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Inflation Targeting

Executive summary

- Since New Zealand first introduced inflation targeting in the late 1980s, a growing number of other countries have adopted it to operate their monetary policy.
- A main feature of inflation targeting is commitment to maintaining price stability. In practice this has meant central banks aiming for a low and stable inflation rate.
- The pursuit of price stability is recognition that high and volatile inflation is harmful to an economy. The negative economic impact of high inflation can occur whether or not the inflation is anticipated in the expectations of households and firms. Deflation—a negative inflation rate—also presents substantial economic risks. Consequently, most inflation targeting economies have avoided targeting a zero inflation rate.
- In New Zealand's case, the previous 0-3% target range for annual inflation was narrowed to 1-3% in mid-September 2002, but with the additional flexibility of requiring the Reserve Bank to aim to keep annual inflation within this range on average over the medium term.
- The narrowing of New Zealand's inflation target range aligns it more closely to common practice among other low inflation economies who have also used explicit inflation targeting over the past decade, such as Australia, Canada and Sweden. There has especially been a policy convergence with Australian policy through the adoption of averaging target outcomes over the medium term.
- The very existence of a target range reflects the difficulty of accurately forecasting inflation. This is due to long and variable time lags between the implementation of a monetary policy stance and its ultimate impact on the inflation rate. For New Zealand, this lag of policy transmission can take up to two years.
- Over short periods of around a year, the Reserve Bank can influence economic activity. Beyond that time, monetary policy only significantly affects the inflation rate and not other real economic variables such as economic growth and employment.
- Economists believe there is a threshold inflation rate above which sustainable economic growth is detrimentally affected. Recent research suggests the threshold may be an annual inflation rate around 3%, but results of various studies differ.

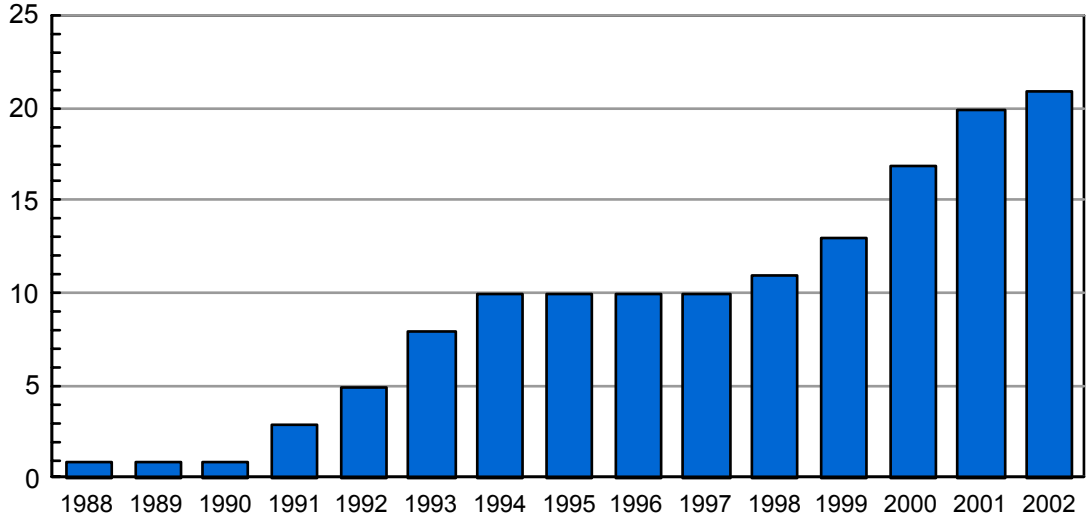
Introduction

Since New Zealand pioneered its use in 1988,[1] inflation targeting has increasingly been adopted by other countries as the main framework for operating monetary policy in their economies. This paper provides an overview of inflation targeting frameworks, including discussion of some of the key debates surrounding their use and the operation of monetary policy in general. These include questioning whether there is an optimal inflation rate that countries should aim for and also examining whether monetary policy can be used to enhance long-term economic growth prospects.

1. What is inflation targeting?

Over the past decade there has been strong growth in the number of economies abandoning other monetary policy frameworks (such as targeting money supply or exchange rate levels) in favour of inflation targeting. This growth is illustrated in Figure One below:

Figure 1: Countries using inflation targeting, 1988-2002.



Source: Author's calculations.

Variations in the details of how different countries operate inflation targeting regimes make it difficult to provide an all-encompassing definition for inflation targeting. Nevertheless, various common characteristics can be identified and summarised as follows:

1. an official commitment to price stability as the main medium to long term goal of the operation of monetary policy.

2. formalisation of the price stability commitment through the public announcement of medium to long term numerical targets (or target ranges) for the inflation rate.

3. an absence of targeting other economic variables such as money supply or the exchange rate.

[1] Different sources often attribute the introduction of inflation targeting by New Zealand to early 1990 when the Reserve Bank Act 1989 was implemented. However, a plan to lower inflation to within a 0-2% target range by the early 1990s was formulated in 1988 after the announcement in April of that year by the then-finance minister, Roger Douglas, to direct monetary policy towards lowering inflation (Sherwin, 1999, p.73).

4. increased transparency of the operation of monetary policy by the central bank through heightened public communication of monetary policy objectives. In many cases this has been accompanied by greater operational independence of the central bank from the government and increased accountability for the central bank to achieve the specified inflation targets.[2]

Of these characteristics, the commitment to the pursuit of price stability is the main defining characteristic of inflation targeting regimes, while the others have been adopted to a lesser or greater degree by different countries.[3] In strict economic terms, price stability refers to a 0% inflation rate.[4] In practice however, no country has targeted zero inflation, for reasons that are discussed in more detail below. Instead, each country has tended to define price stability as a low and stable inflation rate. A widely cited quotation[5] of the chairman of the US Federal Reserve, Alan Greenspan, provides a useful definition of how price stability has been interpreted in practice by monetary authorities:

> *"For all practical purposes, price stability means that expected changes in the average price level are small enough and gradual enough that they do not materially enter business and household decisions."*[6]

Underlying this definition of price stability and the growing adoption of inflation targeting by various countries is the belief that high and volatile inflation is harmful to economic growth. Indeed, the apparent failure of other forms[7] of monetary policy operation to alleviate high and volatile inflation rates among many industrialised countries in the 1970s and 1980s (New Zealand included), helps explains the shift to use of inflation targeting since the early 1990s.

2. The costs of high and volatile inflation

Before examining the range of identified costs of high inflation to an economy, it is important to be clear about what exactly is meant by inflation. Inflation is usually correctly associated with increasing prices, but the important point is it is a change in the overall level of prices in an economy, rather than relative price changes between different products. Specifically, inflation refers to the rate of change in the average prices of goods and services in the economy. It is usually defined as the annual percentage change in a consumer price index (CPI) of a country. The CPI, in turn, represents a surveyed estimate of the average price for a given period of a standard "basket" of goods and services consumed by a typical household.

The costs of high inflation to an economy can broadly be grouped into two categories; anticipated and unanticipated costs.[8]

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[2] Bernanke et al (1999); Mishkin (2000a); Mishkin and Schmidt-Hebbel (2000); Sterne (2002).
[3] Appendix 1 provides a detailed summary of the characteristics of inflation targeting in different countries.
[4] Blanchard (2000, p.506).
[5] See, for example: Bank of England (2002, p.2); Meyer (2001, p.2); or Mishkin (2000b, p.8).
[6] Bank of England (2002, p.2).
[7] These other forms have often included a combination of objectives, such as exchange rate stabilisation or targeting monetary aggregates.
[8] Briault (1995, p.33); Vickers (1999).

Anticipated inflation costs

It is sometimes questioned whether it matters if the inflation rate is, say, at 2% per year or 10%, as long as people know what to expect. However, there are costs to high inflation, even if it is fully anticipated by consumers in advance. First, countries' tax systems are not fully indexed to account for the effects of inflation. In other words, individuals and businesses are generally taxed on their *nominal* (non-inflation-adjusted) incomes, regardless of whether high inflation is actually reducing their purchasing power. Consequently for example, high inflation can erode *real* (inflation-adjusted) wages, especially if workers have insufficient wage bargaining power to ensure their incomes keep pace with the rate of inflation.

A second negative effect of anticipated inflation is that it can effectively act as a tax on holders of money. Since high inflation constantly reduces the value of money, people become less willing to hold onto money (i.e. cash) for long periods of time. This is known as *shoe leather costs* since people would rather traipse back and forth to the bank to withdraw small amounts of money from interest-bearing accounts as needed.[9] In the age of ATMs and EFT-POS this may not seem like a problem, but it can actually complicate asset management and make it more expensive.[10]

There is also the efficiency cost on the side of businesses, who have to constantly update their prices (so-called *menu costs*) which in turn can confuse consumers. This has the potential to reduce the usefulness of money as a unit of exchange and even undermine the whole credibility of a currency altogether. A commonly used analogy[11] for this threat is to imagine if units of measurement such as a metre were to change by several centimetres per year. Judging distance would become more difficult, constant updating of rulers would be costly and eventually the whole validity of the measurement system would be undermined.

Unanticipated inflation costs

The main culprit of the costs of inflation is arguably the volatility that has tended to accompany high rates of inflation. This volatility raises uncertainty in an economy, with several potentially very serious costs. First, unanticipated inflation can distort what is called the *price mechanism*. In an economy with relatively stable and low inflation, households and businesses can read changes in relative prices reasonably well and react accordingly with their consumption and investment decisions. With high inflation however, it becomes difficult to distinguish between changes in relative prices of goods and services and the overall general price increase. As a result, resources are misallocated. It has been calculated that even a sustained inflation rate of 5% results in a doubling of prices within just over 14 years, thereby disguising most relative price changes.[12]

To take a New Zealand example, in recent years the dairying sector was a major stimulus to overall economic growth. High international dairy product prices coupled with favourable growing conditions made it profitable for farmers to shift their operations from farming types offering weaker returns (such as sheep and beef) into dairying. In this situation the farmers (as business enterprises) read the relative price changes and directed their investment accordingly.

[9] ibid.
[10] Faber and Ruoss (2000).
[11] See, for example, Bank of England (2002, p. 2) and Vickers (1999, p.6).
[12] The Economist (1992), p. 21.

If, however, there had been high general inflation here or among our main trading partners, then it would have been more difficult for farmers to isolate the investment potential of dairying.

A second key way unanticipated inflation can be costly to an economy is with its impact on investment. Uncertainty over future price levels and interest rates can make businesses reluctant to undertake long-term investment decisions and encourage them to focus instead on short-term profit gains.[13] A related and reinforcing disincentive to long-term investment is the increased uncertainty generated by high unanticipated inflation. This may force savers and borrowers to demand a higher *risk premium*, which can act to raise the real cost of borrowing to businesses thereby further dampening investment.[14]

Finally, high unanticipated inflation erodes the value of debt in real terms.[15] While borrowers gain from this, savers and people on fixed incomes lose out. This less-equitable redistribution of wealth can particularly afflict retirement savings and the elderly.

3. The risks of deflation

Just as high inflation can be damaging to an economy, deflation can also present very real risks. Deflation is a sustained fall in the overall price level. In other words, deflation is a negative inflation rate. It should not be confused with *disinflation*, which refers to a fall in the rate of inflation. (For example, Appendix 2 shows that in 2000 and 2001 Japan's annual inflation rate was –0.7%; that is deflation. In contrast, Poland's annual inflation rate fell from 10.1% in 2000 to 5.5% in 2001, demonstrating an example of disinflation.)

One of the main problems posed by deflation is it can affect the expectations of consumers and businesses about future price levels. If households think prices for goods and services will be lower in the future then they have an incentive to delay their spending, resulting in a drop in overall consumption. Similarly, businesses have an incentive to postpone investment in their enterprises if they think both prices for capital equipment and the interest rates charged on borrowing funds will be lower in the future. The combined outcome of this lower consumption and investment in a deflationary economy is an overall fall in demand.[16] If this persists, a country's economy contracts.

Faced with falling *aggregate demand*, a central bank has limited scope to stimulate a deflationary economy. As the International Monetary Fund has noted in a recent investigation into monetary policy when there is low inflation:

> *"Deflation blunts the effectiveness of monetary policy and can lead to a downward spiral of activity..."*[17]

To stimulate a temporary increase in aggregate demand in an economy with monetary policy, a central bank can reduce interest rates. This makes spending on consumer goods more attractive to households (rather than saving income in interest-bearing bank accounts) and borrowing for investment more attractive to businesses since they can get cheaper loans. If deflation persists, however, the central bank faces the restriction that nominal interest rates cannot fall less than zero. (A negative nominal interest rate would imply savers and lenders would be paying borrowers interest, rather than the other way round!) Deflation therefore

[13] Bank of England (2002, p. 3); The Economist (1992), p. 21;. Briault (1995, p. 33).
[14] ibid.
[15] Bank of England (2002, p. 3).
[16] The Economist (1995a, p.86); Faber and Ruoss (2000).
[17] International Monetary Fund (2002, p. 92).

raises the risk that *real* (inflation adjusted) interest rates will become uncomfortably high, forcing borrowers to service their debts at rates higher than nominal interest rates.

[See the Box 1 for further explanation.]

This increased real debt burden for households and firms consequently can produce further drops in consumption and investment, exacerbating deflation further and creating a downward spiral. If too many firms and households can no longer service their debts and become insolvent, then in a worst-case scenario the entire financial system can be threatened by the collapse of banks and lending institutions.[18]

Box 1: Real interest rates in a deflationary economy

Real interest rates are interest rates adjusted for inflation. They refer to the real return to lenders on the loans they make. An approximation for calculating the real interest rate can be given by:

Real interest rate ≈ nominal interest rate – inflation rate

In a healthy economy with a key nominal interest rate at, for example, 5% and inflation of around 2.5% per year, it follows that the:

Real interest rate ≈ 5% - 2.5% = 2.5%

In the case of an economy facing deflation, by contrast, the interest rate might have been lowered to only 0.02% (as Japan as recently experienced) and the inflation rate might be –4%, resulting in:

Real interest rate ≈ 0.02% - (-4%) = 4.02%

In this deflation scenario, borrowers are effectively forced to borrow at rates higher than the official interest rates. Their costs of servicing debt becomes higher, raising the risk that they will be unable to service their debts and become insolvent.

4. Is there an optimal rate of inflation?

There is a broad consensus among most economists and policymakers that both high inflation and deflation are harmful to an economy, for the reasons provided in the discussion above. This raises the question, is there an optimal inflation rate that a country should aim for to avoid the problems of high inflation and the risks of deflation? The bottom-line answer—certainly with regards to formal economic research—is that there is no definitive answer. To quote a prominent authority on monetary policy issues, Frederic Mishkin:

> *"I characterise the question of what the optimal inflation rate should be as the $64,000 question. It is probably the key question that faces many monetary policymakers at the present time."*[19]

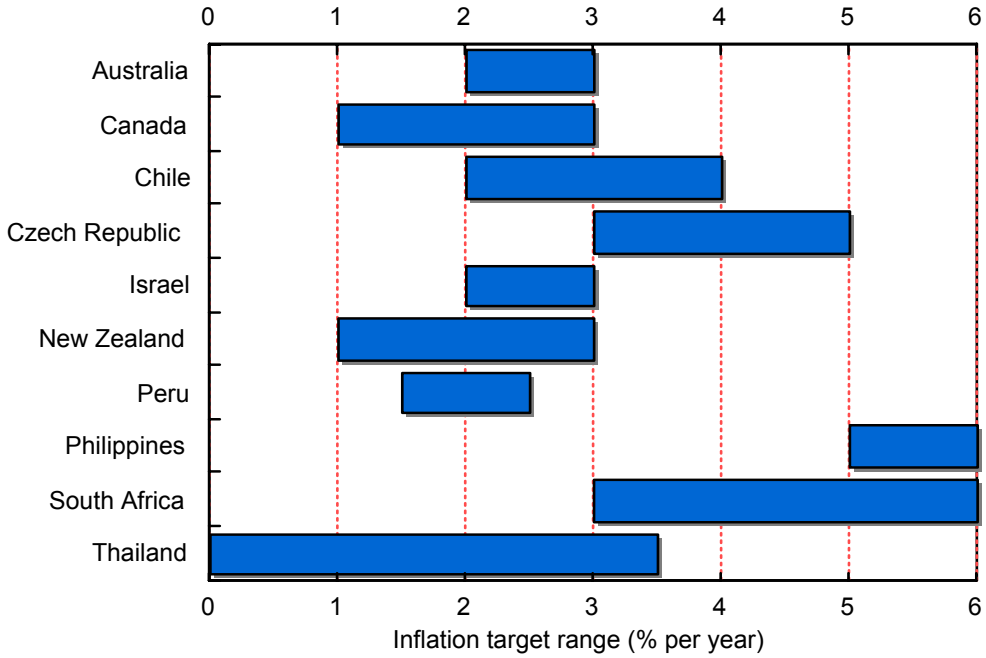
In practice most countries, that have adopted inflation targeting as the framework for operating their monetary policy, have opted for targeting a low and stable inflation rate of around 2-3%. The exceptions are countries that have

[18] Faber and Ruoss (2000).
[19] Quoted in a commentary on the Andrés and Hernandes chapter in Feldstein (1999, p. 344).

adopted inflation targeting while attempting to work out of higher inflation rates. In such cases, the tendency has been to lower inflation targets in phases.

The differentiation between high and low inflation economies aside, inflation targeting countries can be grouped into two categories: those that target an inflation *target range*, and those that target an inflation *target point* with a permissible tolerance of deviation either side of the target point. Figure 2a shows the countries that currently have an inflation targeting framework using a target range, along with the size of the ranges. Figure 2b shows the countries with target points for their inflation targets. The sanctioned tolerance deviations around those target points for each framework are also illustrated.[20]

Figure 2a: Inflation target ranges, as at late September 2002



Source: Appendix 1.

Among the current[21] inflation targeting countries, the split between those targeting inflation points and those targeting ranges is roughly even. However, it is noteworthy that the countries that first adopted inflation targeting for operating their monetary policy back in the early 1990s (including New Zealand, Canada and Australia) opted for inflation target ranges. In contrast, the majority of countries that have introduced inflation targeting since the end of the 1990s use a target point.[22] The reason for this recent preference is not clear, but may partly be the result of influence of the International Monetary Fund (IMF) in assisting countries of East Europe and Latin America with their economic policies.[23]

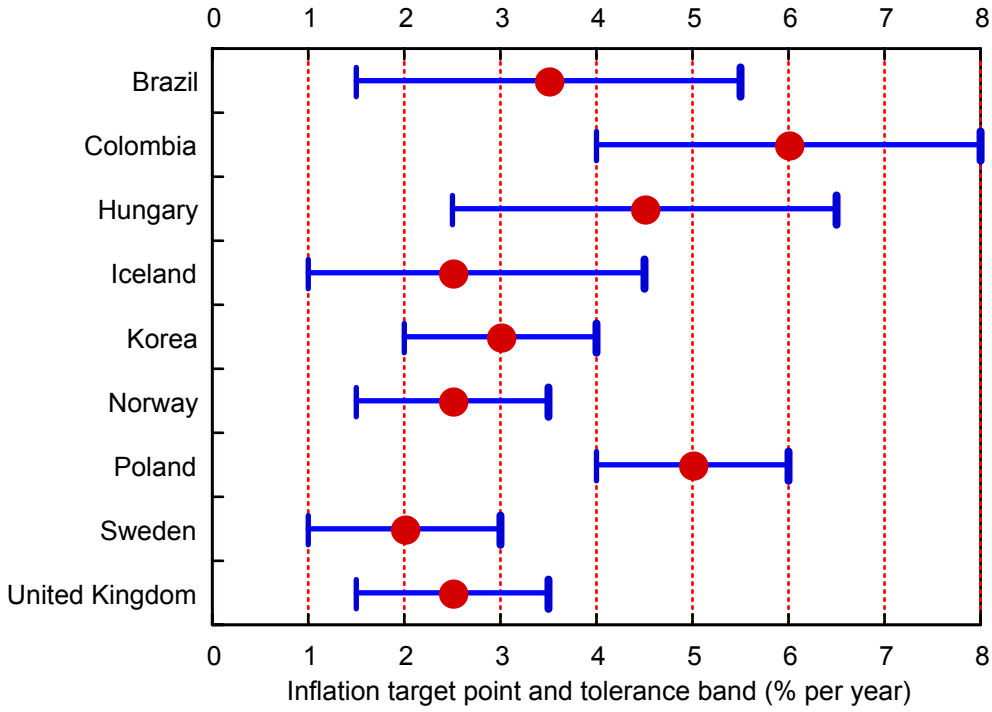
[20] Figures 2a and 2b include all but two of the inflation targeting countries detailed in Appendix 1. Excluded are Switzerland and Mexico, which have annual targets of reaching inflation of less that 2% and 4.5% respectively. The categorisation of these two regimes into point targets or ranges is subjective and therefore they have been excluded from the analysis. It should be noted, however, that Switzerland's choice of inflation target deliberately mimics that of the Eurozone countries, whose monetary policy is directed by the European Central Bank.

[21] As of September 2002.

[22] Referring to Figures 2a and 2b plus Appendix One, it can be seen that since 1999 eleven economies adopted inflation targeting for their monetary policy frameworks (Brazil, Colombia, Hungary, Iceland, Mexico, Norway, Philippines, Poland, South Africa, Switzerland, and Thailand). Of these, six now use inflation target points, three use ranges and the remaining two have targets of less than a set inflation target (Mexico and Switzerland), which can be argued to be more of a target point than range.

[23] Brazil, for example, devised its inflation targeting framework following a joint seminar organised by the IMF and the Central Bank of Brazil (see IMF Staff Country Report No.99/97, September 1997, Brazil: Selected Issues and Statistical Appendix, p. 86.)

Figure 2b: Inflation target points and their tolerance bands, as of 2002



Source: Appendix 1.

Target point versus target range

The differences between inflation target points and ranges are relatively subtle, and the broadly even split between use of the two types of targets by countries currently using inflation targeting is indicative of this subtlety. An advantage of using a target range is that it arguably provides a central bank with more flexibility in its operation of monetary policy.[24] On the other hand, this flexibility may come with the result of less transparency to the public about how the central bank is operating its monetary policy.[25]

Another potential disadvantage of a target range is its edges (the floor and ceiling of the range) can come to be viewed by the public, financial markets or politicians as too 'hard.'[26] This means that there is focus on whether or not monetary policy is moving inflation just inside or outside the edges of the range, rather than viewing inflation rates as deviation from the middle of the range. This disadvantage of target ranges is arguably absent with the use of a *target point* since it is clear to all observers exactly what numerical target a central bank is aiming for and how far actual measured inflation deviates from that target.[27]

The main disadvantage of a target point is it is unlikely to be reached accurately by monetary policy due to the inherent difficulty of forecasting inflation. Consequently, the use of target points is accompanied by tolerance bands that allow deviation of inflation either side of the target point.

[24] Mishkin (2000b, p. 14).
[25] IMF Country Report No.01/82, June 2001: Iceland : Selected Issues and Statistical Appendix, p. 29.
[26] Mishkin (2000b, p. 16).
[27] Meyer (2001, p. 11).

New Zealand's target range

New Zealand targets a range of 1-3% "on average over the medium term" for annual inflation under a new *Policy Targets Agreement (PTA)* signed between the Finance Minister and new Governor of the Reserve Bank (Dr Alan Bollard) on 17 September 2002.[28] This new target range has replaced a wider 0-3% range that had been in place since December 1996.

Past analysis by the Reserve Bank has suggested that 80% of short-term variation in the inflation rate was covered by the previous 0-3% target range, resulting in the expectation that observed annual inflation results may fall outside the range 20% of the time, or in around one year out of every five.[29] Based on this analysis, the narrowing of the target range by one percentage point will raise the probability that actual observed inflation will breach the target range more often.

The stipulation that inflation should fall within the 1-3% range only "on average over the medium term" arguably provides more flexibility for tolerating breaches of the target range. But under the Reserve Bank Act 1989 strict accountability requirements remain, with the Bank Governor technically able to be dismissed for breaches of the target range. New Zealand is the only country to have such a stringent accountability clause in its inflation targeting framework.

An added implication of a narrowing of the inflation range may be to effectively raise inflation expectations by around half a percentage point (reflecting an upward shift of the midpoint of the range from 1.5% to 2.0%).

New Zealand's new target range differs from the recommendation of the 2001 Independent Review of Monetary Policy in New Zealand. The review, conducted by a Swedish authority on monetary policy, Lars Svensson, recommended shifting to a medium term target point of 1.5% annual inflation, with 0% and 3% "soft" edges so that they did not indicate any "hard and precise thresholds for policy responses." [30]

This recommendation did not suggest any substantial change in the way monetary policy has recently operated in New Zealand. In recent years the Reserve Bank publicly communicated that it aimed for the 1.5% midpoint of the previous target range, thereby representing in practice a form of hybrid policy between use of a target range and target point. However, the Reserve Bank and the Treasury were generally supportive of shifting to a point target but the recommendation was rejected by the Government in its formal response to the review in May 2001 on the grounds the Reserve Bank already targeted the midpoint and a shift to a point target could potentially confuse "the key message of flexibility."[31]

[28] The PTA can be viewed on the Reserve Bank of New Zealand website: http://www.rbnz.govt.nz/monpol/pta/0124848.html
[29] Reserve Bank of New Zealand (1999b, pp. 18-19).
[30] Svensson (2001, p.64).
[31] Conway and Orr (2001, p.2); Cullen (2001, p. 4)

Table 1: Inflation targets in different countries (for 2002)[1]

Target points (ranked by target point)	Target point	Tolerance band (% points)
Colombia	6.0	± 2.1
Poland	5.0	± 1.0
Hungary	4.5	± 2.2
Brazil	3.5	± 2.0
Korea	3.0	± 1.0
Iceland	2.5	-1.5,+2.0
Norway	2.5	± 1.0
United Kingdom	2.5	± 1.0
Sweden	2.0	± 1.0
Average[3]	**3.5**	
Average excluding disinflationary economies[2,3]	**2.5**	

Target ranges (ranked by implied target midpoint)	Range	Implied midpoint
Philippines	(5-6)	5.5
South Africa	(3-6)	4.5
Czech Republic	(3-5)	4.0
Thailand	0-3.5)	1.75
Peru	(1.5-2.5)	2.0
Chile	(2-4)	3.0
Australia	(2-3)	2.5
Israel	(2-3)	2.5
Canada	(1-3)	2.0
New Zealand[1]	***(1-3)***	***2.0***
Average[3]		**3.0**
Average excluding disinflationary economies[3,4]		**2.25**

Notes:

1. For New Zealand the new target range adopted on 17 September is used. Prior to that there was a 0-3% target range.
2. Excludes Brazil, Colombia, Hungary and Poland
3. Averages are rounded to nearest 0.5% point.
4. Excludes Czech Republic, Philippines and South Africa.

Source: Appendix 1.

Comparison of New Zealand's target with other countries

Table 1 above details the inflation targets pursued by various countries in 2002. Several broad observations can be made about the design of inflation targets in these countries and how New Zealand's existing target range compares with them.[32]

First, none of the inflation targeting frameworks pursue a strict price stability target of 0%. Instead, the average midpoint for countries using ranges is 3.5% (rounded to the nearest 0.25 percentage point), while the average target point is 3.0%. Removing the upward bias generated by the several high inflation economies that have only adopted inflation targeting in the past couple of years and are pursuing disinflationary policies reduces the average inflation midpoints for ranges to 2.25% and the average target point to 2.5%.

The general design of targets around 2-3% is recognition of the need to avoid the 0% interest rate floor and the risk of deflation. It is also acknowledgement that there is an upward bias in the estimation of actual inflation by consumer price indexes.[33] International studies have estimated consumer price indexes tend to overestimate actual inflation in an economy in a range of 0.5% up to 1%.[34] This is due to the inability of the indexes (unless regularly revised) to fully account for both improvement in quality of goods and services that can increase prices and problems of weighting in the index arising when some items become relatively more cheaper and more important in household budgets.[35] An example of this in recent times is the growth of use of mobile phones. The overall effect of the upward bias of consumer price indexes is that even if a

[32] Note that this data was used for Figures 2a and 2b. Looking back at these charts may be useful when reading this section.
[33] Fischer (1997).
[34] Orr (2002, p. 42); Reserve Bank of New Zealand (1999, p. 19).
[35] Pétursson (2000, p. 42); Reserve Bank of New Zealand (1999, p. 19).

country was to seek true price stability (0% actual inflation) it would have to target CPI inflation of at least 0.5%.

A second observation is most inflation targeting regimes have also avoided setting 0% as the lower bound of their target ranges in favour of a floor (or maximum negative deviation from their target point) set at around 1-2%. Prior to the introduction of the new PTA in September, New Zealand stood out with Thailand as the only countries using a 0% lower bound for their ranges. New Zealand and Thailand were also distinctive for having the widest inflation target ranges among the low inflation countries (at 3 and 3.5 percentage points respectively).[36]

By adopting a 1-3% target range, New Zealand's framework appears very similar to that operated by the Bank of Canada. However, the Bank of Canada specifically focuses on the midpoint of its range, whereas New Zealand has adopted the looser Australian approach of keeping inflation within its target range only on average over the medium term.

[Box 2 looks in more detail at what targeting inflation "on average over the medium term" actually means in practice.]

Regardless of the size of target ranges and tolerance bands, their very existence is acknowledgement by monetary authorities that it is very difficult to forecast inflation with accuracy. A key reason for this is that monetary policy affects the economy, and especially inflation, with long and variable time lags.[37] This issue of lags is explained in more detail in the following section.

Box 2: What does "on average over the medium term" mean?

The PTA signed between the new Reserve Bank of New Zealand Governor and Minister of Finance on 17 September 2002 has adopted terminology used by the Reserve Bank of Australia (RBA) to keep future CPI inflation within the target range "*on average over the medium term."*

A precise definition of what timeframe the medium term represents has been avoided in the PTA. One commentary has suggested this is a deliberate move by the Reserve Bank to prevent it giving a tight definition that could become "locked in for all time."[38]

Comments from the RBA provide some insight to what averaging over the medium term might actually entail. A former Assistant Governor (Economic) noted in 1999 that:

> *"In the past I have explained this notion as follows: if we were to come back here five years from now, and find that the average rate of inflation has a 2 before the decimal place, we would regard that as a satisfactory performance, and consistent with [Australia's 2-3%] target."*[39]

In New Zealand's case, the Reserve Bank Governor, Alan Bollard, has informally suggested the medium term could potentially be periods of two or more years.[40] This is reasonably consistent with recent indications from Reserve Bank analysts that medium term trends in the economy relate to an outlook of one to two years ahead.[41] It is also consistent with the time it takes for an interest rate change to filter through to the inflation rate—this is discussed in more detail in section 5 below.

[36] Countries like Brazil and South Africa have similarly wide ranges but they are pursuing disinflationary policies and tend to revise their targets downward on a regular (normally annual) basis.
[37] Bernanke et al (1999, p. 12); Mishkin (2000b, p. 11).
[38] Bancorp New Zealand Ltd (2002).
[39] Stevens (1999, p. 56)
[40] ANZ
[41] See, for example, Drew & Orr (1999, especially pp. 20-21.)

5. Inflation and economic growth

Previous sections of this paper have discussed the potential costs of high inflation and deflation, plus examined the setting of inflation targets by various countries. This section looks more closely at the role of monetary policy in an economy, with specific reference to economic growth.

Transmission of monetary policy through an economy

The fundamental role of a central bank in its operation of monetary policy in an economy is to influence the overall supply of money. With inflation targeting frameworks, such as New Zealand's, the central bank adjusts money supply by influencing the level of interest rates. The aim of these adjustments is to maintain price stability in the economy. As was noted above, the interpretation of price stability has been relaxed by all central banks currently operating inflation targeting frameworks so that targeting low and stable inflation of around 2-3% tends to be the main aim of monetary policy. One of the most critical points about the operation of monetary policy is that its effects filter through to different sections of the economy with imprecise and variable time lags. This is usually referred to as the *transmission mechanism* of monetary policy.[42]

For most industrialised countries the full time it takes for a shift in interest rates by a central bank to impact on the inflation rate is up to two years.[43] In New Zealand's case, the Reserve Bank of New Zealand operates its inflation forecasting model on the basis that the full effects of monetary policy take around six to eight quarters (18 to 24 months) from adjustment of the interest rate to its effect on the inflation rate.[44] Consequently, inflation targeting by central banks is forward-looking since interest rate decisions need to be made in anticipation of expected inflation up to two years in the future. The operation of the transmission mechanism of monetary policy is more clearly illustrated using an example.

Figure 3 on the next page provides a simplified scenario of the Reserve Bank of New Zealand undertaking tightening of monetary policy.[45] In this scenario, the bank believes the economy is close to operating beyond its sustainable capacity (i.e. overall demand in the economy is exceeding its ability to supply that demand) resulting in emerging inflationary pressures. Consequently, the bank is concerned that—according to its forecasts—inflation will in the future risk breaching the upper limit of its 0-3% target range.

To counter this situation, the bank raises the official cash rate (OCR). The OCR is the interest rate around which the Reserve Bank is prepared to lend overnight money to retail banks and also borrow overnight from banks. It is therefore a key influence on short-term wholesale interest rates. Commercial banks respond in turn by raising their retail interest rates, increasing the cost of borrowing to individuals and businesses. Around the same time, the raising of domestic interest rates relative to other countries can make New Zealand more attractive to international investors, thereby strengthening the value of the New Zealand dollar. These interest rate and exchange rate developments occur quite rapidly in an open small economy like New Zealand's.

Their combined effect is to reduce demand in the economy since households become less enthusiastic about spending (in favour of saving) and both

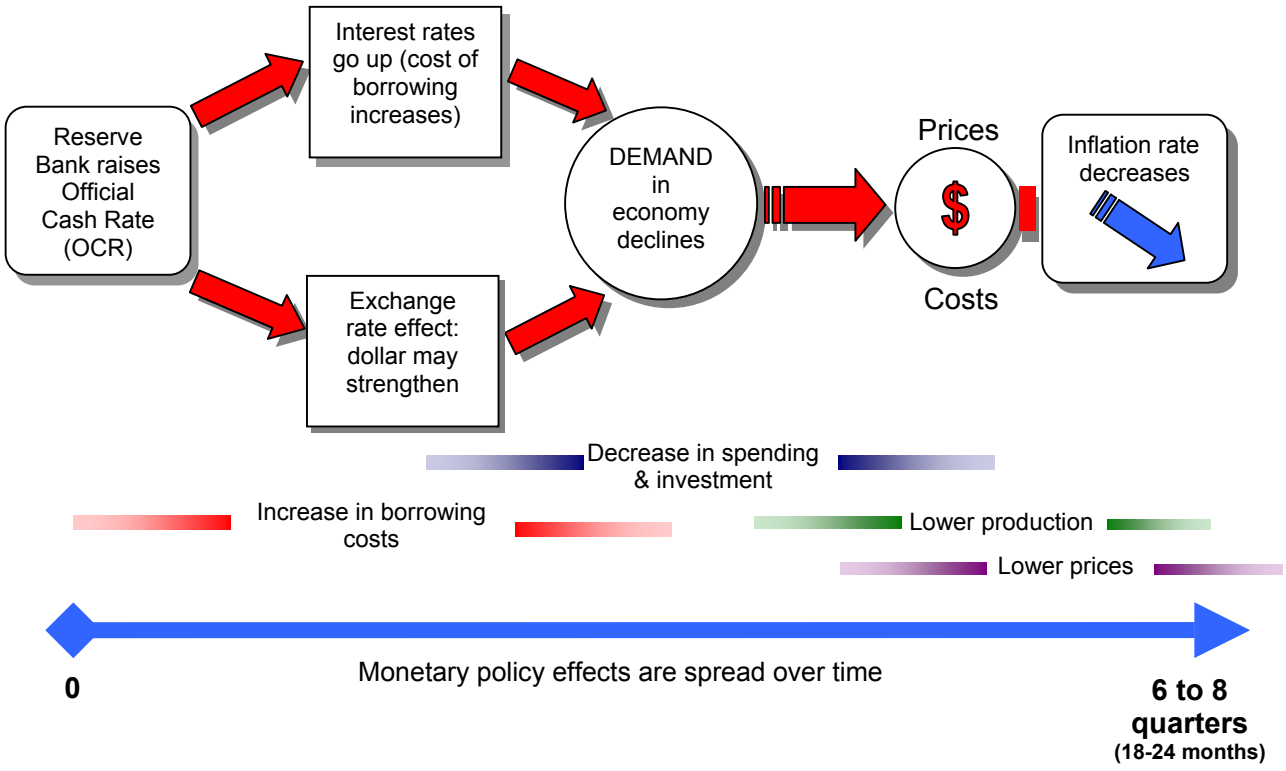
[42] See, for example: Monetary Policy Committee, Bank of England (2000); Svensson (2001, p. 11).
[43] Mishkin (2000b, p.11);
[44] Reserve Bank of New Zealand (2001, p. 7).
[45] Tightening monetary policy refers to actions by the central bank to reduce money supply in the economy. Conversely, easing monetary policy refers to moves to increase money supply.

households and businesses encounter higher borrowing costs and therefore reduce investment. Export earnings are also dampened by the stronger exchange rate. It is difficult to be precise about the scale and timing of this effect, but the Bank of England has estimated the maximum effect on demand (output) can take up to a year.[46]

The final channel of the monetary policy transmission mechanism is the flow through to prices, costs and the overall inflation rate. As noted above, it can take up to two years before a shift in the interest rate fully impacts on inflation. Lower production in the economy stemming from the fall in consumption and investment eventually results in lower consumer prices. Meanwhile, weak employment growth and higher unemployment reduces wage inflation. The lagged effect is due to households and businesses only gradually adjusting to the change in economic conditions.

Figure 3: The Monetary Policy Transmission Mechanism: a simplified illustration of the impact of monetary policy action on the economy[a]

Scenario: Reserve Bank is concerned forecast inflation is too high. The bank's response is to tighten monetary policy in order to keep future inflation from moving above its target range.



[a] For simplicity, this figure does not show all variables and their interactions. For more detailed illustrations of the transmission process refer to New Zealand Bankers' Association (1997, p. 38) and Monetary Policy Committee, Bank of England (2000?).

Source: Adapted from Bank of Canada (www.bankofcanada.ca), with consultation of Bank of England (2002); Monetary Policy Committee, Bank of England (2000); Reserve Bank of New Zealand (1999b & 2001).

[46] Bank of England (2002, p. 5).

Long term economic growth and the limits of monetary policy

The scenario described above and illustrated in Figure 3 contains a very important observation about monetary policy. In the short run—which refers to a relatively abstract period of time generally equating to less than one year in the case of monetary policy—central banks *can* influence economic activity in an economy.[47] But that impact of monetary policy is relatively short-lived, as Figure 3 illustrates. Any influence a central bank has on raising or lowering interest rates (and hence changing money) does indeed produce a change in overall economic output for up to around a year. From around one year to up to two years however, changes in the inflation rate tend to impact, offsetting the change in demand initially brought on by the central bank's alteration of interest rate levels.

If a central bank were to continue to attempt to stimulate the economy beyond this point, the strength of inflation would outweigh stimulatory effects on the economy, producing the adverse effects of inflation discussed earlier in this paper.

Economic theory and empirical research has tended to conclude that over the long run (i.e. a period of a few years or more) an increase in money supply is largely cancelled out by a proportional increase in the level of inflation, resulting in the money supply change having no substantial effect on long term economic growth.[48] This is known as the *neutrality of money*.[49] In other words, the only economic variable lastingly affected by the initial shift in the interest rate is the inflation rate. As Professor Lars Svensson stated in the 2001 official review of monetary policy in New Zealand:

> *"In the long term, monetary policy can only control nominal variables such as inflation and the nominal exchange rate. It cannot increase the average level or growth of real variables such as GDP and employment…"*[50]

But does inflation impact on *long term* economic growth?

This conclusion of economic theory and research still leaves open an aspect of the question broached in a previous section: Is there an optimal inflation rate? More specifically, if, as summarised in earlier sections of this paper, there are a range of reasons why high inflation is risky to economic efficiency, what is the threshold of inflation that produces detrimental effects on sustainable economic growth?

Unfortunately, the results of academic research are mixed. At the high end of the "inflation-tolerance" spectrum, an IMF researcher in the mid-1990s argued that there was a "significant structural break" in the effects of inflation on growth with an inflation rate of 8%. When inflation was greater than 8% per year, then the negative effect on economic growth rates was found to be "significant, robust, and extremely powerful."[51]

Arguably adding weight to this implicit argument that strenuously targeting price stability may be counterproductive to an economy was another mid-1990s study, undertaken by a prominent Harvard University professor of economics, Robert Barro, while visiting the Bank of England.[52] Barro examined the link between

[47] Conversely, a central bank also has the capacity to temporarily dampen economic activity.
[48] Bernanke et al (ch. 2); Blanchard (2000, Chs. 7 & 26); Pétursson (2000, p. 40).
[49] Blanchard (2000, p. 146).
[50] Svensson (2001, p. 20).
[51] Sarel (1996, p. 199).
[52] Barro (1995, pp.166-).

inflation and growth using a dataset of over 100 countries covering the years 1960-90. His conclusion, based on advanced statistical analysis, was that an increase in annual inflation of one percentage point could reduce annual economic growth by between 0.02 and 0.03 percentage points. As *The Economist* magazine commented, Barro's results were "not harmless, but nor [are they] exactly earth-shattering."[53] That noted, Barro himself appreciated that over a period of many years the effect could be cumulatively large:

> *"…a reduction in the growth rate by 0.2-0.3 percentage points per year means that the level of real gross domestic product would be lowered after 30 years by 4%-7%."*[54]

The IMF has more recently undertaken re-examination of the issue of the existence of threshold effects in the relationship between inflation and growth using more sophisticated statistical analysis techniques.[55] The results found a lower threshold than the earlier work from the mid-1990s, with the threshold level of inflation above which inflation significantly slows growth estimated at 1-3% for industrialised countries.

Useful link

The Reserve Bank of New Zealand released a range of papers in late September to accompany the announcement of the new Policy Targets Agreement between the Bank and the Government. These papers go into more detail about many of the issues broadly covered here and provide useful further information.

The Reserve Bank's briefing note and related papers can be found at:
www.rbnz.govt.nz/monpol/pta/0124760.html

[53] The Economist (1995a, p. 90). However, the article also commented that Barro's estimates were "at the low end of the range established in previous work. Other reputable studies, using rival methodologies and datasets, have produced estimates of the effect of inflation on growth that are five and ten times great than Mr Barro's."
[54] Barro (1995, p. 175).
[55] Khan and Senhadji (2001).

Glossary

aggregate demand — the value of total spending on goods and services in an economy. Its components are consumer spending by households, investment by firms and households, government spending, and net exports (exports minus imports).

central bank — a national institution charged mainly with controlling a country's money and banking system. Central banks therefore have a central role in the control of *monetary policy*. A central bank, such as the Reserve Bank of New Zealand, is often referred to as the "bank's bank" since banks hold accounts with the central bank in order to make payments to each other.

consumers price index (CPI) — a surveyed estimate of the average price for a given period of a standard "basket" of goods and services consumed by a typical household. The annual rate of change of a CPI gives an estimate of the inflation rate in an economy. (Note: in the United Kingdom, the term RPI, standing for retail price index is used instead of CPI.)

CPIX — *consumer price index* excluding credit services/charges (such as mortgage costs). Usually constructed by the national statistical agency, a CPIX excludes the effect of interest rates. This is because interest rates and mortgage costs tend to move in the opposite direction to other goods and services' prices responding to monetary policy changes. For example, if monetary policy is tightened in order to reduce inflationary pressure, the effect is to dampen price increases for most goods and services, but mortgage interest rates actually increase.

In New Zealand's case, a CPIX measure replaced the use of a Reserve Bank constructed measure of *underlying inflation* to monitor *price stability* in December 1997. The CPIX was in turn replaced by a refined CPI measure in September 1999 which now excludes both interest rates and land prices.

deflation — a sustained fall in the overall level of prices in an economy; a negative inflation rate. Rare over the past few decades, deflation has recently attracted renewed prominence since Japan has been afflicted by it over the past couple of years. The most prominent example of deflation in the last century was the Great Depression of the 1930s.

disinflation — a reducing rate of inflation. Inflation is still increasing, but the rate of increase is falling. Hence, a disinflationary path is a process whereby an economy (or, more specifically a *central bank*) seeks to progressively reduce its inflation rate from high to low levels.

escape clauses (caveats) — situations or circumstances that a central bank operating an inflation targeting framework can overlook breaches in their *target range* or *target point* because they are beyond the influence of the bank. Common examples include natural disasters, increases in indirect taxes, or major supply shocks (such as a major increase in the price of oil).

GDP — gross domestic product: a measure of the total value of goods and services produced by an economy over a specified time period. GDP provides an estimation of the size of the economy.

headline inflation — see *consumer price inflation.*

inflation — a persistent increase in the general/overall level of prices in an economy, which consequently reduces purchasing power. Inflation is usually measured by a *consumers price index,* although some countries monitor alternative measures such as *CPIX* or *underlying inflation* for the operation of their *monetary policy*.

long term (or long run) — in strict economic terms this refers to the time it takes to vary all factors of production (labour and capital) but not change the type of technology used. With regards to the operation of monetary policy the long term usually implies a period of several years or more, but there is no tight definition.

medium term (or medium run) — there is no tightly defined time frame for the medium term, but in practice it generally refers to a time period of over one year up to around a maximum of 3-5 years. Within this time span a change in an interest rate by a central bank fully flows through the *transmission mechanism* to affect *aggregate demand* and *inflation*. See also Box 2 in this paper.

menu costs — costs to businesses resulting from high inflation. The high inflation rate requires the businesses to frequently adjust their prices, for example, by updating price tags, changing published price lists, billboards, etc.

monetary policy — the actions a central bank takes to control the money supply in an economy and influence the level of interest rates and the exchange rate.

money supply	the total stock of money in an economy that can be freely exchanged for goods and services. Money is defined in several varying ways, with narrow money supply referring to notes and coins, while broader definitions include less liquid forms of money such as bank deposits.
neutrality of money	the view that over a period of a few years, the level and growth of money supply in an economy (as controlled by a *central bank*) can only affect the inflation rate and not real economic variables such as economic growth or employment.
nominal interest rates	interest rates unadjusted for the effects of inflation.
OCR	the Official Cash Rate. This is the interest rate which the Reserve Bank of New Zealand sets for overnight borrowing and lending between itself and commercial banks. The level of the OCR in turn influences the level of retail interest rates. The OCR is the main tool the Reserve Bank uses to control *monetary policy* in the New Zealand economy.
policy targets agreement (PTA)	this negotiated contract between the Reserve Bank Governor and Minister of Finance defines *price stability* for the purposes of the bank operating *monetary policy* and inflation targeting. The current PTA was signed on 17 September 2002 and requires the Reserve Bank to aim to keep annual "CPI inflation outcomes between 1-3% on average over the medium term."
price mechanism	the process by which markets set prices based on the laws of supply and demand.
price stability	in strict economic terms price stability refers to a zero *inflation* rate. In practice, all central banks using inflation targeting have defined price stability as low and stable inflation of around 1-3%.
real interest rates	interest rates adjusted for inflation. They refer to the actual return to lenders on the loans they make when the effects of inflation have been accounted for. See Box 1 on page 6.
Reserve Bank Act (1989)	the legislation that gives the Reserve Bank independence from direct government control and states the central bank's primary function with its control of *monetary policy* is to maintain *price stability* in the economy. The definition of price stability is stated in a *policy targets agreement (PTA)* negotiated between the Government and the Reserve Bank.
risk premium	the additional return that investors require to induce them to invest when returns are uncertain (risky).
shoe leather costs	refers to an increase in transaction costs when inflation is high enough to discourage people from holding on to money (in the form of cash) for long time periods.
short term (or short run)	normally in economics this refers to an unspecified time period when it is possible to vary some inputs in a production process (e.g. the number of workers in a factory) but not others (the size of the factory). For monetary policy it generally refers to a period of approximately less than one year when a change in an interest rate has affected borrowing costs but not aggregate demand and the rate of inflation.
target range and target point	central banks pursuing inflation targeting have tended to either adopt a target range, where they aim to keep annual inflation with a band of normally a couple of percentage points (e.g. 1-3%) or aim for a specific target point, but allow for a tolerance level for deviations of actual inflation around that point (e.g. point of 2.5% annual inflation with tolerance of plus or minus 1 percentage point).
transmission mechanism	the process by which changes in *money supply* by a *central bank* flow through the economy to eventually affect *aggregate demand* and *inflation*.
underlying inflation (also called core inflation)	an alternative measure of inflation (to the usual *CPI* measures best understood by the public) that are sometimes used by central banks to monitor price stability in an economy. Underlying inflation measures typically exclude more "volatile" items such as some primary commodity goods, taxes and duties, and interest rates. A *CPIX* measure is a type of underlying inflation indicator. The Reserve Bank of New Zealand estimated its own measure of underlying inflation up until December 1997 (see CPIX above)>

Appendix 1: Inflation target frameworks in various countries[56]

Country	Date inflation targeting implemented	Target range or point for annual inflation and who sets it[57]	Indicator used to assess inflation	Horizon of inflation target	Accountability for target misses	Escape clauses regarding target misses?	Transparency & publication of monetary policy information by central bank
Australia	1993	2-3% target range on average over the medium term (business cycle). Set by the Reserve Bank of Australia.	CPI	Over the business cycle (i.e. multi-year)	None, although changes in monetary policy by central bank are publicly announced and explained.	None	Quarterly statements on monetary policy Bank governor appears before a Parliamentary Standing Committee twice a year.
Brazil	June 1999	3.5% target point with ±2% points tolerance (2002). 3.25% target point with ±2% points tolerance (2003). Set by National Monetary Council of central bank on basis of proposals by Ministry of Finance.	National consumer price index (the "IPCA"); this is actually a measure of inflation in nine metro areas plus two other urban areas.	One year.	President of central bank must issue an open letter to Minister of Finance explaining the cause of the target breach and what measures have been taken, along with the time required, to bring inflation back to target..	None	Quarterly Inflation Report. Publication of inflation projections (2 year fan charts). Publication of minutes 2 weeks after meetings of monetary council.
Canada	February 1991	1-3% target range with monetary policy aimed at keeping inflation at the 2% midpoint. Set jointly by government and central bank.	CPI, although core inflation is used as an operational guide by the bank to reduce likelihood bank will react to short-term volatility in the CPI.	Multi-year (to 2006 under current arrangement).	If inflation persistently deviates from target midpoint, the central bank gives special attention in its public reports to explaining the reason and how and when it expects to bring inflation back towards the midpoint.	Revision of the target under very exceptional circumstances such as a major oil supply crisis or natural disasters.	Semi-annual Monetary Policy Statement with semi-annual Updates (resulting in a quarterly publication of monetary policy review and outlook). Publication of inflation projections.
Chile	January 1991	2-4% target range, with central bank using the 3% midpoint as an operational target to guide monetary policy over the medium-term. Set by central bank in consultation with the government.	CPI, although central bank monitors core inflation (which excludes vegetable, fruit and fuel prices).	12-24 months, but also with a medium term target.	None	None	Monetary Policy Report published 3 times a year. Publication of monetary policy meeting minutes.

[56] In addition to the listed countries, both Finland and Spain had inflation targeting frameworks prior to becoming members of the European Central Bank in January 1999.
[57] Inflation targets provided are the latest available ones in use. With the exception of a couple of countries (notably Australia, which introduced inflation targeting after reducing inflation), most listed countries have in the past used different target ranges, especially if their central banks have pursued a disinflationary strategy to reduce inflation to low levels.

Country	Date inflation targeting implemented	Target range or point for annual inflation and who sets it[57]	Indicator used to assess inflation	Horizon of inflation target	Accountability for target misses	Escape clauses regarding target misses?	Transparency & publication of monetary policy information by central bank
Colombia	September 2000	6% target point for 2002 set jointly by government and central bank.	CPI	One-year	None	None	Quarterly Inflation Report. Monthly publication of inflation forecasts and observed outcomes of inflation. Semi-annual report to Congress by central bank directors on monetary policy developments.
Czech Republic	January 1998	3-5% target range for 2002, declining to 2-4% in 2005.	Headline inflation.	Multi-year, but with annual adjustments.	None	Supply shocks that result in major changes in world raw material prices; natural disasters; major change in agricultural production; indirect taxes.	Quarterly inflation reports. Minutes of bank board meetings published within 12 days. Inflation projections published with one year horizon.
Hungary	June 2001	Disflationary path set by Monetary Council of central bank: 4.5% target point with ±2% points tolerance (2002). 3.5% target point with ±2% points tolerance (2003). 2-2.5% target range (2004/5).	Headline inflation.	Multi-year with annual downward revisions.	None (?)	Central bank will respond to inflationary shocks only if they are permanent in nature and threaten the medium term inflation target.	Quarterly Report on Inflation; includes forecasts of inflation looking six quarters ahead.
Iceland	March 2001	2.5% target point with ±1.5% points tolerance (the upper tolerance for 2002 has been set at +2% points). Set by bank, on agreement with Prime Minister.	CPI (excluding mortgage interest payments).	Achieve stable 2.5% inflation by end of 2003.	Central bank must explain deviations of greater than ±1.5% points (or -1.5% point, +2% point in 2002) to government and publicly release the report.	None (?)	Quarterly Monetary Bulletin contains inflation forecasts (2 year forecast horizon). Immediate press release of policy decisions, including explanation of reasons for any policy changes.
Israel	1992	2-3% (2002) 1-3% (2003 onward) Set by government in consultation with	CPI	One year; from 2003 indefinite.	Public explanation when deviations from target are greater than ± 1% point.	None	Semi-annual Inflation Report (although inflation forecasts are not published). Communications to Parliament. Annual Monetary Survey.

Country	Date inflation targeting implemented	Target range or point for annual inflation and who sets it[57]	Indicator used to assess inflation	Horizon of inflation target	Accountability for target misses	Escape clauses regarding target misses?	Transparency & publication of monetary policy information by central bank
Korea (South)	April 1998	3% target point with ±1% tolerance band for 2002. Medium term target is for 2.5% inflation. Set by bank in consultation with government.	Underlying inflation (headline inflation minus non-cereal agricultural products and petroleum-based products).	One-year but with a medium term target.	None	None	Monetary Report published and submitted to Parliament. Monthly account of monetary policy direction.
Mexico	January 1999	Less than 4.5% inflation for 2002. Medium-term target to lower annual inflation to 3% by end of 2003. Target set by bank.	CPI	Multi-year	None	None	Quarterly Inflation Reports.
New Zealand	April 1988[58]	0-3% target range (up until 17 September 2002) 1-3% target range on average	CPI (which now excludes interest charges and property section prices)	Governor's term of office (five-year term)	Public explanation why target breached and what measures have been taken, along with the time required, to bring inflation back to target. Under the Reserve Bank Act 1989, the bank Governor can also technically dismissed for breaches of the target range.	Unusual events such as natural disasters, international commodity price shocks, or significant change in indirect taxes.	Quarterly Monetary Policy Statement, with reporting to Parliamentary Select Committee on monetary policy developments.
Norway	March 2001	2.5% target point with a ±1% tolerance band. Set by government.	Underlying inflation (excludes taxes and excise duty changes and extraordinary disturbances)	Two years.	Central bank must provide explanation for target misses to government.	None (?)	Inflation Report published 3 times per year, reinforced by further assessments every six weeks by bank's executive board. Minutes of board's meetings published.

[58] The introduction of inflation targeting by New Zealand is often given as early 1990. This was when the Reserve Bank Act 1989 was implemented. However, a plan to reduce inflation to within a 0-2% target range by the early 1990s was formulated in 1988 following the announcement in April by the then-finance minister, Roger Douglas, to direct monetary policy towards lowering inflation (Sherwin, 1999, p.73).

Country	Date inflation targeting implemented	Target range or point for annual inflation and who sets it[57]	Indicator used to assess inflation	Horizon of inflation target	Accountability for target misses	Escape clauses regarding target misses?	Transparency & publication of monetary policy information by central bank
Peru	1994	1.5-2.5% range (2002) 1.5-2.5% range (2003) Set by central bank in consultation with government.	CPI	Annual	None	None	?
Philippines	January 2002	5-6% target range (for 2002); 4.5-5.5% (for 2003) Set by central bank.	CPI, although four core inflation measures are monitored by the central bank.	Two years	Open letter from Bank Governor to President of Philippines explaining why actual inflation breached target and measures adopted by the bank to bring inflation back into the target range.	?(Bank in its primer suggested it may use escape clauses but not sure if does)	Highlights of bank's Monetary Board discussions on monetary policy are published after six weeks.
Poland	1999	5% target point with ±1% point tolerance band for 2002; medium term goal of lowering inflation to less than 4% by end of 2003.	Headline inflation.	Multi-year with annual downward revisions.	None	None	Quarterly Inflation Report (but no inflation forecasts released to public). Monetary Policy Guidelines released in September annually providing inflation target for following year. Press releases after each meeting of Monetary Policy Committee.
South Africa	February 2000	3-6% target range (for 2002-3) 3-5% target range (2004-5) Set by central bank.	CPIX (excludes mortgage interest costs).	Multi-year	None	Bank will make allowance will be made for serious supply shocks.	Semi-annual Monetary Policy Review. Regular reporting by bank to Parliament.
Sweden	January 1993	2% target point with ±1% point tolerance band. Set by central bank.	CPI, although bank policy decisions take into account underlying inflation (which excludes mortgage interest costs and indirect taxes).	Indefinite	None	None	Quarterly Inflation Report. Minutes of Monetary Policy Committee meetings published after 2 weeks. Written account of monetary policy to a Parliamentary Standing Committee at least twice a year.
Switzerland	January 2000	Target of less than 2% inflation (in line with European Central Bank). Set by central bank.	CPI	3 years	None	Unusual events provided they don't produce general inflationary pressure.	Medium term inflation forecast published twice yearly. Assessment of monetary policy published quarterly.

Country	Date inflation targeting implemented	Target range or point for annual inflation and who sets it[57]	Indicator used to assess inflation	Horizon of inflation target	Accountability for target misses	Escape clauses regarding target misses?	Transparency & publication of monetary policy information by central bank
Thailand	April 2000	0-3.5% set by the government in consultation with the central bank.	Underlying CPI (excludes raw food and energy prices).	Indefinite	The central bank's Monetary Policy Committee must publicly explain why target breached and what measures have been taken, along with the time required, to bring inflation back to target.	None	Quarterly inflation report. Publication of 2-year inflation projections (using fan charts). Publication of minutes of Monetary Policy Committee meetings.
United Kingdom	October 1992	2.5% target point with ± 1 percentage point tolerance band. Set by government.	RPIX (Retail price index minus mortgage interest costs.)	Indefinite	Open letter from Bank Governor to Chancellor of Exchequer explaining why target breached and what measures have been taken, along with the time required, to bring inflation back to target.	None	Quarterly Inflation Report; includes 2 year "fan chart" projections of inflation and GDP. Minutes of Monetary Policy Committee meetings published after 2 weeks.

Sources: IMF International Financial Statistics (July 2002); IMF, Staff Country Reports, various countries; Mishkin (2002); Mishkin and Schmidt-Hebbel (2000); Morande (2001); OECD, various country Economic Surveys; Sherwin (1999); Various central bank websites.

Appendix 2: Consumer price inflation among inflation targeting countries, 1997-2001

Annual average % changes

	1997	1998	1999	2000	2001	**Annual average % change, 1997-2001**
Australia	0.3	0.8	1.5	4.5	4.4	2.3
Brazil	6.9	3.2	4.9	7.1	6.8	5.8
Canada	1.6	1.0	1.8	2.6	2.6	1.9
Chile	6.1	5.1	3.3	3.8	3.7	4.4
Colombia	18.5	18.7	10.9	9.2	8.0	13.1
Czech Republic	8.5	10.7	2.1	3.9	4.8	6.0
Hungary	18.3	14.1	10.0	9.8	9.2	12.3
Iceland	1.8	1.6	3.3	5.1	6.4	3.6
Israel	9	5.5	5.2	1.1	1.3	4.4
Japan	1.8	0.6	-0.3	-0.7	-0.7	0.1
Korea	4.5	7.5	0.8	2.2	4.1	3.8
Mexico	20.6	15.9	16.6	9.5	6.3	13.8
New Zealand	**1.2**	**1.3**	**-0.1**	**2.6**	**2.6**	**1.5**
Norway	2.7	2.2	2.4	3.0	3.0	2.7
Peru	8.5	7.3	3.5	3.8	2.2	5.1
Philippines	5.7	9.7	6.7	4.3	6.3	6.5
Poland	14.8	11.6	7.3	10.1	5.5	9.9
South Africa	8.6	6.9	5.2	5.3	5.6	6.3
Sweden	0.9	0.4	0.3	1.4	2.6	1.1
Switzerland	0.5	0.1	0.8	1.6	1.0	0.8
Thailand	5.7	8.1	0.2	1.6	1.9	3.5
United Kingdom	3.2	3.4	1.6	2.9	1.8	2.6

Source: Economist Intelligence Unit: *2002 Country by Country;* OECD, www.sourceoecd.org

Bibliography

Akerlof, G A, Dickens, W T & Perry, G L 1996, The Macroeconomics of Low Inflation. *Brookings Papers on Economic Activity* 1, pp. 1-59.

Andrés, J & Hernando, I 1999, Does Inflation Harm Economic Growth? Evidence From the OECD, in *The Costs and Benefits of Price Stability*, Feldstein, M, Chicago, The University of Chicago Press: pp. 315-339.

ANZ Economics (NZ) 2002, RBNZ Policy Target Eased to 1-3% over the Medium Term, *New Zealand Economic News*, 17 September.

Bancorp NZ Limited 2002, Policy Targets Agreement – New Fuzzy and Flexible PTA, *Economic Alert – Press Release*, 17 September.

Bank of England 2002, *Low inflation and business*, Bank of England

Barro, R J 1995, Inflation and Economic Growth. *Bank of England Quarterly Bulletin*, May, pp. 166-176.

Bernanke, B S, Laubach, T, Mishkin, F S & Posen, A S 1999, *Inflation Targeting, Lessons from the International Experience.*, Princeton University Press, Princeton.

Blanchard, O 2000, *Macroeconomics*, Prentice Hall International Inc., New Jersey.

—— 2001, The Long and Large Decline in U.S. Output Volatility. *Brookings Papers on Economic Activity* Spring, pp. 135-.

Briault, C 1995, The Costs of Inflation. *Bank of England Quarterly Bulletin* 35(1), February, pp. 33-45.

Brittan, S 1995, Elusive Case for Stable Prices, *Financial Times,* 18 May.

—— 2002, Inflation Can Be Too Low, *Financial Times,* 5 June.

Conway, P & Orr, A 2001, *Comments on the Independent Review of Monetary Policy*, Westpac Institutional Bank, Wellington, April www.wib.westpac.co.nz

Cullen, M 2001, *Government Response to Monetary Policy Review (Media Statement)*, 30 May www.beehive.govt.nz/ViewDocument.cfm?DocumentID=10720

Dennis, R 1997, Bandwidth, Bandlength, and Inflation Targeting: Some Observations. *Reserve Bank of New Zealand Bulletin* 60(1), pp. 22-26.

Drew, A & Orr, A 2001, The Reserve Bank's Role in the Recent Business Cycle: Actions and Evolution. Reserve Bank of New Zealand Bulletin 60(1), March, pp. 2-23.

Faber, M S & Ruoss, E 2000, Money and Monetary Policy. *Bildung und Wirtschaft* 2000/1.

Fallow, B 2002, Economists Question Bank's Tight Targets, *The New Zealand Herald,* 4 July.

Fischer, S 1997, *Maintaining Price Stability*, Federal Reserve Bank of Minneapolis, Minneapolis, 1 June

Ghosh, A & Phillips, S 1998, Warning: Inflation May Be Harmful to Your Growth. *IMF Staff Papers* 45(4), December.

International Monetary Fund 2002, Monetary Policy in a Low Inflation Era. *World Economic Outlook*, April, pp. 85-103.

Khan, M S & Senhadji, A S 2001, Threshold Effects in the Relationship Between Inflation and Growth. *IMF Staff Papers* 48(1), pp. 1-21.

Krugman, P 1996, Stable Prices and Fast Growth: Just Say No. *The Economist*, 31 August, pp. 15-18.

Lyons, P 2002, Balancing Inflation and Growth, *The New Zealand Herald,* 2 July.

Meyer, L H 2001, *Inflation Targets and Inflation Targeting*, Federal Reserve Bank of St. Louis, November/December

Mishkin, F S 2000a, *From Monetary Targeting to Inflation Targeting: Lessons from the Industrialised Countries*, Graduate School of Business, Columbia University and National Bureau of Economic Research, January.

—— 2000b, *Issues in Inflation Targeting*, Graduate School of Business, Columbia University and National Bureau of Economic Research, June.

Mishkin, F S & Schmidt-Hebbel, K 2000, *One Decade of Inflation Targeting in the World: What do We Know and What do We Need to Know?* , November.

Monetary Policy Committee Bank of England 2000, *The transmission mechanism of monetary policy*, Bank of England, London, www.bankofengland.co.uk/montrans.pdf

New Zealand Bankers' Association 1997, *Banking in New Zealand*, New Zealand Bankers' Association, Wellington.

Orr, A 2002, *Don is Gone, All Hail the PTA! August 14 MPS Review*, Westpac Institutional Bank, Wellington, 12 August

Pétursson, T 2000, Exchange Rate or Inflation Targeting in Monetary Policy? *Monetary Bulletin (Iceland)* 2000/01, pp. 36-44.

Reserve Bank of New Zealand 1999a, *Monetary Policy Over the Business Cycle*, Reserve Bank of New Zealand, Wellington, May.

—— 1999b, *Briefing on the Reserve Bank of New Zealand 1999*, Reserve Bank of New Zealand, Wellington, November.

—— 2001, *Inflation Targeting in Principle and in Practice*, Reserve Bank of New Zealand, Wellington.

Sarel, M 1996, Nonlinear Effects of Inflation on Economic Growth. *IMF Staff Papers* 43(1), March, pp. 199-215.

Sherwin, M 1999, Inflation Targeting: 10 years on. *Reserve Bank of New Zealand Bulletin* 62(3), pp. 72-80.

Sniderman, M S 1996, Inflation Targets: The Next Step for Monetary Policy. *Economic Commentary*, August 1.

Sterne, G 1999, The Use of Explicit Targets for Monetary Policy: Practical Experiences of 91 Economies in the 1990s. *Bank of England Quarterly Bulletin*, August.

—— 2002, Inflation Targets in a Global Context, in *Inflation Targeting: Design, Performance, Challenges*, Loayza, N, Santiago Chile, Central Bank of Chile: pp. 23-77.

Stevens, G R 1999, Six Years of Inflation Targeting, *Reserve Bank of Australia Bulletin*, May, pp. 46-61.

Svensson, L E O 2001, *Independent Review of the Operation of Monetary Policy in New Zealand: Report to the Minister of Finance*, Institute for International Economic Studies, Stockholm University, February.

Temple, J 2000, Inflation and Growth: Stories Short and Tall. *Journal of Economic Surveys* 14(4), pp. 395-425.

The Economist 1992, Zero inflation: How low is low enough? *The Economist*, 7 Nov, pp. 21-24.

—— 1995, Death by deflation, *The Economist*: p. 86.

—— 1995, The cost of inflation. *The Economist*, 13 May, p. 90.

—— 1999, A new economy for the New World? *The Economist*, 23 September.

—— 2001, The new bogey, *The Economist*, 15 November.

—— 2001, On target? *The Economist*, 30 April.

Vickers, J 1999, Price Stability in the UK, www.bankofengland.co.uk/speeches/speech44.pdf

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