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**Inflation Targeting: What Is the Meaning of the Bottom of the Band?**

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**Abstract**

This paper investigates the meaning of the bottom of target bands in inflation targeting regimes. It is argued that the design of lower limits on target bands, if not done with care, can lead to a lack of transparency, potentially confusing markets about how the authorities will react to a fall in inflation. After first discussing the conceptual issues, the paper then examines the experience with target bands in New Zealand, Israel and Canada and explores how the conceptual issues have played out in practice.

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## I. INTRODUCTION

Inflation targeting has proven to be an important monetary framework for attaining and maintaining low inflation for a number of industrial countries. Now, interest in inflation targeting is expanding to other countries, particularly emerging market countries, some of which have inflation that is still above policymakers' longer-term inflation objectives (e.g., Poland and the Philippines).<sup>2</sup> Along with increasing interest in inflation targeting by policymakers, there is a growing academic literature on inflation targeting and some good articles exist with comprehensive reviews of the subject (e.g., Debelle (1997a) and Masson et al (1997)). Nevertheless, the issue of designing a downward target path when a sharp disinflation is the objective has not received much coverage in part because, other than Israel, most of the up-to-now inflation targeting countries have either sought only to maintain low inflation or to achieve modest reductions in inflation.

The objective of this paper is to explore one particular issue regarding the design of declining paths of inflation targets: the significance of the lower limit of a target band when that limit is still well above policymakers' ultimate inflation objective. It is argued that the design of lower limits on target bands, if not done with care, can lead to a lack of transparency—which is widely agreed to be one of the hallmarks of inflation targeting—potentially confusing markets about how the authorities will react to a fall in inflation.

The next section of this paper reviews some important issues in designing target bands and the third section then examines the experience with target bands in New Zealand, Israel and Canada and discusses how some of the conceptual issues have played out in practice. The last section contains a few concluding remarks.

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<sup>2</sup> Christoffersen and Wescott (1999) and Debelle and Lim (1998).

## II. TARGET BANDS

### A. General Regime Design

As indicated above, several excellent introductions to the topic of inflation targeting (IT) exist, and therefore, only a couple of its most salient features are mentioned here. Leiderman and Svensson (1995), for example, state that the essential characteristic of IT is the existence of an explicit quantitative inflation target (e.g., specifying the index, the target level, the time frame, and possibly the situations under which the target might be modified or disregarded). In general, the adoption of IT grew out of situations where other monetary frameworks had been used and ultimately were considered deficient in some important aspect (e.g., instability in the demand for money).<sup>3</sup> The UK, for example, had tried and discarded exchange rate targeting and monetary aggregate targeting.

Discussions of IT stress the importance of the transparency and credibility of the regime. The transparency of IT reduces the inflationary bias of monetary policy since financial markets should quickly spot any inflationary opportunism. In this way, transparency enhances the credibility of monetary policy. Another way of looking at the issue is that the enhanced transparency of IT works to strengthen the *de facto* instrument independence of the central bank thus improving the ability of the central bank to achieve its targets.<sup>4</sup> Haldane (1997) notes that transparency is arguably *the* feature distinguishing IT from other monetary frameworks.

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<sup>3</sup> The term framework is used here to avoid the debate on whether IT should be considered a true monetary policy rule, as the distinction is not important for the issue under consideration. See Bernanke and Mishkin (1997) and Svensson (1998) on this debate.

<sup>4</sup> See Haldane (1997), Fischer (1994) and Persson and Tabellini (1993) and for discussions of credibility and transparency as desirable aspects of a monetary policy framework.

Beyond transparency and credibility, a large number of technical issues need to be considered in designing an inflation targeting framework.<sup>5</sup> Who assigns the target? How does the inflation target relate to other objectives of monetary policy? What is the horizon of the target? What is the appropriate level of the target? What price index should be used to define inflation? How will the monetary authorities be held accountable for achieving the target? How will forecasts of inflation be used? Finally, what degree of tolerance will be allowed in achieving the target? It is here that the subject of target bands arises which is the focus of this paper.

### **B. Tolerance Margins**

Once an inflation target is defined, a decision needs to be made on what, if any, the margin of tolerance will be for the achievement of the target. Why is there a need for a margin of tolerance? Why not just use a point target? As background, the IT literature recommends that the horizon for the achievement of an inflation target in advanced economies should, in general, be some 1½ to 2 years ahead. However, research suggests that it is very difficult to hit an inflation target at such a horizon.<sup>6</sup> Dennis (1997) reviews studies seeking to determine optimal bandwidth in an IT regime. A typical format of these studies is to ask what bandwidth would be necessary so that, given appropriate policy settings, no more than 5 percent of inflation observations would lie outside the target band. The estimates

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<sup>5</sup> Debelle (1997a) and Mishkin and Posen (1997) have lists of factors that need to be considered in adopting IT.

<sup>6</sup> Shortening the horizon would not necessarily improve the situation. Orsmond (1998) argues that as the horizon shortens, interest rate volatility is likely to increase.

reviewed range from 3 to 14 percentage points. The implication is that a point target is almost certain to be missed, potentially damaging the credibility of the policy framework.<sup>7</sup>

Apart from the issue of credibility, research has suggested that trying to hit a very narrowly defined target could cause interest rates to be excessively volatile. For example, Nicholl and Archer (1992) explain that with a narrow band more frequent changes in interest rates will be needed to keep inflation inside the band and these frequent movements in interest rates could destabilize financial markets even though the inflation target was met. Tolerance margins allow a central bank to give a sense to markets of how much variability in inflation outturns should be expected, although in practice—as suggested by the bandwidth studies cited above—announced bands typically understate this variability. In any case, most countries adopting IT have included tolerance margins.<sup>8</sup>

Once it has been decided that a margin of tolerance is necessary in general terms, the construction of the margins needs to be formalized and communicated to the public. In this context, there are several options: caveats, ceilings, thick points, and bands. Transparency would seem to demand that a central bank's internal choice should be the one communicated to the public.

One possible method of establishing the tolerance margins is to set conditions under which a miss of a point target might be acceptable. This is variously described as allowing “exemptions” or “caveats.”<sup>9</sup> For example, in New Zealand the policy framework allows various types of supply shocks to be accommodated by the central bank. This method, if used

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<sup>7</sup> Bernanke et al (1999) take the view that it may be more damaging to a central bank's credibility to miss a range rather than to miss a point.

<sup>8</sup> See, for example, Bernanke and Mishkin (1997).

<sup>9</sup> Yates (1995) refers to ranges as substitutes for exemptions with a point target.

alone, only provides a tolerance margin under certain conditions. Alternatively, when the inflation target is set such that inflation is to be below a certain rate by a given date (i.e., a ceiling), the framework allows for a very broad margin of tolerance on the downside without the requirement that any conditions be met. If the ceiling is set slightly above the authorities' internal inflation objective, there is also some margin on the upside. Spain, prior to the adoption of the euro, was an example of a country using a ceiling.<sup>10</sup>

Thick points are another possible method of establishing a tolerance margin. Stevens and Debelle (1995) give a description of the use of thick points in the case of Australia where they explain that the authorities' target of 2-3 percent should be interpreted as a broad central tendency for inflation—a thick point—rather than as a narrow band. It is not a range that the central bank views must, or necessarily can, be maintained at all times and under any circumstances. Or, as they alternatively explain, if some years hence, the central bank can look back and observe that the average rate of inflation has a '2' in front of the decimal place, the authorities will view the regime as a success.

Finally, there are target bands. While, as discussed, there are other methods of establishing tolerance margins, target bands have been the most popular.<sup>11</sup> The top of a target band is basically equivalent to a ceiling for upside inflation moves. The new feature is the bottom of the band. This naturally leads to the question: what is the significance of the bottom of the band or, in other words, what will happen when the band floor is breached?

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<sup>10</sup> Spain is not a pure IT case given its exchange rate commitment during this period.

<sup>11</sup> See, for example, Bernanke and Mishkin (1997), Debelle (1997a) and Masson et al (1997).

### C. The Bottom of the Band

There are two basic interpretations of the bottom of the band. Under the first, the band floor means relatively little. It is really just part of a guidepost to account for the uncertainty in the ability of the monetary authorities to hit a particular point within the target range (such as the middle) which is the “real” target. For example, if the authorities believe that the optimal rate of inflation at the target horizon is 5 percent and that tolerance margins of +/- 2 percent are necessary, then the target range would be set at 3 to 7 percent. The 3 percent lower limit has no intrinsic significance other than to help guide market inflationary expectations in the direction of the middle of the band. Under this interpretation, there is no need for corrective action if the bottom of the band is breached. In particular, market participants should not necessarily begin to expect that monetary policy will be eased if the forecast of inflation at the target horizon falls below the target band.

Of course, the guideposts do not have to be pointing at the center of the band. Yates (1995), for example, implicitly discusses the use of target bands as non-centered guideposts, raising the possibility that the range could be skewed to one side or the other of the authorities’ optimal rate of inflation. He notes that, if it is more damaging to credibility to overshoot rather than to undershoot a target range, then a skewed range may be appropriate to provide more room to maneuver on the upside.

The second interpretation is that the bottom of the band has real significance. Breaching it can be considered like touching an electric fence.<sup>12</sup> Under this interpretation, the band floor can communicate information about the authorities’ views on the optimal rate of

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<sup>12</sup> Debelle (1997b) uses the electric fence terminology.

inflation and/or their preferred speed of disinflation. It also indicates to market participants that policy may be eased if the forecast of inflation at the target horizon falls below the band.

There is an extensive literature on the optimal inflation rate.<sup>13</sup> In this literature, at least three reasons are given for why the optimal inflation rate is very likely to be above zero. First, monetary policy may occasionally need to target negative real interest rates to stabilize the economy. Second, downward nominal rigidities in product and labor markets may lead to convex Phillips curves, implying that driving inflation down to zero may impose costs in terms of foregone output, even over the longer term. And third, because of measurement problems, actual indexes of inflation are biased upwards.

While there is no consensus about the empirical importance of the arguments for a non-zero optimal rate of inflation, in practice many central banks interpret price stability as distinct from zero inflation (e.g., the Bundesbank in the pre-euro period). Without specific guidance from policymakers, it may be difficult for markets to interpret whether or not the bottom of an inflation target band is the same as the authorities' optimal inflation rate. The fact that the rate is above zero is not sufficient information. If the band floor is simply the authorities' view of the long-term optimal inflation rate, then the interpretation of the floor is clear. Market participants should reasonably expect that monetary policy will be eased if the forecast of inflation at the target horizon falls below the optimal rate of inflation. As noted in the introduction, however, the subject of interest in this paper is the less transparent situation where the bottom edge of the band is significantly above the authorities' optimal inflation rate. In this case, the band floor is likely communicating information about the authorities' views on the preferred rate of disinflation.

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<sup>13</sup> See, for example, Fischer (1994), Yates (1995) and Haldane (1997).



When inflation is higher than its optimal rate, the authorities must decide on the appropriate speed of disinflation. If the preferred speed of disinflation is such that targeted inflation will not fall to the authorities' desired long-term rate before the end of the target horizon, then this is a reason that the bottom of an intermediate target band might be set above the optimal inflation rate. Dennis (1997) and Ghosh and Phillips (1998) briefly discuss issues concerning the appropriate speed of disinflation. Ghosh and Phillips, for example, find that the appropriate speed of disinflation is tied to the starting point. They conclude that, when inflation is even only moderately high, all but the most severe disinflations are beneficial for growth, even in the short run. However, they find that as inflation moves below about 6 percent, the output costs of disinflation are increasing. For countries adopting IT that already have low inflation, the bottom of the target band will likely be near the authorities' ultimate inflation objective. Countries starting IT with relatively high inflation, however, may wish to establish target bands with intermediate inflation objectives. This will allow the authorities to separate the initial period when they seek a relatively sharp disinflation, during which output costs should be relatively low, from the latter period when they seek a less substantial drop in inflation, during which output costs may be relatively higher. The electric fence may be used because the authorities may not want to complicate the achievement of the initial disinflation with political problems caused by the relatively greater output costs associated with the second period of disinflation.

Regardless of the authorities' views on the proper rate of disinflation, there are still the problems of transparency and credibility regarding how to communicate those views to the public. This issue is related to the subject of "opportunistic disinflation" where

policymakers use unforeseen events to deliver a desired reduction in inflation.<sup>14</sup> In the present case, the formulation of the question is: what will be policymakers' reaction if unforeseen circumstances push projected inflation down below the bottom of the inflation target band when the bottom is still above the authorities' optimal inflation rate? Will the authorities opportunistically let inflation fall below the band or will they lower interest rates? Given the dynamic inconsistency problem, can policymakers realistically commit themselves? As an example, in February 1999, markets were wondering how the Bank of England would react if inflation undershot the authorities' inflation target.<sup>15</sup> Would it allow inflation to drift back up to the target or would it lower the target?

Of course, in some circumstances, but not others, a central bank might want to let inflation fall below the bottom of the band. The authorities' choice will likely depend on the circumstances and the relative output costs of following one strategy or another. For example, if inflation dropped below the band because monetary policy was "too tight", then presumably this is another way of saying that the output costs of the more rapid-than-expected disinflation were too high. In this case, the authorities would likely want to loosen the policy stance (i.e., the central bank would follow an electric fence interpretation). Alternatively, if the drop in inflation were due to a favorable transitory supply shock, then the authorities might opportunistically chose to accept the lower inflation, assuming inflation was still above the lower bound of the optimal range (i.e., use the guidepost interpretation). The point of this paper is not to argue that one interpretation of the bottom of the band is superior to another, but rather to argue that policymakers should make as clear as possible to

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<sup>14</sup> See Orphanides and Wilcox (1996) for a discussion of opportunistic disinflation.

<sup>15</sup> See the February 19, 1999 issue of *Global Data Watch*, a J.P. Morgan publication.

markets which policy they are following or under which circumstances they will permit breaches of the target band.

As will be shown in case studies below, both the interpretations of the band floor as an electric fence and as a guidepost have been used in practice. As discussed above, guideposts and electric fences have different implications about the direction of monetary policy as forecasted inflation falls below the target band. If the authorities do not communicate clearly and convincingly their intended use of the target range, this can create uncertainty and would appear *prima facie* to be inconsistent with the goals of increasing the credibility and transparency of the monetary policy framework through the adoption of IT. Given the importance of transparency and credibility, greater clarity about the role of the band floor would seem to be important in situations where target bands are used (e.g., central banks could clearly state their views on the optimal inflation rate and the preferred speed of disinflation). Too much flexibility in the framework runs the risk that markets will be uncertain about policymaker's intentions and the adoption of IT may fail to lead to the desired improvement in inflationary expectations.

### **III. CASE STUDIES**

#### **A. New Zealand**

New Zealand implemented inflation targeting in March 1990 as part of a broad reform of economic policy making in response to a number of years of low GDP growth and high inflation.<sup>16</sup> The official target was the overall CPI but operationally the Reserve Bank focused on a measure of underlying inflation designed to remove the effects of various

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<sup>16</sup> Brash (1998) and (1999) and A. Fischer (1995) give overviews of IT in New Zealand. The Governor of the RBNZ is accountable for deviations from the inflation target.

temporary factors such as significant changes in public sector charges.<sup>17</sup> In addition to these caveats to the inflation target, specific tolerance margins were established through the use of bands. While the initial framework established 0-2 percent as the definition of price stability, given that the starting point of inflation was over 5 percent, a series of intermediate targets were established, including 3-5 percent for end-1990 and 1½-3½ percent for end-1991. In February 1991, the targets were revised to 2½-4½ percent for end-1991 and 1½-3½ percent for end-1992. The top panel of Figure 1 shows inflation, as measured by the headline CPI, and the target bands that were in place as the target horizons were approached.<sup>18</sup>

The authorities have been particularly clear on the meaning of the band floor. For example, Governor Brash has said that that the Reserve Bank takes the bottom as seriously as the top of the band and the term “electric fence” has appeared in the Reserve Bank’s Bulletin as a way to describe the target bands.<sup>19</sup> The rationale for this approach was that decisions on the definition of price stability and the appropriate speed of disinflation were best made by the political authorities. Once the parameters of the desired disinflation were established, the central bank had independence in the use of its monetary instruments to achieve the targets. This interpretation of the bands was maintained until the monetary framework was modified in late 1997. At that time, as described by Deputy Governor Sherwin, the edges of the band

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<sup>17</sup> Sherwin (1999).

<sup>18</sup> The alternative measures of underlying inflation used by the Reserve Bank are not included in the graph as they are not germane to the discussion.

<sup>19</sup> See Brash (1999) and Debelle (1997b).

were softened in the direction of an Australian “thick point”.<sup>20</sup> This change allowed the focus to be shifted away from avoiding breaches of the target bands at all cost, to keeping inflation near the mid-point of the target range over the medium term.

For a case study of an electric fence target band in action, the experience of September 1991 can be examined.<sup>21</sup> The Reserve Bank’s Bulletin covering the period August 15 to November 15, 1991 gives an interesting review of this episode.<sup>22</sup> In September 1991, current inflation as measured by the CPI fell to 2.2 percent. Inflation was projected to fall slightly below 2 percent by December 1991 and some increase in measured inflation was expected in 1992 due to recent exchange rate depreciation. Surveys suggested that businesses expected that inflation would be some 2½ percent by September 1992. Underlying inflation was expected to be around 2 percent in December 1991—below the existing target range for that date—and to be in the upper half of the 1½-3½ percent range for December 1992, i.e., above 2½ percent. It is important to remember that the Reserve Bank’s long-term goal at that time was to have inflation in the 0-2 percent range. Notwithstanding that underlying inflation did not appear to be permanently falling into the long-term target range, the Reserve Bank took the bottom of its December 1991 target band seriously and explicitly eased monetary policy in September. Thus in this particular instance, the bottom of a target band was interpreted by the monetary authorities as a true electric fence. Policy was eased as the fence was reached and there was no opportunistic attempt to achieve a more rapid disinflation than had been specified by the government.

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<sup>20</sup> See Sherwin (1999) and Sarel (1999) for details on the changes to the framework.

<sup>21</sup> For examinations of this episode, see Nicholl and Archer (1992), A. Fischer (1995), Mishkin and Posen (1997) and Bernanke et al (1999).

<sup>22</sup> Browning and Gibbs (1991).

## B. Israel

Israel first began using implicit inflation targets for monetary policy in the mid-1980s, without making their use public. Formally monetary policy was based on an exchange rate anchor.<sup>23</sup> A more explicit adoption of IT occurred in December 1991 when Israel modified the operation of its monetary framework, which had been based on keeping the exchange rate within a horizontal band, to being based on a diagonal exchange rate band. Specifically, the authorities decided that their monetary policy for 1992 would be conducted so as to keep the exchange rate of the shekel against a currency basket within a plus/minus 5 percent band that would depreciate over time. The rate of depreciation of the band (9 percent per annum) was based on the projected inflation differential between Israel and its trading partners.<sup>24</sup> Thus the adoption of an explicit inflation target was done, not so much for its own sake, but rather as a technical requirement of the adjustment in the exchange rate regime. In consequence, even after December 1991, not much attention was paid to the inflation targets by either the public or the government until September 1994 when the government began to take official note of the inflation targets. Currently, the government establishes inflation targets based on the overall CPI in consultation with the Bank of Israel.<sup>25</sup>

Regarding objectives, the Bank has a clear preference for price stability. Governor Frenkel, for example, has said that given statistical distortions, price stability in many countries might be in the 2-3 percent range but he has also noted that “the aim should be price stability without qualification.”<sup>26</sup> The views of the government have been less clear,

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<sup>23</sup> Ben-Bassat (1995).

<sup>24</sup> Helpman, Leiderman, and Bufman (1994).

<sup>25</sup> Uniquely among the case studies examined in this paper, monetary policy in Israel continues to operate with an exchange rate commitment.

however. Former Bank Research Director Ben-Bassat has said "...the political system expresses its clear preference for the goals of stimulating economic activity and reducing unemployment over that of dampening inflation."<sup>27</sup> Formally, the government has adopted a strategy of gradually reducing inflation by 2001 to the level prevailing in OECD countries.

Israel has generally used bands to provide tolerance margins. The middle panel of Figure 1 shows how these bands have changed over time. The use of inflation target bands has been mostly explained by the authorities as being necessary because of the difficulty in hitting a point inflation target.<sup>28</sup> However, there has been uncertainty about how the authorities would react to breaches in the bottom of the band. Is the bottom of the inflation band an electric fence or a guidepost? This has not been clear.<sup>29</sup> Press statements by government officials suggested that the government largely took the former view.<sup>30</sup> Debates within the government over target proposals by the Bank of Israel ending in the rejection of ranges such as 6 to 9 percent in favor of 7 to 10 percent for 1998 when inflation was running at about 9 percent also suggested an electric fence interpretation.<sup>31</sup> Likewise, the observation by Governor Frenkel that having the government choose the inflation target forces them to consider the tradeoff between inflation and growth also hinted at an electric fence

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<sup>26</sup> Frenkel (1996b).

<sup>27</sup> Ben-Bassat (1995).

<sup>28</sup> See, for example, Ben-Bassat (1995) or Frenkel (1996a).

<sup>29</sup> For example, Bufman, Leiderman, and Sokoler (1995) call for a clear statement by the authorities on how deviations from the target will be dealt with.

<sup>30</sup> Globes website: May 24, 1998 and June 24, 1998.

<sup>31</sup> Globes website: August 14 and 17, 1997.

interpretation of the bottom of the band.<sup>32</sup> Nevertheless, as shown below, when inflation fell significantly below the existing band in 1998, the authorities did not take action to move it back inside the band and used the situation to consolidate the disinflation.

In the first half of 1998, with domestic economic activity slowing, inflation fell from being at the bottom of the target band established for 1998 (7 percent) to about 3 percent by mid-year. The Bank of Israel's estimates of the 12-month ahead inflationary expectations also fell by a roughly similar amount.<sup>33</sup> In response, the Bank lowered its official lending rates but not as fast as the decline in inflation and their measure of the expected real interest rate increased by around 2 percent. Initially, the Bank came under sharp criticism for not reducing interest rates as fast as the drop in inflation, including by the Prime Minister.<sup>34</sup> However, the Bank's view was that it was important " ... to consolidate a low inflation environment consistent with the government's long-term goal—to achieve price stability over time..."<sup>35</sup> Eventually, the view that the unexpected fall in inflation should be consolidated was accepted by the government and—notwithstanding a rise in inflation in the later part of 1998—the target range for 1999 was set at 4 percent.<sup>36</sup> While undoubtedly the course followed by the authorities was the correct one given the circumstances, it did—for a time—cause an increase in uncertainty as market participants were unsure whether the Bank

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<sup>32</sup> Frenkel (1996a)

<sup>33</sup> *Recent Economic Developments*, Bank of Israel, No. 83, July 1998.

<sup>34</sup> Globes website, May 25, 1998.

<sup>35</sup> Bank of Israel, *Annual Report*, 1998.

<sup>36</sup> The Bank cut its lending rate sharply in August 1998 at the same time the inflation target for 1999 was announced, so there was apparently a limit in the Bank's ability to exploit the favorable inflation performance of the first half of 1998 to achieve more rapid disinflation.



would ease policy as inflation and inflationary expectations fell some 4 percentage points below the target band or would take advantage of the unexpected decline in inflation to try to bring forward the achievement of the authorities' long-term inflation objectives. As the chief economist at an Israeli financial institution wrote in an editorial, "... we are in the dark as regards the goal towards the Bank of Israel is striving, and hence, also as regards the interest rate policy and changes in the exchange rate."<sup>37</sup>

### **C. Canada**

The Bank of Canada used M1 as its intermediate target from 1975 to 1982. Subsequently because financial innovation weakened the links between M1 and nominal spending, M1 was discarded and the bank essentially operated without an intermediate target. However, as time passed, there was an increasing focus directly on inflation.<sup>38</sup> In February 1991, as inflationary pressures were subsiding, the authorities took the opportunity to formalize the commitment to price stability and announced the explicit adoption of inflation targeting, thereby hoping to improve inflationary expectations that remained relatively high.<sup>39</sup>

When the IT regime was adopted, inflation was running at about 6 percent. Because this was substantially higher than the authorities' view of price stability (a rate clearly below 2 percent), the authorities adopted a path of gradually declining target bands: 2 to 4 percent

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<sup>37</sup> Globes website, March 19, 1998.

<sup>38</sup> Freedman (1994) notes that although a precise definition of price stability was not specified, work indicated that it was "clearly below 2 percent".

<sup>39</sup> The Minister of Finance and the Governor of the Bank of Canada jointly determine the inflation targets.

for end-1992; 1½-3½ percent for mid-1994 and 1-3 percent for end-1995.<sup>40</sup> The latter target was eventually extended through 2001. The overall CPI was declared the official target but operationally the Bank watched closely a measure of core inflation excluding food and energy in addition to the effects of changes in indirect taxes. The bottom panel of Figure 1 shows CPI inflation (in practice the overall measure and core inflation moved closely over this period) along with the inflation targets.

During the early period of inflation targeting in Canada (1991-93), when the authorities were trying to bring down inflation, the IT framework evolved gradually and somewhat informally but, in general, the target bands received considerably less emphasis than in the case of New Zealand. For example, the Bank of Canada's *Annual Report* for 1991, when reviewing the activities of the Bank in 1991, described the inflation targets using only the midpoints. The bands were not even mentioned. Likewise, a background note appearing in the March 1991 *Bank of Canada Review*, which was released when the targets were announced, also emphasized the midpoints. The background note explained that bands were used because "policy changes cannot be calibrated so precisely as to achieve an exact rate of increase in prices." While the note did go on to explain that, if inflation was pushed outside the target band, the Bank would take policy actions directed to bringing inflation back to the midpoint of the target band, some comments by Bank officials nevertheless appeared to suggest that their concern in the early years of IT was more in regard to upside misses than downside misses. For example, when discussing the fall in inflation in 1992, Deputy Governor Freedman noted that the Bank's view was that "... it would be inappropriate to take action deliberately to push up the rate of inflation once it had reached

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<sup>40</sup> Freedman (1994).

the lower band of the target range, given that the longer-term goal was to achieve price stability.”<sup>41</sup>

The Bank of Canada’s *Annual Reports* for 1991 and 1992, as well as the *Bank of Canada Review* background note mentioned above, suggest that implicitly there was a declining indicative target range going from a band of 4 to 6 percent at end-1990 to the official target band of 2 to 4 percent at end-1992.<sup>42</sup> The *Annual Report* of 1992 makes clear that inflation (both overall and core) was below this indicative target band for almost all of 1992.<sup>43</sup> Notwithstanding this, when the 1992 *Annual Report* discusses the Bank’s monetary policy operations in that year, there is no mention of the Bank seeking to engineer an easing in monetary policy. In contrast, it indicates that market factors were pushing interest rates lower through most of this period and that occasionally the Bank needed to temper the pace of that decline.<sup>44</sup> Of course the Bank took the low level of inflation and expectations of future inflation into account when formulating monetary policy. However, the Bank’s behavior in this episode was considerably different from that of the Reserve Bank of New Zealand when there was a breach in the bottom of its targeting band in September 1991. This illustrates that without precise information being given to markets about the authorities’ interpretation of the bottom of an inflation targeting band, markets cannot be sure as to how the authorities will react if the band floor is breached.

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<sup>41</sup> Freedman (1994).

<sup>42</sup> See, for example, Chart 1 on page 10 of the March 1991, *Bank of Canada Review*.

<sup>43</sup> See page 20.

<sup>44</sup> Note that the US/Canadian interest rate differential changed relatively little in the first quarter of 1992 when inflation fell sharply to below the bottom of the indicative target band.

The above case study is not meant to criticize the actions of the Bank of Canada during the early IT period. Given the difficulties in trying to predict the pace at which disinflation might take place, it was perhaps natural that the bottom of the inflation band would not be rigidly adhered to at a time when the authorities were still trying to bring inflation down. Since late 1993, the Bank of Canada has reacted symmetrically when inflation was expected to move outside the target range. In 1994, Governor Thiessen noted that "... the Bank will respond if it appears that momentum was developing to push the underlying rate of inflation through the bottom of the band."<sup>45</sup>

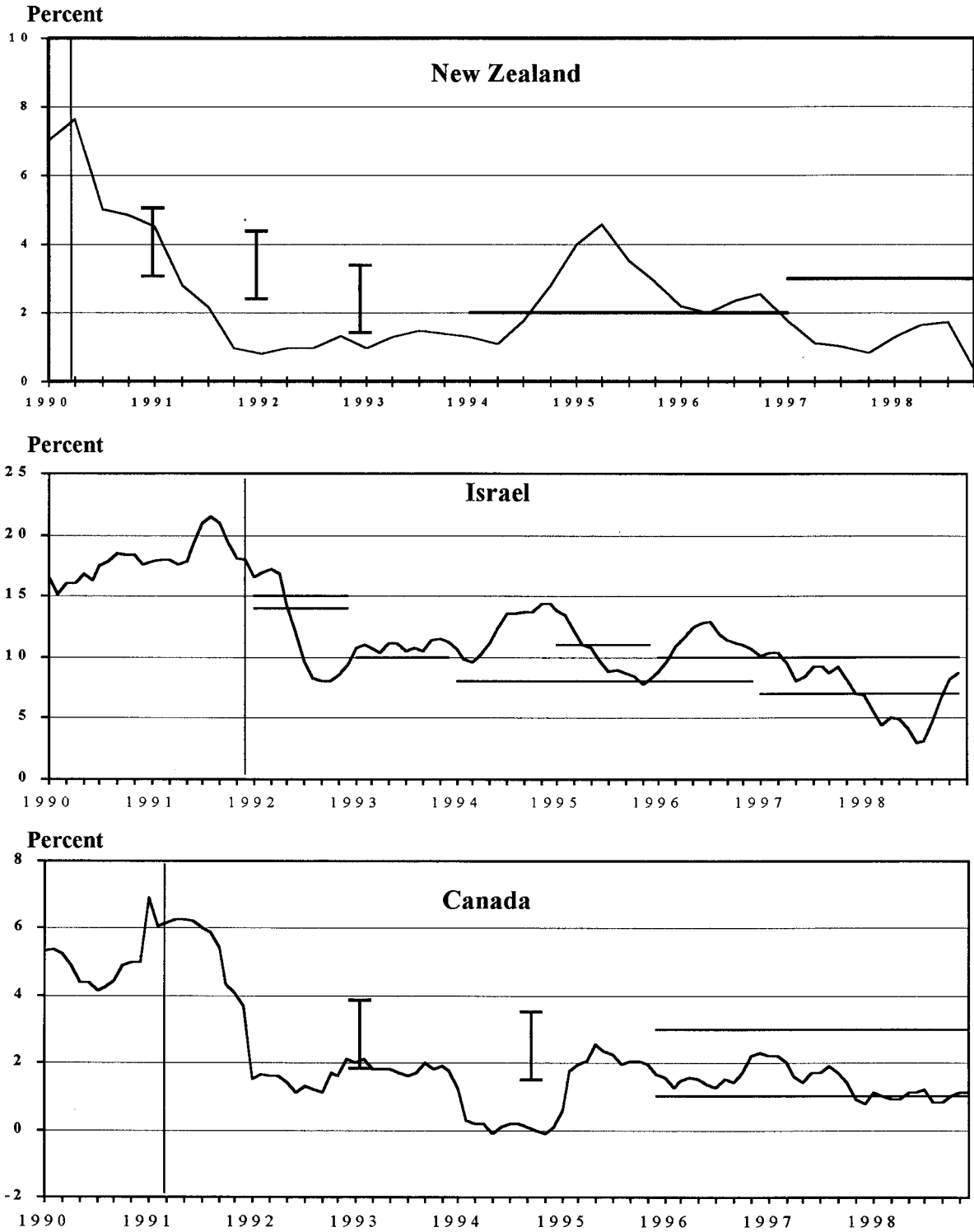
#### IV. CONCLUDING REMARKS

The case studies above are not meant to be complete analyses of the inflation targeting experiences of New Zealand, Israel, and Canada. All three countries have made very successful use of IT in their disinflation efforts. Rather the above studies are meant to give brief illustrations of some of the difficulties in implementing IT as they relate to the design of target bands. As noted by Bufman and Leiderman (1998), "To gain credibility, the inflation targeting regime has to be as unambiguous as possible." The case studies have tried to demonstrate that eliminating ambiguity can be difficult. Any country deciding to adopt IT—particularly one seeking to attain sharply lower inflation rather than maintain low inflation—needs to ask itself: how does the construction of the targeting framework enhance credibility and transparency? The view taken in this paper is that target bands—while appearing to be straightforward on the surface—can send confusing signals to markets about policymakers' intentions if they are not designed carefully.

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<sup>45</sup> Thiessen (1994).

**Figure 1: Inflation and Inflation Targets  
(percent per annum)**



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