently small that they are outweighed by the perceived costs of switching. The guiding philosophy seems to be ‘whatever works’.

3.2 The evolution of inflation targeters’ forecasts

This is not to say that the practice of IT has been completely static for 15 years. In more subtle ways, IT *has* evolved – particularly when it comes to what central banks choose to communicate. And perhaps the most prominent dimension of communication has to do with the forecasts central banks choose to report. Here, there *has* been a fair amount of change, at least for some central banks: the general trend is clearly towards reporting explicit forecasts over increasingly long horizons.

This dispersion in terms of what forecasts (if any) central banks choose to report is clearly evident in Table 2. The first column under the ‘forecasts’ heading indicates whether the central bank publishes official forecasts of GDP growth, inflation, and the output gap; and, if so, the horizon over which the forecasts are published. A blank entry indicates no forecast for that variable is published; forecasts that are more qualitative, or limited in terms of frequency, are indicated by parentheses. The ‘policy rate’ entries in the table report the nature of the policy assumption on which the forecasts are conditioned: forecasts conditioned on a constant or (published)

market-implied path of interest rates are listed as such, while those that are based on a published, time-varying interest rate projection (presumably one consistent with bringing inflation back to its target) are labelled as ‘endogenous’.¹⁶ The policy rate entry is left blank in those cases where the policy rate assumption is unspecified. A tick mark in the second column indicates that a ‘fan chart’, or the equivalent, is used to report the uncertainty associated with the forecast variables.

In addition to (or, in some cases, instead of) official projections, many central banks report unofficial, private-sector forecasts of key macroeconomic and financial variables. These cases are noted in the last column of the table, with an indication as to whether the unofficial forecasts are based on surveys (S) or are market-based measures (M) derived from asset prices, such as the nominal-index bond spread.

At the full-reporting end of the spectrum are New Zealand and recent adopters Norway, Iceland, Colombia and the Czech Republic. New Zealand has, at least since 1997, reported relatively detailed annual projections for real GDP, inflation, and the output gap for a 2–3 year horizon. Quarterly projections for many of the key variables are also made public. While many of these are not tabulated, plots of the projections appear in the *Monetary Policy Statement*, and the data underlying the plots are made available publicly on the RBNZ’s website.

As impressive as it is, New Zealand’s high standard for forecast disclosure has recently been equalled or even surpassed by the Norwegian central bank.¹⁷ The Norges Bank reports detailed forecasts for a 3–4 year horizon, compared with 2–3 years for the RBNZ. (The May 2004 *Inflation Report*, for example, reports forecasts through 2007.) Both central banks are also quite explicit about the interest rate path on which the forecast is conditioned: the RBNZ bases its forecast on a (non-constant) trajectory of interest rates consistent with attaining the inflation target at its chosen horizon, while the Norges Bank uses market expectations derived from the term structure of interest rates. (Similarly, the exchange rate forecast is derived from forward rates.) And the Norwegian central bank, together with the RBNZ, the Central Bank of Iceland, the Colombian Central Bank and the Czech National Bank are the *only* central banks to publish forecasts of the output gap – an essential ingredient in the sorts of optimal targeting rules advocated by Svensson (1999).

Among the established early-adopter central banks, it is fair to say that the Bank of Canada and the RBA, along with the Bank of Israel, occupy positions near the opposite end of the forecast-reporting spectrum, publishing only near-term, often qualitative, forecasts for a relatively small set of variables. (Some of the emerging-market countries among the recent adopters, not surprisingly, tend to report only minimal forecasts, presumably due in part to a shortage of experience and research infrastructure. But this is hardly uniform – see Colombia and Brazil.) But both the Canadian and Australian central banks have begun to include more information in

16. These official interest rate projections are published with varying degrees of specificity, however, with some, such as the Czech Republic, indicating only in general terms how they expect the interest rate to evolve.

17. Colombia’s Banco de la República also publishes a surprisingly detailed forecast, comparable to that of the Norges Bank, but it is only available in Spanish.

recent years, gradually moving to slightly more explicit forecasts of a larger set of macroeconomic variables. Nonetheless, both still fall short of banks like the RBNZ and the Norges Bank in terms of forecast detail and horizon.

Of the three, Australia goes the farthest in de-emphasising forecasts.¹⁸ The RBA's extensive *Statement on Monetary Policy* covers a very wide range of topics, but its focus is mainly on describing and interpreting recent trends. The *Statement* is not entirely backward-looking, however. The introduction (page 3 of the May 2004 issue) and the section entitled 'Inflation outlook' appearing on the last page of the document (page 51 of the same issue), contain a broad-brush forecast, such as 'inflation is now expected to decline to around 1¾ per cent at the end of this year, rising to around 2½ per cent by the end of 2005'. While this lacks the level of precision (spurious or otherwise) found in other ITers' published forecasts, it is slightly more specific than previous years' *Statements*. The May 1997 *Statement*, for example, said 'the Bank expects underlying inflation during 1997 to remain low, probably declining slightly below 2 per cent for a while. Some pick-up in inflation is likely in 1998 as the favourable exchange rate effects pass but, provided growth in labour costs is not excessive, price inflation should remain within the 2 to 3 per cent range'. Official GDP forecasts are generally not reported in the *Statement on Monetary Policy*, but instead are presented semi-annually in the Governor's Opening Statement to the House of Representatives Standing Committee on Economics, Finance and Public Administration.

The Bank of Canada's forecasts have undergone a similar evolution in recent years. When it was first published in 1995, the *Monetary Policy Report* contained no explicit forecasts of either inflation or output. But starting in 1996, GDP forecasts for the subsequent year began to appear. A section entitled 'Inflation projection' appeared in November 1997, and from 1998 onward GDP and inflation forecasts are consistently presented. (Only core inflation forecasts were reported during this period, and usually as a range.) In 2003, the *Report* added a table containing forecasts of core and overall inflation for the current and subsequent years. Still, it is perhaps telling that Canada's forecasts appear only at the very end of its monetary policy document. The ITers with a history of emphasising the forecast, like the UK, New Zealand and Sweden, typically feature their forecasts prominently in the opening section of their documents.

Israel's situation differs in many ways from those of Australia and Canada. Its failure to give an extensive forecast is probably more a function of the high level of economic uncertainty in that country than due to any intrinsic aversion to reporting a forecast. More than 12 years after adopting an inflation target, Israel is just now completing a transition period from relatively high inflation to its long-term objective of 1–3 per cent. Driven in part by exchange rate fluctuations, inflation has been extremely volatile in recent years, however, reaching 6 per cent in 2002 and –2 per cent in 2003. Clearly, making long-term forecasts in this kind of environment is difficult.

18. See Debelle (2003) for an excellent description of Australia's relatively relaxed approach to inflation targeting.

3.3 Why do forecasts matter?

Why do many ITers seem to attach such importance to publishing a forecast? And what explains the evolution of the practice of IT towards the publication of more complete, longer-horizon forecasts?

The immediate answer to both questions, of course, is simply that optimal monetary policy, whether framed in terms of a targeting rule or an instrument rule, is always framed in terms of expectations (or at least the policy authority's projections) of the relevant target variables. Inflation targeting is really inflation-*forecast* targeting, as noted in Svensson (1997). Indeed, along with the use of an optimal targeting rule, Svensson (1999) lists the publication of explicit forecasts for inflation and the output gap as the touchstone for inflation targeting. Thus, if the public is to understand what the central bank is doing in terms of a policy rule, published forecasts are essential. And more broadly, the publication of forecasts fits with ITers' overall emphasis on transparency.

Why transparency itself is important is a deeper question. Geraats (2002) suggests two broad categories of effects: information and incentive. The information effect is based on the idea that the central bank has some proprietary information about the state of the economy, and disclosing information can reduce the uncertainty associated with private-sector forecasts. This is a rather general point, however, and need not apply specifically to ITers – the same line of reasoning suggests that all central banks should disclose their forecasts, whether or not they choose to adopt the entire IT framework.

There is, of course, one key piece of information disclosed by inflation-targeting central banks, and not revealed by non-ITers: the *long-run* inflation forecast, which is, of course, equal to the inflation target itself. Orphanides and Williams (2003) show that, compared with the case in which expectations are formed by recursive least-squares regression, an inflation target improves economic performance by pinning down long-run inflation expectations. But this result only explains why setting an explicit target is helpful, and says nothing about the usefulness of releasing forecasts *per se*.

That leaves Geraats' so-called incentive effects. The idea here is that the disclosure of forecasts reduces or eliminates any incentive the central bank might have to 'cheat' on its commitment to low inflation by engineering higher-than-expected inflation, and thus achieving a higher level of output. This line of reasoning is based on models that include a Barro-Gordon (1983) style time-consistency problem, extended to include private information, along the lines of Canzoneri (1985). King (1997) argues, informally, that the overall transparency associated with inflation targeting effectively removes the possibility of cheating, and allows the central bank to attain the optimal state-contingent rule. Herrendorf (1998) formalises this idea, showing that the disclosure of 'planned' inflation (that is, the central bank's projection) reduces the inflation bias.

It is worth keeping in mind, however, that the issue of transparency is much more subtle in practice than these sorts of stylised models would suggest. Posen (2002) points out that there are many ways to promote transparency, and publishing a forecast

by itself does not reveal all the information one would need to discern (or verify) the central bank's underlying preferences. Moreover, as discussed in Posen (2003), the effects of transparency may be highly varied, depending on the nature of the information being disclosed. He suggests, for example, that the largest effect of the publication of forecasts would be on the way in which financial markets respond to economic news. By contrast, the careful articulation of the policy framework through other forms of communication, such as speeches, would be more likely to build trust and convey flexibility. This particular aspect of communication is the focus of a subsequent section of the paper, dealing with the nature of central banks' stated policy goals.

Regardless of any effect the publication might have on anyone's behaviour, the availability of forecasts is unquestionably a boon to anyone seeking to understand and characterise the conduct of monetary policy. Below, the central banks' forecasts will be used in an effort to assess the degree of 'flexibility' in their response to inflation and real economic conditions. So even if the forecasts reveal nothing by way of private information about the state of the economy, their publication at a minimum facilitates the public's learning about the descriptive rule followed by the monetary authority.

4. Critiques of Inflation Targeting

Judging from its popularity, at least, inflation targeting is widely viewed as a success. It is also worth noting that the framework has never been abandoned, except when Finland and Spain joined the European Monetary Union. And in light of the mixed reviews of the ECB's policy framework, such as that of Galí *et al* (2004), one wonders whether these two countries might not be experiencing a form of buyer's remorse.

Inflation targeting has its critics, however. Critiques of IT tend to fall into one of three categories. The first is that it simply doesn't matter – the performance of ITers is indistinguishable from that of comparable non-ITers. A second critique is that IT is too inflexible, in that it goes too far in constraining central banks' response to economic conditions – particularly real-side fluctuations in employment and output. The third is that IT, at least as practiced, does not come close enough to the theoretical ideal of *optimal* monetary policy. A case can be made, however, that the thrust of this third critique is really very close to the 'too inflexible' criticism.

4.1 The 'inflation targeting doesn't matter' critique

Discerning a distinct empirical effect of inflation targeting has posed a major challenge to IT advocates. The problems are threefold. The first is the relatively short sample available for evaluating ITers' track record. (Of course, the longer IT is debated, the more evidence is accumulated.) The second is disentangling the effects of IT from the generally favourable economic conditions prevailing in the 1990s. And the third, related problem, is specifying an appropriate counterfactual, in the absence of an exogenously-assigned control group of non-ITers.

In large part as a result of these obstacles, the evidence on whether IT ‘matters’ has been rather mixed. The general improvement in the performance of economic outcomes in inflation-targeting countries is by now reasonably well documented. Corbo, Landerretche and Schmidt-Hebbel (2002), for example, found that ITers were able to reduce their inflation rates and hit their inflation targets quite reliably while also reducing the volatility, relative to the pre-adoption period.¹⁹ Neumann and von Hagen (2002) found that interest rate volatility also fell post-adoption; however, they were unable to detect any significant differences on this, or any other dimension, between the performance of ITers and industrialised non-ITers. In a similar vein, Ball and Sheridan (2003) concluded that much of the apparent improvement in ITers’ economic performance can be attributed to a reversion to the mean, rather than to a distinct effect of IT *per se*. Hyvonen (2004), however, challenged the Ball and Sheridan conclusion, showing that mean reversion tends not to occur in the absence of a policy framework designed to effect such a reversion – mean reversion simply doesn’t happen by itself. With no more than 15 years’ worth of data (and for most countries, much less), however, the question of IT’s effects on macroeconomic performance is sure to remain unsettled for some time to come.

The difficulty of discerning a first-order difference in macroeconomic outcomes has led to efforts to distinguish more subtle differences between ITers and non-ITers. Here the results have been somewhat more promising. One important finding is that the persistence of inflation among ITers is less than for non-ITers, a result reported by Kuttner and Posen (1999, 2001), Siklos (1999) and Levin, Natalucci and Piger (2004). The interpretation is that, with inflation expectations more firmly anchored by the inflation target, there is less of a tendency for inflation shocks to propagate through wage- and price-setting behaviour. This hypothesis is borne out by analyses that examine inflation expectations more directly. Kuttner and Posen (1999), for example, find a smaller impact of inflation shocks on long-term interest rates in Canada and the United Kingdom post-adoption. And in analysing survey-based inflation expectations, Levin *et al* (2004) find that recent inflation realisations have a much smaller impact on expectations for ITers than they do for non-ITers.

4.2 Flexibility and optimality – one goal, or two?

The objection most often raised to inflation targeting in the US is that it is too ‘inflexible’. Usually, that is taken to mean that the adoption of IT would force the central bank to pay attention *only* to inflation, to the exclusion of output stabilisation – and potentially other central bank objectives, such as financial stability, as well. In other words, IT is viewed as a step in the direction of ‘inflation only’ targeting; or as Kohn (2004) put it, ‘adopting IT, even in its softer versions, would be a slight shift along the continuum of constrained discretion in the direction of constraint, and the

19. It is worth mentioning a related study by Chortareas, Stasavage and Sterne (2002) examining the effects of central bank transparency, defined narrowly in terms of whether, and at what level of detail, a forecast is published. Using self-reported survey data, they find that those central banks that publish more extensive forecasts also tend to have lower inflation rates, on average.

benefits of such a shift are unlikely to outweigh its costs'. The Federal Open Market Committee (FOMC) has not formally taken up the question of inflation targeting since 1995, but the objections raised during that discussion were essentially the same. In arguing against the idea, Federal Reserve Governor Janet Yellen interpreted it as meaning that 'the inflation rate should be the sole objective of policy for current and future years, with no weight being placed on achieving competing, ultimate goals for real variables' (FOMC 1995). A similar objection was raised by Friedman and Kuttner (1996).²⁰

The problem is, as Blanchard (2003) observes, that the intellectual (or at least academic) foundation of inflation targeting rests on the 'divine coincidence' that stabilising inflation is equivalent to stabilising output around its natural level. Cost shocks may be present, but their effect comes exclusively through their impact on the natural level of output; hence there is no conflict between the two objectives of output and inflation stabilisation. The conclusion follows logically from the absence of an error term in the New Keynesian version of the Phillips Curve. In this case, the optimal level of output can be attained by eliminating any dispersion in *relative* prices, which in the context of models with staggered price setting, requires complete price stability.²¹ In this case, the two goals of output and inflation stabilisation collapse into a single objective.

For monetary policy to have two meaningfully distinct goals requires the existence of cost-push, or supply shocks. Woodford (2004) includes an exogenous cost-push shock in the aggregate supply relation, thereby creating 'a tension between the goals of inflation stabilisation and output-gap stabilisation' – a property shared by Svensson's various formulations of optimal monetary policy.²² In the presence of these shocks, absolute price stabilisation will generally *not* be optimal. Faced with an adverse cost-push shock, the loss-minimising central bank will allow inflation to rise temporarily, rather than keep inflation constant at the cost of a sharper reduction in output. This is precisely the point made by Yellen in her argument against inflation targeting (FOMC 1995): 'Fortunately, the goals of price stability and output stability are often in harmony, but when the goals conflict and it comes to calling for tough trade-offs, to me, a wise and humane policy is occasionally to let inflation rise even when inflation is running above target'. This is, of course, exactly the trade-off represented by the optimal targeting rule (Equation 2) discussed above.

So if IT is nothing more than conducting policy based on an optimal targeting rule like Equation (2), as Svensson (1999) maintains, what accounts for Yellen's

20. Unfortunately, much of the debate in the mid 1990s was framed by the proposed *Economic Growth and Price Stability Act* of 1995, which would have replaced the Fed's dual mandate with the single objective of price stability. For this reason, the Act was widely interpreted as specifying 'inflation-only targeting'.

21. The definitive statement of this idea in a New Keynesian setting is Woodford (2003), especially Chapter 6, Section 3. The New Classical rendition of the same argument can be found in Goodfriend and King (1997).

22. Interestingly, Woodford (2003) discounts the empirical relevance of these inefficient cost-push shocks: 'while it is certainly possible that substantial disturbances of this kind occur, the matter is far from established' (p 454).

objection? The most likely explanation is that inflation targeters often do not *talk* as if they were guided by (2), preferring to focus instead on the simple targeting rule of bringing the inflation rate back to its target over the medium-term horizon. This of course relates back to the point in Woodford (2004), that to implement policy optimally, ITers need to specify the transition path back to the inflation target, since it is along the transition path that the output-inflation trade-off becomes relevant. Thus, the charge that IT is too inflexible is, at least in this dimension, equivalent to the criticism that ITers should more closely follow the prescriptions of optimal policy rules.

4.3 What do inflation targeters say about output stabilisation?

Surely no inflation-targeting central banker would admit to being an ‘inflation nutter’, to borrow King’s (1997) memorable phrase. All now claim to be ‘flexible’. But pledges of flexibility are rather abstract – in concrete terms, how do inflation-targeting central banks state their policy objectives? And do they do so in such a way that communicates the potential trade-off between stabilising output and stabilising inflation, and indicates, at least roughly, how the central bank would balance those objectives should they conflict?

One might argue that what matters is what inflation-targeting central banks actually *do* – not what they *say*. But an essential element – if not *the* essential element – of inflation targeting is transparency; Bernanke *et al* (1999) maintain that IT is, more than anything else, a framework for improving communication. One would therefore hope that the flexible deeds of inflation-targeting central banks would be matched by equally flexible words. Adhering to the conventional wisdom that central banks should ‘do what they do but talk only about inflation’ would, as Friedman (2003) points out, obfuscate the real goals of monetary policy, and represent the antithesis of transparency. This would also open ITers up to the charge of *manipulating* rather than *managing* expectations. More worryingly, Friedman (2004) suggests that the single-minded focus on an inflation target may eventually lead to ‘the atrophication of concerns for real outcomes’.

So how does lip service to flexibility translate into talk? In an effort to address that question, I perused the official online publications of all of the early adopters listed in Table 2, as well as those of a (not randomly) selected subset of the recent adopters. What I was looking for was a statement of the broad objectives of monetary policy, and how competing objectives might be balanced, if at all. Such statements often appear at the very beginning of the central banks’ *Inflation Reports*, or the equivalent; in other cases, a statement of policy objectives can be found as a stand-alone page somewhere on the central bank’s website, or as part of the document spelling out the criteria by which the policy authority was to be evaluated (for example, New Zealand’s PTA). Occasionally, the relevant information was gleaned from a central bank official’s speech, if that speech was represented as conveying the official views of the institution. This unscientific survey revealed a wide variation in ITers’ communication strategy.

What ITers say about output stabilisation can be put into three groups. The central banks in the first, ‘tough talk’, category are those that either ignore or deny any responsibility for output stabilisation. On the other end of the spectrum are those that explicitly acknowledge the possibility that trade-offs may arise between output and inflation stabilisation – call these the ‘explicit flexibility’ ITers. Some banks occupy a middle ground, acknowledging some role for output stabilisation, but without clearly mentioning a trade-off. Table 3 displays an (admittedly subjective) assessment of where some of the ITers fall on this spectrum. Interestingly, where the central banks fall seems to bear no direct relation to whether they operate under a unitary, hierarchical, or dual mandate.²³

Table 3: Selected ITers’ Stated Role for Output Stabilisation

Tough talk	Intermediate	Explicit flexibility
New Zealand, pre-1999 (U)	New Zealand, post-1999 (U)	Norway (H)
UK (H)	Sweden (U)	
Canada (D)	Australia (D)	
Chile (U)		

Notes: (U) indicates a unitary legal mandate (price stability, or in the case of Chile, currency stability), (H) indicates a hierarchical mandate with price stability first, and (D) a dual or multiple mandate.

Sources: Debelle (2003); Truman (2003); central banks’ publications

Statements from the ‘tough talk’ central banks’ statements either assert that controlling inflation promotes real growth, or they ignore the issue altogether. In effectively establishing a unitary objective, these institutions present a view of the world characterised by Blanchard’s ‘divine coincidence’.

One of the best examples of the former is the Bank of Canada, whose policy statements have consistently promoted the view that low inflation is the means by which healthy growth is achieved. The November 2000 *Monetary Policy Report*, for example, states: ‘Inflation control is not an end in itself; it is the means whereby monetary policy contributes to solid economic performance’. Similarly, the background information accompanying the renewal of the inflation target (Bank of Canada 2001) states: ‘the targets contribute to the achievement of sustained, robust economic growth’. Even policy tightenings intended to curb inflation are described as necessary for promoting growth. The statement accompanying the 17 May 2000 rate hike, for instance, said it was ‘deemed necessary to keep the future trend of inflation near the midpoint of the Bank’s target range of 1–3 per cent *so that* the Canadian economy could continue to grow at a sustainable rate’ [emphasis added]. The Chilean central bank takes a similar line, stating in its *Monetary Policy Report* that ‘monetary policy’s focus on inflation targeting helps to moderate fluctuations in employment and domestic output’. In the same vein, the RBNZ’s 1996 and 1997 PTAs give its objective as maintaining ‘a stable general level of prices *so*

23. Truman (2003) lists the RBA as having a hierarchical mandate, but here I follow Debelle (2003) in categorising it as a dual/multiple mandate central bank.

that monetary policy can make its maximum contribution to sustainable economic growth, employment, and development opportunities within the New Zealand economy' [emphasis added].

Other tough talkers ignore the output stabilisation issue altogether. This would describe the RBNZ prior to 1996, when its PTA mentioned only price stability. The Bank of England might also be put into this category, although its remit does acknowledge that 'the actual inflation rate will on occasions depart from its target as a result of shocks and disturbances. Attempts to keep inflation at the inflation target in these circumstances may cause undesirable volatility in output'.

This is *not* to say that tough talkers ignore output fluctuations entirely. But central banks in this group consistently describe monetary policy in terms of demand shocks, which, as we know, create no tension between output and inflation objectives. A 1998 brochure written by Don Brash, then-Governor of the RBNZ, is typical: 'if the economy underperforms, that creates a risk of deflation. In such a case, to achieve price stability, the Reserve Bank gives the economy a "kick start" by lowering short term interest rates. The inverse applies if the economy overheats, the Reserve Bank constraining inflation via higher short term interest rates' (Brash 1998). And this is largely consistent with the way in which real-side developments are treated in these central banks' official publications – as a determinant or predictor of inflation, rather than in terms of a distinct goal.

Even these tough talkers concede that there are situations in which complete price stabilisation would be inappropriate, however. These are instances of one-off price level changes, due, for example, to changes in indirect taxes or transitory oil-price shocks. (These might be thought of as one-time, serially uncorrelated cost shocks.) In these cases, central banks typically say they will not try to offset the first-round effects of the price changes, but instead hold the line against any follow-on inflationary effects. Sometimes, as in the early years of New Zealand's framework, an escape clause will be given with a very specific set of conditions under which target deviations would be allowed. (More recent PTAs still contain an escape clause with a list of conditions, but since 1996 the list seems intended to be illustrative, rather than exhaustive.) Thus, tough talkers stop short of hard-line 'inflation nutters'.

The ITers in the intermediate category are those that acknowledge – or at least hint at – an objective of output stabilisation that is distinct from inflation control; Sweden's Riksbank, the RBA, and the post-1999 RBNZ arguably fall into this category. A relatively direct statement to this effect can be found on the RBA's website: 'This approach allows a role for monetary policy in dampening the fluctuations in output over the course of the business cycle'. The RBNZ is a bit more oblique, but since 1999 its PTAs declare that the Bank shall 'implement monetary policy in a sustainable, consistent, transparent manner, and shall seek to avoid unnecessary instability in output, interest rates, and the exchange rate'.²⁴ The

24. As noted above, in 2002, following the appointment of a new governor, Alan Bollard, the horizon for RBNZ's inflation target was changed to 'on average over the medium term', suggesting somewhat greater flexibility. Ironically, Brash (1998) had argued against a similar relaxation of the horizon, which had been proposed by New Zealand's trade unions.

Riksbank's 1999 'clarification and evaluation' of its inflation target (Heikensten 1999), is the most detailed and specific of the three institutions in this category, stating that 'monetary policy does have consequences for the demand situation and employment *in the short run*' [emphasis in the original]. It goes on to say that for 'considerable shocks', there may be grounds for not attempting to return inflation to the targeted level immediately. In such a situation the Riksbank shall clearly state *in advance* – in the *Inflation Report* and in connection with monetary policy decisions – how it expects inflation to deviate from the target and why. In both cases, the justification for deviations are the social costs that might otherwise be incurred because of avoidable fluctuations in economic activity'.

Only one 'explicitly flexible' inflation targeter has turned up thus far: Norway. Compared with other central banks, the Norges Bank's directness on the issue of flexibility is exceptional. The opening pages of its *Inflation Report* declare that the 'Norges Bank operates a flexible inflation-targeting regime, so that weight is given to both variability in inflation and variability in output and employment'. And with respect to the targeting horizon, it states: 'The more precise horizon will depend on the disturbances to which the economy is exposed, and how they will affect the path for the real economy in the time ahead'.

Deputy Governor Jarle Berge went even farther in a September 2002 speech, describing in detail the trade-off facing the central bank: 'Monetary policy can be used aggressively to bring inflation under control quickly, but with considerable fluctuations in the real economy as a consequence; or it may be used more gradually with less of an impact on the real economy, but with inflation being allowed to deviate from the target over a slightly longer period. In the short term, there will thus be a trade-off between output and employment developments and the variation in inflation around the inflation target' (Berge 2002).²⁵

The lessons from all this are twofold. One is that based on ITers' rhetoric, it is easy to see how even enlightened observers like Friedman and Yellen could conclude that inflation targeting is inflation-*only* targeting. The other lesson is that one way to convey flexibility is to be a little vague, like the RBA – but it is not the only way. The Norges Bank (and to a lesser extent, the Riksbank) convey a great deal of flexibility in much more precise terms, contradicting the view that a trade-off exists between transparency and flexibility. And the Norges Bank's approach, with its explicit acknowledgement of a role for output stabilisation, is arguably more consistent with transparency of the sort that Friedman (2004) finds lacking in ITers' descriptions of their policy objectives.

4.4 Have ITers demonstrated their flexibility?

No amount of talk matters, of course, unless it is also consistent with the central bank's actions. How then is one to assess the flexibility of central banks' policies? This section presents two complementary assessments for a small subset of the inflation

25. Berge goes on to describe the trade-off in terms of a 'loss function', displaying a 'Taylor curve' along with hypothetical indifference curves. Although he stopped short of stating his value for λ in Equation (1), he noted that this was implicit in the horizon chosen for inflation stabilisation.

targeters discussed above. One method involves estimating simple reaction functions (that is, ‘ad hoc instrument rules’) in the hope of finding positive coefficients on the output gap or growth terms. The other, more informal method is to look directly at how central banks responded in situations where they were presented with a choice between output and inflation stabilisation. Following Kuttner (2004), the approach involves using inflation-targeting central banks’ own published forecasts, rather than econometrically-estimated proxies for the relevant expectations. This has the advantages of incorporating central banks’ own real-time judgement as to economic conditions, as well as simplifying the econometrics – an important consideration in working with such short samples, where methods like Generalised Method of Moments would be highly problematic. The main disadvantage, of course, is that it limits the analysis to those central banks which have a relatively long track record of published forecasts, and even then the time span covered is constrained by the availability of forecast data. For this reason, the analysis focuses on New Zealand, Sweden and the United Kingdom.

The reaction-function approach uses a variant of the forward-looking Clarida, Gali and Gertler (2000) specification,

$$i_t = \alpha i_t^* + \beta_1 x_{t,t} + \beta_2 \Delta y_{t+k,t} + \gamma (\pi_{t+k,t} - \pi^*) + \rho i_{t-1} + e_t \quad (3)$$

where $\Delta y_{t+k,t}$ and $\pi_{t+k,t}$ are the central bank’s period- t forecasts of real GDP growth and inflation over the subsequent k quarters, $x_{t,t}$ is the estimate of the period- t output gap made at time t and i_t is the policy rate (typically the repo rate). The lagged interest rate on the right-hand side is usually interpreted as capturing interest rate smoothing. The attractiveness of the specification is that it assumes forward-looking behaviour on the part of the central bank. And because the bank’s inflation forecast is included as a regressor, positive estimates of β_1 or β_2 are often loosely interpreted as reflecting a concern for output stabilisation over and above the extent to which output affects the inflation forecast.²⁶

In implementing this approach, one immediately runs up against the problem that central banks do not generally report estimates of the output gap, $x_{t,t}$. Among the three banks analysed, New Zealand is the only one to have reported output gap figures with any degree of consistency.²⁷ But using an assumed rate of potential GDP growth, and assuming the output gap tends to zero as the end of the forecast horizon, it is possible to back out an implicit estimate of the output gap using the central banks’ projections of real GDP growth. Although this procedure is less than ideal, it at least has the merit of using only information available to the bank in real time. Additional details on this procedure appear in Kuttner (2004).

26. This interpretation is not entirely justified, however, as optimal instrument rules resembling Equation (3) typically include a non-zero coefficient on output (or the gap), even with a zero value for λ , the weight on output fluctuations in Equation (1).

27. The RBNZ reported quarterly output gap projections in its *Monetary Policy Statements* from December 1997 through November 1999, and again from December 2000 through March 2001. For those periods in which quarterly figures were not reported, they were interpolated from the annual averages, which have been published consistently throughout the 1997–2003 period.

Results from estimating Equation (3) appear in Table 4 with the horizon k set to four quarters. The equation works ‘well’ for New Zealand and Sweden, in the sense that the estimated coefficients have the ‘correct’ sign, and are statistically significant.²⁸ The so-called Taylor Principle of a greater than one-for-one response of the nominal interest rate to inflation is satisfied. Taking into account the coefficient on the lagged interest rate, the implied long-run response is 4.9 for New Zealand, and 2.8 for Sweden. But with respect to the flexibility issue, the key result is that the estimated coefficients on output (real GDP growth for Sweden, the gap for New Zealand) are positive and statistically significant. Regardless of what they might say, therefore, these two central banks respond to real economic conditions *over and above* what those conditions might imply for future inflation.²⁹ The UK yields poor results, however. None of the coefficients are significant, although those on forecast GDP growth and inflation at least have the correct signs. The coefficient on the lagged interest rate is near unity, suggesting that over this very small sample, the Bank of England’s repo rate looks more or less like a random walk.³⁰

An alternative way to assess ITers’ flexibility is to examine their response when confronted with a choice between controlling inflation and stabilising output – cost-push shocks, in other words. Discerning these shocks in the data is no easy task, of course. (This is presumably why Woodford (2003) views even the question of their existence as ‘far from established’.) But here again, one can use central bankers’ own forecasts to determine, at least qualitatively, the nature of the shocks experienced by their economies.

One way to do this is simply to examine the co-movement between the output and inflation forecast errors. Higher-than-expected realisations of both GDP and inflation would suggest a positive aggregate demand shock, for example. If, on the other hand, inflation came in higher than expected but GDP growth was *lower* than expected, an adverse supply shock would be the likely culprit. Similarly, higher-than-expected GDP growth combined with lower-than-expected inflation would be associated with a *favourable* supply shock.

As in the reaction-function analysis above, this approach also relies on the availability of published forecasts. That means focusing on the same set of countries – New Zealand, Sweden, and the UK – plus Canada, whose relatively sketchy forecasts are more amenable to this more qualitative analysis than they would have been to the estimation of a reaction function. Annual, rather than quarterly, forecast errors are analysed, simply because all of the forecasts are for annual changes in real GDP or the CPI, thus creating a great deal of overlap at a quarterly frequency.

Figures 2 through 5 contain scatterplots of the real GDP and inflation forecast errors for these four countries. (Note that the plots’ scales differ considerably across countries.) Years characterised by demand shocks – output and inflation forecast

28. Very similar results are reported in Berg *et al* (2002).

29. It would be interesting to know whether the same would be true for New Zealand in the 1990–1996 sub-sample, which is often regarded as characterised by relatively ‘strict’ inflation targeting.

30. One reason for the poor results could simply be the lack of much significant variation in the inflation or the output gap forecasts since 1997.

Table 4: Estimated Forward-looking Reaction Function for New Zealand, Sweden and the UK

	N	Coefficient on:					\bar{R}^2	LM test for 2nd order auto-correlation
		Intercept	Current output gap	Growth forecast	Inflation forecast	Lagged i		
New Zealand 1997:Q4–2003:Q2	23	1.20 (0.61)	0.42** (0.19)	0.50* (0.26)	1.22** (0.53)	0.75*** (0.10)	0.78	9.00 0.011
Sweden 1994:Q1–2003:Q2	38	0.06 (0.41)	-0.18 (0.13)	0.31** (0.12)	0.65*** (0.10)	0.77*** (0.05)	0.97	3.95 0.138
UK 1997:Q4–2003:Q2	23	-2.34 (1.39)	-0.06 (0.32)	0.53 (0.39)	0.09 (0.37)	1.19*** (0.13)	0.90	4.68 0.096

Notes: Estimation is by ordinary least squares. Numbers in parentheses are standard errors. Asterisks denote statistical significance: ***, **, and * at the 0.01, 0.05 and 0.10 levels, respectively. The inflation forecast is the forecast change in the target inflation rate over the subsequent four quarters, minus the inflation target (or the midpoint of the range, in the case of New Zealand). The growth forecast is for real GDP growth over the subsequent four quarters, or in the case of New Zealand, the change in the output gap.

Figure 2: Output and Inflation Forecast Errors – New Zealand

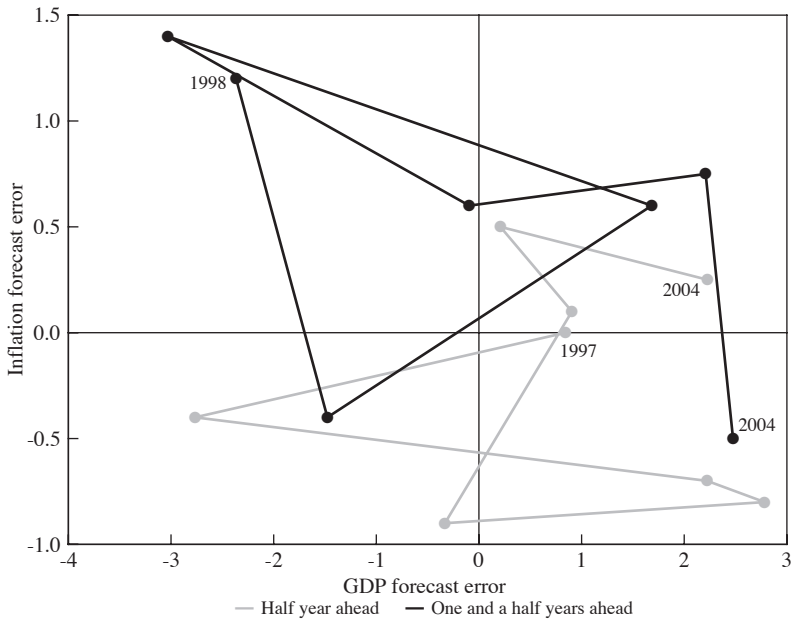


Figure 3: Output and Inflation Forecast Errors – Sweden

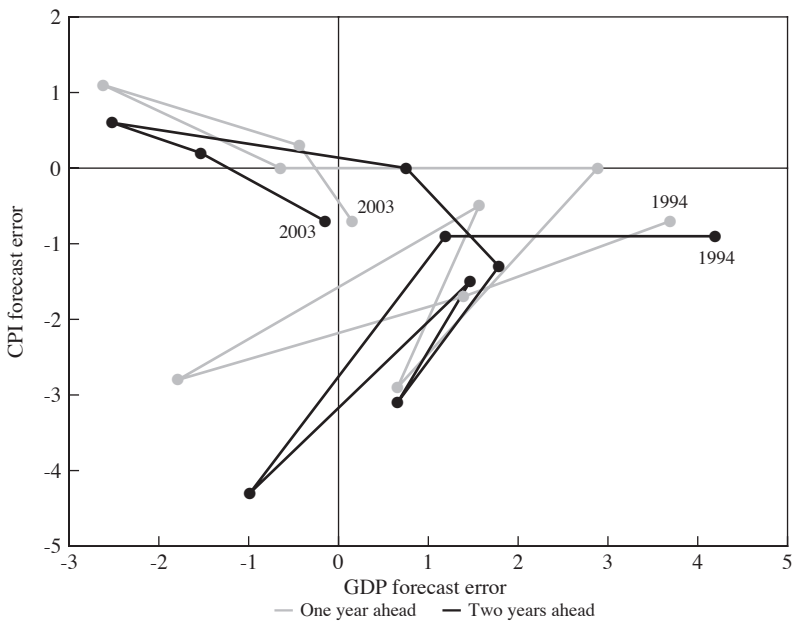


Figure 4: Output and Inflation Forecast Errors – UK

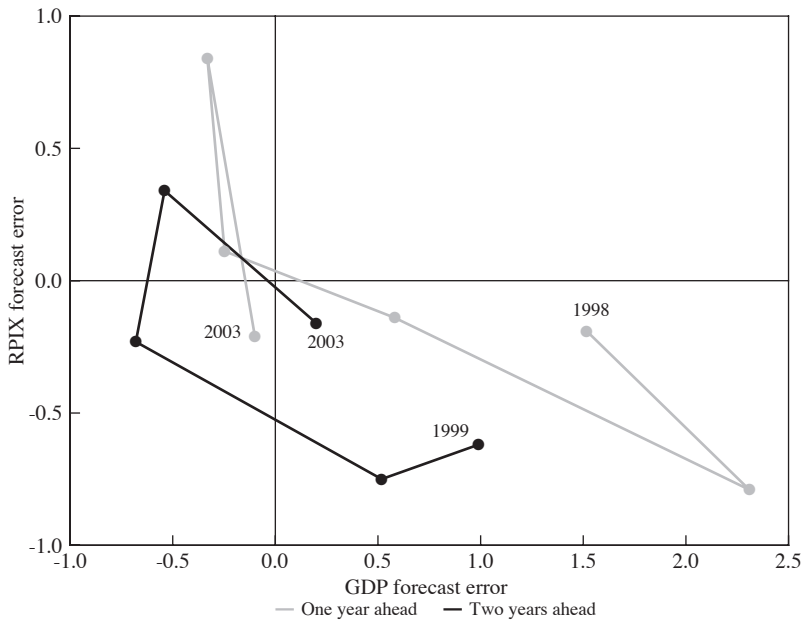


Figure 5: Output and Inflation Forecast Errors – Canada

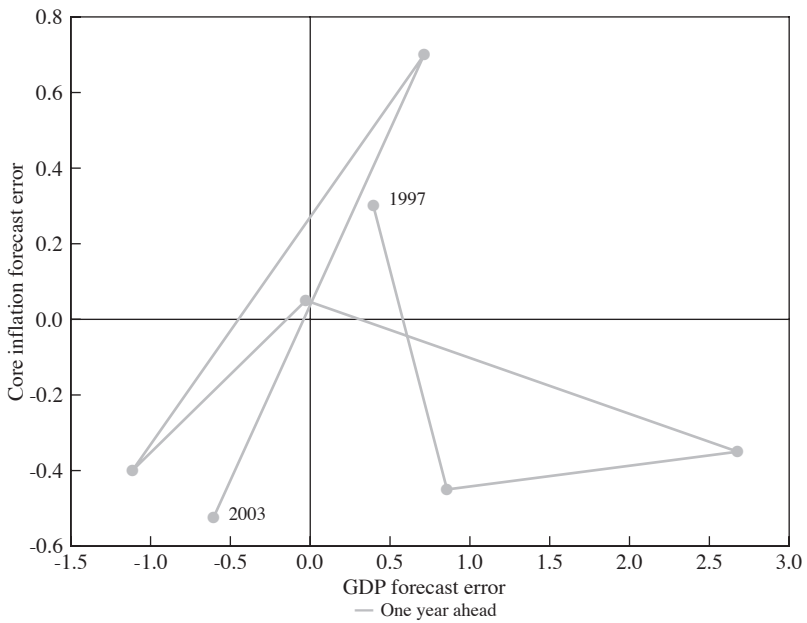
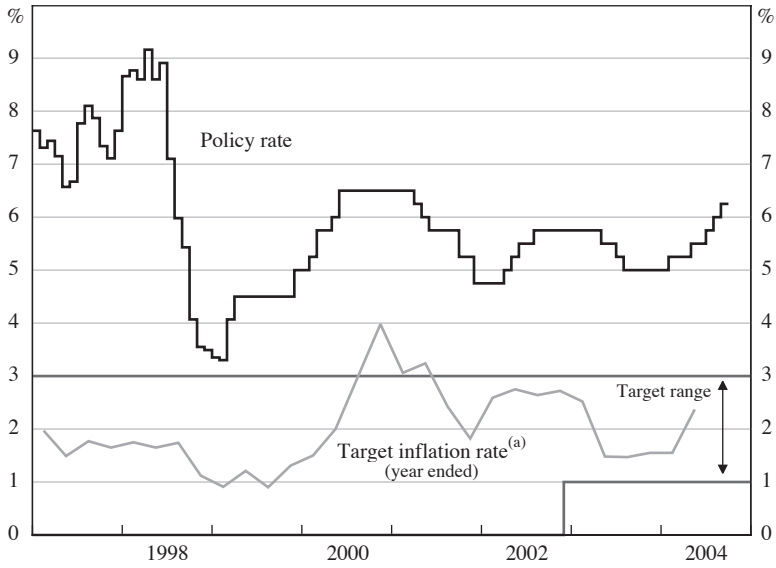


Figure 6: Inflation and the Policy Rate – New Zealand



(a) Until September 1997, an underlying measure of inflation was targeted. From September 1997 to June 1999, core CPI inflation was targeted and after June 1999 headline CPI inflation.

Figure 7: Inflation and the Repo Rate – Sweden

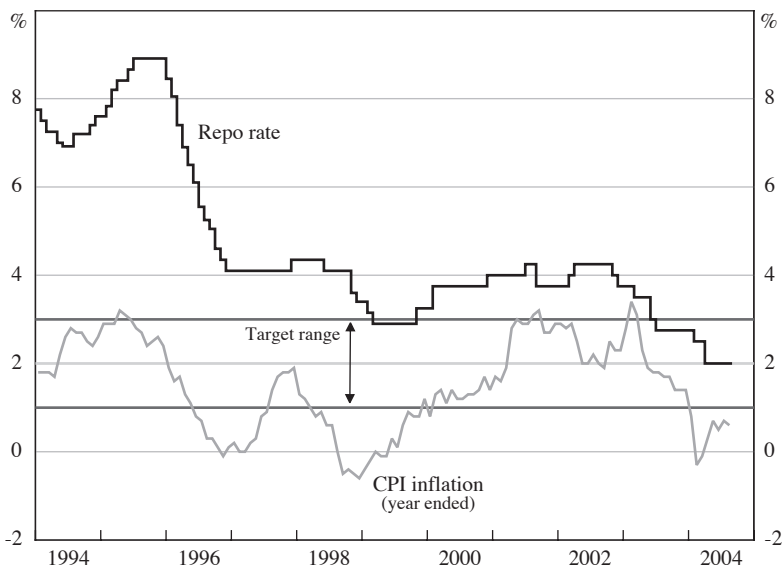


Figure 8: Inflation and the Repo Rate – UK

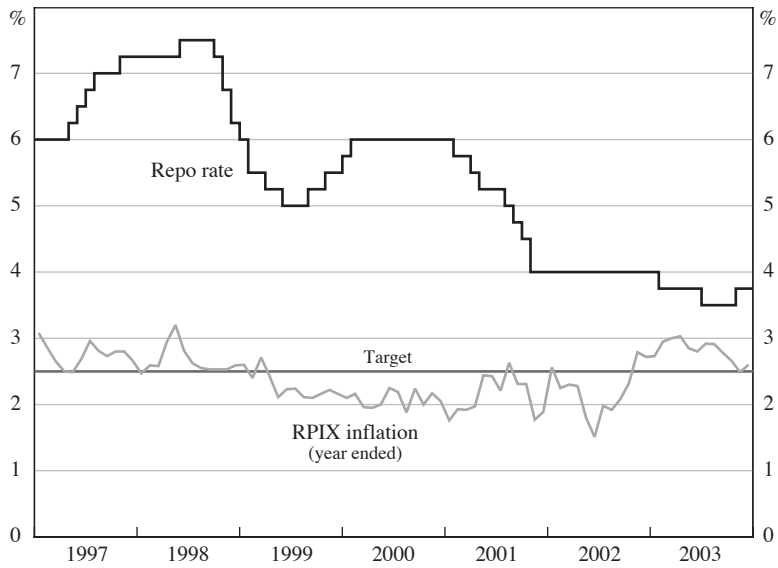
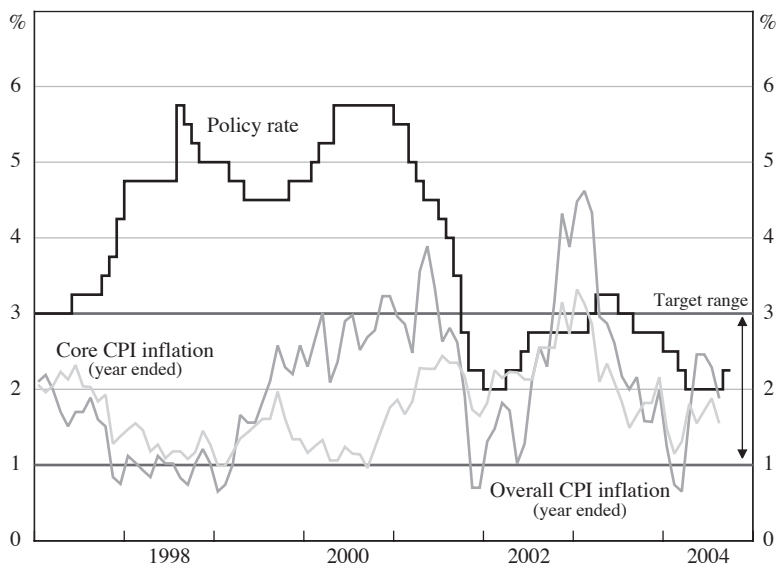


Figure 9: Inflation and the Policy Rate – Canada



errors of the same sign – fall in the northeast and southwest quadrants. Those years in which output and inflation unexpectedly moved in *opposite* directions fall in the northwest and southeast quadrants. These are the years in which policy-makers potentially faced a real trade-off between output and inflation stabilisation.

The first conclusions to be drawn from the figures is that a relatively large number of the observations lie in the northwest and southeast quadrants, suggesting the four countries' experiences are not dominated by demand shocks. There are a few notable exceptions, however: Sweden in 1996, and Canada during the 2001–2003 period. As shown in Figures 7 and 9, monetary policy responded pretty much as expected, with large movements in the policy interest rates.

A second conclusion to be drawn from the figures is that all four countries spent a lot of time in the southeast quadrant, with higher-than-expected GDP and lower-than-expected inflation. These are mostly the 'new economy' years, 1998–2000, when many central bankers around the world were surprised by their economies' capacity for non-inflationary growth. This favourable-supply-shock configuration clearly creates something of a trade-off, as reversing the fall in inflation would have entailed pursuing a more *expansionary* monetary policy – but this is surely an easier dilemma to deal with than that created by adverse supply shocks.³¹ In any case, there is no clear tendency for any of the central banks to fight the drop in inflation with expansionary policy. In Canada, for example, the policy interest rate was kept in the vicinity of 4¾ per cent during 1998 and 1999, despite an inflation rate at or near the bottom of the target range. Similarly, there is not much of an overall trend in the UK's repo rate over this period. Rates were actually *raised* in both countries in 2000, despite below-target inflation, presumably reflecting the view that some of the late-90s expansion resulted from demand factors. (And indeed, the inflation forecasts were tending to rise during this period.) For all these reasons, the policy reaction to this 'new economy' growth spurt is not an ideal test case.

ITers' response to adverse supply shocks – observations in the northwest quadrant of the scatterplots – would provide a better gauge of flexibility. The problem is that there are very few of these observations in the relatively short sample for which forecast data are available. In fact, for New Zealand and Sweden the only points in this quadrant correspond to 2001; for the UK, it is 2002.³² (Canada has *no* observations in this quadrant.) How did policy in these three countries respond to these episodes?

For the UK, the answer is simple: the Bank of England did nothing. Despite higher-than-expected inflation, the Bank kept the repo rate at 4 per cent throughout 2002, and even cut it 25 basis points in February 2003. Its May 2003 *Inflation Report* was very clear that it viewed the adverse inflation shock as due strictly to

31. A questionable feature of the conventional quadratic objective function used in the analysis of optimal monetary policy is its symmetrical treatment of favourable and adverse shocks.

32. The 1998 inflation forecast error for New Zealand is also large and positive, but this is the result of the bank's forecast of a sharp deceleration in inflation in that year, to 0.5 per cent from 2.0 per cent in 1997, which seems to have been based on an implausibly large degree of exchange rate pass-through.

transitory factors: higher petrol prices, a depreciation of the pound, and (puzzlingly) a fall in house prices. Clearly, the Bank looked past these factors in its decision to keep policy unchanged.

New Zealand's situation in 2001 was somewhat more difficult than that of the UK. Annual core CPI inflation breached the upper bound of the target range in late 2000, and remained above 3 per cent through the first half of 2001; and yet, annual GDP growth had slowed to 1.2 per cent in March 2001.³³ Despite the inflation spike, however, the RBNZ cut rates by 175 basis points over the course of 2001. Complicating the decision was the fact that transitory factors could not fully account for the rapid price rises; as discussed in some detail in the May 2001 *Monetary Policy Statement*, stripping out the volatile CPI components still left an inflation rate near the upper end of the target range. This episode, therefore, seems to demonstrate a willingness on the part of the RBNZ to respond to economic weakness, even when it involved a risk of higher inflation.³⁴

Sweden's situation in 2001 is in many ways similar to that of New Zealand: significantly above-target inflation, combined with lower-than-expected growth. And like New Zealand, the inflation surge was not readily attributable to one-time or transitory factors. The Riksbank's response was relatively muted: a 25 basis point rate increase in July 2001, followed by a 50 basis point rate cut in September 2001 as inflationary pressures eased. Like the RBNZ and the Bank of England, the Riksbank did not over-react to higher-than-expected, above-target inflation when it was accompanied by slow economic growth.

5. Conclusions

An impressively large and rich literature on inflation targeting, from both practical and theoretical perspectives, has developed in the past 10 years. From the standpoint of stimulating interesting research on monetary policy, at least, IT should be judged a resounding success. But in spite of (or perhaps *because* of) all the research on the topic, a number of misunderstandings have persisted about inflation targeting – at least in non-IT countries, such as the US. This paper's goal has been to illuminate, if not completely resolve, some of those misunderstandings.

The first section of the paper took up the deceptively simple question of how to define IT, and identify ITers – both from a practical perspective, and theoretically, in terms of optimal monetary policy rules. The conclusion is that IT, at least as currently practised, does not translate neatly into one specific kind of monetary policy rule, although it can certainly be described as a rule in a broad sense of the word.

33. Annual figures for New Zealand are conventionally reported on a March-over-March basis.

34. In a detailed narrative examination of RBNZ policy during three episodes in the 1990s (1992–93, 1995–96 and 1997–98), Svensson (2001) concluded that 'there is no evidence that policy has systematically resulted in unnecessary variability in output, interest rates and the exchange rate', despite the fact that the language about 'unnecessary instability in output, interest rates and the exchange rate' did not appear in the PTA until December 1999.

The second section described the ways in which the practice of inflation targeting has – and has *not* – changed over the past 15 years. The basic features of most countries' IT frameworks have changed very little over the years. There has, however, been something of a trend towards the more comprehensive reporting of macroeconomic forecasts, perhaps reflective of efforts to increase transparency and the emphasis on forward-looking policy-making.

The third section discussed two critiques of inflation targeting: first, that it doesn't matter; and second, that it is too inflexible. On the latter, the paper presented some evidence indicating that ITers have, in practice, been relatively flexible, in the sense of taking real economic conditions into account in deciding how aggressively to react to inflation. Perusing ITers' published policy statements, however, it is very easy to come away with the impression that IT involves a more single-minded pursuit of price stability, suggesting something of a gap between the rhetoric and the reality of IT. This conclusion echoes Faust and Henderson's (2004) assessment that IT 'involves communication policy that is literally inconsistent with best practice, and in any case obfuscates some relatively simple issues'.

Inflation-targeting central banks' reluctance to talk directly about output stabilisation is in some ways understandable. After all, many countries adopted IT in less-than-ideal circumstances, such as after the abandonment of an exchange rate peg, or as part of a broader disinflation strategy. In these cases, it is perhaps not surprising that ITers should have played up the price stability message, at the expense of flexibility, in an effort to establish their anti-inflationary credentials. And in any case, there seems to be a deeply-ingrained central banking taboo against talking about any sort of short-term trade-off between output and inflation, and not only among ITers. (One need only recall the controversy surrounding Alan Blinder's 1994 statement that the 'central bank *does* have a role in reducing unemployment'.³⁵)

ITers have also been lucky. Aside from the occasional financial panic, the 1990s were a relatively quiescent decade, more or less free of supply-side disturbances such as the persistent oil price shocks and productivity slowdown of the 1970s. Moreover, to the extent that there *have* been supply shifts, they have generally been favourable, combining higher growth and lower inflation. Thus, a benign economic environment has allowed ITers to finesse the more difficult policy issues. Reality has obeyed Blanchard's 'divine coincidence', in other words. The good luck will inevitably run out, however, and adverse cost-push shocks are sure to appear at some point. Dealing sensibly with a more difficult economic environment may require further evolution in the practice of IT, towards even greater transparency in terms of communicating the relevant policy trade-offs. And that might not be such a bad thing.

35. Quoted in Woodward (2000, p 132).

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