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## Contents



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# Editor's Note

When one thinks about a central bank, one tends to think mainly about monetary policy, given that this is the most visible function of most central banks. But central banks have more strings to their bow than monetary policy. This is certainly true for the Reserve Bank of New Zealand. In addition to having responsibility for monetary policy, we also have major responsibilities in a range of other areas, including oversight of the financial system, registration and supervision of banks, advising on exchange rate policy issues, managing foreign exchange reserves and managing bank notes and coins. In addition, the Bank maintains an involvement in a range of other policy issues, such as currency union issues, the factors that influence the potential growth of the economy and the implications of a low saving rate for the economy. And there is much to the Bank behind the scenes. As an organisation with a major balance sheet and with responsibility for important policy issues, there is a need for the Bank to maintain sound practices in corporate governance, risk management and the management of human resources.

The *Bulletin* provides a vehicle for giving exposure to a number of these issues and to reveal aspects of the Bank's functions and organisation that tend to fall in the shadows of its higher profile functions. In recent issues of the *Bulletin*, we have attempted to broaden the range of subject matter to provide a greater understanding of the Bank's lesser known functions and to promote a better informed public debate on various policy issues. This issue of the *Bulletin* is no exception. It contains six articles and two speeches, covering a wide range of topics. Indeed, there is "something for everyone" in this issue.

The first article, *The Taylor rule and its relevance to New Zealand monetary policy*, relates to the Bank's monetary policy function and discusses the use that the Bank makes of what has become known as the "Taylor rule". The Taylor rule is a formula devised to assist central banks to assess the appropriate level of short-term interest rates in order to produce a desired inflation outcome. It is based on relationships between the output gap, neutral real interest rates and the extent to which actual inflation has departed from the desired inflation target. The article notes that the Taylor rule provides a useful input into the monetary policy decision-making process at the Bank, but is merely one of many pieces of information to which the Bank has regard when deciding where to set the Official Cash Rate.

The second article, *Exchange rate strategies for small open developed economies such as New Zealand*, continues the series of articles we have published in recent editions of the *Bulletin* on exchange rate-related issues. It is an edited version of a paper presented by the Bank to an economic workshop on Exchange Rate Strategies for Developed Open Economies in the New Millennium, held in Wellington in February 2002. The article notes that the large swings in the New Zealand exchange rate over the past decade have promoted debate on alternative exchange rate strategies that might allow for reductions in exchange rate variability, and potentially better economic growth performance. In discussing these issues, the article compares exchange rate volatility and cyclical variability for the New Zealand dollar with other currencies and assesses the merit of different options available to reduce exchange rate movements.

An important aspect of the business of most organisations is communication. This is no less true for a central bank, where communication plays an important role in promoting clear understanding of policy decisions and better informed debate on policy issues. The third article, *The Reserve Bank's External Communications*, deals with these issues. It reviews the way the Bank communicates its decisions and policies to external audiences and assesses why the Bank needs a communications programme, the methods used, and the way evolving circumstances are changing the Bank's approach to its external communications.

A change of theme is introduced in the fourth article - *Managing Human Resources – A central bank perspective*. This article looks behind the public image of the Bank and summarises developments in its human resources policies and practices over recent years. The management of human resources is a vital area of most organisations, but it is especially important for a central bank, given that credibility is a central bank's most important attribute, and that the quality of its staff are integral to a central bank's performance and credibility. Therefore, managing human resources effectively is a critical element in maintaining an effective and credible central bank. This article summarises the evolution of the Bank's approach to human resources management, placing this in the context of the changes that

have occurred within the Bank's structure and governance arrangements over the last decade or so.

Indicators of market expectations based on option prices are gaining in popularity among central banks. The Bank recently began to use these indicators in financial stability and monetary policy analysis. An article in this edition of the *Bulletin* – *Extracting market expectations from option prices* – provides a non-technical overview of these techniques and highlights how they might be used, through examples. The article discusses techniques that use information in the prices of financial options to reveal the nature of the uncertainty that surrounds the market expectations about financial market indicators, such as stock indices and the exchange rate.

In May 1999, the Bank issued its first polymer bank note into circulation. By March 2000 all denominations had been converted from paper to polymer. By the end of 2001 approximately 110 million polymer notes had been issued into circulation. The polymer notes were introduced for a number of reasons, including their enhanced security features (and therefore a lower risk of counterfeit), longer life and lower processing costs. Now that the first of the polymer notes have been in circulation for nearly three years, it is timely to assess their performance against the expectations that the Bank had of them when they were introduced. That is the purpose of the article – *Polymer bank notes – the New Zealand experience* – in this edition of the *Bulletin*.

Also included in this edition of the *Bulletin* are two speeches given recently by the Governor of the Bank, Don Brash. One of these speeches – *Inflation targeting 14 years on* – reviews the New Zealand approach to inflation targeting and assesses its achievements. The second speech – *An indebted people* – discusses the extent of New Zealand's external indebtedness and the implications of this for the economy.

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ARTICLES

# The Taylor rule and its relevance to New Zealand monetary policy

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The Taylor rule is a simple formula devised to mimic the United States Federal Reserve's interest rate decisions and is thought to perform well in the United States. It is based on relationships between the output gap, neutral real interest rates and the extent to which actual inflation has departed from the desired inflation rate. This article discusses some strengths and weaknesses of the Taylor rule, and then puts it into the New Zealand context. To the extent that it is appropriate for New Zealand, the Taylor rule might provide a useful input into the monetary policy decision-making process at the Reserve Bank. We compare New Zealand's short-term interest rate path with that suggested by the Taylor rule, and discuss how the Bank can use the Taylor rule as part of its framework for thinking about interest rate decisions.

## 1 Introduction

Where should the Reserve Bank set interest rates so that inflation remains within, or returns to, the target range of 0 to 3 per cent? The Governor of the Reserve Bank considers this question and makes scheduled announcements on his conclusion eight times each year. In deciding on where to set the Official Cash Rate (OCR), the Bank considers all available information relevant to inflationary pressures, particularly information relating to the future state of the economy.

Because it is recognised for its ability to mimic the general pattern of interest rate movements, we keep an eye on a range of New Zealand formulations of the Taylor rule when reaching a view on the OCR. The Taylor rule was first proposed by John Taylor (1993). It is a simple formula to calculate an appropriate level of the short-term interest rate as a function of three key variables: the neutral real interest rate, the level of inflation relative to the inflation target, and the output gap (the level of excess demand or spare capacity in the economy). Not only does the Taylor rule mimic the general pattern of interest rates, it seems to be a relatively useful way of thinking about monetary policy decisions in many different models of how actual economies work.

However, the Taylor rule only directly controls for two variables that the policy-maker uses in the monetary policy decision – inflation and the output gap – and assumes that the neutral real interest rate is constant. Therefore, it leaves out many other factors that might affect the future state of the economy and hence the monetary policy decision. As Taylor points out in his 1993 paper, it is not clear that the policy-maker should respond in the same way every time to changes in the output gap or inflation. As discussed later in this article, there are important factors that cause a central bank to set interest rates at a level that differs materially from what the Taylor rule suggests, which is why the Taylor rule mimics actual monetary policy decisions imperfectly.

It is also important to recognise that the Taylor rule relies on estimates of variables that are robust in concept, but very difficult to measure in practice, such as the neutral real interest rate and the output gap. Notwithstanding these limitations, the Taylor rule is a useful analytical framework to assist a central bank in the monetary policy decision making process.

This article discusses some strengths and weaknesses of the Taylor rule in section 2, and whether the Taylor rule is better thought of as a broad benchmark for interest rate decisions rather than as a rule per se. In section 3, we compare and contrast actual interest rates with those the Taylor rule would have implied for the New Zealand economy in recent periods. Section 4 examines some difficulties in using the Taylor rule

[1] The authors would like to thank Geof Mortlock, David Archer, Nils Björksten, Yuong Ha, David Hargreaves, Leni Hunter, Weshah Razzak, Michael Reddell and other colleagues for their comments and assistance in preparing this article.

to give policy advice in real time. We summarise our main points in the conclusion.

## 2 The Taylor rule – assessing its strengths and weaknesses

There is an extensive literature on the relative merits of the Taylor rule. This section provides a brief summary of some key points in the debate from the Bank's perspective, rather than a comprehensive survey.

### The form of the Taylor rule

The Taylor rule is a simple reaction function. Its simplicity is both a virtue and a weakness. The Taylor rule says that short-term interest rates should be "neutral" on average, so that the central bank does not cause persistent inflationary or disinflationary pressures, and that interest rates should be adjusted in response to the current state of the economy. If demand is high relative to productive capacity, short-term interest rates should be raised, and if inflation is above target, interest rates should be raised. Conversely, if the economy is operating below its capacity, or inflation is running below the target inflation rate, the Taylor rule suggests that short-term interest rates should be reduced.

More precisely, the Taylor rule is summarised by the following equation:

*Desired interest rate = Neutral real interest rate + Inflation + ½ (Inflation – Inflation target) + ½ Output gap*

To determine what the OCR implied by the Taylor rule is at any point in time, we must know the neutral real interest rate (NRR), the output gap, inflation, and the Bank's inflation target.

Both the neutral real rate and the output gap are unobserved variables, unlike nominal interest rates or exchange rates. Because of their unobservable nature, there exists substantial disagreement on the precise definitions, and uncertainty over how well different measurement techniques capture the underlying concepts. This problem is not unique to the Taylor rule though, and is common to many other alternative formulae and models as well. For example, the Bank's Forecasting and Policy System (FPS), the model the Bank uses for forecasting the economy to assist it in formulating monetary policy decisions, produces forecasts of inflation that depend on both the neutral real rate and the output gap. These inflation forecasts feed into policy advice on what the appropriate level of the interest rate is.

The Bank defines the neutral real rate as 'the interest rate that would prevail if there were no inflationary or deflationary pressure requiring the central bank to lean in either direction' (Archibald and Hunter, 2001, p 17). When inflation is at target and the output gap is zero the Taylor rule recommends a nominal interest rate equal to the neutral real rate plus inflation.

Although the concept of the neutral real rate is valid, there are significant difficulties in actually measuring it. As Archibald and Hunter explained, the neutral real rate can be estimated in a number of different ways, but not very precisely. Moreover, the neutral real rate is unlikely to be constant through time; it is likely to vary depending on investor/borrower preferences, risk premia and other factors. Reflecting these uncertainties, the Bank has estimated a wide range of possible neutral real rates for New Zealand, ranging from 2.8 per cent to 5.6 per cent. Plantier and Scrimgeour (2002) suggest that uncertainty about the level of the neutral real rate poses a problem for the Taylor rule. Moreover, average interest rates over recent history may not be a good indication of what the current neutral real rate is. However, more sophisticated estimation techniques do not reduce the uncertainty about the level of the neutral real rate a great deal.

Another difficulty associated with the Taylor rule is the estimation of the output gap. The output gap measures the difference between the sustainable productive capacity of the economy (potential output) and the actual level of production or demand in the economy (typically measured by Gross Domestic Product). In the absence of countervailing factors, a positive output gap (where demand exceeds the sustainable productive capacity of the economy) will give rise to inflationary pressures, while a negative output gap will cause inflationary pressures to subside.

Although the output gap is conceptually useful, it is difficult to measure. Measuring potential output is particularly

problematic, given inadequacies in the data available and the inherent difficulty in identifying capacity constraints. Moreover, potential output growth is not constant through time – it varies in line with a range of factors, such as shifts in the labour force, productivity and technology. There are also difficulties in estimating actual output accurately, due to lags in data becoming available and the measurement difficulties in various data series. Orphanides et al (2000) argue that monetary policy should take less account of the output gap when there is uncertainty about how to measure potential output. Instead it should focus more on inflation developments. Furthermore, Orphanides (2001) suggests that these measurement problems require a cautious interpretation of the interest rate profile currently suggested by the Taylor rule for past years, as it incorporates information about potential output available now, but not at the time policy decisions were made.

In addition, we have many different measures of inflation available, and it is not always clear which is the most appropriate indicator of future inflationary pressure. The Taylor rule normally incorporates a response to CPI-based "headline" inflation. The headline inflation rate does not incorporate an adjustment for the effects of transitory factors such as changes in indirect taxes or one-off changes in oil prices. Headline inflation can therefore misrepresent the nature of underlying or persistent inflation in the economy, and is not necessarily the most appropriate measure of inflation for monetary policy decision making purposes. Therefore, it may be appropriate for the Taylor rule to use a measure of "core" inflation, which excludes such one-off influences on prices.

Another potential difficulty for the Taylor rule is that it requires an inflation target that is expressed as a particular inflation rate. For New Zealand, the official inflation target is a range – currently 0 to 3 per cent. However, for the purpose of the Taylor rule and models such as FPS, we usually represent the mid-point of that range as our inflation target – ie 1.5 per cent.

## Optimality vs robustness

There is a large range of alternative reaction functions (that is, ways of adjusting interest rates in response to economic developments) that central banks can consider when setting monetary policy, of which the Taylor rule is just one. Ideally, the central bank would like to use the "optimal" reaction function – the one that most consistently produces interest rate outcomes consistent with keeping inflation within the target range. The relative merit of the different rules available is at the heart of recent international research in monetary policy. Many academics and central bankers have compared different policy rules and have identified strengths and weaknesses in each of them. (See Drew and Hunt, 2000, for an example of this type of work.)

Often the Taylor rule is one of the options considered in this type of research. The research suggests that the Taylor rule usually does not provide the best way of deciding where to set interest rates for a given model of how the economy works. Usually there is another formula for setting interest rates that takes into account a broader set of information that is more helpful in controlling inflation rates and dampening economic fluctuations.

In identifying the optimal reaction function, the researcher needs to use a particular model of the economy. The best reaction function may depend on how different parts of the economy are related. However no one knows for certain which model is the right one to use in the analysis. In addition, the structure of the economy (and hence how it should be modelled) changes over time. This brings us to the issue of robustness. Because the merit of a particular rule for setting policy depends on the way the economy works, and because no one has complete understanding of how the economy works, it would be desirable to have a rule that performs well across a range of different conceptions of what drives economic activity and inflationary pressures. It seems that the Taylor rule goes some way to fulfil this robustness criterion (see Levin, Wieland and Williams, 1999, 2001 and Taylor, 1999).

## Independence from FPS

As noted earlier, the Reserve Bank maintains a large model of the New Zealand economy. This model, known as FPS, is a key feature of the Bank's analysis of where the economy is going, and where interest rates need to be set in order to maintain CPI inflation within the middle of the inflation target. Although FPS is a valuable tool in our analysis, it

provides an abstraction of how the actual economy works, as all models do. Sometimes the equations in FPS may not do a good job of modelling the effects of particular shocks. This does not stop FPS from being useful, but there may be occasions where its advice will not be the best possible advice.

To protect ourselves from such a risk, the Bank uses FPS in combination with a wide range of other tools for assessing inflationary conditions, including a good measure of judgement honed from long observation of how the economy works. One such tool is the Taylor rule, which does not depend on a particular model of the economy. (Thus, the Taylor rule is a greater simplification of the problem facing the policy-maker than FPS is.) This can be helpful when there are shocks that FPS cannot model well. Looking at the Taylor rule may help us reduce the risk of making policy errors, by limiting the exposure to any one view of how the actual economy works. The Taylor rule tends to be a good alternative to consider because it seems to be relatively robust to different transmission mechanisms, as highlighted above.

## Backward-looking nature of the Taylor rule

It is widely held that monetary policy needs to be forward-looking to be most effective. Due to the lags inherent in monetary policy – some suggest monetary policy can take up to two years to have its full impact – central banks must think about where the economy is going in the future. When the central bank is forward-looking, it is more likely to be effective in preventing inflationary or deflationary pressures. On the other hand, the Taylor rule is backward-looking – its inputs are data on the recent state of the economy. Therefore, it is arguable that this makes the Taylor rule less useful for monetary policy purposes, given that it does not anticipate the future state of the economy.

The extent to which this is a problem depends on the length of the monetary transmission mechanism and the extent to which the current output gap and inflation provide a reliable guide to the future state of the economy. For example, the longer the monetary transmission lag is, the more forward-looking monetary policy should be (see Batini and Nelson, 2001, and Ha, 2000). Moreover, although the output gap at the time monetary policy is being formulated might be a guide to the future state of the economy (at the time when monetary policy decisions taken today have their full effect on the economy), monetary policy is more likely to be effective if it is based on a more extensive forecast of the future state of the economy – ie by reference to more than just the current output gap. The inability to forecast the future state of the economy with the current output gap and inflation helps to explain the limitations of the Taylor rule in some models.

One way to limit the criticism that the Taylor rule is backward-looking is to use forecasts of inflation and the output gap in the Taylor rule, so as to make the Taylor rule forward-looking. However, this would remove an advantage of the Taylor rule – that its inputs are based on relatively hard data – and would require the specification of a model of how the economy works so that inflation can be forecast.

It is worth noting that the rate of inflation and the level of the output gap both tend to be quite persistent. If inflation is low now, then it is likely to be low in the next quarter and the quarter after that. Similarly, if the output gap is positive now, then it is likely to remain positive for some time. This inertia means that current inflation and the output gap may not necessarily be bad predictors of future inflation and the output gap. In addition, it is difficult to find variables other than current inflation that contain information about future inflation. Therefore, using forecasts of inflation and the output gap may not make a big difference to the advice of the Taylor rule.

## The Taylor rule in an open economy

The Taylor rule does not include an explicit allowance for the effects of the exchange rate. This can be seen as a crucial weakness of the Taylor rule in a small, open economy such as New Zealand's, where the exchange rate can play a major role in economic developments. For example, exchange rate movements can have significant direct effects on the level of prices, inflation expectations and inflationary dynamics. In addition, the exchange rate could be expected to have some impact on the demand conditions for New Zealand goods and services, and therefore indirect effects on inflationary pressures.

Undoubtedly, in an open economy such as New Zealand's, the best way of making monetary policy decisions explicitly

takes into account changes in the exchange rate and their effect on the economy. However, predicting the effects of the exchange rate is not always easy. Recent experience in New Zealand suggests that the exchange rate is not always a reliable indicator of the future state of the economy, and its effect on inflation is by no means predictable.

While the Taylor rule does not account directly for the exchange rate, it does so implicitly. When the exchange rate falls, cyclical output and inflation typically rise. As these two variables are incorporated into the Taylor rule, the Taylor rule takes some account of the effects of exchange rate movements. It is therefore fair to say that, although the Taylor rule does not respond directly to the exchange rate, it does respond indirectly to the effects of the exchange rate.

Some research, eg Conway *et al* (1999), suggests that the central bank should respond to domestic inflation, rather than the CPI (where the latter includes import price inflation). If this is the case, then the Taylor rule's response to headline inflation will be appropriate when domestic inflation is prominent, but not so when inflation in the tradable sector is dominant. A simple remedy for this problem is to use a measure of domestic inflation, such as non-tradable price inflation, in the Taylor rule. On the other hand, Svensson's (2000) results suggest that it is better to respond to CPI inflation than domestic inflation, whether the central bank uses a Taylor rule or a more complex reaction function.

## 3 Does the Reserve Bank follow a Taylor rule?

As noted earlier in this article, the Reserve Bank considers a wide range of factors when making monetary policy decisions. These include a large number of data series on the real economy, monetary and credit data, information on inflation and inflation expectations, information on business and consumer confidence, financial market developments and comprehensive data on the world economy (focusing principally on our main trading partners). And as discussed earlier, we make use of the Bank's FPS model to generate forecasts of the economy and to assess alternative inflation scenarios. We also draw on the information provided to us by the many businesses and economists that we meet with in the course of a forecast round. All of this helps the Bank to build up a picture of the economy, both as it is at the time a monetary policy decision is being made, and as it is expected to be when monetary policy decisions taken at the present will have their effects.

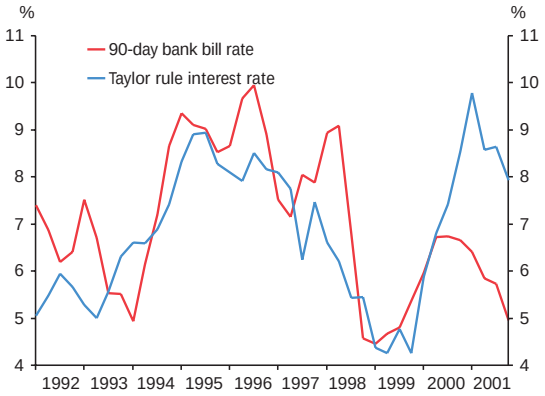
Within this context, the Bank considers other sources of information that may shed light on where the OCR should be set in order to keep inflation within the target band. And this is where the Taylor rule and other models play an important role. Whereas other indicators, such as recent changes in commodity prices, may provide advice on the direction interest rates need to move in, the Taylor rule provides a useful benchmark for checking our thinking on the appropriate level for the OCR. If the Taylor rule suggests an interest rate that deviates significantly from what FPS and our own judgement suggest, that prompts us to reflect further on our assessment of the appropriate setting for monetary conditions.

So the Taylor rule is not used as a "rule" that we implement, but a source of information. Similarly the policy recommendations provided by FPS are not used as rules, but as advice about what interest rates are needed to keep prices stable. Instead of making a commitment to adjust interest rates in one way or another according to some formula, we are committed to maintaining price stability as set out in the Policy Targets Agreement. For us, the Taylor rule is an indicator we look at to help us achieve our price stability objective.

### Taylor rule compared with New Zealand interest rates

Given that the Taylor rule is backward-looking, we might expect quite significant differences between the 90 day interest rates suggested by the Taylor rule and the 90 day interest rates resulting from the Bank's actual monetary policy decisions. Interestingly, there is a broad similarity between the Taylor rule's interest rate profile for New Zealand and the interest rate profile that has resulted from policy decisions made by the Bank, although there have been periods when we have deviated from the interest rate track suggested by the Taylor rule. Figure 1 shows the actual 90 day interest rate track from 1992 onwards and alongside it the interest rate track suggested by the Taylor rule computed for the same period. The graph shows that, while there are differences between what we have done and what the Taylor

Figure 1
New Zealand interest rates and the Taylor rule since 1992




rule suggests we should have done, the Taylor rule does mimic the general pattern of the 90 day rate in New Zealand for most periods.

The graph above demonstrates that there are several recent episodes when the Taylor rule did not mimic our behaviour closely. The three recent periods that stand out are 1996, 1998, and 2001. In 1996 and 1998, interest rates were higher than the Taylor rule would suggest, while in 2001 interest rates were set lower than those implied by the Taylor rule. In 1996, the higher level of interest rates than that suggested by the Taylor rule reflected the Bank's general concern that rising inflationary expectations would become entrenched because we were breaching the then 0 to 2 per cent inflation target range, and because house price inflation was in double digits for much of the year. In 1998, the downward pressure on the exchange rate led to a large increase in short-term interest rates that was later unwound.

These Taylor rule calculations benefit from being able to assess key variables with hindsight, and without the many uncertainties prevalent when policy decisions are actually being made. As it happens, in both cases, policy eventually reverted towards the interest rate indicated by the Taylor rule. However, with only two observations to go on, it would be premature to draw any strong conclusions. To shed more light on why the Taylor rule interest rates and actual interest rates occasionally differ, we now discuss the more recent divergence, namely the interest rate track in 2001.

### 2001 and the Taylor rule

The decisions the Bank made in 2001, to lower the OCR in the face of relatively high inflation, ran counter to the interest rate profile suggested by the Taylor rule. Thinking about what the Taylor rule was saying, and why, helped us to reason more clearly about why we lowered interest rates.

First, early in 2001, the CPI inflation figures were influenced by one-off factors, such as increases in taxes on tobacco, exchange rate depreciation and high oil prices. As these factors were temporary, we put less weight on the increase in headline inflation than the Taylor rule did.

Second, the likelihood of a global slowdown spilling over and reducing inflation in New Zealand was a key consideration in reducing interest rates in 2001. We thought this risk was sufficiently high to reduce interest rates as a form of insurance. On the other hand, the Taylor rule, being backward-looking, made no such judgement.

Lastly, the terrorist attacks in the United States dominated the latter part of 2001. We reasoned that those events would worsen the weakness apparent in some of our major trading partners, and so had implications for economic activity and prices in New Zealand. Again, we reduced the OCR because we were looking ahead, whereas the Taylor rule does not.

## 4 Using the Taylor rule in real-time

Having discussed some important properties of the Taylor rule in section 2, and shown in section 3 that the Taylor rule does not match precisely the Bank's OCR decisions, we turn our attention to the matter of how we use the Taylor rule to inform the decision-making process at the Bank.

The practical difficulties associated with using a Taylor rule in real time stem from uncertainty about the Taylor rule's inputs. In this section we discuss some methods used at the Bank to handle these uncertainties. We discuss uncertainty in the neutral real interest rate (NRR), the inflation rate and the output gap.

## The importance of knowing the NRR

As mentioned above, the NRR concept is quite subjective, and necessarily depends on how one thinks the economy works. The Taylor rule suggests that the current or lagged output gap and inflation are sufficiently good indicators of future inflationary pressure. However, in reality, the economy is much more complicated. For this reason, we prefer to think of the NRR in the Taylor rule as a residual term that represents all other factors that make the task of controlling inflation harder or easier. On this view, the NRR should not be treated as a constant. Rather, it should be adjusted based on the perceived transmission mechanism and other factors that impinge on the future path of the economy.

The consequence of this uncertainty is that inflation may be more variable than if we actually knew for sure what the NRR was. Taylor (1994) shows how this works. For example, if we thought the NRR was higher than it really was, then we would consistently set interest rates higher than necessary. (This happens as much in the Taylor rule as in other rules that embed some concept of neutral interest rates.) This would depress the economy and cause inflation to be lower than our target. Conversely, if we think the NRR is lower than it really is, then interest rate settings would mean that inflation becomes higher than we want it to be.

In practice, while we are likely to make small errors in our assessment of the neutral real interest rate, these errors will not have large effects. Sooner or later we would get some feedback from the economy providing information on any policy errors, and we would alter the way we respond to developments in the economy. The bigger the error, the faster the feedback is likely to arrive.

## Dealing with uncertainty – output gap and the NRR: the grid

As discussed, there is a considerable amount of uncertainty surrounding estimates of both the output gap and the neutral real rate. A different view of the output gap or the NRR can lead the Taylor rule to give a substantially different recommendation for the interest rate. For example, other factors that may affect the future state of the economy could indicate that the NRR should be lower or higher.

In order to demonstrate this uncertainty, we use the following table to illustrate how the Taylor rule interest rate varies with one's view of the output gap and the NRR. In the table below, inflation is assumed to be two per cent, but this table can be adjusted for other views about the level of current inflation. Table 1 below shows that a 25 basis point change in the NRR leads to a 25 basis point change in the Taylor rule's implied interest rate. A half per cent change in the output gap also yields a 25 basis point change in the interest rate implied by the Taylor rule.

From the table, it is clear that there is a wide range of plausible interest rate settings that depend on one's view of the level of the output gap and the NRR. Because of this wide range, the Taylor rule is not particularly helpful in making close calls on interest rate decisions, but should indicate when interest rates are deviating from a plausible range. When this occurs, it does not necessarily indicate that a policy error has been made, but it does suggest that considerable judgement is being applied regarding the future evolution of the economy.

Table 1
Interest rates implied by the Taylor rule with output gap and NRR uncertainty

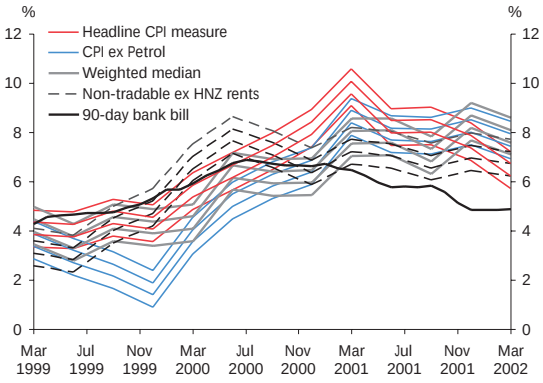
| | Output gap (%) | | | | |
|---|---|---|---|---|---|
| NRR (%) | -1 | -0.5 | 0 | 0.5 | 1 |
| 3.5 | 5.25 | 5.50 | 5.75 | 6.00 | 6.25 |
| 3.75 | 5.50 | 5.75 | 6.00 | 6.25 | 6.50 |
| 4.0 | 5.75 | 6.00 | 6.25 | 6.50 | 6.75 |
| 4.25 | 6.00 | 6.25 | 6.50 | 6.75 | 7.00 |
| 4.5 | 6.25 | 6.50 | 6.75 | 7.00 | 7.25 |

### Dealing with uncertainty – inflation and the NRR: the graph

Looking at several measures of current inflation ensures that the interest rate implied by the Taylor rule is not being driven by one-off factors that do not generate persistent inflationary pressure. For example, if only one of the several measures of inflation is indicating that inflation is above or below target, then it may be safe to ignore the warning coming from that particular Taylor rule. However, if all sensible views of current inflation are above or below target, then the Taylor rule recommendations may deserve more attention.

In the Bank's *Monetary Policy Statement* of May 2001, we included a graph showing what the Taylor rule recommends for a range of different estimates of the NRR and for different measures of inflation, but ignoring uncertainty about the output gap. A more recent version is reproduced here in figure 2. As with table 1, our uncertainty about the current and future state of the economy, as well as inflation, mean that there is a wide range of interest rates that are compatible with a Taylor rule

Figure 2
Taylor rule suggested 90 day interest rate with different inflation rates




## 5 Conclusions

The Taylor rule is a useful part of the Reserve Bank's analytical toolbox. It provides a framework for checking our thinking on the appropriate level for the OCR. As the subject of much recent research, the Taylor rule seems to be a robust way of setting monetary policy, though it is unlikely to be optimal in all circumstances. Where the interest rate suggested by the Taylor rule departs significantly from the interest rate that the Bank has arrived at through its forecasting process and judgement, this causes the Bank to reflect on what factors might justify the difference between the two interest rates.

A number of factors can justify a difference between the OCR and the interest rate suggested by the Taylor rule. These include differences between the current output gap and the forecast output gap, changing relationships between the output gap and inflationary pressures, changes in the neutral real interest rate, one-off effects on inflation, the expected effects of the world economy on New Zealand and exchange rate developments. All these factors require cautious evaluation of the messages the Taylor rule gives. Measurement difficulties surrounding the neutral real rate and the output gap, and the selection of the appropriate inflation rate, also place constraints on the use of the Taylor rule.

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# Exchange rate strategies for small open developed economies such as New Zealand

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Changes in the global financial system, together with new experience with fixed and floating exchange rates, have resulted in a reassessment of exchange rate strategies for both developed and emerging market economies. The emergence of a currency union in Europe has been seen by some as showing the path forward in the continuing integration process of developed nations, including New Zealand. In view of the large swings in the New Zealand exchange rate over the past decade, some attention has recently been paid to alternative exchange rate strategies that might allow for reductions in exchange rate variability, and potentially better economic growth performance. This article discusses these issues. It is an edited version of a paper presented by the Reserve Bank to an economic workshop on Exchange Rate Strategies for Developed Open Economies in the New Millennium, held in February 2002. Papers presented at this workshop are available at: http://www.rbnz.govt.nz/research/workshops/111791/0111791-02.html#P99_2657

## 1 Introduction

Over the past two decades, the liberalisation of capital flows and the creation of deep and liquid foreign exchange markets have changed the economic environment within which open economies operate. The benefits of these developments are substantial, including greater availability of options for financing productive activity all over the world, and better opportunities for savers to diversify risk and increase return. Nevertheless, the new environment also poses serious new challenges for policy-makers.

One of these challenges is the risk posed by the interface with the international economy. A series of costly currency and financial crises during the past decade illustrates a greater macroeconomic fragility of economies with fixed exchange rates and open capital accounts. These crises include those of the European Monetary System in 1992-3, Mexico in 1994, Southeast Asia in 1997, Russia and Brazil in 1998 and more recently also Turkey and Argentina. Moreover, the initial outbreaks of crises have resulted in unpredicted contagion effects, striking several countries with apparently strong fundamentals and well-regarded economic policies.

The increased frequency and severity of these currency and financial crises, particularly in emerging markets, has led to a rethinking about exchange rate arrangements, in two general directions. First, a consensus has emerged about the "impossible trinity" of a fixed exchange rate, capital mobility, and a monetary policy dedicated to domestic goals. This in turn has led several countries to abandon fixed rates, through the adoption of a floating exchange rate (often combined with inflation targeting) or via the formation of a currency union or dollarisation. Second, there are now discussions regarding the best way to modify the international financial architecture to reduce the overall likelihood of crises. In addition, much has been written on the urgency of reducing country-specific macroeconomic fragility by structural means, eg improving governance structures, designing more robust financial systems, more effective bankruptcy codes and selecting more appropriate exchange rate regimes.

In developed economies, the focus of the exchange rate policy debate has tended to be less about preventing or containing crises on the home front, and more about the measures that may improve growth and welfare prospects over the longer term. The recent debate has been dominated by the ongoing European transition to a common currency, as part of a package to increase political and economic integration.

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A neglected area of discussion is the appropriate exchange rate regime for relatively small, open, developed economies that are outside of the European experiment, such as New Zealand, Iceland, Norway, Australia and Canada. These economies are naturally affected by the changes in the international economic environment, and their policy-makers must consider how best to respond to these changes in order to manage new risks and take advantage of opportunities to improve welfare.

This article discusses a range of issues relating to the appropriate choice of exchange rate regime for a small, open economy, such as New Zealand. Section 2 surveys exchange rate arrangements of developed countries and discusses the issue of exchange rate volatility. Section 3 describes the New Zealand context of successful performance in maintaining price stability while suffering disappointments with respect to growth performance. Section 4 describes various options available to New Zealand with respect to currency arrangements. These options include those that may mitigate exchange rate movements within a floating exchange rate regime as well as the option to form a currency union with a trading partner. Section 5 concludes.

## 2 Exchange rate issues for developed economies

Developed countries differ from emerging market economies in several ways. They have a higher per capita income, long-established institutional structures associated with rules-based democracies, and significant social welfare programmes. Effective governance and regulatory structures have evolved, which enjoy widespread public acceptance, due in part to their accountability to the electorate. All of this allows for a greater measure of robustness in response to economic shocks of various kinds. While robustness is not the same as immunity, it does imply a considerably lower likelihood of a panic-generated crisis, and a greater capacity to contain damage caused by real shocks.

By and large, a duality of exchange rate regimes exists today among the developed economies. Table 1 (reproduced from Fischer, 2001, p7) shows that, of 22 developed countries (not including euro area countries Greece or Luxembourg), ten have opted to join the euro area, nine float their currencies independently and the remaining three are special cases: Singapore with a managed float, Hong Kong with a currency board, and Denmark, with a slightly flexible peg to the euro.

Table 1
Exchange rate arrangements in developed market economies
(as of December 31, 1999)

| Euro area | | Other | |
|---|---|---|---|
| Austria | NS | Australia | IF |
| Belgium | NS | Canada | IF |
| Finland | NS | Denmark | HB |
| France | NS | Hong Kong SAR | CB |
| Germany | NS | Japan | IF |
| Ireland | NS | New Zealand | IF |
| Italy | NS | Norway | IF |
| Netherlands | NS | Singapore | MF |
| Portugal | NS | Sweden | IF |
| Spain | NS | Switzerland | IF |
| | | United Kingdom | IF |
| | | United States | IF |

Source: IMF, *Annual Report 2000*
Note: Economies listed in the MSCI Developed Markets index.
Key:
NS = Arrangements with no separate legal tender
CB = Currency board
IF = Independently floating
HB = Pegged rate in horizontal band
MF = Managed float with no pre-announced exchange rate path

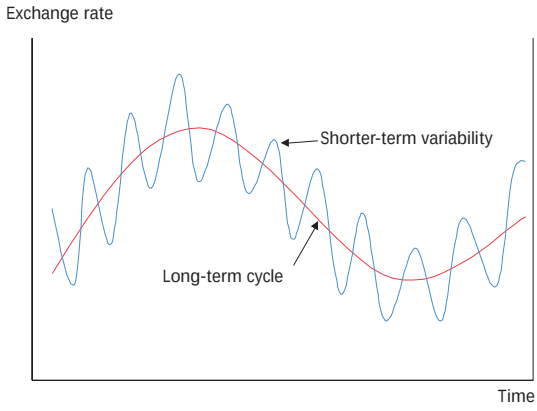
All of the countries on which we focus in this article have floating exchange rates, albeit with varying degrees of periodic intervention in foreign exchange markets.

The most obvious characteristic of a floating exchange rate is the constant fluctuation against other currencies. This allows for efficient absorption of shocks to the current account, but is also believed to be disruptive to trade and foreign investment. To the extent that most fluctuations are temporary, and some large swings are clear over-reactions that do not find support in fundamentals, one does not have to look far for a motivation to seek mechanisms to reduce variability.

### *Types of volatility*

It is helpful at this point to draw a distinction between short-term volatility, which looks at fluctuations with a frequency of less than a year, and longer cycles of up to several years.

Figure 1
Exchange rate volatility and cycle amplitude

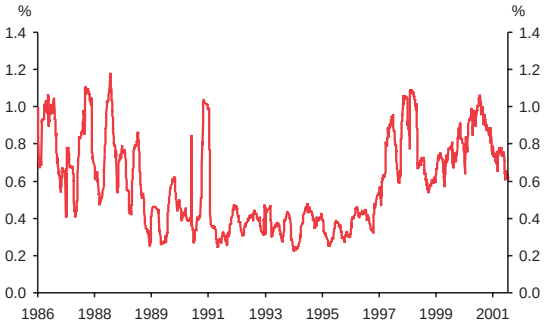



***Short-term volatility:*** Volatility is a term generally used to describe exchange rate fluctuations that occur over a reasonably short time horizon, such as hourly, weekly, or monthly.

In New Zealand, exchange rate volatility appears to have increased recently after a relatively stable period between 1992 and 1997, resulting in some expressions of concern. Figure 2 depicts the evolution of volatility, defined as the standard deviation of the daily percentage change in the NZD/USD exchange rate for a 60 day moving window.

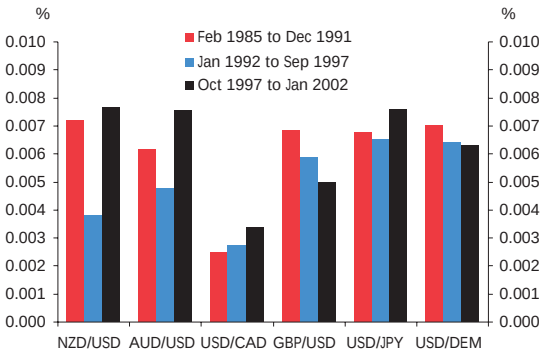
Figure 2 shows that while volatility against the US dollar has increased in recent years from a fairly stable period between 1992 and 1997, it is lower than the volatility that was typical in the mid- to late 1980s. Volatility against the Japanese yen has been broadly similar but slightly higher during this time period, exhibiting a bit less of a "smile" pattern. By contrast, volatility against the Australian dollar has not increased as much in recent years, and after following the figure 2 series very closely since 1986 has recently diverged to levels significantly lower than volatility against the US dollar. This may reflect the closer integration between the Australian and New Zealand economies.

Figure 2
Exchange rate volatility in NZD/USD
(rolling 60 day volatility)




In comparison with other countries, New Zealand dollar volatility does not seem significantly different with respect to the US dollar. Figure 3 shows that, for three periods since 1985, the short term volatility in the AUD/USD exchange rate has been very similar to that of the NZD/USD, and that broadly similar volatilities are seen in some other currencies relative to the USD. The notable exception is in the USD/

Figure 3
USD currency pair volatility comparisons
(rolling 30 day volatility)



Canadian dollar exchange rate, which has displayed relatively low volatility, again possibly reflecting the close integration of those two economies.

In addition, empirical estimates of the direct cost of exchange rate volatility in New Zealand (as elsewhere) have been low. Fluctuations in the trade-weighted exchange rate index (TWI) with frequencies varying from 1 to 8 quarters have extremely small or insignificant effects on exports, imports and investment (Gray, 2002). One possible explanation for this is that most businesses are able to hedge themselves effectively against this type of volatility. Brookes et al (2000) find that New Zealand firms typically engage in substantial hedging of known trade receipts and payments out to around six months, but with less cover for flows expected between six and twelve months ahead. There is also a rapid fall-off in the extent of cover for trade that is expected to occur beyond 12 months. In other words, firms are relatively easily able to insulate themselves from short-horizon exchange rate volatility.

***Amplitude of the exchange rate cycle:*** The business cycle frequency of the exchange rate fluctuations is often referred to as the 'amplitude of the exchange rate cycle', to distinguish it from higher frequency volatility.

Of course, long-term variations in the exchange rate often have benefits, to the extent that they move with swings in fundamentals such as commodity prices or foreign demand. But it is also well known that exchange rates often deviate from fundamentals for very extended periods of time. For example, the persistence of deviations from purchasing power parity (PPP) in modern floating exchange rate data has been difficult to explain (eg Rogoff (1996)).

Long-term exchange rate fluctuations that do not track fundamentals are problematic for businesses with unhedged exposure to these unpredictable movements, which in turn do nothing to insulate against external shocks. Whereas hedging instruments can often be used to mitigate the costs associated with short-term volatility, firms generally "ride out" the longer-term exchange rate cycles. The costs associated with doing this can be significant.

There are basically two reasons why firms do not use hedging instruments to insulate themselves from longer-term cycles. First, firms often face considerable uncertainty about the size of income and cost streams beyond the next 6-12 months. Without a better understanding of exchange rate exposure, they are not in a position to put in place a good hedging strategy. Hedging could also leave a firm significantly worse off if it prevents the firm from benefiting from a favourable exchange rate development, especially if the move puts the firm's competitors at an advantage. For example, when the New Zealand dollar began to depreciate in response to the Asian crisis, many firms were unable to benefit from the depreciation because they had already covered a large proportion of export sales with forward contracts.

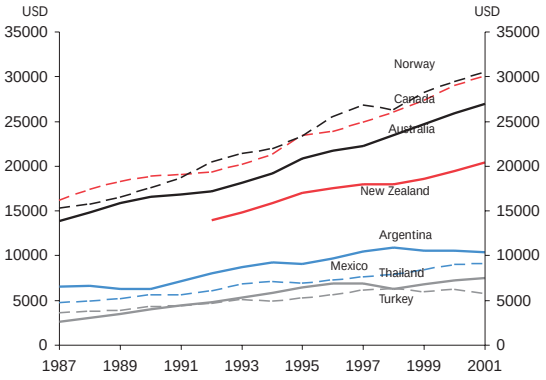
Second, long-term hedging contracts are usually expensive, if available at all. Foreign exchange cover for long terms involves significant credit exposure. If the firm taking the forward cover is unable to settle an exchange rate deal when it comes due, the bank which has written the forward cover risks taking a substantial loss in unwinding the financial contract. Such risks add to the cost of hedge contracts. Moreover, it is more difficult for financial intermediaries to lay off their risk positions in respect of longer-term swaps and forwards, therefore reducing their willingness to provide hedges to exporters and importers.

## 3 The New Zealand context

New Zealand formally introduced inflation targeting in 1989, and has had a freely floating exchange rate since 1985. The results of this framework to date are broadly positive, given that inflation has been low and stable for ten years, and there have been no financial or banking sector crises – even in the face of the Asian crisis and a significant exchange rate depreciation. However, economic growth has been disappointing relative to many of our trading partners and our relatively high external indebtedness exposes the economy to potential vulnerabilities. Overall, though, the current exchange rate system seems sustainable and robust, particularly given the overall environment of fiscal surpluses, low levels of public debt and a sound banking system. Recent GDP growth has also been surprisingly robust, given the global slowdown of 2001.

Nevertheless, and as noted above, over the past two decades the relative growth performance of New Zealand has been disappointing. Wide-ranging reforms during the late 1980s and early 1990s generated hopes of more rapid growth during the 1990s than has been the case. A common benchmark of comparison is Australia, which reformed less than New Zealand, but has grown faster during the same period.

Figure 4
Evolution of per capita GDP (PPP-corrected)

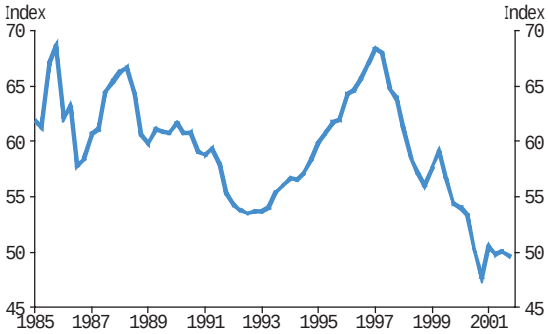



This poor relative growth performance has sparked a search for explanations, including in respect of the exchange rate.[2] The role of the New Zealand dollar in the recent business cycle has also been the topic of a speech by the Governor of the Reserve Bank (Brash (1999)). Various commentators have wondered whether movements in the New Zealand dollar's exchange value have been detrimental to growth.

These movements have been large. Figure 5 illustrates how, for example, between late 1992 and early 1997, the TWI appreciated by almost 30 per cent before depreciating by a similar magnitude over the following $3^1/_2$ years.

While the New Zealand exchange rate has moved through very significant cycles, other larger currencies have also, on occasion, experienced similarly large movements. Figure 6 plots the recent episode of depreciation in New Zealand's real effective exchange rate alongside recent episodes of significant currency depreciation for other OECD economies.

Figure 5
Evolution of New Zealand's trade weighted exchange rate index 1985-2001




Each episode has been lined up at a common starting point (ie at the peak of the respective exchange rate cycle). Thus, for example, New Zealand's episode of depreciation starts in the first quarter of 1997 and ends in the fourth quarter of 2000. The episode of depreciation for Canada starts in the third quarter of 1991 and proceeds until the second quarter of 1995. While the fall in the New Zealand dollar has been very significant, the magnitude of cycle that New Zealand has experienced is not significantly different from those of other countries.

Similarly, figure 7 shows that New Zealand's mid-1990s episode of appreciation, although large, was also not substantially out of line with movements in other currencies.

In understanding these large movements, it is possible to point to some specific drivers, such as the factors that contributed to the large yen depreciation of the mid-1990s or the large US dollar depreciation of the late 1980s. But so too can we point to some specific factors driving the large New Zealand dollar movements. It remains to be seen whether these magnitudes of exchange rate movement will be the norm or the exception.

Even if New Zealand is not an outlier in the magnitude of its exchange rate cycle, this is of limited comfort. Instability of exchange rates among the major currencies has long been a topic of policy-maker concern and discussion, with regular proposals for target zones among the three major currencies. Fischer (2001) points out that, while such a system does not exist formally, it still seems that when major exchange rates get very far out of line with fundamentals, two or three of the big three economies' authorities will agree to intervene in the currency markets. Examples of this include mid-1995,

[2] Other, non-exchange-rate-related explanations, abound. For example, Skilling (2001) has explored the possibility that the unsatisfying relative performance of New Zealand is due to characteristics that are not so amenable to policy, such as smallness, dispersion of population and distance from major external markets.

Figure 6
Peak to trough comparison of various real exchange rates[3]

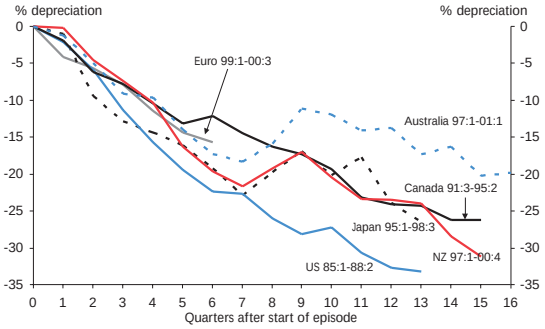
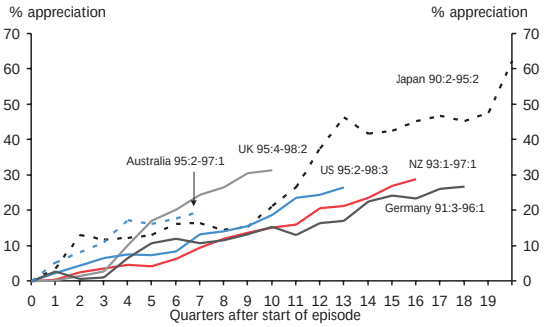



Figure 7
Trough to peak comparison of various real exchange rates

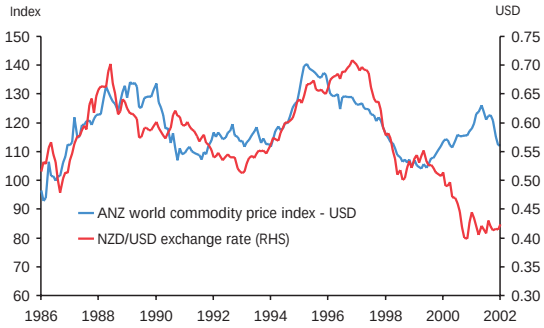



when the yen-dollar exchange rate reached 80, implying a yen that was significantly appreciated relative to estimates of its equilibrium value, and 2000, when the euro was significantly depreciated relative to its estimated equilibrium value.

This brings us to the question of the extent to which such exchange rate swings reflect shifts in underlying economic fundamentals. If movements in New Zealand's exchange rate predominantly reflect "fundamentals", then there is a strong case for retaining a flexible exchange rate. But to the extent that movements do *not* reflect fundamentals, then it is arguable that such exchange rate swings are more disruptive and impose higher average transactions costs on relatively open economies such as New Zealand than corresponding fluctuations do in less open large economies such as the United States, Japan or the euro area.

The significant body of economic literature on this topic provides mixed evidence. There are a number of economic drivers that can potentially explain a significant proportion of exchange rate fluctuations. For New Zealand, Australia and Canada, commodity price fluctuations are an important driver. Figure 8 shows the NZD/USD exchange rate and the ANZ index of the world prices of New Zealand's commodity exports. For most of the sample, the exchange rate moved broadly together with the index of commodity prices, thus smoothing the cycles of NZD prices. In more recent times, the currency has fallen even as commodity prices rose, thus amplifying the movement in domestic prices, rather than dampening it. It therefore seems that the exchange rate moves in association with commodity prices during some periods but not during others.

Figure 8
Commodity prices and the exchange rate, 1986 - 2002




On the other side of the debate, there is substantial evidence to suggest that exchange rates sometimes deviate from fundamentals for very extended periods of time (eg Rogoff, 1996). A range of various structural and time-series exchange rate models have been unable to outperform a random walk model. This conclusion was first drawn by Meese and Rogoff (1983) for major OECD currencies, and their conclusion has stood the test of time, with scant evidence of robust exceptions to their finding. With regard to the exchange rates of smaller open economies, there has been less consensus, with a number of relatively successful attempts at using commodity prices or the terms of trade to model the "commodity currencies" of Canada and Australia.[4] However, Chen and Rogoff (2002) were unable to overturn the earlier Meese and Rogoff result, even after incorporating world commodity price fluctuations in models of the exchange rates of Canada, Australia and New Zealand.

[3] The exchange rates shown are the real effective exchange rates as calculated by the IMF.

[4] See Frankel and Rose (1995) for a survey of the empirical research on exchange rates.

Despite observing that world prices of commodity exports "do appear to have a strong and stable influence on the real exchange rates of New Zealand and Australia", Chen and Rogoff found that standard exchange rate equations – adjusted for commodity price shocks – do not offer very much encouragement for the point of view that the commodity currencies might be easier to explain than the major currencies. In other words, even after taking the explanatory power of commodity price movements into account, there remains an extremely persistent movement of real exchange rates away from the levels suggested by their fundamentals.

The costs of significant exchange rate amplitude, over and above that driven by fundamentals, are difficult to measure. It is clear that the profitability of firms in the tradables sector will suffer when the exchange rate is very uncompetitive, at the top of the exchange rate cycle, while firms will enjoy higher than average profitability at the bottom of the cycle. Assuming that these effects are symmetric, the main microeconomic cost to the economy will be the transition costs associated with people having to move between the tradables and non-tradables sectors. The more important external trade is to an economy, the greater the potential costs of unexpected currency fluctuations. For New Zealand, with a moderately large tradables sector, these costs may be high.

The costs of significant amplitude are likely to be still higher if firms are risk averse. Consider a domestic manufacturer who would like to invest in a new factory, in order to expand export production. Although at the current, relatively low level of the exchange rate, the expansion may be highly profitable, the manufacturer may (quite rightly) be concerned about how the exchange rate will move over the life of the new plant. In the New Zealand case, many exporters were hurt by the high exchange rate in 1995-96, and memory of that time may be sufficient to deter the manufacturer from expanding at the lower exchange rate.

In other words, risk averse behaviour would imply that the growth of new firms during periods of a low exchange rate might not be sufficient to offset the decline of firms during periods of a high exchange rate. In the aggregate, this would result in slower overall tradables sector growth than might be expected with a more stable exchange rate. Further research would be required to determine whether such risk aversion, and the associated trade hysteresis, has been important in the New Zealand export sector.

There is, however, some recent empirical evidence which suggests surprisingly large economic benefits associated with entrenched exchange rate stability, such as that achieved in a currency union. Rose (2000) uses trade volume data to suggest that trade may increase by up to a factor of three with the adoption of a currency union. The direction is plausible, although there are some reasons to be cautious about the magnitude of this result (see Smith, 2001). Using a different approach, Parsley and Wei (2001) find that dramatic reductions in international price dispersion take place under currency union arrangements, even compared with what takes place via currency market intervention. By focusing on reductions in international price dispersion, as opposed to trade flows, Parsley and Wei find that reducing volatility via intervention has nowhere near the microeconomic price convergence effects of establishment of a currency board or use of a common currency. Other information pertinent to this topic includes small business surveys reported on by Grimes et al (2000), which suggest that a separate New Zealand currency may be an obstacle to cross-border business expansion. More data and empirical studies are continually emerging, and these are being given due attention in New Zealand as well.

One of the points of caution in trying to quantify the potential impact of currency union is that the adoption of a currency union tends to be associated with other aspects of economic integration, such as a reduction of trade barriers and harmonisation of commercial law and product standard arrangements. It can therefore be difficult accurately to measure the extent to which currency union *per se* increases trade and economic growth and how much of the increased trade is attributable to other aspects of economic integration.

Finally, for central bankers there is always some concern that exchange rate volatility may partly derive from the monetary policy process itself. When responding to domestic inflation pressures with interest rate increases, an incentive may emerge for international capital to take advantage of a growing interest rate differential with the rest of the world. This would tend to cause the exchange rate to appreciate. Thus, a side effect of minimising overall price variability may be an exacerbation of the exchange rate cycle, increasing

the costs of price variability for the tradables sector. To some extent, this may have been the case in New Zealand in the mid-1990s when measures to contain strong inflation in the non-tradables sector (and particularly the housing sector) led to high domestic interest rates – which was an important driver of the exchange rate appreciation over that time. However, it should be emphasised that the alternative response of not responding as strongly to inflation pressures would have resulted in higher domestic inflation, which would itself have hurt the tradables sector.

# 4 Exchange rate options that are available to New Zealand

There are many possible exchange rate arrangements for a developed economy, at least in theory. Options at one end of the spectrum include dollarisation and entering into a currency union. At the other end of the spectrum is the adoption of a freely floating exchange rate. In the middle are the options of pegging the exchange rate or adopting a managed float (of which there are many forms). New Zealand has operated very much at the free floating end of the exchange rate spectrum; we have not intervened in the foreign exchange market to influence the rate since the currency was floated in 1985. These arrangements have now proved robust over several economic cycles.

By contrast, adjustable peg systems have not proved viable over any lengthy period, especially for countries that are integrated into the international capital markets (see, eg Stiglitz 2001, Fischer 2001). A major lesson of the repeated European Monetary System crises in the eighties and in 1992-3 and the many emerging market crises since 1994 is that adjustable pegs are especially problematic for countries with open capital accounts. Pegging the exchange rate is therefore not an option to consider seriously in an environment characterised by close integration of financial markets, without significant controls on the flows of capital. Instead, this section first discusses the status quo arrangement – ie retention of a free floating exchange rate system with no direct intervention in the foreign exchange market, while reserving the right to correct disorderly market conditions.[5] We then consider those options that may moderate/affect the behaviour of floating exchange rates. Finally, we consider the option of entering a currency union with a large trading partner.

## 4.1 Retaining the status quo

There are three main advantages of a floating exchange rate regime for New Zealand. First, the exchange rate can act as a buffer against shocks to the current account. Given the relative importance of commodities in New Zealand production and exports, shocks to the terms of trade will often require adjustment of the exchange rate in order to maintain external balance.

Second, a floating exchange rate encourages the private sector to be more diligent in hedging foreign currency exposures.[6] On balance, banks and corporates in New Zealand have robust systems for the management of foreign exchange exposures, as has been discussed in some detail by Woolford et al (2001).

The third benefit of a floating exchange rate is that this enables monetary policy to be dedicated to a price stability target which can be pursued independently, without policy-makers being burdened by conflicting objectives or undermined by the monetary measures needed to support a managed float. In practice, the floating currency arrangement has been an important element in facilitating credible disinflationary policies in New Zealand.

The main disadvantages of a floating exchange rate stem from the extent to which the exchange rate 'overshoots' or 'undershoots' its real fundamental drivers. The discussion above has highlighted some of the problems, particularly with respect to the tradables sector, that are caused by exchange rate movements beyond those attributable to fundamentals.

[5] This right exists but has not been exercised during the period since 1985.

[6] Eichengreen (2000b) points out that if the exchange rate floats, banks will have an object lesson, on a daily basis, on the need to hedge their foreign currency exposures, whereas for a variety of reasons incentives are quite the opposite under pegs.

## 4.2 Options to moderate the behaviour of floating exchange rates

### *Capital controls*

For a country such as New Zealand, with an open capital account and a floating exchange rate, capital markets effectively determine the prevailing "mix" of monetary policy, in terms of the configuration of interest and exchange rates. With free capital movement, a change in the Official Cash Rate (OCR) can induce cross-border capital flows and changes in the exchange rate. While the Reserve Bank sets the OCR, it cannot determine the mix of interest rate and exchange rate conditions. There have been times when we would have preferred a different combination of settings, but had limited capacity to achieve this (eg in the mid-1990s, when monetary conditions took the form of a higher exchange rate than we would have preferred). In addition, there is no scope to direct monetary policy only at one sector or one region of the economy. In short, monetary policy is generally too blunt a tool to target the source of inflationary pressure directly.

Some countries have attempted to influence the "mix" of monetary conditions by establishing supplementary controls as an additional policy tool. Chile introduced capital controls in the 1990s in order to influence the size and composition of capital inflows, with rather mixed success.[7] During the turmoil of the Asian crisis, Malaysia put controls on capital outflows as part of a package of crisis containment measures.

At the Reserve Bank we have also studied whether there are any supplementary measures that, if adopted, might ease apparent imbalances (Reserve Bank (2000)). We have not been convinced that any of the options we have identified would, if employed, have materially eased the cyclical imbalances that we experienced in the 1990s. We also recognise that any such gains would have come at significant ongoing costs to the efficient operation of New Zealand's economy and financial markets. Capital controls of the type utilised by Chile might perhaps have limited to some extent the upward pressure on the exchange rate that New Zealand experienced in the mid-1990s. These gains would nevertheless have had to be weighed against the longer-term costs of making it more difficult and costly for New Zealand borrowers to access world capital markets across all stages of the cycle, and not simply when New Zealand was wanting to lean strongly against domestic inflation.[8]

For New Zealand, having successfully liberalised domestic financial markets, it is far from straightforward to restrain cross-border capital flows. As Eichengreen (2000a) has pointed out, an open capital market makes it easier for banks to channel international financial transactions through affiliates and to repackage them as derivative securities. In the end, for controls to be effective, they have to be draconian and distortionary, which does not usually appeal to policy-makers or their constituents.

### *Sterilised intervention in the foreign exchange market*

Compared with capital controls, sterilised intervention in the foreign exchange market is a more orthodox tool. The process of a central bank buying or selling its own currency in the market in exchange for foreign currency is said to be sterilised when it is 'neutralised' by other transactions in the domestic money market to ensure that the level of settlement cash in the banking system remains unchanged. This ensures that foreign exchange intervention has no impact on the monetary base.

In the academic literature, there remains considerable controversy over whether intervention can be successful at stabilising exchange rates—and if it is, whether it is wise to use it.[9] This controversy notwithstanding, authorities in many countries do intervene from time to time in the foreign exchange markets to try to stabilise the exchange rate, even while taking care not to be perceived as trying to defend a particular rate. According to Fischer (2001), this is one of

[7] The overall conclusion seems to be that capital controls did for a time alter the maturity structure of foreign borrowing (Gallego et al (1999)) but they also led to evasion and distortionary behaviour. Empirical evidence presented by Edwards (2000) suggests that the Chilean controls became less effective after 1998 (and are not currently used at all). There is evidence (see Eichengreen (2000a)) that limits on bank borrowing abroad encouraged Chilean mining companies to borrow on behalf of the banks and on-lend the proceeds.

[8] Further discussion is contained in *Reserve Bank of New Zealand Bulletin* (2000), p 88.

[9] For a good survey of the debate, with on balance cautiously positive conclusions on the effectiveness of exchange rate intervention, see Sarno and Taylor (2001).

the remaining areas in which central bankers place considerable emphasis on the "touch and feel" of the market, and where systematic policy rules are not yet common.

As noted above, the Reserve Bank has not intervened in the foreign exchange market since the New Zealand dollar was floated in March 1985; the role of intervention has been deliberately reserved for cases of "extreme disorder", and to date no "extreme disorder" has been encountered. It is sometimes asked whether use of this tool should be considered in order to mitigate some of the difficulties associated with a floating exchange rate. The Reserve Bank's response to this question to date has been that, after 17 years of not having intervened, it is unclear how financial markets would respond to a change in intervention policy, and it is unclear as to the likely effectiveness of more regular intervention (*Reserve Bank*, 2000).

Nevertheless, for the purpose of this article it is useful to discuss this position. One argument against intervention is the possibility of financial risk, in the sense that the interventions may be unprofitable. Some central banks have indeed made significant losses from foreign exchange intervention, although this has generally only been the case when the central bank has attempted to defend a particular level of the exchange rate (eg the Bank of England in 1992). The experience of central banks that have focused more on influencing market sentiment and dynamics has been that financial profits are common, at least when measured over long horizons.

As mentioned above, the formal statistical evidence is relatively equivocal on whether central bank intervention is effective in moving exchange rates in the manner desired. Markets nevertheless remain rather attentive to central bank intervention. If the Reserve Bank were to change the current policy of non-intervention, an obvious objective of the new policy would be to smooth out the extreme tops and bottoms of the exchange rate cycle, intervening only when movements no longer seemed in line with fundamentals.

A policy of sterilised intervention to reduce the extent of exchange rate overshoots presupposes that market dynamics or 'herd effects' largely drive overshoots in the exchange rate. On this basis, intervention is undertaken with the objective of influencing market sentiment and dynamics in ways that assist in reducing the extent of overshoot. However, it is also possible that the exchange rate cycle is actually driven by monetary policy itself, perhaps as a result of interest rate responses to demand conditions in the non-tradables sector. Under such circumstances, intervention would probably not be very effective.

Would an alternative policy on foreign exchange intervention have had a material impact on the recent exchange rate cycle in New Zealand? There is little doubt that the exchange rate would still have appreciated very strongly under the influence of the high New Zealand interest rates during the mid-1990s even if sterilised intervention had been used with the objective of reducing exchange rate peaks and troughs. Nevertheless, there is also little doubt that the real exchange rate became overvalued during that time.[10] If sterilised intervention had succeeded in reducing the extent of the exchange rate appreciation, even by only a couple of percentage points, then some of the costs of that overvalued exchange rate might have been avoided. In turn, this might have reduced any incidence of firms abandoning the tradables sector for the non-tradables sector, as discussed above. Unfortunately, it is just as difficult to assess the benefits of limiting large exchange rate cycles as it is to estimate their costs. This is an area where there is scope for more research.

### *Using monetary policy to influence the exchange rate*

In the global context, the issue is unresolved as to whether monetary policy in a floating exchange rate system should be used in the short run to try to affect the exchange rate.

There is a large but inconclusive literature on the desirability of including exchange rate movements in the loss function[11] of a central bank. At face value it would seem that an inflation targeting central bank should respond to exchange rate movements only insofar as these affect inflation. But to the extent that monetary policy-makers care about the real

[10] See Brook & Hargreaves (2000, 2001) for estimates of the equilibrium real exchange rate.

[11] A loss function makes explicit how concerned a central bank is about missing its target(s), which may include a specific inflation rate, a zero output gap, a particular exchange rate, etc. The central bank may not be able to meet all targets simultaneously, but it minimises its "loss" by making appropriate trade-offs.

side of the economy (and central banks inevitably do concern themselves with the implications of monetary policy for the real economy), then central banks might wish to respond to asset price movements (such as the exchange rate) for reasons other than their impact on inflation. However, to the extent that a central bank does seek to influence the level or direction of the exchange rate, regardless of the inflationary consequences of doing so, it risks allowing inflation to move outside of the target band. It is not possible simultaneously to pursue an exchange rate target and an inflation target, other than possibly for short periods.

Fischer (2001) has suggested that the issue is not unlike that of how monetary policy in an inflation targeting framework should respond to movements in output and unemployment. In particular, there is almost certainly some short-run tradeoff between the real exchange rate and inflation. It is a valid policy question how an inflation targeting monetary authority should best deal with this tradeoff.

At the Reserve Bank, our response to this tradeoff has evolved over time[12] as inflation expectations have become better anchored and as the extent of exchange rate pass-through has declined.[13] Currently our approach is to 'look through' the direct price level effects that stem from exchange rate changes, and to focus more predominantly on the demand effects of exchange rate movements. However, we have not closely considered what impact this policy approach may have on the magnitude and duration of the exchange rate cycle itself.

In any case, it is not obvious how the central bank could exert a significant influence on the real exchange rate cycle while maintaining an inflation target.

### 4.3 A currency union for New Zealand?

Of particular relevance to the Reserve Bank is the sometimes voiced suggestion that New Zealand should enter a currency union with a large trading partner, such as Australia or the United States. The arguments in favour of a currency union have been the standard optimum currency area cost-benefit analysis: New Zealand would gain microeconomic efficiency and would become more integrated with partner economies, at the cost of losing monetary policy independence.

Various aspects of the costs and benefits of this are continually being examined, though with few clear-cut recommendations emerging so far (for a survey, see Bjorksten 2001). This is not particularly surprising. Similar exercises were conducted in various European countries prior to the launch of EMU, with much clarification of the dimensions and issues but with the same lack of conclusive evidence in favour of one side or the other. The Reserve Bank has also observed that the decision of whether or not to abandon the New Zealand dollar is fundamentally a political issue (Brash (2000)).

The studies undertaken on the European Union show that the microeconomic benefits of currency union relate to the response of production to lowered transaction costs and enlarged markets, and this depends in part on a host of integration-related policy measures (including competition policy, harmonisation of regulations, financial sector consolidation, etc), which necessarily in some form accompany the adoption of a currency union. On the other side of the ledger, the costs relate to business cycles that are not synchronised across countries, the likelihood of large asymmetric shocks, and the limits to rapid price and wage adjustment. For both the costs and the benefits, the bottom line effects of a currency union over time are subject to a large amount of uncertainty, and in the European case the decision to proceed was therefore more politically than economically driven.

Coleman (1999) has nevertheless observed that, even without trying to quantify costs and benefits, changes to the global economic environment have led to lower costs and greater benefits of a currency union today than would have been the case in earlier decades. This is especially true of the progress being made in facilitating closer economic integration of financial markets and the harmonisation of commercial law, product standards and other legal and regulatory frameworks. A continuation of these trends will increase the attractiveness of abandoning an independent currency in New Zealand.

However, it is important to recognise the very real limitations of drawing parallels between the European experience and

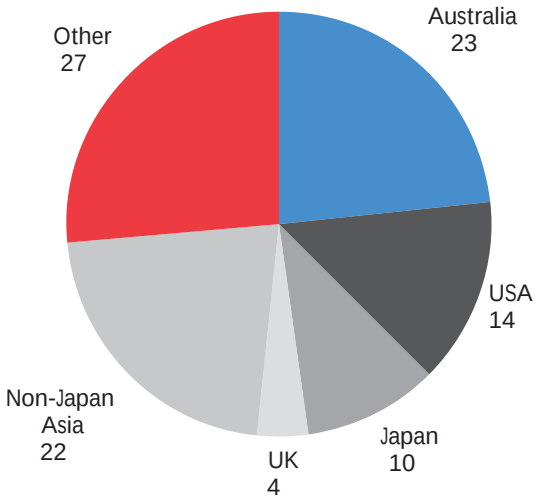
[12] See Brook (2001) for a discussion of this evolution.

[13] See Hampton (2001) for a discussion of the recent changes in exchange rate passthrough in New Zealand.

the New Zealand context. There are at least three major differences worth noting.

First, New Zealand trade is highly diversified across trading partners. As figure 9 shows, a currency union which eliminates exchange rate volatility with one trading partner will not remove exchange rate volatility for most of the tradables sector. Indeed, it is arguable that entering into a currency union could actually result in greater exchange rate volatility and cyclical amplitude of the new currency against some of our trading partners' currencies than is currently the case with the New Zealand dollar. Currency union therefore has the potential to make a substantial proportion of New Zealand's exporters and importers worse off than may be the case if the New Zealand dollar is retained.

Figure 9
Share of New Zealand imports in 2001, by major trading partner (per cent of total imports)




A second major difference between the European context and what applies to New Zealand is the fact that, for small European countries, the status quo was not an option. A currency union of one sort or another was emerging, with major implications for the economic environment, and the decision for most EU members was whether or not to take part in it. Europeans in many countries were therefore concerned in a policy sense with the general consequences of the emergence of the EMU, the effects of the EMU on the national economy in the event of participation/non-participation, appropriate national economic policy under each alternative, and currency exchange arrangements between the EMU insiders and outsiders.

For New Zealand, the choice is between the status quo and adopting the currency of a much larger country or bloc of countries, probably with little effective representation in the setting of the common monetary policy. The question to consider would thus be the desirability of an effective dollarisation.

To date, the arguments favouring dollarisation have been directed primarily towards developing or emerging economies, where the domestic monetary policy arrangements lacked credibility. No other countries that are starting from a situation of successful management of inflation with a floating exchange rate have seriously considered dollarisation. Buiter (2000), writing on the case of Iceland, forcefully argues that this is only to be expected:

> "Unilateral 'euroisation', where a 'peripheral' country simply adopts the currency of another ('centre') nation, without a fair share of the common seignorage, without access to the discount window and other lender of last resort facilities, and without a voice in the decision-making processes of the centre's central bank should be of interest only to a chronically mismanaged economic basket case, whose only hope of achieving monetary stability is to unilaterally surrender monetary sovereignty."

Because of the established success and credibility of New Zealand's inflation targeting monetary policy, the benefits to New Zealand of dollarisation are probably limited to those that derive from expanded trade and economic integration, rather than from any enhancements to the credibility of monetary policy. Therefore, insights from the dollarisation literature are of limited applicability.

The third difference between the European and New Zealand contexts concerns the timing of any decision to abandon the domestic currency; that is, whether there is sufficient convergence in business cycles at the moment of currency unification. This is a factor over which New Zealand would have fairly complete control; because the status quo remains an option for New Zealand, there is more or less complete flexibility in choosing when to abandon the national currency,

if at all. For most European countries, the timing was pre-decided.

Eichengreen (2000b) has suggested that timing should be part and parcel of a currency union decision. Similarly, Lars Calmfors has repeatedly pointed out the long-lasting negative effects in Europe of even short run macroeconomic disturbances, namely high and persistent unemployment and/or inflation at various periods in recent economic history. Both economists come out strongly in favour of synchronising business cycles before joining a monetary union. In effect, the timing consideration was one of Sweden's justifications for staying out, and remains a central issue to the UK. Given greater product and labour market flexibility, these issues are probably less of a concern for New Zealand than for Europe, although no one would presumably advocate that New Zealand adopt the currency of a booming economy at the same time as New Zealand were heading into a downturn.

## 5 Summary and conclusions

New Zealand is a developed small open economy that enjoys a high degree of integration into global financial markets. Inflation targeting and a policy of non-intervention in foreign currency markets have so far proved effective in maintaining price stability and avoiding currency crises, and seem to provide appropriate incentives to the private sector to hedge foreign currency risk. To date, we can be happy with our current approach.

Nevertheless, changes to the thinking about optimal exchange rate regimes have been substantial in recent years. The Bank is keeping an eye on developments.

The question of modifying New Zealand's exchange rate policy has arisen not because of any concerns about unsustainability or exposure to the risk of crisis, but rather because of disappointment over a slower relative growth performance compared with the rest of the OECD member countries. There is an awareness that small open economies could suffer greater adverse consequences of a floating exchange rate regime than do larger economies, so the subject is worth some careful examination. There is also an awareness that floating exchange rates today do not deliver as many benefits as was previously anticipated, and the example of EMU in Europe is providing new evidence on relative costs and benefits of a currency union arrangement among developed countries.

Given the motivations for change, the issues of the recent dollarisation literature, in which a country enters a common currency arrangement for the monetary policy credibility benefits, have been more or less irrelevant here.

The Reserve Bank's contribution, with regard to economic growth, is to maintain low and stable inflation and to ensure financial sector soundness, thereby reducing risk for lenders and ensuring a lower real interest rate than would otherwise be the case. The Bank cannot by itself increase trade, spur investment or otherwise directly promote growth over the long term via activist policy. Nevertheless, the Bank has a role to play in fostering informed debate about changes to institutional arrangements, insofar as they affect the financial sector and/or the conduct of monetary policy.

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# The Reserve Bank's external communications

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This article reviews the way the Reserve Bank communicates its decisions and policies to external audiences. It assesses why the Bank needs a communications programme, the methods used, and the way evolving circumstances are changing the Bank's approach to its external communications.

## 1 Introduction

The Reserve Bank maintains an active programme of communications with the various external publics that its activities influence. These include the general public, financial market participants, sectors of the economy that are particularly influenced by monetary policy such as exporters, and groups and individuals that take a particular interest in the Bank's activities. The Bank at times needs to communicate specific messages, such as its interest rate announcements or changes to banking supervision requirements. Also, in a more generic sense, there is value in the public and markets having a good understanding of the Bank's role and activities. Much of our communication is therefore aimed at informing the public and specific audiences about our functions and how they relate to the wider economy, as opposed to just communicating with financial markets.

The importance of effective communication by central banks is well recognised internationally, as is demonstrated by the International Monetary Fund's *Code of Good Practices on Transparency in Monetary and Financial Policies*. That code sets out broad principles for central bank transparency in respect of monetary policy, financial regulation and internal governance. It notes that regular, clear communication by central banks helps to promote more effective policy, reduces market uncertainty about policy actions, and is an important element in strengthening the accountability of central banks and fostering sound governance.

As described in this article, the Bank's communications efforts are extensive, and they are also evolving, particularly as inflation expectations have become better anchored.

## 2 The Reserve Bank's external communications requirements

Among public agencies the Reserve Bank is distinctive in the way it explains its policies and actions to the public. In part this is because the Bank is operationally independent of government and takes actions that have real-world effects, as opposed to being primarily an agency that offers advice to the government. In the context of contemporary standards of transparency and accountability, these actions need to be explained to the public.

As with the judiciary, when an arm of the state is operationally independent, the responsible use of its powers is always an issue. With independence comes a greater need for accountability and transparency. Openness to public scrutiny can help to reconcile operational independence with democratic expectations.

In addition, in the area of monetary policy, the Bank's public communications have a particular sensitivity, in that they often influence financial markets. For this reason, the Bank has to take particular care to avoid any financial market confusion caused by muddled or partial communications. Clarity is crucial.

These two requirements – transparency and market sensitivity - occasionally create tensions. Statements targeted at the general public must be comprehensible and yet also correct technically in terms of the requirements of the financial markets. Conversely, statements targeted at the financial markets must at least say nothing that will be misinterpreted by the general public. Simultaneously communicating effectively with both audiences can be difficult.

## 3 Methods of communication

The mechanisms that the Bank uses to communicate with its external audiences include:

- the release four times a year of *Monetary Policy Statements,* which explain the Bank's thinking behind its monetary policy decisions, and four additional interim interest rate adjustments announced by press statement;
- the holding by the Governor of four press conferences a year at the time of the release of *Monetary Policy Statements*;
- an extensive programme of off-the-record public speeches by the Governor and other senior Bank staff to sector and service groups, non-government organisations and the like;
- occasional on-the-record public speeches by the Governor and other senior Bank staff;
- a nationwide "roadshow" of meetings with managers of small and medium-sized businesses held every three years;
- the Governor being interviewed by individual reporters and appearing on radio and television;
- an extensive website;
- the publication of an *Annual Report*;
- the publication of a quarterly journal, the *Reserve Bank of New Zealand Bulletin*, that discusses the policy issues facing the Bank;
- the publication of occasional brochures explaining Bank policies aimed at lay audiences;
- the publication of *Discussion Papers* on technical economic issues; and
- the provision of educational resources explaining economic concepts to students.

In addition, the Bank has recently initiated:

- an on-line service by which subscribers receive press statements and other announcements by email; and
- the broadcasting of the Governor's *Monetary Policy Statement* press conferences live on pay-to-view television (SKY CNBC).

Let's look at some of these in more detail.

### Monetary Policy Statements

Four times a year the Bank publishes *Monetary Policy Statements* (*MPSs*), two being required by statute annually. These documents, of about 40 pages in length, lay out in detail how the Bank sees the economy, inflation and monetary policy evolving in the months ahead. They are detailed, include economic projections and provide the public with an extensive "window" into the Bank's thinking. In addition, each *MPS* contains an interest rate announcement made at the time of the document's release.

The actual interest rate announcement is communicated to the financial markets via a so-called "screen message". The Bank has an arrangement with the wire service news agencies – Reuters, Dow Jones and Bloomberg – so that press statements and other announcements can be instantly transmitted onto their screens, which are used by financial market participants globally. On the day of an *MPS* release at 9.00 am, a press statement which makes the interest rate announcement is simultaneously "flashed" to the wire services. This is done to ensure that, as much as possible, all financial market participants can have access to Reserve Bank announcements at the same moment in time.

Prior to the press release being issued, reporters in a lock-up have nearly two hours to read the full *MPS* and to prepare their reports. However, they are only permitted to file their stories after the "screen message" has been flashed to the wire services. Two minutes after the release of the interest rate announcement, Dr Brash gives a press conference to answer questions about the decision.

A separate lock-up is also held for financial analysts.

### Television

A recent innovation is that Dr Brash's *MPS* press conferences are broadcast live on SKY Television's CNBC channel. The Bank pays for the filming of the press conference, its production and then its transmission to SKY, with SKY

carrying the cost of the actual broadcast. The target audience for this broadcast is financial market participants. If others who are interested watch, that is a bonus, but the main aim is to provide the financial markets with all the nuances of Dr Brash's comments, including his responses to reporters' questions. This is instead of having to rely on second-hand reports via the news media, with the risk of misinterpretation that that entails.

Previously, the Bank broadcast its press conferences live on its website, but we found that most institutions could not access this service because of computer "firewall" limitations. However, we suspect that in the longer run web-based broadcasts of press conferences will become the norm, as this technology matures.

## Speeches

Each year the Governor, and occasionally other staff, deliver a large number of speeches to many different audiences. Most speeches are about monetary policy, but other topics have included the state of the New Zealand economy, prospects and policy options for economic growth, optimal currency regimes, external vulnerability, financial market stability and New Zealand's approach to banking supervision. Most speeches are off-the-record, and a few are on-the-record.

Off-the-record speeches allow the Bank to communicate with large numbers of New Zealanders without flooding the financial markets with potentially confusing messages. Typical audiences are sector and service groups.

On-the-record speeches, usually by the Governor, are valuable for putting the Bank's views to a wider audience. They usually receive widespread media coverage. Speeches are also mailed to relevant audiences using an extensive database of mailing lists. A typical mail-out would go to about 1300 addressees.

In addition, every three years Dr Brash undertakes a "roadshow" in which he tours the country addressing a multitude of audiences, especially in provincial areas. In the 2001 roadshow, Dr Brash addressed representatives of small and medium businesses in 24 towns and cities over two weeks, reaching about 4,700 people. These roadshows are intended to reach a wider audience than the normal sector and service groups that more typically invite Dr Brash to address their meetings.

## Media availability

Aside from the formal communications initiatives described above, the Bank also seeks to be accountable to the public in more general terms. The Bank receives numerous requests from journalists for interviews and often accepts these requests. The one exception is that the Bank does not grant requests to journalists who want to publish material that is market-sensitive, such as the Bank's current view of monetary conditions or the state of the economy. However, that aside, a reporter's request for an interview is granted unless there is a good reason to do otherwise.

The Governor also makes himself available for radio and television interviews. The benefit in this lies not just in the specifics of what's said but also in his generic accountability to the public, which is appropriate in a democracy.

The Bank also puts considerable effort into providing background briefings and advice to reporters seeking to cover economic issues. Statistics about the state of the economy available on the Bank's website are used extensively by the news media.

## Publications

The Bank produces a range of publications explaining its activities and policies. The Bank's key accountability document is its *Annual Report*. This contains:

- statements by the Governor and the Chairman of the Non-Executive Directors' Committee of the Board;
- information about the functions, structure and governance of the Bank;
- details about the non-executive members of the Board;
- a chronology and description of the Bank's activities for the period under review;
- an assessment of the Bank's intended outputs in the year ahead; and
- the Bank's financial statements.

For the last three years in a row, the Bank's *Annual Report* has won the Institute of Chartered Accountants Annual Report Award in its class.

The Bank also publishes the *Reserve Bank of New Zealand Bulletin*, which is a quarterly journal of semi-technical articles mainly written by the Bank's economists. The target audience is intelligent, well informed, but non-specialist readers.

The Bank has a range of brochures and booklets prepared for lay audiences. These include publications that give general descriptions of the Bank's activities and statutory framework, answer questions about monetary policy, explain the nation's currency, provide guidance on registered banks' financial disclosures and provide simple investment advice in the context of low inflation.

Brochures and booklets currently in use are:

*This is the Reserve Bank*

*Central Banking in New Zealand*

*The Impact of Monetary Policy on Growth*

*Monetary Policy Over the Business Cycle*

*Explaining Currency*

*Your Bank's Disclosure Statement - What's in it for you?*

*The REAL Story: Saving and investing now that inflation is under control*

### Internet

The Bank's website[1] is now the public's main method of accessing information about the Bank's activities. The Bank's publications, news releases, speeches and the like are displayed on the website, along with statistical data about the New Zealand economy. Typically we now get over 10,000 visits to the website a week.

### Reserve Bank Email Service

A recent innovation on the Bank's website allows people to register online to receive the Bank's press statements and other announcements by email. This has generated a self-created audience of people interested in what we are doing. At the time of writing, this service had about 1400 users.

[1] http://www.rbnz.govt.nz

### Education

The Bank has sought to augment public understanding of its activities and policies by providing resources to the education system. For sixth form economics students, in 1995 we produced an education kit entitled *Inflation: a sixth form resource*, which concentrated on the merits of low inflation. In 1996 we produced, in conjunction with the Bankers' Association, a kit called *The Tale of the TT2.* Aimed at 7 and 8 year olds, this introduces children to the notion of prices. For third and fourth formers, in 1997 we produced an education kit called *The PIE Kit*, which is a general introduction to economics. (PIE stands for "people, inflation and economics".)

More recently, the Bank sponsored the Journalist Training Organisation to create a course textbook for training mid-career journalists to be business reporters. The Bank also receives numerous requests from schools wanting to visit the Bank. At such visits, we provide a seminar, usually delivered by one of our junior economists.

For 2002, two new education initiatives for secondary schools are being developed, these being a website game that simulates monetary policy decision-making and a competition for 7th form economics students involving making and justifying monetary policy decisions.

### Resources

The Bank's external communications are managed within its Corporate Affairs Department. Those involved in external communications are the Department's Manager, a communications officer, a clerical assistant and a desktop publishing and printing manager. The Bank's *Monetary Policy Statements* and *Bulletins* are written and edited by policy staff elsewhere in the Bank. Aside from the *Annual Report* all published documents are prepared in-house. Each week a Communications Committee meets to assess the communications issues being faced by the Bank and to manage the Bank's communications programme. Its membership comprises the two Governors, the Corporate Affairs Manager, the Communications Officer and the editor of the *Bulletin*.

## 4 Evolving the message

The communications methods that the Bank uses, as described in this article, are now well established. However, in terms of content and tone, the Bank's external communications are in transition and its public persona is changing.

Over the first decade of the Bank's operational independence, the Bank acquired a relatively high public profile and monetary policy was regarded as a relatively controversial feature of public policy. Now that the battle against high inflation has been won, and the monetary policy framework is well established, the Bank seeks a somewhat lower profile – to be seen to be carrying out important but non-controversial functions in a reliable and predictable way. In political and economic terms, we want, long term, to be "just part of the furniture". When participants in an economy can concentrate on issues such as productivity enhancement and economic innovation, and do not have to waste time or energy trying to second-guess future rates of inflation or central bank actions, that benefits economic performance.

The Bank's communications stance was very different when it was first directed to focus on price stability. In the 1970s and 1980s New Zealand experienced high and variable inflation matched by high inflation expectations. In other words, not only were prices rising rapidly, but price setters were sufficiently habituated to this that they consistently assumed high inflation in their pricing plans and tended, given any demand pressures, to put up prices aggressively. As monetary policy brought inflation down in the late 1980s, and then held it down in the early 1990s, so the Bank urgently needed to drag inflation expectations down as well. This was because, once inflation expectations were brought close to the Bank's actual inflation target, then monetary policy could be less aggressive while still maintaining price stability. Paradoxically, the more the public could be persuaded that the Bank was utterly resolute in its pursuit of price stability, the "gentler" monetary policy could actually be.

To that end, the Bank chose to be very active in advocating the benefits of price stability, not merely to build public support for the price stability goal, but also to persuade price setters that inflation was a thing of the past. In doing so, the Bank was seeking to reduce the adjustment costs associated with getting inflation down and keeping it down. We knew that the economic cost of disinflation would be higher for as long as those who set wages and prices did not believe that inflation was coming down or staying down. Therefore, in the early days of the inflation-targeting regime, it was particularly important for the Bank to convince the public, and especially wage and price setters, that we were serious about bringing inflation down to within the target range and keeping it there.

Such activist communications carried their own tensions. For example, a judgement had to be made about how far the Bank should go in advocating or even campaigning for the goals defined in the Reserve Bank of New Zealand Act. The Bank, after all, is merely a government agency carrying out duties set by statute. Our decision was that we had to be forthright – that the goal of monetary policy and the importance of achieving and maintaining price stability had to be clearly articulated. This involved risk, but we made the judgement that operational independence meant that relying on ministerial advocacy of the policy framework was not enough and, indeed, not appropriate if the public were to be convinced of the Bank's operational independence.

Another tension was resolving how to talk about the benefits of price stability without implying that monetary policy had an economic growth target. In the early 1990s, the risk was that price setters might gain the impression that secretly the Bank was trying to use monetary policy to promote short-term economic growth, despite its statutory focus on price stability alone. From that they might have concluded that inflation would be higher than otherwise, which they would have built into their pricing plans. Then to contain this the Bank would have had to set interest rates higher than otherwise, curtailing economic growth. Thus, in the face of high inflation expectations, for monetary policy to make its best contribution to economic growth, ironically it helped for the Bank to appear to be relatively insensitive to the issue.

However, through the 1990s, as inflationary expectations became better "anchored", the Bank was able to make its external communications more balanced, talking more openly about the growth benefits of price stability. To that end, in the 1990s the Bank's documents aimed at lay audiences often included a statement that: *Price stability protects the value*

*of people's incomes and savings, and encourages investment in the nation's productive capacity, thereby contributing to employment, growth, export competitiveness and a more just society. In particular, monetary policy aimed at price stability also promotes secure employment by helping to smooth out boom-bust business cycles. This means when the economy falters, inflationary pressures fall and monetary conditions can be eased, which encourages the economy and employment to grow again.*

Latterly, since December 1999, the Policy Targets Agreement has made this explicit, so that the Bank is now required "In pursuing its price stability objective (to) seek to avoid unnecessary instability in output, interest rates and the exchange rate." In fact, the Bank has done this all along, the difference being that with inflation expectations better anchored, we can now afford to discuss monetary policy in a more balanced way.

So too, in terms of general "tone", the Bank has been evolving a different public relations persona. In the early and mid-1990s the Bank's "communications tone" had a crusading aspect, as we sought to constrain inflationary expectations. However, a less strident approach is now more appropriate, akin to that of a "vigilant guardian" waiting in the background but still committed to do what needs to be done, should the need arise.

The evolution of the Bank's communications stance, as described here, involves risk. If the transition occurs too slowly, the risk is that the public may conclude that the Bank is out of touch, too powerful and undemocratic. The perception could then be that the Bank is "kicking a dead horse", obsessively fighting a war against an inflation threat that in fact is gone, and doing economic damage as a result. The ultimate cost of such a mistake could be a loss of community support, and then political support, and then the Bank's operational independence. Conversely, if the transition occurs too quickly, the risk is that price setters may think the Bank has "gone soft on inflation." The Bank would then have to make monetary policy more aggressive again to win back its credibility. A by-product of that would be economic damage. Getting the balance "right" in our communications strategy is therefore very imp0ortant.

## 5 Conclusion

Looking to the future, a key communications challenge for the Bank will be the continued management of the transition described above. As this takes place, and as the Bank becomes increasingly "off the front page", a likely outcome will be an increased emphasis on using new and targeted technologies to communicate with smaller, more specific audiences. The Bank's website, the Reserve Bank Email Service and the television or web-based transmission of press conferences are examples of these more discrete "new media" initiatives.

# Managing human resources – a central bank perspective

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The adage that "people are our greatest asset" has been a recurrent theme in many businesses and organisations through history. This is no less true for a central bank. Indeed, people are, without doubt, a central bank's most important resource. Our business relies heavily on the expertise, experience and sound judgement of our staff. A central bank's effectiveness crucially depends on its credibility, and this in turn largely comes down to the quality of its staff. Therefore, managing human resources effectively is a critical element in maintaining an effective and credible central bank. This article summarises the evolution of the Reserve Bank's approach to human resources management, placing this in the context of the changes that have occurred within the Bank's structure and governance arrangements over the last decade or so.

## 1 Introduction

We often hear that the most important asset in any organisation is its people. This is no less the case with central banks. To be effective, central banks must have a high degree of credibility. This in turn requires a central bank to have the capacity to keep track of and carefully analyse the many factors that impinge on its core business – maintaining price stability and financial stability. And it requires a central bank to be able to respond with sound and well thought through policies as and when the need arises. This requires considerable skill, expertise, experience and judgement on the part of a central bank's staff. Hence, human resources is a vital area of any central bank, and this certainly holds true for the Reserve Bank.

Although people are a central bank's most important asset, there are also significant risks in the human resources area, and those risks need to be carefully managed. The risks include the consequences of recruiting the "wrong" people, inadequately training and developing them, losing them prematurely, developing ineffective or misguided motivation structures, and failing to consider future human resource capability needs. Hence, the Bank, like most organisations with a key dependency on the skills, experience and judgement of its staff, needs to maintain structures and policies to identify and manage these risks.

This article discusses the Reserve Bank's approach to human resource management and the way this has evolved in recent years. It places this in the wider context of the changes that have occurred to the Bank's organisational structure in the last decade or so.

## 2. Setting the context – evolution of the Reserve Bank's structure and culture

Like the rest of the New Zealand public sector in the late 1980s and early 1990s, the Reserve Bank has undertaken substantial internal reform in a wide range of areas. Some of these reforms resulted from changes to the Bank's functions, some from the Bank becoming operationally independent in the area of monetary policy, and some of the reforms were driven by a desire to strengthen our overall efficiency and effectiveness. Most of the reforms had implications for human resources one way or another. The main developments worth noting in this context include the following:

- In 1989, Parliament granted the Bank operational independence in the area of monetary policy, as part of the move to formalised inflation targeting. With greater independence came an increased need for transparency and accountability, not only for monetary policy, but also in respect of the management of our resources. Reflecting this, the Bank's finances were changed by the redirection of seigniorage income (the income associated with issuing currency) from the Bank to the Government,

and the Bank's funding was made more transparent and subject to greater accountability. The funding for the Bank is now determined by a funding agreement, negotiated every five years with the Government, which prescribes how much income the Bank can retain to cover its operating expenses. This, together with the internal drive towards enhancing the efficient management of the Bank's resources, led it to develop a comprehensive system of planning and budgeting in all of its departments. In turn, this placed an increased emphasis on the setting of clear objectives, monitoring the performance of departments against planned outputs, and developing management systems to ensure that resources are efficiently used within departments. Each department's plans, budgets, and performance are scrutinised by the Bank's Governors and by the Board of directors. Summarised information relating to performance against plans and budgets is disclosed in the Bank's annual report.

- The economic and financial reforms of the mid-1980s resulted in the elimination of some of the Bank's functions, such as foreign exchange controls and the administration of financial regulation. This enabled us to make substantial reductions in staff numbers and to simplify aspects of our operations. Further staff reductions have subsequently been facilitated by the introduction of new technology (as in the processing of currency) and by a conscious process of reviewing what we do and how we do it. Reflecting these developments, staff numbers have fallen dramatically in the Bank in the last 15 years, from more than 700 full time equivalents (FTEs) in the mid-1980s to fewer than 200 FTEs today. The Bank's operational costs have correspondingly fallen significantly in real terms over this period as well, and the Bank's expenditure has generally fallen well below its funding level.
- The reduction in staff numbers, rationalisation of department structures and other changes within the Bank's way of operating have also facilitated the adoption of a flatter structure. Layers of management have been removed, leaving a relatively flat structure of one governor, one deputy governor and eight heads of department, which together comprise the senior management team. The policy departments were configured around their key functional outputs. The Bank developed a process of strategic management and the human resources area attempted to reflect these changes in its structures.
- In the mid-to late 1980s the Bank moved to a fully costed approach to remuneration packages, removing most of the non-salary staff benefits that had formerly been part of staff remuneration arrangements (concessional finance being an example). The Bank also terminated entry into the staff superannuation scheme and encouraged existing staff, through the use of financial incentives, to withdraw from the defined benefit scheme. These changes were undertaken for a number of reasons, including reducing the inequity that results from remuneration provided by way of uncosted finance, to reduce the contingent risks of a defined benefit scheme, to reduce administrative costs, and to avoid internal conflicts in our human resources policies. For example, there were aspects of the remuneration and superannuation systems which created incentives for people to remain with the Bank, regardless of whether they were good at their job (or even whether they enjoyed doing it) – to the Bank's cost.
- In the early 1990s, the Bank moved to a system of formal job grading based on the Hay system (which is a framework for measuring the "size" of jobs and facilitating comparisons of remuneration with similar jobs in other parts of the labour market). This was motivated by a desire to promote a greater degree of internal consistency in the remuneration of staff, having regard to the size and nature of their jobs, and to align remuneration packages better to relevant market comparators. The process of moving staff at mid-management level and above to individual employment contracts also began in the early 1990s, as part of a move to place greater emphasis on individual staff accountability. It was also envisaged that this would allow a more flexible structure for determining people's pay and terms and conditions of employment.
- The 1990s also saw an evolution in the way the Bank organised itself. The flatter management structure and

small staff numbers enabled, and to some extent required, the Bank to delegate greater responsibility to less senior levels of staff. In the 1980s and earlier, the Bank operated with a relatively formal, multi-layered hierarchy, and it had been rare for young graduate staff to be involved in major policy decisions. Today, the Bank has become a much less formal working environment, with less hierarchy, and newer staff members have a much greater involvement in the final stages of the Bank's outputs and play an active role in influencing its decisions. Provided that this is a carefully managed process, the delegation of greater responsibility to relatively less experienced staff has brought major benefits to the staff and the Bank itself. These include a greater sense of "ownership" by staff in the Bank's core functions, a stronger incentive to achieve excellence, quicker turnaround in work and a faster development of skills and knowledge. Other aspects of the way we now operate include providing more flexible working hours for staff, accommodating part time employment, developing open plan workspaces and encouraging a closer liaison between departments.

- In the late 1990s, the Bank began again to reflect on how its culture had evolved and on the challenges that it was facing on the staffing front. The starting point for assessing this was our mission statement and values. The Bank's mission statement is:

  > Our commitment to New Zealanders as New Zealand's central bank: We will do everything in our power to build national and international confidence in the stability and integrity of New Zealand's money and monetary system.
  >
  > We will do that by:
  >
  > - operating monetary policy so as to maintain price stability;
  > - promoting the maintenance of a sound and efficient financial system; and
  > - meeting the currency needs of the public.
  >
  > *We will critically review our performance regularly and will aim to ensure that we use taxpayers' resources efficiently and effectively.*

In the late 1990s we reviewed our values through a process of open discussion among staff. The values reflect the culture that has developed within the Bank – a culture of openness, individual responsibility and accountability, team-work and the pursuit of excellence.

Reflecting this, our values are:

> *Excellence:* We pursue excellence in all that we do and we achieve it by actively challenging, reviewing and improving the way we work.
>
> *Our People:* We value the talents of our people and enhance those talents by providing encouragement, support and opportunities for growth and development.
>
> *Our Reputation:* We strive to inspire public confidence by acting with integrity, exercising sound judgement and using public resources responsibly.
>
> *Working Together:* We respect and encourage both open communication and diverse contributions aimed at achieving the Reserve Bank's goals.

In the past, the Bank met its needs for skill and experience predominantly from full time, salaried, and long-serving employees. In the past decade there has been significant change in the mix of the Bank's staff. In fact, six of eight departmental managers have less than 2.5 years in their current role. Only one of eight departmental heads is doing a job unchanged from the job they were doing three years ago.

Outside the three policy departments, virtually every staff member has had their job redesigned, their reporting line changed or their department downsized, merged, or disestablished since June 1998.

As the Bank has evolved, the profile of its staff has changed quite significantly. In earlier years, most of the Bank's staff were long-term career staff, many of whom joined the Bank straight from school or university. That is increasingly changing. Today, the staff comprises a small core of central bank career specialists who could be expected to remain with the Bank for a large part of their career (with occasional absences due to secondment, etc). This group is surrounded by a circle of skilled and experienced professionals who

typically spend 5-10 years with the Bank. Full time or part time professionals who spend 2-5 years associated with the Bank support them in turn. In part, these developments reflect the changes made to the Bank's culture and mode of operation over recent years. But they also reflect changes to the workforce more generally, such as the development of a more mobile workforce and the tendency for newer employees to seek experience overseas.

These developments have significant implications for all aspects of human resources strategy, policy and practice as we strive to help the Bank to achieve its mission statement and build on its values.

It has meant that we have had to develop an environment where individuals can be their most effective. We are working on this by developing leadership skills, enhancing teamwork, encouraging greater individual responsibility, managing performance and fostering ongoing staff development.

In line with our values, many of the initiatives in the past three years have sought to improve the way we work together. Our goals have been to:

- enhance transparency around human resource processes;
- empower staff and facilitate their ongoing development to meet the Bank's and their needs;
- strengthen the accountability of line managers; and
- simplify unnecessary complexity.

Over the past three and a half years we have re-evaluated and rebuilt virtually every aspect of our human resources strategy and have sought deliberately to evolve the culture of the Bank. Along with this we have attempted to evolve the human resources function to provide strategic advice and to operate on an advisory basis for operational issues. This means that line managers are accountable for managing their staff and the senior management team owns the Bank's human resources strategies and practice.

Human resources at the Bank includes all aspects of:

- recruitment and selection;
- job design and job evaluation;
- training and development;
- motivating and rewarding; and
- succession planning.

The following sections discuss each of the areas above, particularly focussing on three key areas of change - job evaluation, leadership and succession planning, as examples of how we have tried to align our human resources strategies with our needs.

## 3 Recruitment and selection

Getting the best people for the job is a vital element of any human resources strategy. The Bank has therefore placed a great deal of emphasis on the process of staff recruitment, including marketing the Bank to potential employees, advertising specific job positions when they become available, identifying potential candidates before vacancies occur, and maintaining robust procedures for screening candidates. An important element of the recruitment stage in the policy departments of the Bank is taking the initiative to make contact with university graduates well in advance of the actual selection of candidates for graduate positions. For many years, Bank staff have visited most of the universities to market the Bank as a potential employer, including explaining our policy functions, structure, culture, staff policies and what we are looking for in an employee. We also run a summer programme where potential employees are able to work in the Bank between semesters.These initiatives provide an opportunity for interested graduates (mainly in the economics and finance areas) to assess whether the Bank might be a place they would like to work and to ask questions of Bank staff.

We have recently introduced scholarships for graduates. We provide two to three a year on the basis that the person will work at the Bank.

At the stage of recruiting for particular positions, the human resources team provides a consultancy service for the recruiting departments and a representative from human resources usually sits on interview panels to assist in consistency of approach and to provide specialist recruitment advice. In the recruitment process we adopt a careful process

in an attempt to ensure that we appoint the best person for the position. We are now using a wider range of recruitment selection tools than was previously the case, such as structured interviews, role plays, tests of analytical ability and written communication skills, and psychometric testing. These procedures, while by no means perfect, assist us to assess whether candidates have the right blend of skills, knowledge, experience and personal qualities for the position in question. The recruitment process also helps to provide targeted information on candidates' future development needs.

## 4 Job evaluation

Another important human resources activity in the Bank (and in any organisation for that matter) is the process of assessing the "size" of jobs (ie the level of responsibility and the required skills associated with a particular job). Job evaluation is the process of determining the relevant criteria that the Bank wishes to use to assess positions to assist management decision-making and planning. This is an area to which the Bank has devoted considerable resources in the last year or so. Our work in this key area is part of the move the Bank has made from a formerly rigid remuneration and job evaluation structure, where staff were allocated into one of a large number of graded positions, and where remuneration was paid according to the job grade, to a situation today where there is much greater flexibility.

The move to a more flexible job evaluation framework was partly a result of becoming a smaller organisation with a flatter management structure. It was also motivated by a desire to provide a more transparent, internally consistent and simpler framework for assessing types of jobs within the Bank. We also wanted to develop a framework that would give staff a better sense of the types of skills, knowledge and level of responsibility they need to develop in order to progress to more senior levels in the Bank. Our goal was to develop a relatively simple job evaluation system relevant to the nature of the Bank's functions and needs, and to link it to career path information, remuneration, performance appraisal, recruitment selection criteria, and training and development. We also wished to use the job evaluation framework to inform human resources capability discussions, particularly in succession planning. The job evaluation framework needed to support:

- flexible human resource structures that can adjust easily to ongoing change in the Bank; and
- the remuneration review process, through linkages to accurate remuneration information for comparable jobs in relevant parts of the private and public sectors.

We wanted the framework to increase job evaluation and remuneration transparency by providing staff with a better understanding of the factors that the Bank has regard to when deciding remuneration packages, and the factors that influence promotions.

With these objectives in mind, the Bank adopted a broad-banded job evaluation system. We found that a broad-banded matrix would be simple and transparent for staff and managers alike, and would still provide the Bank with the flexibility it needed to ensure that staff remuneration reviews take adequate account of remuneration developments in the private and public sectors for comparable jobs. The new system was implemented in close consultation with managers and staff.

The job evaluation system involves the use of a matrix comprising a number of job attribute categories. These categories are:

- "Making Decisions" (comprising criteria that relate to the nature and level of decision-making required in a job).
- "Capacity to Influence/Client Liaison" (ie the extent to which the job requires the ability to influence internal or external parties, to deal with clients and to bind or represent the Bank externally).
- "Leadership/Teamwork/People" (ie the extent to which a job involves responsibilities to lead or manage people or to provide intellectual leadership).
- "Work Complexity/Solving Problems" (ie the level of complexity and problem solving requirements of a job).
- "Knowledge and Experience" (including the technical knowledge, and the nature, depth and breadth of experience, required for the job).

These are the major factors that we think are important to the Bank in terms of human resource capability and they

provide a meaningful basis for classifying job positions.

Although the job evaluation system provides a useful framework for assessing the "size" of positions within the Bank, we would not pretend that it is a fully objective and scientific structure. No system of job evaluation can be. The job evaluation process inevitably involves a good measure of judgement, but within a consistent set of criteria. We tried to be very clear on this in our communication with staff as we developed the job evaluation system so as to avoid misleading expectations of what the system could deliver. And, in any case, we avoided rigid job evaluation formulae at all costs, preferring a more flexible and realistic structure for assessing jobs. On this basis, we decided the size of positions by looking at the evaluation matrix and making judgements about where a particular position fitted, having regard to the criteria used in the matrix.

Following this process, and after consultation with staff, we released to staff the chart of positions and pay ranges, so as to facilitate a more transparent remuneration structure in the Bank.

The Bank wishes to attract and retain staff with the appropriate skills and experience to enable it to achieve our goals and the pay ranges were set with that in mind. The remuneration policy was revised at the same time as the job evaluation system was developed. The Bank clarified where remuneration fitted within its culture as part of this. It has long been recognised that, for many positions in the Bank, we will never be able to pay market rates; in many cases, the levels of remuneration for comparable positions in the financial sector, for example, well exceed the level of remuneration that the Bank could realistically pay its staff. It was also recognised that, although the level of remuneration that the Bank can offer staff makes an important contribution to recruitment and retention, it is not the only recognition or reward that staff receive from working for the Bank. Feedback from staff over the years has suggested that staff are motivated by a wide range of factors, of which remuneration is but one part. Experience suggests that staff in the Bank attach considerable weight to such factors as a stimulating intellectual environment, opportunities for training and development, and flexible working practices.

Our job evaluation and remuneration systems are now a year old. It is too early to say whether they will meet our long-term needs, but there have certainly already been advantages. The new structures have created greater transparency in remuneration arrangements, and provided a more accountable process for determining remuneration. They provide the employee with greater opportunity to assess the fairness of the review process in respect of his or her own package. The structures also provide an effective system for keeping track of internal relativities.

## 5 Training and development

The nature of central banking requires staff to have wide and deep knowledge of the economy and financial system, to be well informed of relevant international developments and to have a high level of competence in economic and financial analysis. It also requires strong support systems. This requires ongoing development of skills and knowledge in our staff. We therefore consider it vital to keep staff fully abreast of relevant technical developments and to maintain an environment that fosters the development of the required skills, knowledge and judgement in staff.

We have made an explicit commitment to training. We aim to provide an average of 20 hours training and development per employee per annum. Training and development take many forms, depending on the needs and circumstances of the staff in question. Training on technical skills is provided to individual staff where this is considered beneficial to their career path in the Bank, the needs of the job at hand and the Bank's priorities. Similarly, staff development programmes are made available to staff, individually and in groups, on a range of matters, including oral and written communication, working in teams, receiving and giving feedback, time management, and in other areas relevant to the Bank's and staff's needs. As discussed later in the context of succession planning, we also view secondments as an important element in staff development, not only in providing staff with the opportunities to develop new skills and knowledge, but also to benefit from exposure to different work environments.

Our performance review system is partly used to determine development needs and we have promoted a culture where

staff view their development needs as a positive aspect of their career, rather than a negative commentary on their performance.

We have used assessment centres for senior managers to target development needs and 360 degree feedback processes for leaders in the Bank to help us to target development needs as part of the Leadership Project. This is discussed in more detail later in the article.

All staff have a development plan as part of the performance review system and we have particularly targeted managers and leaders in their own development. An example of targeted development is our use of secondments to develop skills to give exposure to different working cultures and to give exposure to the private sector.

## 6 Motivating and rewarding staff

Another important aspect of human resources policy is motivating and rewarding staff. This is an important aspect of policy, given that the Bank is more likely to achieve its objectives when its staff are well motivated than if they are not. Therefore, the Bank has given careful consideration to the theory and practice of rewarding and motivating staff, as part of the Bank's overall effort to improve its performance.

Literature and research have suggested to us that individual employees value different aspects of the employment relationship. For example, some people place more emphasis on salary, while others place more emphasis on the nature of the work, the sense of involvement in the organisation's activities, development opportunities or lifestyle. Research also shows that the things valued are not necessarily related to demographic characteristics such as gender, experience, qualifications and profession.

It was considered that increasing managers' understanding of the individual career values of each of their staff, and then tailoring a management approach based on those values, was likely to improve both motivation and retention. From a Bank-wide perspective, understanding the key values of its employees would allow the design of employment packages and staff development programmes that better target the varying needs of a diverse staff.

We used a career values survey to identify the relative importance of different career drivers for Bank staff. The survey was also designed to provide managers with data that would allow them to discuss some of the issues that drive motivation and retention with individual staff. It has been a valuable tool to help managers provide more targeted career support for their staff.

It is also being used in conjunction with the latest staff "climate" survey. This is a survey of our staff that we usually conduct on a two yearly basis to get feedback on morale and other matters in order to provide us with information about the areas on which we need to concentrate to further strengthen staff motivation.

Through the use of these surveys, and through experience over the years, we have found that an important aspect of staff motivation in the Bank is the staff's sense of involvement in their work and their capacity to contribute to the Bank's outputs. It has also been found that factors such as the nature and variety of work, the scope for development, the scope to progress in the organisation, and the work environment are all important ingredients in the motivation of staff. Of course remuneration is also an important factor in staff motivation. In particular, we have found that a fairer and more transparent process for setting staff remuneration has been an important element in enhancing staff motivation.

## 7 Succession planning

In any organisation it is important to identify future requirements for knowledge and skills and to try to ensure that suitable people will be available to meet these requirements. Succession planning is designed to do this. To the extent practicable, the aim of our succession planning is to have people with the right skills, knowledge and experience available at the right time and in the right place to enable the Bank to perform its functions effectively. Some of this is met by recruiting to fill gaps as and when they arise (or in anticipation of positions becoming vacant in the future). That can be a satisfactory way of meeting a number of the skills/knowledge needs of the Bank. But in some areas it makes more sense to grow the required skills/knowledge organically through internal staff development.

Succession planning is easier said than done in any organisation, but it is especially problematic in a relatively small organisation such as the Reserve Bank. We have a small pool of staff from which to develop future skills and knowledge needs, and it only takes a small increase in staff turnover potentially to expose significant human resources gaps. This requires the Bank to be particularly attentive to the risks of skills/knowledge gaps emerging in core function areas and to maintain strategies for managing these risks as best we can. An important element of this is through staff development – ie identifying the people with the potential to grow into more senior roles and to cultivate their development.

We regularly review our succession planning to ensure that we are managing our risks and building our capability. In addition we have developed a number of strategies to assist us in retention and recruitment for succession planning purposes. We have instigated the "Governor's Network" which is similar to an alumni for staff who may be able to (directly or indirectly) provide the skills that we need. We keep in touch with these people via email and keep them informed of vacancies in the Bank.

As an aid to succession planning and broader staff development, we have taken a proactive approach in arranging occasional secondments for staff, mainly to foreign central banks and the international financial institutions, but also to commercial banks. Secondment arrangements allow staff to develop greater expertise and skills and provide opportunities for exposure to different work cultures. The secondments have proved to be useful in many ways, not least as a means of broadening and deepening the Bank's pool of skills and as a mechanism for motivating staff.

## 8 The leadership project

This article would not be complete without mentioning the leadership project, which, along with the job evaluation project, has been a key area of activity for the Bank. The project was instigated as one of the ways to follow up on staff feedback in 1999 about how the Bank could improve its culture.

As a result of the views expressed in that survey, senior management in the Bank made a number of commitments to staff about leadership. They included:

- a commitment to a greater use of 360 degree feedback (ie a system whereby managers and selected staff are periodically subject to appraisal by their manager, peers, staff and other colleagues);
- a commitment to a greater use of feedback by the Governor, Deputy Governor and managers for their own direct reports; and
- a commitment by senior management to ensure that their own attitudes, behaviour and decisions are consistent with the stated policies of the Bank.

The leadership project took these themes and built on the Bank's existing leadership skills by planning to provide managers with feedback on their skills and strategies to identify and meet development needs.

We reviewed the leadership competencies that were originally developed in 1997 to ensure that they continued to reflect the skills we are seeking from our staff.

In September 2000 the Bank offered the opportunity for Bank staff in leadership roles (both intellectual and people leadership) to participate in 360 degree feedback. This process was aimed at enabling the individuals to receive feedback on how their manager, peers, and direct reports perceived their skills across a range of management and leadership skills.

Senior managers were offered the opportunity of both assessment centres and 360 degree feedback. Assessment centres provide an in-depth analysis of individual motivation and work styles, and have been successfully used within the Bank for senior appointments.

The 360 degree feedback survey information, assessment centre information, and existing performance reviews have been used to formulate individual staff development plans. This will help to target staff development and build the Bank's human resources capability.

## 9 Conclusion

This article outlines some of the changes to human resources policy that we have made in recent years. It is by no means a comprehensive picture, but it attempts to show the directions started long ago and where we are on the journey.

Our recent staff survey results were generally positive and showed that the efforts made by the Bank over the last few years to improve leadership and management have been recognised by staff – particularly in the areas of inter-departmental co-operation and the value the Bank places in its people. However, they indicated that there is room for further improvement. We will therefore continue to review and further develop human resources policy in ways that seek to build on the Bank's existing strengths.

# Extracting market expectations from option prices

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Indicators of market expectations based on option prices are gaining popularity among central banks. The Reserve Bank recently began to use these indicators in financial stability and monetary policy analysis. This article provides a non-technical overview of these techniques and highlights how they might be used, through examples.[2]

## 1 Introduction

In most aspects of life, people – consciously or unconsciously – hold expectations about the future. They collect relevant, currently available, information and use it to help form their view about future events. Expectations play an important role in our lives and in the decisions we make.

Expectations about financial market prices are particularly important for market participants – both investors and borrowers. Investors in these markets have to decide what to buy and what to sell, when, and at what price. Investors' decisions are based on their views about what various asset prices will be in the future. If the investor's expectations prove to be right, they make a profit, whereas if they prove to be wrong, the result is a loss. Therefore, active market participants put a lot of effort into gathering information about the future to produce the best forecasts possible.

Most of the techniques that reveal the expectations of market participants focus on the average of the expectations, and therefore collapse a range of potentially different and individually uncertain views about the future to a single figure. This approach is useful to track the changes in the direction of market sentiments. However, in some cases we are also interested in the uncertainty and the dispersion of individual views surrounding the central view.

This article discusses techniques that use information in the prices of financial options to reveal the nature of the uncertainty that surrounds market expectations about financial market indicators such as stock indices and the exchange rate. First, we introduce concepts such as probability density, standard deviation, skewness, and kurtosis that allow us to quantify and analyse uncertainty. This is followed by a short discussion of options in section 3. Sections 4 and 5 present techniques for measuring market uncertainty: implied volatility and implied probability density functions, respectively. These techniques are illustrated with examples of recent episodes of financial market uncertainty. Finally, we highlight the practical application of these techniques for the Reserve Bank.

## 2 Expectations and uncertainty

Information about market expectations of financial prices, such as interest rates and exchange rates, can be useful for the Reserve Bank. What markets expect affects the way they respond to the Bank's policy actions. Furthermore, quantifying expectations is useful for comparing the Bank's own forecasts with the market view and in assessing the stability of the financial system – these issues are discussed further in section 6.[3]

In quantifying expectations about how a financial asset's price will behave, however, there is a complication, as we have to take into account the uncertainty surrounding these expectations. The uncertainty of market expectations comes from two sources. First, different market participants will have different opinions about the future. When we talk about expectations, we generally refer to the average, or mean

[1] The author would like to thank Geof Mortlock, Michael Reddell and Ian Woolford for their comments on earlier drafts.

[2] For a more detailed and technical discussion of the methods presented here see Gereben (2002).

[3] Gordon and Krippner (2001) gives a thorough overview of the use of expectation-based measures in monetary policy, and the impact of expectations on the effectiveness of monetary policy actions.

value, of a number of individual views – underlying the average is a range of potentially disparate views. Secondly, individuals themselves have a sense of how uncertain the future price of the given asset is. An individual may have a "central forecast", but personal views about the future could probably be better described as if the person were assigning probabilities to a number of different potential outcomes: high probabilities are assigned to the most likely results and lower ones to the less likely cases. This uncertainty at an individual level contributes to the overall dispersion of expectations in the market as a whole.

Although the average (or mean) of market expectations is valuable information in itself, it is often useful to quantify the underlying uncertainty as well – are conditions 'normal', or particularly uncertain?

When facing an uncertain event in the future, people generally have views about the possible outcomes. They also have views about the probability of all the different possible outcomes. The different outcomes and the probabilities assigned to them together can be considered as a *probability distribution*.

Figure 1
Probability density function (PDF)

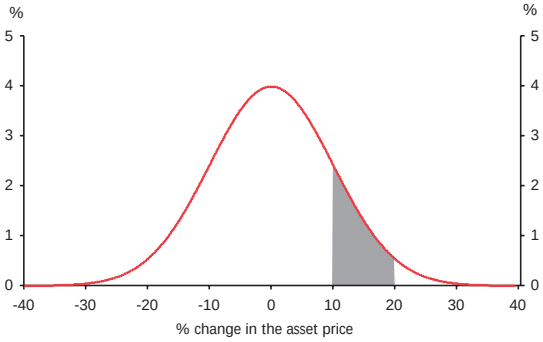
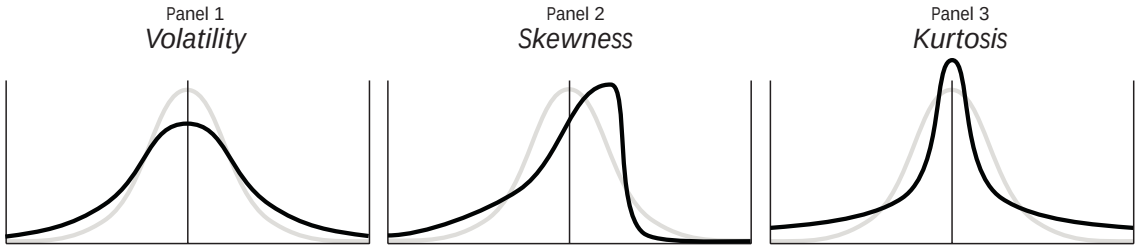



Figure 1 is a graphical representation of expectations about a hypothetical asset's price. On the horizontal axis the potential outcomes – in this case, potential changes in the price – are plotted. The vertical axis shows the probability of the outcomes. Loosely speaking, the value *y* measured on the vertical axis at point *x* means that there is *y* per cent probability of the asset price being in a 1 percentage point wide area around *x*. This mathematical concept, which is often used to visualise a probability distribution, is called a *probability density function* (PDF). Loosely speaking, a probability density function is a mathematical tool that gives us the expected likelihood of each possible future outcome. The area measured below the density function between two points is equal to the probability of the asset price being between the two points. To illustrate, let us assume that we want to calculate the probability of a price increase between 10 and 20 per cent. The answer is given by the size of the area below the density function between the 10 per cent and the 20 per cent points as shown by the shaded area in figure 1.

The shape of the curve in figure 1 tells us about the nature of the uncertainty that surrounds expectations about the asset's price. For example, the wider the density function, the higher the uncertainty, and conversely, a narrower probability density function means that expectations are more tightly bunched around the most likely event. Economists and statisticians have precise definitions and tools to quantify the shape of PDFs. The three most widely used concepts for characterising the shape of probability density functions are *volatility, skewness, and kurtosis*.

Volatility reflects the width of a density function. The first panel of figure 2 shows the difference between two density functions with different volatilities. Lower volatility (shown by the grey line) means that the final outcome of the financial

Figure 2
Shape characteristics of a PDF



asset's price is expected by most observers to be relatively closer to the mean of the expectations. Higher volatility (shown by the black line) on the other hand indicates that the chance of a deviation from the mean is relatively higher. Volatility can be thought of as a general measure of uncertainty about the final outcome. The most commonly used measure of volatility is the *standard deviation*.

Probability density functions are not necessarily symmetric: for example, there may be cases when individuals assign higher chances to large price changes in one direction than in the other. The asymmetry of a PDF is called "skewness". The second panel of figure 2 displays a (negatively) skewed density function relative to a symmetric one. The negative skewness on the chart indicates that in this case large price falls are perceived to be much more likely than large price increases. Note that on the right side of the panel the probability – the area under the PDF – is concentrated close to the centre of the distribution, whereas on the left side of the panel the probability of outcomes away from the centre is not negligible. The most commonly used measure is called the *skewness coefficient*.

Another shape characteristic of a PDF is called *kurtosis*. Kurtosis is an indicator of the likelihood of large deviations from the mean of the expectations. Unlike volatility, which indicates the average size of potential deviations from the mean, kurtosis indicates the extent to which deviations themselves can be different from each other. A density function with a high degree of kurtosis indicates that although in most cases the deviation is likely to be small, there is a perception of a non-negligible chance of extremely high or extremely low outcomes. Panel 3 of figure 2 illustrates the difference between distributions with low kurtosis (shown by the grey line) and high kurtosis (shown by the black line). The most widespread indicator is called the *coefficient of kurtosis*.

The coefficients of standard deviation, skewness, and kurtosis are generally expressed as percentages. The standard deviation and kurtosis coefficients take only positive values, while the coefficient of skewness can be either positive – indicating larger probability at the right tail of the density function, or negative, indicating larger probability at the left tail of the density function. To give a precise definition of the coefficients of standard deviation, skewness, and kurtosis goes beyond the scope of this article.[4] However, the precise interpretation of their numerical scale is not relevant from the point of view of our analysis. What is more important for us is the *dynamics* of these indicators – eg how these indicators evolve over time and how their current levels compare to their values in the past.

Now we have a toolkit that allows us to analyse the distribution of market expectations. The challenge is to obtain the expectations themselves. This is where options are particularly useful.

## 3 What is an option?

Options are one form of financial derivatives. They are 'derivative' in the sense that their final payoff depends on the price of some other product.[5] This other product is often called the option's 'underlying asset'. Options can be written on a large number of assets, such as agricultural commodities, shares, bonds, foreign currency, and so on.

As a central bank, the Reserve Bank is particularly interested in following the evolution of the New Zealand interest rate and currency options markets. However, other option markets, such as equity or commodity options can also provide useful information about the domestic economy or the international environment.

Due to their special features, options are particularly useful for recovering the market participants' view about the uncertainty that surrounds the price of the asset on which the option is written. As the option's value is heavily dependent on the distribution of the probabilities of various possible outcomes, the market participants reveal their view about uncertainty through the price at which various options are traded. Options are essentially like insurance products, and we are looking at the relative prices of various different

[4] An introduction into probability density functions and other statistical concepts mentioned in this article can be found in Ramanathan (1993).

[5] For a detailed explanation of derivative securities, and of the way in "hedgers", "speculators" and "traders" participate in markets for these products see Hawkesby (1999).

insurance policies. To get a broader insight into this process, we have to take a closer look at option contracts.

The two basic types of options are "calls" and "puts". They are contracts between two parties, the option's holder and the option's writer. In a *call* option contract, the holder pays a fee to the writer to obtain the *right (but not the obligation) to buy* a certain amount of the underlying asset at a pre-specified day (called the expiration date or maturity) and at a pre-specified price (called the strike or exercise price). On the other hand, the writer of the option is obliged to sell – on the request of the holder – the underlying asset at the pre-specified strike price when the option expires.

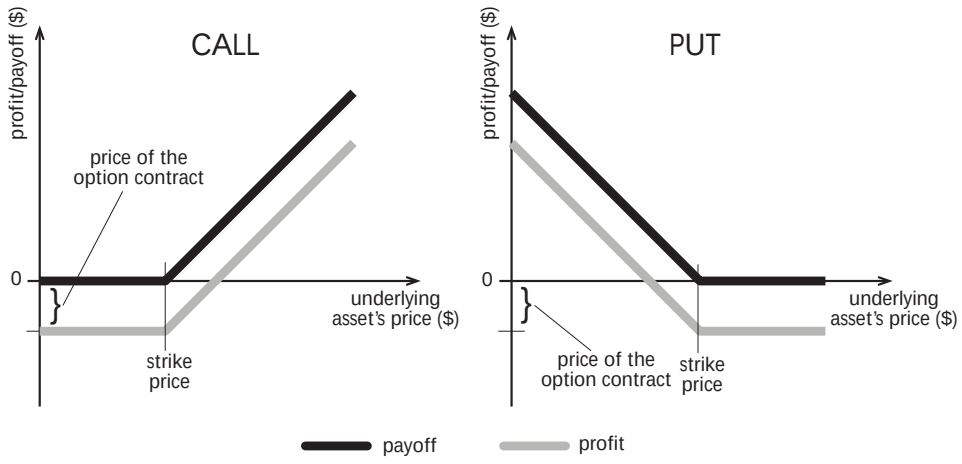
A *put* option, on the other hand, gives its holder the *right (but not the obligation) to sell* a certain amount of the underlying asset at a pre-specified day and at a pre-specified price. On the other hand, the writer is obliged to buy the underlying asset at maturity on request. Similarly to the call option, the holder pays an option fee to the writer.[6]

To get a better understanding of options it is useful to look at their payoff to the holder at maturity. Figure 3 shows the payoffs and the final profits – which are equal to the payoff minus the option's price – of call and put options at maturity the underlying asset's final price changes. As noted above, a call option gives the right to buy an asset at a pre-specified strike price. If the price of the underlying asset at maturity is lower than the strike price, it is not profitable to exploit this right by exercising the option: therefore the option is worth nothing. On the other hand, if the price at maturity is higher than the strike, the option holder can exercise the option, and gain the difference between the market price and the strike price.

Similarly, as noted above, a put option confers the right to sell an asset at a pre-specified price. If the market price of the underlying asset is higher than the strike price, it does not make sense to sell at a lower price; thus the option is worthless. However, if the market price is lower than the strike price it is worth exercising the option. Here, the option holder's payoff is the difference between the two prices.

A closer look at figure 3 gives us an insight into the relationship between the option's value and the price uncertainty of the underlying asset. The potential loss to the holder of the option is bounded: the option's final payoff is never worth less than zero. If we take into account that the option's holder has to pay a fee – the option's price– to enter into the option contract, the total profit of the option can be negative (see the grey line on figure 3). However, it is never less than the initial price of the option, the upfront "insurance premium". On the other hand, the potential gain is practically unbounded. The higher is the underlying asset's price at maturity, the higher is the gain from holding

Figure 3
The payoff and profit diagrams of call and put options




[6] There are several different types of options. The ones described here are called European-style options. Another popular class of options, called American-style options differs from the ones described here in that they can be exercised not only on a single day, but at any time between the purchase and the maturity date.

a call option. Similarly, the lower is the asset's price the higher is the gain from holding a put option.[7] If the uncertainty surrounding the price in the future is higher, so too is the chance that the price will deviate significantly from the strike price from the option. Under these conditions, the chance for a large profit is higher and therefore the buyer of the option is willing to pay a higher amount to enter into a contract. From the viewpoint of the option's writer, higher uncertainty means higher probability of the option being executed, in which case the option's writer would make a loss. Thus to compensate for this risk, the writer would require a higher initial option fee to enter into a contract. All in all, there exists a positive relationship between the uncertainty (or volatility) of the underlying asset's price and the price of an option written on the asset.

## 4 Implied volatility

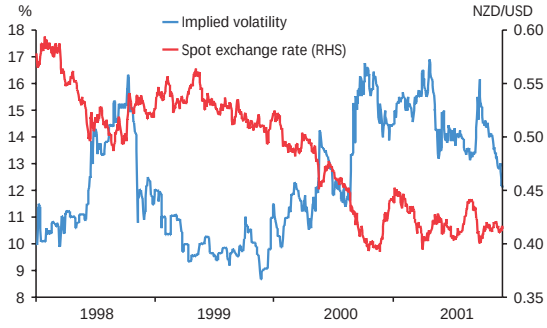
As we have seen, option prices appear to be closely related to the market's expectation about the uncertainty that surrounds the price of the underlying asset. Because of this relationship, we can use option prices to extract information about market expectations. Several different methods for unfolding this information from option prices exist.

The simplest method is to calculate the so-called *Black-Scholes implied volatility* measure. The Black-Scholes formula is a pricing tool that gives an approximate fix on the option's price in terms of several parameters: the current price of the underlying asset, the strike price, the interest rate of a risk-free investment, the time until maturity, and the standard deviation of the underlying asset's price.[8] This last parameter is generally referred to simply as volatility or 'vol'. One use of the Black-Scholes formula is to calculate option prices from given parameters. However, unlike the other four that are precisely given at any time, the volatility parameter is not directly observable, as it is related to the future uncertainty of the underlying asset's price. Thus we can only rely on estimates of it.

Another way of using the formula is to 'reverse engineer' the volatility parameter from existing option price data. To do this, one has to find the level of the volatility parameter that makes the option's price calculated by the formula equal to the option price observed in the market. The resulting measure of uncertainty is called implied volatility, which can be considered as a proxy for the market's expectation of the volatility of future price changes. It is usually expressed in annual terms. Measures of implied volatility can be calculated for all financial assets, provided that options written on them are regularly traded. Therefore, the prices of these options are available and observable on a regular basis.

Given that there exists a clear-cut relationship between the implied volatility and the option's price, on some option markets the quotes are given directly in terms of implied volatilities rather than in terms of prices expressed in currency units. On these markets the implied volatility is directly observable through the quotes of option writers and option buyers.

Figure 4
Implied volatility of the NZD/USD exchange rate



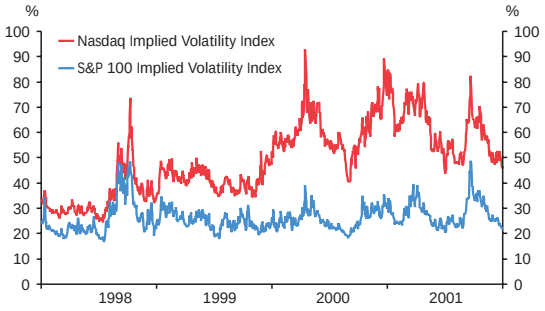

Source: UBS Warburg

To illustrate, figure 4 displays the implied volatility of the NZD / USD exchange rate over the last four years, together with the spot exchange rate. The data are over-the-counter currency option quotes provided by UBS Warburg. The level of implied volatility varied significantly over the period. At first sight, there is a noticeable co-movement between the exchange rate and the implied volatility. Periods characterised with a weak exchange rate seem to go together with a perception of higher volatility, therefore higher risk. Other changes in the implied volatility can be associated with domestic and international events. For example, we can identify the effects of the Asian and Russian crises that caused significant fluctuations in the implied volatility in the second

[7] In case of a put option, the profit is not unlimited, as the underlying asset's price cannot go to below zero.

[8] Black and Scholes (1973).

Figure 5
Implied volatility of the S&P 100 and Nasdaq stock indices




Source: Chicago Board Options Exchange

half of 1998. An upsurge in negative sentiment about the New Zealand economy prompted a sharp rise in the perceived uncertainty and fall in the spot exchange rate in September 2000. Finally, the terrorist attack in the United States caused another temporary increase in the implied volatility in September 2001.

Figure 5 provides another example, this time of the implied volatility of two stock indices, the S&P 100 and the Nasdaq. The S&P 100 index tracks the price of the largest and most actively traded stocks in the United States. The Nasdaq has a large proportion of IT and telecommunications-oriented companies in it. Options written on these indices are actively traded on the Chicago Board Options Exchange (CBOE). The CBOE publishes implied volatility indices for both the S&P 100 and the Nasdaq. As with the NZD/USD spot rate, the Russian crisis caused a significant increase in market uncertainty. Similarly, the burst of the equity price bubble of the IT (or 'tech') sector starting around the first half of 2000 caused a large increase in the gap between the implied volatility of the Nasdaq and the S&P 100 indices. According to the market's perception, the technology-oriented Nasdaq index (the 'new economy' sector) became increasingly risky compared to the S&P 100, which represented the more "traditional" sectors of the economy. Finally, a spike in the implied volatility of both indices could be observed after the terrorist attacks against the US on 11 September 2001.

## 5 Implied probability distributions

Implied volatility indicates the range of uncertainty surrounding market expectations about financial prices. However, implied volatility in itself does not allow us to analyse fully the general shape and the nature of the distribution of these expectations. To obtain a more precise characterisation of the shape, more advanced methods are needed.

A widely used method, originally developed by Malz (1998), allows us to extract a probability density function that describes the structure of the uncertainty surrounding market expectations (see the box for more details on the Malz method). After deriving the density functions, we can calculate the measures that characterise its shape: the standard deviation, the skewness, and the kurtosis.

The Bank uses this method to derive the density functions for the NZD/USD exchange rate. We use a daily data-set of currency option prices, covering the last two years. UBS Warburg provided the data on option quotes. As price data for options with different maturities is available, it is possible to calculate the expectations for 1 month, 3 months, 6 months, and one year ahead.

As the market for options written on the NZ dollar is relatively small by international standards, there is a risk that some of the option contracts that were used in the process of estimating the implied PDFs are not traded on a regular basis. If there is no actual trade behind the quoted prices, there is no guarantee that those prices represent the market participants' expectations.

The analysis of our data-set reveals that at the first half of the period covered there were some short periods characterised with only a low level of market liquidity. Despite these signs, however, the information derived from options seems to match other data sources on expectations and market sentiment. This suggests that the level of market liquidity, while not always high, is sufficient for fluctuations in quoted option prices to give us meaningful information on changes in the distribution of expectations.

## Box: Malz's method for extracting implied density functions from currency options

Malz (1998) developed a method to derive the uncertainty surrounding the market expectations about exchange rates using the prices of currency options. The global currency option market is a highly liquid marketplace of options written on different currencies. Furthermore, the standard contract types of this market are remarkably well suited for deriving implied probability density functions.

One particular feature of the currency option market is that the majority of trades involve standard option combinations. Option combinations are two or more options traded together as a single product. The rationale behind the combinations is to create financial products with special payoff structures that match the market participants' needs.

The most popular option combinations traded on the market are *straddles*, *risk reversals,* and *strangles*.

A straddle is a simultaneous purchase of a put and a call option with the same strike prices. The first panel of figure B1 shows the payoff function of the straddle. As the chart displays, the larger the deviation from the strike price, the higher the payoff for the straddle's owner. This means that the straddle becomes more lucrative in times of high volatility. As a consequence, the market price of a straddle contract reflects the currency option market's guess about the future volatility of the exchange rate.

Entering into a risk reversal contract means buying a call option with a high exercise price and selling a put option with a low exercise price. Its payoff is displayed on the second panel. The structure of the contract is such that if risks are symmetric, the price of the call is equal to the price of the put option, and the price of the risk reversal is therefore zero. In the case of asymmetric expectations, however, the risk reversal price may be either negative or positive. Negative risk reversal prices indicate negative skewness, whereas positive risk reversal prices indicate positive skewness.

A strangle is a combination of a buying a call option with a high strike price and a put option with a low strike price. As can be seen on the third panel, the strangle turns profitable in the case of highly positive or highly negative price changes in the underlying asset. Thus, if the price of a strangle contract is high, the market assigns relatively high probability to these extreme outcomes. Strangle prices can therefore be used as an indicator of kurtosis.

Quotes on straddles, risk reversals and strangles can be obtained on a daily basis. Malz's method uses the daily observations of these instruments to deduct the shape of the probability density functions, which in turn describe market expectations, using mathematical techniques.

Figure B1
Option combinations

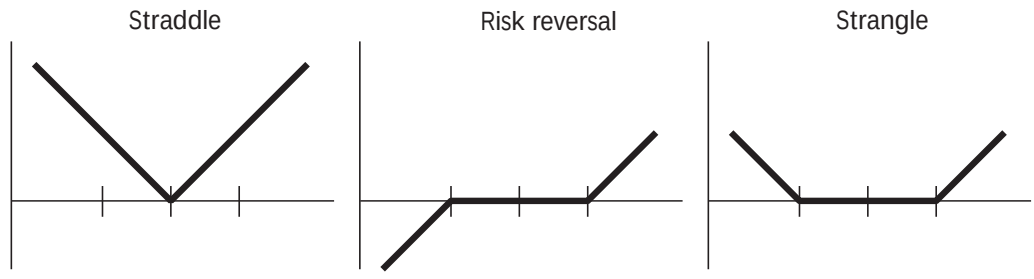
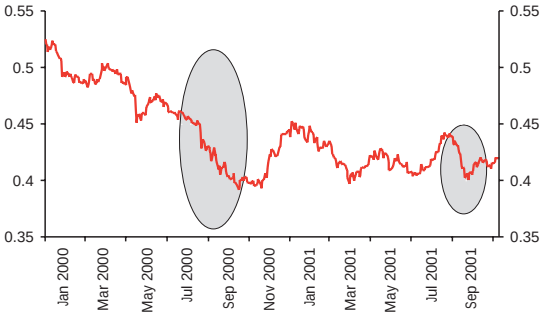


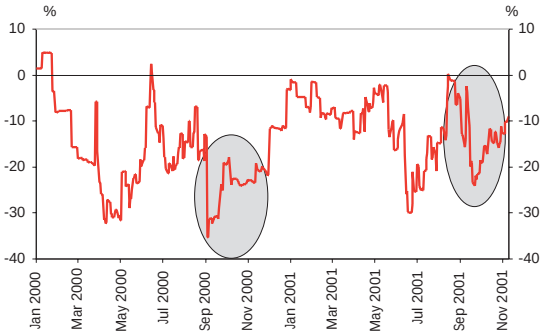
Figure 6
Uncertainty measures of the NZD/USD exchange rate
(calculated from 3-month NZD/USD options)

Spot rate




Standard deviation


Skewness




Kurtosis

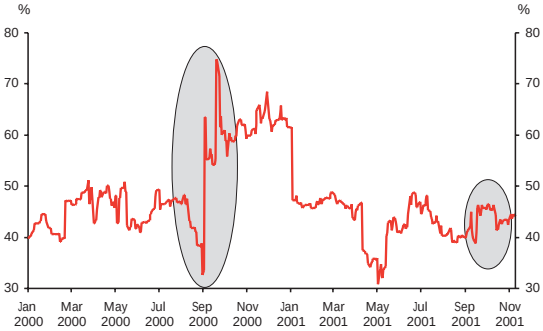



Figure 6 displays the path of the NZD/USD spot exchange rate together with the standard deviation, skewness, and kurtosis measures calculated from the implied probability density functions. Two significant episodes in the exchange rate history of the last two years – the sharp decline of the New Zealand dollar over August and September 2000, and the September 11 attack on the World Trade Center and the Pentagon – are highlighted.[9] These episodes are well reflected in the standard deviation, skewness, and kurtosis statistics. Over the first period (August-September 2000) implied volatility and kurtosis were strongly increasing, indicating an increase in uncertainty in general and a higher perceived chance of extreme price movements in particular. Also, the skewness measure went deeply negative, indicating 'bearish' expectations on the exchange rate, ie the market was much more worried about further significant price falls than price increases.

The second highlighted episode is the aftermath of the terrorist attack against the World Trade Center, which showed similar, although rather more temporary fluctuations in the standard deviation, skewness, and kurtosis measures. The analysis in the rest of this section focuses on this event, given that the impact on market uncertainty was dramatic.

Figure 7 shows the shape of the options-implied density functions of the NZD/USD before and after the 11 September attack. The distributions were calculated from options with a one month maturity. It can be observed that the market turmoil caused by the attacks resulted in a more dispersed distribution of the one month-ahead expected returns. Moreover, the increase in the distribution was more marked at the lower tail, implying an increase in the skewness that suggests expectations being biased towards greater downside risk for the NZD/USD cross rate.

[9] Movements leading up to the May 2000 *Monetary Policy Statement* (MPS) are also interesting. The sharp fall in the skewness indicator over the early months of 2000 highlighted the vulnerability of the market to a marked fall in the exchange rate, for which the widely expected rise in the OCR at the May MPS appears to have been the trigger.

Figure 7
Probability density functions for the NZD/USD 1 month ahead
(expected percentage change relative to the spot rate)

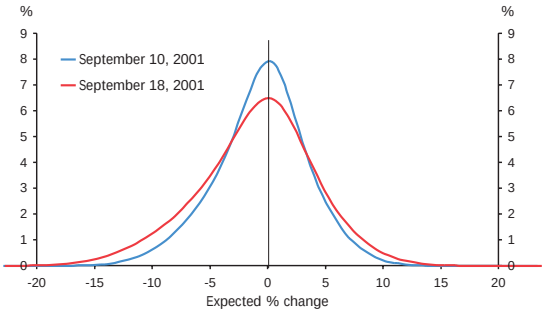



Figure 8
Standard deviation and skewness around 11 September
(calculated from options with a maturity of three months)

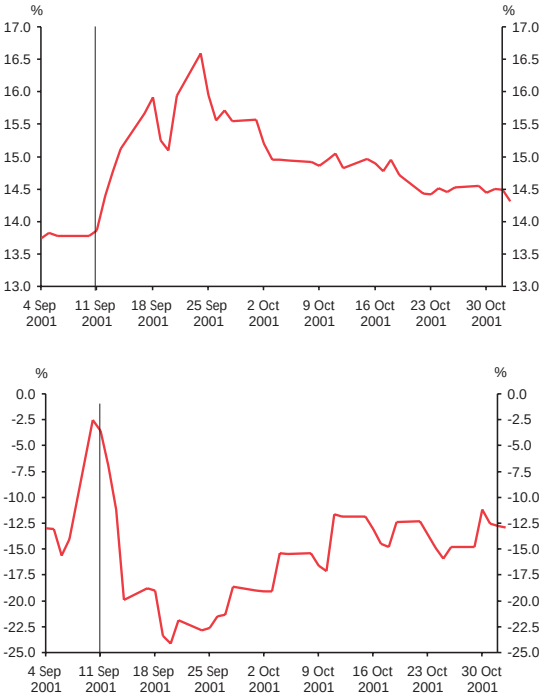



Figure 8 displays the evolution of the standard deviation and the skewness measure of the implied probability distributions in the aftermath of the crisis. Although initially the standard deviation increased quickly and the skewness turned highly negative (indicating depreciation expectations) the market view began to retrace from the extreme uncertainty recorded to more 'normal' levels by the last week of September. By the end of October both the standard deviation and the skewness had returned to around their pre-crisis levels.

A very similar pattern could be observed in the expectations surrounding the exchange rate of the Australian dollar. This suggests that the observed fluctuations in the options-based indicators were indeed due to the international financial turmoil, rather than being New Zealand specific.

## 6 How can the Reserve Bank use the information derived from option prices?

Option-based information about market uncertainty can be useful for a central bank in several ways.[10] However, as with many other statistical or econometric methods used in economic analysis, these indicators come with a health warning. Data quality, fluctuations in market liquidity – especially on small markets such as the New Zealand option market – and the assumptions behind the techniques may influence the results obtained from these measures.[11] Options-based indicators should therefore always be used in conjunction with other information sources (such as other financial prices, market surveys and opinions, discussions with market participants etc) that can act as a crosscheck on the results.

The Reserve Bank has recently started to analyse and use options-implied probability indicators. These indicators are included in our standard set of macro-prudential indicators that are monitored by the Bank's Financial System Oversight Committee and which will be discussed in the annual macro-

[10] For applications of option-implied probability measures in monetary policy analysis see for example Bahra (1997), Aguilar and Hördahl (1999), Eitrheim, Frøyland, and Røisland (1999) or Bank for International Settlements (1999). Examples of use of implied volatility indicators and options-based probability density functions as indicators of financial stability can be found in Bank of England (2001) and IMF (2002).

[11] One simplifying technical assumption used in the majority of the techniques that use derivative prices to infer market expectations is that market participants are risk neutral, ie they do not require a yield premium for risky investments. This assumption is not intuitively obvious and is generally rejected empirically. Although the risk neutrality biases somewhat the results that we obtain from options-based indicators, this bias is generally found to influence the shape of the obtained probability density functions only negligibly (see Rubinstein (1994)).

financial stability article in the *Bulletin*.[12] They also form part of the analysis of financial market conditions that help inform our monetary policy deliberations.

Options-based indicators can enrich our understanding of market sentiment. These methods focus on the uncertainty, and heightened uncertainty might be a warning sign of potential vulnerabilities. Together with other market based indicators such as different credit, bond and swap spreads, and equity price indices, options-related indicators are particularly useful in the Reserve Bank's monitoring of the stability of the financial system and complement other macro-prudential data sources such as macroeconomic and banking system data. The main advantage of indicators based on market prices is their forward-looking nature and their availability on a daily basis. Also, we can follow both domestic and overseas option markets simultaneously, which can help us to separate global market shocks from domestic disturbances.

Besides the analysis of the stability of the financial system, there are other areas where the Reserve Bank can make use of the information derived from option prices. For example, interest rate options can provide information about the distribution of interest rate expectations before OCR decisions. Market-based measures of expectations can also indicate whether the Reserve Bank's monetary policy measures influenced the market in the intended way. For example, did market expectations change in the desired direction after a change in monetary policy settings? Option-based indicators can also show whether central bank measures reduced or increased the uncertainty in the market. They can also explain the behaviour of other financial variables, such as risk premia.

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[12] A detailed description of the Reserve Bank's approach to financial stability indicators and of the role of the Financial System Oversight Committee can be found in Woolford (2001).

# Polymer bank notes – the New Zealand experience

Brian Lang, Head of Currency and Building Services

In May 1999 the Reserve Bank issued its first polymer bank notes into circulation. By March 2000 all denominations had been converted from paper to polymer. By the end of 2001 approximately 110 million polymer notes had been issued into circulation. This article assesses the performance of polymer notes compared with our expectations at the time they were introduced.[1]

## 1 Introduction

When the Reserve Bank introduced polymer notes, in May 1999, it indicated that polymer notes have a number of advantages relative to paper currency. In particular, it noted that polymer notes have security features that reduce the risk of counterfeit, are more durable than paper notes and more cost effective. Now that polymer notes have been in circulation for some time, it is timely to assess whether they have lived up to the Bank's expectations of them. This article discusses the performance of polymer notes, taking into account their security features, durability and cost. It also discusses recent developments in the Bank's currency processing operations.

## 2 The benefits of polymer notes

### Security

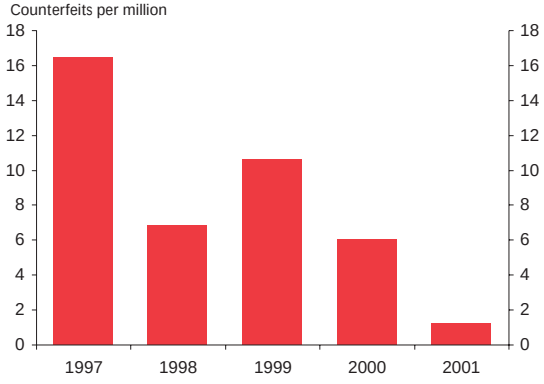
The risk of counterfeiting a nation's currency is always a potential concern for a central bank and motivates the need for currency to be designed with security features to minimise the risk of counterfeit. With the advent of desktop publishing software and colour printers, the technology to make reasonably accurate copies of bank notes is available to a much wider section of the population than was once the case.

One of the prime motivations for the Bank's change to polymer notes was to take advantage of new technology to enhance the security features of notes, including the use of a transparent part of a note, known as a 'window'. Our new bank notes have two clear windows which are designed to be easily seen by the general public without the need to hold the note up to the light. This is important, because in this country, the holding of a note to the light can be considered insulting in some circumstances. The clear areas also retain their effectiveness regardless of wear and tear on the note, unlike some of the security features used in paper notes.

The polymer substrate itself also provides a barrier to forgery, as it is difficult to produce a copy on plastic. Attempts to date at counterfeiting the polymer note design in New Zealand have all been produced on ordinary paper.

There has been a very significant reduction in counterfeits detected by the processing machines at the Bank since the introduction of polymer notes. In calendar year 2001, the number of detected forgeries totaled 114, compared with 501 in 2000, 758 in 1999, and 1,100 in 1997. Figure 1 illustrates the trend:

Figure 1
Counterfeits detected
(*per million notes in circulation*)




[1] See *Reserve Bank of New Zealand Bulletin* (1999), vol 62, no 2.

Table 1
Total number of notes destroyed as a percentage of notes in circulation

| | $5 | $10 | $20 | $50 | $100 |
|---|---|---|---|---|---|
| Paper notes 1998 | 65.8 | 103.3 | 52.3 | 26.0 | 17.1 |
| Polymer notes 2001 | 5.1 | 6.4 | 5.1 | 1.7 | 1.3 |

Most of the forgeries detected in recent times have been of the former paper note design. Attempts to counterfeit the polymer design have been negligible. In recent years the note most often counterfeited was the high usage $20 denomination. In 1998, when all notes in circulation were of paper, 61 per cent of all detected forgeries were $20 notes. There was a dramatic shift in 1999 after the introduction of the polymer $20 note, with forgeries of this denomination declining to only around 3 per cent of the total detected in 2000.

The New Zealand Police have also seen a decline in reported forgeries. The trends in the reporting of counterfeit notes to the Police follow very closely the trends experienced by the Bank. Between September last year and January this year the Police saw only two counterfeit notes - one a paper simulation of a polymer $100 note (with just one fake window), and the other a paper $50 note. In January this year, the Bank machine-processed 10 million notes (one tenth of the total in circulation) and discovered only one paper forgery and no polymer-based forgeries.

The Reserve Bank of Australia has also seen similar reductions in counterfeit notes since the introduction of polymer notes in Australia in 1992. Most counterfeits detected in Australia are for the most part low grade, on a paper substrate that could easily be identified by the different feel compared with a genuine note. Only a very small number of counterfeits have been printed on a plastic material.[2]

## Durability

Early indications suggest that the polymer notes are living up to the expectations the Bank had of them in terms of their durability. Fewer polymer notes need to be destroyed than was the case with paper notes, and the estimated life of a polymer note is considerably longer than in the case of paper currency.

The Reserve Bank maintains sophisticated processing machines at its site in Wellington. All notes returned to the Bank are processed through these machines. The numbers of notes destroyed as 'unfit' for circulation in 2001 (when most notes in circulation were polymer) for each denomination when compared with calendar 1998 (when all notes were paper), as a percentage of total notes in circulation, are set out in table 1.

While it is still early days in assessing the likely life of polymer notes in New Zealand, we can get some indication by analysing the figures for the $20 note. This note is the most popular in New Zealand, making up 52 per cent of all notes on issue by volume, and is the default denomination in virtually all ATM machines. The polymer $20 note has been in circulation since May 1999 (31 months to date), with relatively few notes needing to be replaced. The average life of a paper $20 note was just under 24 months. On current indications, the polymer $20 note will last about 20 years. However, it is not expected that, in reality, the notes will last that long. Nevertheless, we will achieve significantly longer life with polymer notes than with the paper version.

Overall, we have seen little physical damage to polymer notes in circulation, apart from the $5 note, which is showing some signs of ink wear damage. As is the case in a number of countries, this is probably due to the tendency for the $5 notes to be kept with coins in a purse or pocket. Also, they are inclined to remain in circulation for long periods, as retailers use them as part of their cash 'float' and do not bank them on a regular basis. This increases the wear and tear on $5 notes compared with the higher denomination currency.

[2] See the Reserve Bank of Australia Annual Report 2001, page 46.

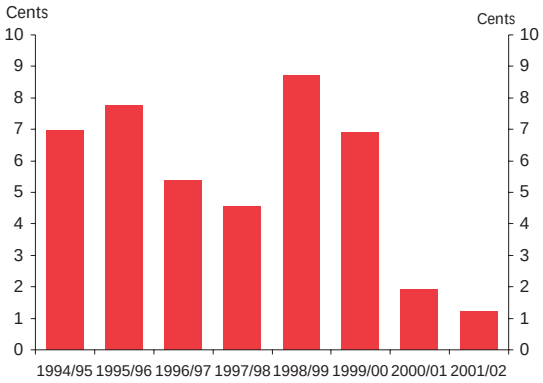
Feedback from the users of currency also suggests that polymer notes are proving to be more durable than paper notes. For example, a survey of public opinion taken in November 2000,[3] showed that 93 per cent of the public and 100 per cent of retailers agreed that polymer notes retain their quality longer than paper notes.

## Cost effectiveness

In changing to polymer notes the Bank expected to make some cost savings. The longer life of polymer notes was expected to offset the higher production costs over a relatively short period.

Figure 2 shows the trend in the issue of currency cost (production, transportation and local taxes), divided by the average number of notes in circulation over recent years. The figures show that the annual cost per paper note in circulation declined between 1994/95 and 1997/98, when the Bank reaped the benefits of lower production costs due to competitive tendering. In 1998/99 and 1999/00 the unit cost was influenced by Year 2000 contingencies and the issue of new polymer notes to replace all existing paper notes. In 2000/01 and 2001/02 to date, the longer life of polymer notes is reflected in the very significant drop in the unit cost per note in circulation.

Figure 2
Unit issue cost per note in circulation




Actual note issue expenses averaged $3.8 million in the years 1995/96 to 1997/98, compared with $1.9 million in the financial year 2000/01 and an estimated $1.3 million for 2001/02. Thus, the additional cost of approximately $6 million for the change-over to polymer notes is expected to be recouped within three years. The issue cost per note in circulation has decreased by 58 per cent between 1997/98 (when all notes issued were paper) and 2000/01 (when all notes issued were polymer).

The significant reduction in notes detected as unfit for circulation is also providing some cost savings in the destruction of notes.

## Functionality

For the change from paper to polymer notes in New Zealand, we continued with the same basic design, colour and size of the existing paper notes and had few problems during the transition. The polymer notes were well received by people working in the banking and cash handling industry and there has been a very positive response to the new technology from the public. Because we retained the same size notes, the country's entire ATM network was converted to dispense the polymer notes in a very short period (about a month), as the change-over only required a software adjustment, which was completed by branch staff in most banks.

Experience to date by one of the main ATM servicing companies has seen an average decline of 50 per cent in fault call-outs. With paper notes the average was approximately 5 call-outs per ATM each month. With polymer notes the number of call-outs is averaging just 2.5 per ATM per month.

The Bank's own processing machines have coped with the change to polymer very well. A relatively simple and inexpensive software upgrade enabled our machines to identify paper notes for destruction and to band polymer notes ready for re-issue. The same machine-readable covert features that were incorporated in the paper notes were successfully implanted into our polymer design.

Much had been made of the fact that the handling differences of polymer would cause difficulties for bank tellers, money handlers and the public. However, this did not eventuate, and people appeared to adapt to the slight differences very quickly. The November 2000 survey showed that, although more than half of the general public and retailers thought that polymer notes were more difficult to

[3] The full survey results can be found on the Bank's internet site:
http://www.rbnz.govt.nz/news/2000/0099099.html

handle than paper, 77 per cent of the public and 80 per cent of retailers still gave positive ratings for ease of handling of the new notes.

### Environmental considerations

Polymer notes are more environmentally friendly than paper notes because the polymer substrate is less polluting than paper and the waste polymer can be recycled into useful products rather than being disposed of. With the very low numbers of unfit polymer notes being returned to the Bank, most waste still takes the form of old paper notes. Therefore, it has not been possible as yet to accumulate enough waste polymer to interest recycling companies.

The November 2000 survey revealed that 90 per cent of the public and 100 per cent of retailers consider that polymer notes are cleaner than paper.

## 3 Implications for note processing

Most central banks are heavily involved in the cash distribution process. Depending on the customer base of commercial banks, some banks finish the working day with excess stocks of cash, while other have a deficiency of cash. The excess cash is deposited at the central bank, where it is processed by machines and then re-issued on demand. The machines check that the notes are genuine and fit for re-issue.

Providing facilities, such as branch offices, machinery and staff (including security), in order to process bank notes is very expensive for a central bank. The introduction of polymer notes provided us with a catalyst to review our role, as the new notes were expected to be harder to counterfeit and would retain their quality much longer than paper notes.

An examination of cash flows between commercial banks and the Bank revealed that the maximum net flow on any particular day, apart from around the peak retail periods of Christmas and Easter, was never greater than 10 per cent of the total cash holdings of all commercial banks. In calendar year 1998 (when Year 2000 contingencies or changes in note design did not influence cash flows), we received 540 million notes from banks and issued 544 million to them. There were only 66 million notes in circulation in New Zealand at any time during that year. Therefore, on average, each note was processed by the Bank over eight times.

Because we provided this convenient service to banks there was little incentive on the banking industry to seek efficiencies. Some bank branches even returned to the Bank and ordered from the Bank the same denomination notes on the same working day, apparently regardless of the costs and risks of transportation. There was also little or no attempt by the banks to buy or sell notes between themselves.

During 2000 we initiated a change of role from retail processor and distributor of notes to mainly wholesale supplier. We provide an avenue for the return of unfit notes (including old paper notes) and facilitate the issue and return of notes at the seasonal peak times of Christmas and Easter.

We have also provided some direct funding support to banks in compensation for their need to hold more cash while they adjust to our new procedures. Initially we considered introducing a 'notes held to order' system which involves the central bank retaining ownership of excess notes deposited into secure cash centres owned by the commercial banks. However, this is considered to be a cumbersome and potentially risky way of financing excess stocks.

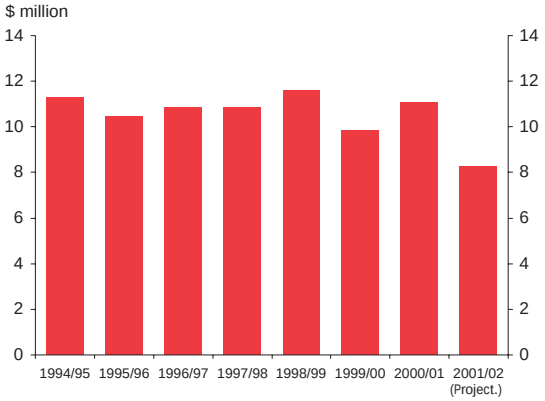
We agreed to finance 10 per cent of the total value of banks' cash holdings by way of a compensatory interest payment. This involves the banks advising us of their daily cash balances each month, with the compensatory payment being based on the OCR rate prevailing at the time. The compensatory payment to the banks totaled $2.9 million in 2000/01 and a projected $3.1 million in 2001/02. Of course this is the gross amount of the payments; the net effect is zero because the bank gains seigniorage income from the higher note holdings of the commercial banks.

The changes in our note processing procedures will provide significant cost savings for the Bank. Our two branch offices have closed and we now operate only out of Wellington, with reduced staffing levels. Reflecting this, currency operating expenses (excluding new note and coin issues), is expected to fall from an average of around $11 million per annum in recent years to a projected $8.3 million (which

includes the compensatory payment) in the current financial year to June 2002.

Figure 3 illustrates the recent downward trend in currency operating expenses (excluding note and coin issue, but including the compensatory payment):

Figure 3
Currency operating expenses




If the reduced cost of note issue and the change to wholesale supplier are combined, the Bank's unit cost per note in circulation has declined by 53 per cent, from 20.7 cents per note in 1997/98 to a projected 9.7 cents per note in the year to June 2002.

The withdrawal of the Reserve Bank from the daily distribution cycle has resulted in higher cash balances for the commercial banks as they come to grips with the change. However, it is believed that the banks now accept that the management of cash should be a market-driven issue. They are taking initiatives to improve the efficiency of cash distribution throughout the country.

### The future

In August 2000, the Bank issued a limited number of a special commemorative $10 bank notes into circulation. The key objective was to test some new design and security features that had been specifically developed for the polymer substrate. A survey of public opinion found that, although 60 per cent of respondents indicated a preference or strong preference for the new note over the normal note, the special security features were less well known.

It is unlikely that the Bank will consider a design or denomination change to our current bank note series within the near future.

However, we monitor developments in currency security features in other countries and will continue to assess, on an ongoing basis, whether further security enhancements to New Zealand currency should be made.

## 4 Conclusion

For the Bank, the key advantages for New Zealand in issuing polymer notes are now apparent. Lower issue costs, a significant reduction in forgeries and a very positive public reaction to the 'cleaner' note indicate that the shift to polymer notes has been beneficial. The notes are also proving to be very efficient in processing through all types of machines.

To date, the introduction of polymer notes has had no significant negative implications. Reflecting this, the November 2000 opinion survey showed that 74 per cent of the general public and 90 per cent of retailers prefer or strongly prefer polymer notes over paper. We can therefore regard the introduction of polymer notes as a success.

# Inflation targeting 14 years on

A speech delivered by Donald T Brash, Governor of the Reserve Bank of New Zealand at the American Economics Association conference in Atlanta on the 5 January 2002

Mr Chairman, Ladies and Gentlemen

It is a great honour to participate in this session on inflation targeting this morning, and to share the platform with such distinguished practitioners of that art.

I was asked to speak first because my name comes first, by a rather narrow margin, when the four speakers are lined up alphabetically. It also happens that New Zealand was the first country in the world to adopt a formal inflation target, in the sense that we understand the term today, in the late eighties. Both of these facts give me some latitude about what to talk about, although when Jacob Frenkel invited me to participate in this panel discussion he stressed that I was not being invited to address the theory of inflation targeting so much as to talk about some of the lessons we have learnt from experience over almost 14 years. And that is what I propose to do.

Bernanke *et al* have defined inflation targeting as

> "a framework for monetary policy characterised by the public announcement of official quantitative targets (or target ranges) for the inflation rate over one or more time horizons, and by explicit acknowledgement that low, stable inflation is monetary policy's primary long-run goal. Among other important features of inflation targeting are vigorous efforts to communicate with the public about the plans and objectives of the monetary authorities, and, in many cases, mechanisms that strengthen the central bank's accountability for attaining those objectives."[1]

I am very comfortable with that definition.

## Has inflation targeting met its objectives in New Zealand?

Countries usually adopt inflation targeting for one or more of the following reasons:

- A desire to find some credible anchor for monetary policy, often after a period of high inflation and/or the loss of a previous anchor (perhaps an exchange rate target which proved impossible to maintain or a money aggregate target which proved both difficult to achieve and less closely connected to the inflation rate than hoped for).
- A desire to give the central bank instrument independence, but to balance that with some clearer specification of what the central bank should seek to achieve with that instrument independence – in other words, to make it possible to balance independence with accountability.
- A desire to reduce the social and economic costs of disinflation by reducing the inflation expectations of both financial markets and agents in the real economy.

In New Zealand's experience, I have little doubt that the adoption of inflation targeting helped to provide an anchor for monetary policy. Certainly, there had been important progress in reducing inflation between the mid-eighties and the time a specific target was first discussed in April 1988, but in the year to March that year CPI inflation was still 9 per cent, and predictions by the Reserve Bank that inflation would fall below 4 per cent within two years were widely ridiculed.

By 1991, inflation was under 2 per cent, and inflation has averaged around 2 per cent over the last 10 years. Of course, lots of other countries have also achieved low rates of inflation over the last decade, so it is impossible to be dogmatic about the extent to which inflation targeting helped in the case of New Zealand. But in my own judgement the single focus which inflation targeting required of the central bank was a material factor in focusing the Bank on that objective. Beyond the first year or two, we did not spend a lot of time debating what the optimal inflation rate might

[1] B S Bernanke *et al.*, *Inflation targeting: Lessons from the International Experience*, Princeton University Press, 1999, p 4.

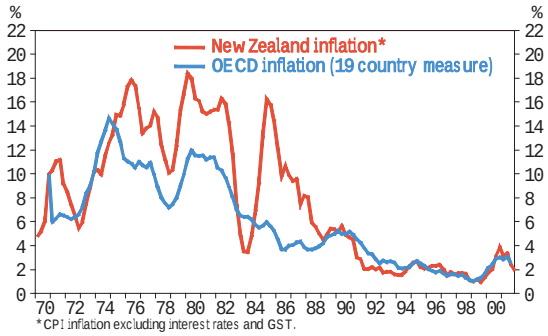

Malcolm Walker, April 1988

be. In terms of making the decisions about monetary policy, that was irrelevant because the target had been agreed. The only debate was about what degree of monetary policy pressure was needed to achieve that objective.

In the seventies and eighties, during most of which period New Zealand did not have an inflation target, New Zealand's inflation was not only markedly higher than it was in the nineties, it was also higher than inflation in other OECD countries. Inflation targeting helped us to achieve a substantial improvement in our inflation performance in absolute terms; it helped us to reduce inflation relative to inflation in other developed countries; it helped to reduce the volatility of inflation; and it helped us to maintain that improved performance.

Interestingly, and perhaps contrary to some impressions both in New Zealand and abroad, achieving this marked improvement in inflation performance was not bought at the cost of an increase in output volatility. Yes, output volatility was higher in New Zealand during the nineties than in, say, Australia or the United States, but that is hardly surprising: one would expect to see rather more output volatility in a very small, commodity-dependent, economy than in a much larger and more diversified economy. But the nineties saw *both* a decline in inflation volatility and a decline in output volatility in New Zealand, as compared with the two previous decades.[2]

Figure 2
OECD inflation and NZ inflation




Inflation targeting has also come to be seen as an important aspect of the Reserve Bank's accountability. New Zealand had no tradition of central bank independence prior to the late eighties. Although more and more people could see the cynical way in which monetary policy could be manipulated by politicians who gave greater weight to their own re-election than to preserving the purchasing power of the currency, it was always going to be a challenge to get

[2] "Output volatility in New Zealand", in Independent Review of the Operation of Monetary Policy: Reserve Bank and Non-Executive Directors' Submissions, Reserve Bank of New Zealand, October 2000.

substantial political buy-in to full central bank independence. One of the things which made that political buy-in possible – to the extent that both major political parties voted for the legislation giving the Reserve Bank instrument independence late in 1989 – was the fact that it was Parliament which mandated price stability as the Bank's objective, and what that meant was to be formally and publicly agreed in a Policy Targets Agreement (PTA) between the Governor and the Minister of Finance. In other words, there was to be full instrument independence but not full goal independence. The legislation was drafted in such a way that the PTA *could* have been based around exchange rate targeting, nominal income targeting, or conceivably even money aggregate targeting, but in the context of the time everybody understood that the PTA would be based around the inflation target which had been announced more than 18 months earlier. The Bank was to be accountable for delivering that agreed inflation target, and the legislation made it clear that the Governor could lose his job for "inadequate performance" in achieving that objective.

There is no doubt that a desire to change inflation expectations was an important part of the motivation in the adoption of an inflation target in New Zealand. Then-Minister of Finance Roger Douglas was very concerned in March 1988 that, with inflation moving into single figures for almost the first time in 15 years (with the exception of a brief period during which all prices, wages, interest rates, dividends and rents were subject to tight administrative control), the public would expect the monetary authorities to ease up, and settle for inflation in the 5 to 7 per cent range. It was in that context that the Minister announced, during the course of a television interview on 1 April 1988, that he was thinking of genuine price stability, "around 0, or 0 to one per cent".

It is less clear that the adoption of an inflation target was in fact successful in reducing the costs of disinflation by reducing the inflation expectations of financial markets and the public – and this despite the fact that my senior colleagues and I devoted an enormous amount of effort to convincing the public of the seriousness of our intent. Guy Debelle has done a study of the sacrifice ratio involved in reducing inflation in Canada, Australia and New Zealand. For New Zealand (which had a specific inflation target) and Australia (which did not, at least until after its disinflation had been completed), that study suggests that the sacrifice ratios were similar.[3] I would not myself want to put too much store by that result. New Zealand's inflation performance had been rather worse than Australia's for some years by the late eighties, and one would therefore expect to find inflationary expectations more deeply entrenched in New Zealand. Moreover, just two years into the disinflation process in New Zealand the Government introduced a 10 per cent Goods and Services Tax, which increased the CPI by an estimated 8 per cent. Then, in mid-1989, that tax was increased from 10 per cent to 12.5 per cent. Both moves presumably had some effect in maintaining inflationary expectations at a relatively high level.

Although I can not prove it, I believe that the inflation targeting regime did help to change expectations and behaviour at the margin.

I well recall that, in late 1990, not many months after the Policy Targets Agreement had seen the 0 to 2 per cent inflation target formally agreed between Governor and Minister, the head of the New Zealand Council of Trade Unions, Ken Douglas, wrote an article which appeared in one of the major newspapers.[4] The article argued that the Reserve Bank was focused on an undesirably narrow objective (namely, low inflation), but that, as long as that was the case, unions would need to moderate wage demands to avoid increases in unemployment. In the weeks which followed, he actively, and with very considerable courage, campaigned for moderate wage settlements as a way of reducing unemployment. I have little doubt that the inflation target played a part in encouraging employers and unions to adjust their wage settlements to levels which were quite quickly consistent with the inflation target.

There was also a very large reduction in the spread between the yield on New Zealand government New Zealand dollar long-term bonds and that on US Treasuries. In the mid-eighties, that spread had peaked at around 1000 basis points. By early 1990, that spread had reduced to around 400 basis points, and it has been well under 200 basis points for most of the last decade. Of course, most of that reduction in

[3] Debelle, Guy (1996) "The ends of three small inflations: Australia, New Zealand and Canada", *Canadian Public Policy*, March 1996.

[4] *The Dominion*, 31 October 1990.

spreads was presumably simply the result of New Zealand's greatly improved inflation performance, but that improved performance was, as I have argued, in part attributable to the inflation targeting framework, while that framework probably also helped, at the margin, to convince markets that low inflation was likely to endure.

## An inflation target agreed by Governor and Minister

In New Zealand's experience, the fact that the inflation target was, and still is, formally agreed between the Governor of the central bank and the Minister of Finance on behalf of the Government has been unambiguously positive. And I make this point because some observers have suggested that this need to agree the inflation target between central bank and executive/legislature is an undesirable restraint on central bank independence.

There is no question that it is, in principle, a restraint. In our framework, the inflation target is formally agreed between Minister and Governor, and can be changed either by mutual agreement or by the Minister unilaterally (if the Governor does not agree to a change) by the use of the so-called override provision in the legislation.

But, in a world of open capital markets, the fact that the legislation requires the Policy Targets Agreement, or any override of that Agreement, to be in the public domain means that no Minister can manipulate the target for cynical political ends. On the contrary, the Minister has every incentive to make it publicly clear that the inflation target he wants the central bank to deliver is consistent with price stability and a stable currency. Indeed, it is this obligation to be transparent about the objectives of policy, and about the *modus operandi* of policy, that is one of the most important aspects of the New Zealand inflation targeting framework, arguably as important as instrument independence itself. If a Minister were, say, to instruct the Bank to ignore the inflation rate and focus instead on increasing the growth rate – as he could do by invoking the override provision – markets would almost certainly deliver an immediate increase in interest rates across almost the entire yield curve (the Bank would still, of course, be able to anchor the overnight rate), together with a sharp fall in the exchange rate. The need to be transparent ties the hands of *both* government and central bank unless there are good and explainable reasons for change.

The fact that the inflation target is a matter agreed between Minister and Governor has effectively protected the Bank from criticism by the government, and in the almost 14 years during which inflation targeting has been in place, the number of government ministers who have attacked the Bank can be counted on the fingers of one hand. Given that the Minister of Finance is involved in agreeing the inflation target, it is not easy for him or other ministers to attack the Bank for having policy too tight unless inflation is, or looks likely to be, below the target. Of course, we are not fully protected from criticism, even from the government: given the long lags with which monetary policy operates, and the inherent uncertainty, we may still be criticized for the timing or magnitude of policy moves, though in practice that has been a very unusual event in our experience.

Moreover, agreeing the target between the Minister and the Governor has the important indirect effect of improving the consistency of monetary and fiscal policies while still leaving the central bank with instrument independence. By agreeing the inflation target with the Governor, the Minister of Finance is implicitly agreeing that if fiscal policy is changed, monetary policy may need to change also, potentially offsetting any stimulus (or restraint) emanating from fiscal policy.

We saw this most dramatically in mid-1990 when the Minister announced an expansionary Budget just months before the general election scheduled for late that year. Markets were concerned about the loosening in fiscal policy, and became uneasy about the future direction of policy. This was reflected in a rise in long-term interest rates and a fall in the exchange rate, to which we responded by tightening monetary policy. Immediately, an editorial in New Zealand's largest daily paper noted that the Budget had "rekindled inflationary expectations. The (Reserve Bank) was bound to lift interest ratesÖ. Electors are frequently bribed to their ultimate cost. This time the independence of responsible monetary control quickly exposes a fiscal fraud."[5] The main Opposition party campaigned in the election on a commitment to get interest rates reduced, not by leaning on the central bank but by

[5] *New Zealand Herald,* 3 August 1990.

"giving monetary policy some mates" through tighter fiscal policy and deregulation of the labour market.

Five years later, with several years of fiscal surplus behind it, the Government undertook to reduce income taxes subject to several conditions being met, one of which was that the Reserve Bank was satisfied that such tax cuts would not require a significant tightening of monetary policy.

To me, these are good illustrations of the benefit of having the specification of the objective of monetary policy a matter for formal and public agreement between government and central bank. It forms a kind of pre-commitment strategy.

## The pre-conditions for inflation targeting

There is another issue related to inflation targeting on which I would like to comment, and that relates to the pre-conditions which must be met before a country can sensibly embark upon it. It has sometimes been suggested that inflation targeting is such a complicated undertaking that only countries with lots of economists with PhDs from good American schools, several sophisticated econometric models, and a good understanding of how the monetary transmission mechanism works dare to undertake it.

On the basis of New Zealand's experience, I would argue that this is quite incorrect. Of course, operating any monetary policy is easier, and more likely to be successful, if the central bank has access to competent people and has a good understanding of how the transmission mechanism works. But the core elements of inflation targeting are not particularly complex, or rather are no more complex than operating other approaches to monetary policy. When we embarked on inflation targeting, we had our fair share of competent staff, but we had no clear understanding of how the transmission mechanism worked and a rather inadequate economic model. Indeed, the economy had been subject to such dramatic change over the previous few years that no model based on past relationships would have been of much use to us. Notwithstanding those deficiencies, we have little doubt that inflation targeting has been successful in New Zealand. We certainly have no reason to believe that we would have been more successful if we had been trying to target nominal income or a money aggregate.

## Evolution has been significant

Perhaps because we began inflation targeting at a time when the New Zealand economy was undergoing so much structural change, it was probably inevitable that our approach to the task would evolve quite significantly over the years after 1988.

In the early years, we assumed from international experience that raising interest rates would tend to reduce inflationary pressures and that reducing interest rates would tend to increase inflationary pressures. But we had no reliable evidence, indeed no evidence at all, which might guide us on the extent to which an interest rate change in New Zealand would change the inflation rate. For this reason, and perhaps because some of us retained deeply monetarist sympathies, we began the process of reducing inflation by adopting a very "quantitative" approach to the task – we determined to hold the liquidity in the banking system stable, something made relatively easy by the clean float of the exchange rate (in place since March 1985) and by a government commitment to fund any fiscal deficit by the sale of bonds. Interest rates across the whole yield curve were completely driven by market pressures, and fluctuated considerably.

In the late eighties, we realised that, while we did not know in any specific sense what effect a change in interest rates had on inflation, we did have a reasonable estimate of the effect of exchange rate movements on the inflation rate. We estimated that a 1 per cent movement in the exchange rate, as measured by a trade-weighted index, produced a change in the Consumers Price Index of about 0.4 per cent over the following year or so. And from this fact we developed an implementation regime which was for a time rather heavily oriented to the exchange rate.

At no time did we have an exchange rate target in the conventional sense. But we did derive a "conditional comfort zone" for the trade-weighted measure of the exchange rate which seemed to us, given all the other factors affecting the inflation rate, to be consistent with progress towards, or later maintenance of, the inflation target. In other words, the comfort zone was moved up (an appreciated New Zealand dollar) when domestic inflation was projected to rise towards the top of the inflation target, and down (a depreciated New Zealand dollar) when domestic inflation was projected to fall towards the bottom of the inflation target.

We still set no interest rate, but rather made small adjustments to the target for the quantity of settlement cash in the banking system, with the aim of tightening or easing monetary conditions. And while we did not announce our comfort zone for the exchange rate, the financial markets usually had a very clear understanding of where that zone was, both because we were open about the exchange rate "pass-through coefficient" (0.4) which we were using in our inflation forecasts and because from time to time we would "clear our throat" to draw attention to the fact that monetary conditions were in danger of becoming inconsistent with the inflation target. We referred to our use of OMOs in the implementation of monetary policy – not so much "open market operations" as "open mouth operations".

We discovered that occasional "open mouth operations" were actually all we needed to implement policy most of the time, and we left the target for settlement cash unchanged for years at a time. In other words, the mere fact that the financial markets understood that we *could* adjust the quantity of settlement cash in the banking system, thereby tightening or easing monetary conditions, was sufficient to produce a change in monetary conditions consistent with our objective of meeting the inflation target, without the need for any actual change in settlement cash. It was in one sense the ultimate "no hands central banking", where we set no interest rate and no exchange rate, and left the target for settlement cash unchanged for many months on end. In time, what moved monetary conditions was our quarterly, published, inflation forecasts, and the widespread knowledge that, if push came to shove, the central bank was able to inflict financial pain on banks if monetary conditions did not move in a way consistent with the inflation target. This system also imposed an absolutely miniscule "monetary policy tax" on the financial system, since the amount of settlement cash in the system (on which we paid a below-market interest rate to discourage banks from holding excess balances) was never more than 0.1 per cent of banking system deposits, and was normally well below that.

As time went by, we moved away from a focus on the direct price effects of movements in the exchange rate. In part, that was because these price effects became progressively more muted, as several other inflation targeting countries also found in the nineties. In part too, it was because we developed a better understanding of the inflation process in New Zealand. We moved our forecasting horizon out somewhat, beyond the direct price effects of exchange rate movements to the more medium-term effects of the real exchange rate and real interest rates on inflation through their effect on the output gap. But we continued to implement policy through our ability to move the quantity of settlement cash in the banking system, and through making our views about the appropriateness of monetary conditions known through our quarterly inflation forecasts and occasional "open mouth operations ".

This worked effectively as a system for keeping inflation under control, but it had disadvantages from a public relations point of view. Occasionally, monetary conditions would become a bit too easy to be consistent with our inflation target, and we would draw attention to the fact that conditions should be somewhat tighter. And conditions would tighten, usually through an increase in market interest rates and some appreciation in the exchange rate. But we had no quantitative way of informing the market about *how far* conditions should tighten, with the result that we often had to make a "that's about far enough" statement a week or 10 days later. The financial market understood this system, but to the general public it sometimes led to the perception that the Reserve Bank was having difficulty making up its mind whether conditions were too loose or too tight. We needed some kind of quantitative indicator.

So in June 1997, we started expressing our views on the appropriateness of monetary conditions in terms of a Monetary Conditions Index. We announced that we would use an MCI based on a movement of 100 basis points in 90 day interest rates being equivalent to a movement of 2 per cent in the trade-weighted measure of the exchange rate, with the average conditions prevailing in the December quarter of 1996 being equal to 1000. Had this experience been a total success, I would have been happy to acknowledge our debt to the Bank of Canada for this experiment!

The experience was not a total failure. In particular, it finally persuaded financial market participants, at home and abroad, that we had no exchange rate target in the conventional sense. Prior to that time, and related no doubt in part to the "conditional exchange rate comfort zones" which we had

used in the late eighties and early nineties, there had been quite a widespread perception that we were in some sense "putting a floor" under the exchange rate, with the result that investing in New Zealand dollars was a "one way bet".

I well recall a conversation with a fund manager in New York late in 1996, at a time when almost all observers felt that the New Zealand dollar was considerably over-valued. Referring to the action by the Swedish central bank to drive overnight interest rates to 500 per cent to defend the krona some years earlier, he asked me whether we would have "the courage" to do the same, to defend the New Zealand dollar. I assured him that there was absolutely no way that I would push New Zealand interest rates to 500 per cent to defend the New Zealand dollar. "Why not?" he asked. "Because we do not have an exchange rate target; we have an inflation target", I replied. "Clearly, if the New Zealand dollar falls sharply, this may have implications for the future inflation rate, and this might require us to push up interest rates somewhat, but the mere fact that the exchange rate declines does not require us to push rates to 500 per cent." He was appalled, and warned me that if my views became known on Wall Street, the New Zealand dollar "was done". I urged him to spread the message since, as indicated, the currency was almost certainly well over-valued by almost any measure at that time.

Adopting the MCI in June 1997, and expressing our views about monetary conditions in terms of a "desired" level of the MCI, finally ended the view that the Bank had a covert exchange rate target. It also gave us, for the first time, a quantitative way of telling the market by how much we wanted conditions to tighten or loosen. But the MCI was quickly, and to some extent unfairly, discredited, partly because it was introduced at the very outset of the Asian crisis. That crisis hit demand for many of New Zealand's exports very hard, and it was appropriate that the New Zealand exchange rate declined to reflect that external shock. We recognised that, and gradually reduced our "desired" level of the MCI through the second half of 1997 and the first half of 1998. But we failed to recognise the extent to which the external shock had affected the appropriate exchange rate, with the result that we reduced the MCI too slowly through that period. Even though we were still not setting any interest rate directly, the result was a sharp increase in 90 day interest rates to "offset" the sharp decline in the exchange rate, and we have acknowledged elsewhere that that probably exacerbated the short and shallow recession which took place in the second part of 1997 and the first part of 1998.

We relaxed the "bands" around the "desired MCI" in the second half of 1998, and in March 1999 finally moved to a conventional implementation regime, abandoning both the quantity target for settlement cash and, as a signaling device, the MCI, and adopting instead an Official Cash Rate, whereby the interest rate on overnight money in the system is kept within a range of plus or minus 25 basis points from the nominated rate.

Our approach to the inflation target itself evolved somewhat over the 14 years. In 1988, the target was simply expressed as "0 to 2 per cent". When the first formal Policy Targets Agreement was signed early in 1990, the target was still 0 to 2 per cent, and there was explicit provision for renegotiating the target if the inflation rate was affected by what we referred to as "caveats" – large external shocks to the price level (such as a big change in the international oil price), changes to indirect tax rates, and similar. The second Policy Targets Agreement, signed shortly after the general election in late 1990, extended the date by which inflation of 0 to 2 per cent had to be achieved from the end of 1992 to the end of 1993, and removed the need for renegotiation of the Agreement if the inflation rate were affected by "caveatable" items. Instead, the Bank was to ensure that CPI inflation excluding such "caveatable" items was within the target. This led us to calculate and publish what we referred to as "underlying inflation", which was CPI inflation less "caveatable" items. But this had all sorts of problems associated with it, not least a perception problem, with the Bank calculating the underlying inflation rate on which the Governor's performance was to be judged. Now we have a target of keeping the CPI between 0 and 3 per cent (the target was widened after the general election of November 1996) and a need to have a good explanation if inflation diverges from that target. The Policy Targets Agreement makes it clear that external shocks, changes in indirect tax rates, and similar factors constitute valid reasons for the inflation rate to diverge from the target for a time. (The latest PTA, signed on 16 December 1999, is attached.)

We characterise ourselves as "flexible inflation targeters" rather than "strict inflation targeters", in Lars Svensson's terminology. But there is debate even within the Reserve Bank itself whether we have always been flexible inflation targeters or whether perhaps we have evolved to greater flexibility than we had earlier in our inflation targeting history.

There is little doubt that in the early years our *rhetoric* was rather "strict". We had the challenge of convincing a sceptical public, made cynical by years of broken political promises about keeping inflation under control, that *this* time there was going to be a serious commitment to keeping inflation under tight control. So we emphasised that monetary policy had been given only a single goal by statute, namely "stability in the general level of prices", and I as Governor was liable to be dismissed for failing to deliver that objective. And we repeated that message, again and again. We recognised that the more quickly we could convince both financial markets and the general public that we were absolutely committed to achieving the inflation target, whatever the cost in terms of unemployment and lost output, the smaller that cost in employment and output would be. Allowing people to think that we were "soft-hearted", and would back off the inflation target as soon as unemployment started to increase, seemed a certain way to *increase* unemployment. (Having said that, and as indicated earlier, it is not unambiguously clear that demonstrating a strong commitment to a particular inflation target was in fact successful in improving the inflation/unemployment trade-off during the period of disinflation, though my personal view is that it helped.)

In those early years, it is probable that none of my colleagues themselves really believed that we would be able to get inflation within a 0 to 2 per cent target and keep it there.[6] But in 1991, two years ahead of the deadline imposed by the Policy Targets Agreement, inflation fell within the target for the first time, to the considerable surprise of many people both inside and outside the central bank. And in 1992, inflation was again within the target. And in 1993. And in 1994. By this time, many people, again both inside the central bank and outside it, were coming to believe not only that inflation could be kept inside a 0 to 2 per cent target, but also that keeping inflation within the target was not such a difficult job after all. Economic growth was among the fastest in the OECD; inflation was within the target; New Zealand dollar 10 year bond rates were marginally *lower* than the yields on 10 year Treasuries (in the first part of 1994). It all seemed pretty easy.

In the year to June 1995, underlying inflation increased to 2.2 per cent, outside the target for the first time since 1991. But that result was influenced in part by an adverse weather pattern in May 1995, which had sharply increased the price of fresh fruit and vegetables. We still thought that we would quickly return to within the inflation target. In the event, we were close to the top of the target, or marginally above it, from the June 1995 year to the December 1996 year.[7] We had all learnt that keeping inflation within such a narrow range was a major challenge, and could probably be accomplished only at the cost of undesirably high volatility in the real economy. We began talking about the inflation target as something to which we would be constantly aiming, but not something which we could or should deliver at all times, and that is how we regard the target today. We recognise that there is a trade-off, not between growth and inflation, but rather between the volatility of growth and the volatility of inflation, and we are prepared to accept some degree of inflation volatility to avoid throwing the real economy around too violently.

Of course, we have been immeasurably helped in doing this by the fact that inflation expectations have become more firmly anchored on the target. Were inflation expectations to become dislodged, we would be obliged to return to a stricter and more vigorous pursuit of the inflation target, even at the expense of some short-term output volatility.

## Single decision-maker or committee?

In the New Zealand central bank, all important decisions are vested in the Governor, not in the Monetary Policy Committee or in the Board, even though we have both. We are by no means unique in this structure – laws in both Canada and

[6] I was sufficiently new in the central bank, and sufficiently naÔve, to assume that it could be achieved, and did not hesitate to sign the Policy Targets Agreement.

[7] Underlying inflation peaked at 2.4 per cent in the year to December 1996.

Israel vest similar powers in the Governor. But the pattern is unusual internationally.

There are clearly advantages and disadvantages in all decision-making structures. When Lars Svensson conducted a review of the New Zealand monetary policy framework for the New Zealand government last year, he recommended moving from the present structure to one where monetary policy decisions are made by an internal committee of five, chaired by the Governor.[8] Interestingly, the New Zealand Treasury, the non-executive directors of the Reserve Bank, and most of my colleagues argued against changing the structure in this regard. And the Government also decided not to change the decision-making structure, after consultation with other political parties in Parliament.

The arguments in favour of having a single decision-maker related essentially to accountability and communications.

The legislation under which the Bank currently operates was passed into law during the late eighties, when there was a heavy emphasis on improving the quality of public sector administration. Devolving more authority to public sector chief executives, and holding them responsible for their outputs, was central to that approach. So when I expressed surprise to the Minister who was responsible for the Reserve Bank legislation that the Bill envisaged the Policy Targets Agreement being between the Minister and the Governor, not between the Minister and the Bank, he explained nonchalantly that "We can't fire the whole Bank. Realistically, we can't even fire the whole Board. But we sure as hell can fire you!" So leaving the Governor in sole charge of monetary policy decisions makes it very clear who is to blame if inflation falls outside the agreed target.

Having a single decision-maker also makes communicating the Bank's monetary policy message relatively easy also. Several of my colleagues take an active part in helping to take the Reserve Bank's message to the general public, but the message is the Governor's, not their own. And this consistency of message is, I believe, helpful.

Having a single decision-maker is also helpful in the context of the way in which we publish our inflation forecasts. New Zealand is, to the best of my knowledge, the only country where the central bank publishes economic forecasts based on endogenous monetary conditions. In other words, our published forecasts attempt to answer the question: "What monetary conditions will be required to move the inflation rate back towards the middle of our 0 to 3 per cent target range over the one- to two-year horizon?" So the forecasts reveal not only where we think the Official Cash Rate is likely to be in the immediate future, but where, *on the basis of present information and clearly specified assumptions about the exchange rate and other variables*, it is likely to move over the next couple of years. There are pros and cons of this approach to forecasting – though we are convinced that there are more pros than cons – but I have been told by some of those who have served as members of monetary policy committees in other central banks that such an approach would be virtually impossible where decisions are made by committee. It is often hard enough to reach a decision on what the policy interest rate should be tomorrow without having to work out where it should be over the next year or two.

There are, of course, risks in having monetary policy decisions vested in a single individual. In our case, we believe that these risks are substantially mitigated by the clear specification of the target for monetary policy in both legislation and the Policy Targets Agreement; by the high level of transparency required by the legislation; by the way in which the Governor is appointed (by the Minister of Finance, but only where the individual concerned has been recommended by the Board); by the longstanding tradition of open discussion and debate in the Bank; and by the fact that the Bank's Board is charged with the primary responsibility of monitoring the Governor's performance, with an obligation to recommend the Governor's dismissal if directors are not satisfied with his performance under the Policy Targets Agreement.

## Single mandate or dual mandate?

Finally, let me briefly touch on the vexed subject of the central bank's mandate. We clearly have a single mandate: monetary policy was required, by the 1989 legislation, to "achieve and maintain stability in the general level of prices". Period. There is no reference to other objectives, and I am entirely

[8] Lars Svensson, Independent Review of the Operation of Monetary Policy in New Zealand: Report to the Minister of Finance, February 2001.

comfortable with that mandate, notwithstanding my healthy regard for New Zealand's most famous economist, the late Bill Phillips. In other words, I am entirely comfortable with the proposition that there is no long-term trade-off between growth and inflation; and that the best contribution of monetary policy to economic growth is the maintenance of low inflation.[9]

But I do want to suggest that those who make a major distinction between central banks with a single price stability mandate and those with a dual mandate, such as the Federal Reserve System, exaggerate the difference. Yes, there will be differences in the policy reaction to some kinds of shock – for example, a central bank with a dual mandate might ease policy in response to a sharp increase in oil prices because of the adverse effects of such an event on real income, and therefore on demand, whereas a central bank with a single price stability mandate may well leave policy unchanged, or may even tighten somewhat, depending on circumstances.

But the reality is that both kinds of central bank regard price stability as the best contribution that monetary policy can make to economic growth. And once price stability has been reached, the *actions* of a single-mandate central bank will often appear identical to those of a dual-mandate central bank. (Of course, the rhetoric will often be different.) This is because most central banks these days focus their monetary policy attention on some concept of core or underlying inflation, and ignore the transitory impact on prices of exchange rate movements, movements in international oil prices, changes in indirect taxes, and so on. And focusing on core or underlying inflation means to a very large extent trying to assess whether there are unused resources in the economy. In other words, keeping core inflation under control once price stability has been achieved is to a very large extent about keeping the estimated output gap as close to zero as possible. Is the central bank output-smoothing, or focused exclusively on maintaining price stability? It may be very difficult to tell unless the central bank explains itself, and I would argue the two approaches are often very similar.

Even where inflation has been pushed away from target, it will often be difficult to tell the difference between the actions of a central bank with a single mandate and the actions of a central bank with a dual mandate. Yes, in theory there may be a difference, but in practice that difference may be very small or irrelevant. We saw that in 1996, when inflation in New Zealand was slightly above the then-target of 0 to 2 per cent. We chose to move back to the target over a number of quarters rather than more quickly, partly because we did in fact make the judgement that the economic costs of moving back to the target very quickly would have been unjustified, but also because we recognised that to have achieved a very early return to target would have required a drastic tightening of policy, with the severe risk that further down the track the inflation rate would have gone below the *bottom* of the target.

Personally, I am very comfortable with our single mandate, especially in the New Zealand context where we have had a long history of believing that monetary policy can do a whole range of things which we now realise have very little to do with monetary policy.

## The end of history?

Is inflation targeting "the end of history" from a monetary policy point of view?[10] Certainly, I believe it has a huge amount to commend it, and the arguments against its adoption seem, in most situations, to be rather weak.

But there remain a number of important unresolved issues, in inflation targeting as in other approaches to monetary policy. How best should central banks communicate the conditionality of their inflation forecasts, while still conveying useful information? Why do movements in the exchange rate now seem to be having such small effects on inflation – does this reflect something about the nature of inflation targeting, or perhaps just some peculiarity of the most recent economic cycle? To what extent can central banks make sufficiently reliable estimates of the output gap, and to what extent do changes in the output gap now affect the inflation rate?

[9] I do not propose to get into a discussion at this point about whether bias-adjusted zero inflation is better or worse than some very small amount of positive inflation.

[10] The suggestion that monetary policy might have reached the "end of history" in the sense that Francis Fukuyama had in mind was first raised, and rejected, by Stephen Grenville, then Deputy Governor of the Reserve Bank of Australia, in an address to the 30th Anniversary Conference hosted by the Monetary Authority of Singapore on 20 July 2001.

And perhaps the most troubling question for us all, inflation targeters and others: is there more to achieving monetary stability than calibrating the central bank's interest rate to keep the prices of goods and services purchased by the household sector stable? During the last decade or so, consumer price inflation has been exceptionally well behaved in most major economies. But at the same time, we have experienced episodes – indeed some severe episodes – of monetary instability in other guises, including asset price instability, financial system instability, and exchange rate crises. These experiences leave us with plenty of unanswered questions. What might Japan have done differently to avoid the bubble, and subsequent collapse, in asset prices – a collapse which has done so much damage to the Japanese monetary system and the Japanese economy more generally? And what might Japan do now, facing more generalised deflation? Are we entirely confident that, in 10 years time, we will be looking back at the recent episode of asset price inflation and deflation in the US with complete satisfaction?

We know that monetary policy can keep consumer price inflation under control, and we believe that inflation targeting has been an effective way of achieving that. But clearly there are plenty of challenging issues for our successors to deal with.

# Appendix 1

## Policy Targets Agreement

This agreement between the Treasurer and the Governor of the Reserve Bank of New Zealand (the Bank) is made under sections 9 (1) and 9 (4) of the Reserve Bank of New Zealand Act 1989 (the Act), and shall apply for the balance of the Governor's present term, expiring on 31 August 2003. It replaces that signed on 15 December 1997.

In terms of section 9 of the Act, the Treasurer and the Governor agree as follows:

**1. Price stability**

Consistent with section 8 of the Act and with the provisions of this agreement, the Bank shall formulate and implement monetary policy with the intention of maintaining a stable general level of prices, so that monetary policy can make its maximum contribution to sustainable economic growth, employment and development opportunities within the New Zealand economy.

**2. Policy target**

a) In pursuing the objective of a stable general level of prices, the Bank shall monitor prices as measured by a range of price indices. The price stability target will be defined in terms of the All Groups Consumers Price Index (CPI), as published by Statistics New Zealand.

b) For the purpose of this agreement, the policy target shall be 12-monthly increases in the CPI of between 0 and 3 per cent.[1]

**3. Unusual events**

a) There is a range of events that can have a significant temporary impact on inflation as measured by the CPI, and mask the underlying trend in prices which is the proper focus of monetary policy. These events may even lead to inflation outcomes outside the target range. Such disturbances include, for example, shifts in the aggregate price level as a result of exceptional movements in the prices of commodities traded in world markets, changes in indirect taxes, significant government policy changes that directly affect prices, or a natural disaster affecting a major part of the economy.

b) When disturbances of the kind described in clause 3 (a) arise, the Bank shall react in a manner which prevents general inflationary pressures emerging.

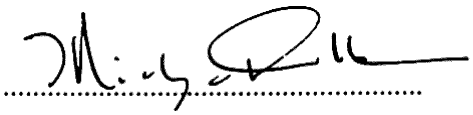
**4. Implementation and accountability**

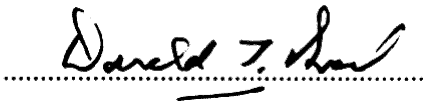
a) The Bank shall constantly and diligently strive to meet the policy target established by this agreement.

b) It is acknowledged that, on occasions, there will be inflation outcomes outside the target range. On those occasions, or when such occasions are projected, the Bank shall explain in Policy Statements made under section 15 of the Act why such outcomes have occurred, or are projected to occur, and what measures it has taken, or proposes to take, to ensure that inflation comes back within that range.

c) In pursuing its price stability objective, the Bank shall implement monetary policy in a sustainable, consistent and transparent manner and shall seek to avoid unnecessary instability in output, interest rates and the exchange rate.

d) The Bank shall be fully accountable for its judgments and actions in implementing monetary policy.





Hon Michael Cullen
Treasurer

Donald T Brash
Governor
Reserve Bank of New Zealand

DATED at Wellington, this 16th day of December 1999

[1] Statistics New Zealand introduced a revised CPI regime from the September quarter, 1999. Until the June quarter 2000, 12-monthly increases in the CPI will be calculated by comparing the new CPI series with the old CPI series adjusted by removing the impact of changes in interest rates and section prices. This adjustment is calculated by Statistics New Zealand. (Refer to the RBNZ's November 1999 *Monetary Policy Statement*, p 8, for details.)

# An indebted people

A speech by Donald T Brash, Governor, Reserve Bank of New Zealand to the Canterbury Employers' Chamber of Commerce on 25 January 2002

Mr Chairman, ladies and gentlemen

I am delighted to be here again for my ninth annual address to the Canterbury Employers' Chamber of Commerce. Last year I spoke to this audience about what goes on "behind the scenes" in formulating monetary policy at the Reserve Bank, and over the years I have addressed a wide range of topics. In 1998, I talked about New Zealand's balance of payments deficit and its relevance to policy-makers. The topic of that speech was "New Zealand's balance of payments deficit: does it matter?" [1]

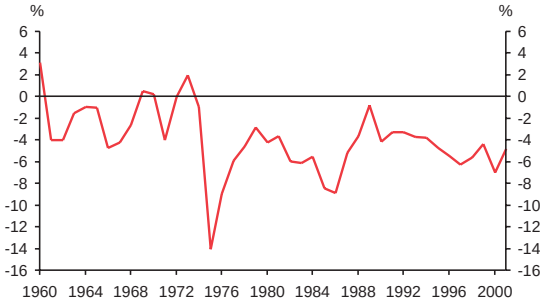
I want to return to this topic today, from a slightly different tack. As part of our brief to watch out for things to do with financial stability, we in the Reserve Bank have been doing some thinking recently about New Zealand's dependence on foreign capital and some of the risks that that exposes us to.[2]

(As an aside, it seems fitting to be addressing this topic in Christchurch this year, as my own Masters thesis, submitted to the University of Canterbury forty years ago this year, was entitled "New Zealand's External Debt Servicing Capacity" – although I am bound to say my understanding of the issues has evolved considerably since that time!)

## Just how dependent are we on foreign capital?

By international standards, and by our own historical standards, New Zealand is unusually dependent on foreign capital. Since the mid-1970s, New Zealand has consistently spent more on goods and services from abroad, including the income paid to the foreigners who have provided us with capital, than it has earned from exports. It has, in other words, consistently run a current account balance of payments deficit. Each of these deficits has had to be financed by capital inflows of one kind or another.

Figure 1
Current account
(as a percentage of GDP)




Source: Statistics New Zealand

Four years ago when I talked about the current account, the deficit stood at 6.4 per cent of GDP, then one of the largest deficits in the world relative to GDP. In fact, the deficit deteriorated further, peaking at 7.0 per cent of GDP in the year to March 2000. The latest information we have is for the year to September 2001, when the current account deficit was 3.4 per cent of GDP. That is low by recent New Zealand standards. But what matters is not any particular year's current account deficit – whether the 14 per cent peak deficit in 1975, when the terms of trade collapsed, or the rather lower deficit of the last year, helped by good commodity prices and an unusually low exchange rate. What matters, when we think about financial stability, is the *accumulation* of deficits: the stock of debt and equity finance which foreign investors have provided to this economy over the years, and the relationship of that stock to our wealth and income.

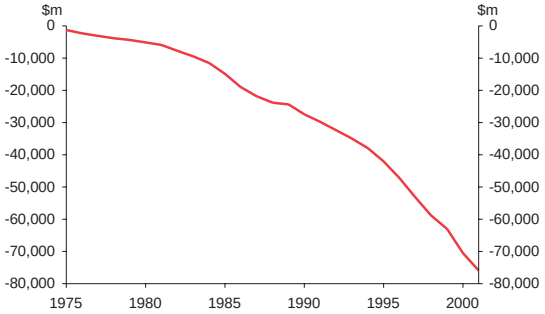
Capital inflows match (and fund) a current account deficit. Capital inflows can take the form of debt (foreigners lending to us) or equity (foreign investors buying property and shares in other productive assets in New Zealand). But each inflow adds to the stock of foreign debt and foreign ownership. The numbers involved are large. If we add together all the current account deficits since 1975, they total almost $80 billion, and of course there were substantial amounts of foreign debt and foreign ownership prior to that date.

I have no doubt that foreign investment in New Zealand has

[1] Speech to Canterbury Employers' Chamber of Commerce, 30th January 1998.

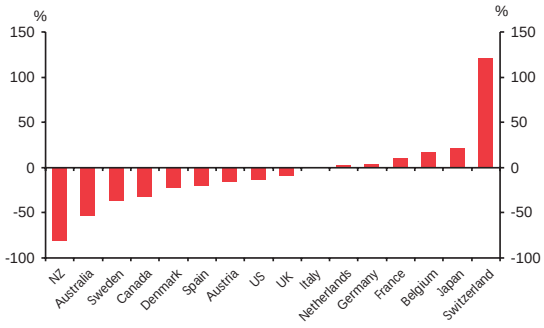
[2] See, for example, the article "International capital flows, external debt, and New Zealand financial stability" in the December 2001 issue of the Reserve Bank's *Bulletin*.

Figure 2
Cumulative current account deficit, 1975 – 2001
(NZ dollar millions)




Source: Statistics New Zealand

Figure 3
Net foreign assets
(as a percentage of GDP, 1995 – 2000 average)




Source: IMF

been very beneficial to the New Zealand economy and to most New Zealanders, and that is especially true since we abolished the subsidies which we used to extend to some foreign investors through our protection of internationally uncompetitive industries.[3]

Of course, there is nothing inherently wrong with borrowing or debt either. I differ, for example, from a strict interpretation of the sentiment Mr Micawber expressed in Charles Dickens's "David Copperfield":

> "Annual income twenty pounds, annual expenditure nineteen pounds nineteen shillings and sixpence, result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and sixpence, result misery."

Taking on debt permits spending and investment earlier than would otherwise be possible. It can provide a buffer when income is temporarily low, and help finance profitable investment opportunities. This applies both to individuals and to nations. Much of the initial infrastructure of this country was financed by foreign borrowing from the United Kingdom in the nineteenth century.

However, the more indebted a country is the more vulnerable it is to things going wrong. In many ways, the story is the same for a country as for a highly indebted individual – everything is fine as long as there is the willingness and the ability to service the debt. But the higher the level of debt, the more exposed the individual is if, say, he or she is made redundant or faces unexpected expenses.

I mentioned a moment ago that we have run current account deficits totalling around $80 billion since 1975. The best official measure of how reliant we are on foreign capital is Statistics New Zealand's International Investment Position data. That shows that our total *net* use of foreign capital – allowing for the best estimates of New Zealanders' holdings of foreign assets – is around $88 billion, or nearly 80 per cent of GDP. Moreover, the gross numbers matter too – the total amount of capital which foreigners have provided to New Zealand is around $170 billion. There is a mix of debt and equity: the distinction between the two isn't always clear cut,[4] but in the official data approximately $120 billion of the total takes the form of debt.

In isolation, these figures don't mean very much; and, after all, many of us have had mortgages well in excess of one year's income. International comparisons can help us gain a better perspective. Most mature and highly developed economies in Europe and North America are either net lenders to the rest of the world, or have financing from abroad equivalent to only 20-30 per cent of GDP. Even Australia, with its own history of persistent current account deficits, is only about half as dependent on foreign capital as we are.

It is not easy to draw strong conclusions from international comparisons, as there are measurement difficulties in

[3] "Foreign investment in New Zealand: Does it threaten our prosperity or our sovereignty?", speech to the Wellington Rotary Club, 20 November 1995.

[4] Tax considerations often encourage foreign parent companies to finance their local subsidiaries in the form of debt rather than equity, and some instruments are designed to be equity for some purposes and debt for tax purposes.

comparing data from different countries. However, it does seem that New Zealand is now much more dependent on foreign capital than any of the developed countries we like to compare ourselves with. One exception is the tiny – but much wealthier – country of Iceland, which is in about the same position. Looking back over history, the data are not as reliable, but it is not obvious that any developed country in the post-war era has been more dependent on foreign capital than we are now[5] – and certainly none since the general liberalisation of private capital flows over the last few decades.

As I suggested earlier, a heavy dependence on foreign capital – whether of debt or of equity – need not be a problem. What matters is how that capital is used, and what is happening to the incomes and assets of those raising the finance. I have noted on many occasions that Singapore ran very large current account deficits, averaging around 11 per cent of GDP, for a long period in the 1970s. As any businessperson knows, borrowing or raising outside equity makes a lot of sense if there are profitable investment opportunities available. At a national level, an unusually high degree of dependence on foreign capital (especially debt) makes a lot of sense if there are opportunities that mean it is reasonable to expect the rate of economic growth to take a big step up, and to move ahead of the average.

Singapore got that sort of pay-off. That country graduated from being a low-income developing country in the 1950s to the point where it now has per capita incomes higher than our own.

Unfortunately, we haven't achieved a similarly dramatic transformation. Yes, our GDP growth performance has been better in the 1990s, but on most measures (eg growth in output per hour or per person employed) it has still not been as good as those of other, much less indebted, developed nations. Australia's picture looks better: although our trans-Tasman cousins have also run relatively large current account deficits, and are therefore also relatively quite heavily dependent on foreign capital, they achieved growth rates among the highest in the developed world during the 1990s.

But even that does not get to the crux of the issue for New Zealand. Gross *domestic* product is a measure of the income generated within New Zealand, and New Zealand's growth in GDP was not too bad during the 1990s. But because we have become increasingly reliant on finance from foreign savers, an increasing share of the income this economy generates goes (in interest and dividends) to those who financed us. Gross *national* product is a measure of the income generated by New Zealanders' own resources. Unfortunately, GNP per capita in New Zealand barely increased at all during that time. In other words, because we have been such heavy users of capital from foreign savers – so reluctant to save enough to provide our own investment capital – much of the growth in the New Zealand economy in recent years has accrued to those foreign savers.

This is not a speech about why our growth performance has been disappointing. I have spoken on that and related issues on other occasions, including to this audience two years ago.[6]

Instead, I want to devote the rest of this speech to looking briefly at how we came to be so dependent on foreign capital, and then turn to outlining some of the risks that that dependence may expose New Zealand to.

## How did we get into this situation?

I don't think there are too many easy answers to the question of *why* we became so dependent on foreign capital. I think it is clear, however, that the current situation is more a reflection of private sector choices over a number of years than of government decisions, though of course to the extent that government policies have

*influenced* private sector choices those government policies must share some of the responsibility.

At the heart of the issue, countries run up obligations to foreign investors when, in total, they are spending

[5] Ireland may have been an exception in the late 1970s and early 1980s (the data do not allow a direct comparison).

[6] "The building blocks of economic growth", speech to the Canterbury Employers' Chamber of Commerce, 26 January 2000. See also "Faster growth? If we want it", a speech to the Catching the Knowledge Wave conference, 2 August 2001.

(consuming or investing) more than they are earning.

Let me stress that government borrowing is not the issue today. When we first ran large current account deficits in the 1970s, and through to 1984, government fiscal deficits accounted for much of the excess spending that gave rise to the current account deficits, and government borrowing abroad financed those deficits. As late as the early 1990s, New Zealand's total government debt was relatively high by international standards – though never anywhere nearly as high as the public debt of countries like Ireland, Belgium and Italy, or indeed Japan today. But a decade or more of prudent fiscal management means that our net public debt is now among the lowest in the developed world. Good comparative data are hard to come by, but it seems likely that the New Zealand government's overall net asset position is today at least as good as the average for developed countries.

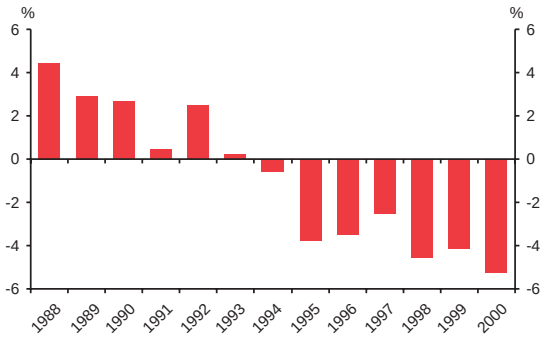
It is also worth noting that the New Zealand government now has no *net* foreign currency debt. The small amount of foreign currency government debt still outstanding is fully matched by foreign currency assets held by the Treasury and the Reserve Bank. The limited net amount of debt still owed by the government to foreigners is in the form of locally-issued New Zealand dollar bonds that foreign investors have bought on the local bond market.

Nor is privatisation to blame. Many of the formerly government-owned assets that have been sold have ended up owned by foreign investors. But selling the assets didn't change the spending habits of New Zealanders. The deficits needed to be financed: selling assets (whether privately owned or publicly owned) has been one way of doing that, and if we hadn't sold such assets, we would have had to finance those deficits by going even further into debt. As I said a moment ago, current account deficits need to be financed, and that financing can take the form of either equity or debt. If not equity, then debt; if not debt, then equity.

Who then is behind the spending that has made us so reliant on foreign savings? The "culprit" has been the private sector – and New Zealand households in particular. The share of their incomes that New Zealand households are saving has fallen away very markedly. Household savings rates fell in a number of developed countries over the last ten years or so. But, while some caution is needed because of cross-country measurement difficulties, New Zealand's record looks particularly poor.

Fifteen years ago, our household saving rate was not too bad by developed country standards. But by 2000, we had slipped down to the bottom of the OECD developed-country class. By that year, our households were, in aggregate, spending more than their income. The OECD average saving rate that year was 8.4 per cent.

Figure 4
Household saving rate in New Zealand
(disposable income minus consumption as a percentage of disposable income)




Source: Statistics New Zealand

The sharp fall in the household savings rate has not been sufficiently offset by increased savings in other sectors of the economy, so that now our overall *national* savings rate also appears to be the lowest among the developed OECD countries. If we, as New Zealanders, are not saving very much, somebody else – somebody overseas – has to finance the ongoing investment the economy needs. Our level of investment is not unusually high, but our savings rate is unusually low.

## Why are we, on average, saving so little of our incomes?

I have, from to time to time, suggested that we are poor savers because we have been effectively told by successive governments for more than half a century that we do not *need* to save for the things that people in many other

countries save for. We have been reassured that government will care for us if we get sick; that government will pay for the primary, secondary, and tertiary education of our children; that government will care for us in old age. "You don't need to save" has been the message. And successive governments have also effectively told us, by their behaviour during the seventies and eighties at least, that if we nevertheless do save we would lose our savings through high inflation, and strongly negative after-tax real interest rates.

But while there may be something in that explanation, it does not really explain either why our savings performance is so much inferior to that in, for example, most European countries (where the social welfare net is at least as generous as it is in New Zealand), or why our savings performance has actually deteriorated in recent years, as government's commitment in health, education, and retirement income has become a little less generous, as inflation has been largely eliminated and as real after-tax interest rates on savings have become positive.

In principle, another possibility is that the savings rate (from current income) might be falling because households own assets that have risen in value, making people feel that there is less need to save from current income. This seems to have been the story in the United States – which has also become much more dependent on foreign savings in recent years. Ten years ago, US household saving rates were around 8 or 9 per cent, but by the end of the decade (at the end of the longest and strongest equity market expansion of the twentieth century), the US savings rate had dropped to just 1 per cent. One might question just how robust those high asset prices will prove – on most longer-term metrics, US share prices still look to me to be rather considerably overvalued. But, if people believe the wealth gains will last, it does make sense for them to increase spending and reduce savings in response.

We, by contrast, have not seen soaring asset prices of that sort – indeed, the data suggest that real household wealth has been falling for several years. There are very real data difficulties in comparing wealth in different countries, but New Zealand stands out in the data we do have: we have a low ratio of wealth to income, indeed the lowest of the developed countries we've looked at. Our numbers are likely to be understated – in particular, farms are not included in the data, and farms make up a larger percentage of wealth here than in most other developed countries. But even if adjustments were made for these factors, it seems unlikely to change the overall picture materially. And our relative position in those league tables looks much worse than it did a decade ago.

It is worth highlighting a few numbers. Financial assets and liabilities are easier than most to get a good fix on. New Zealand households' net financial wealth (deposits, shares, unit trusts, pension funds, etc less household debt) is estimated to be only around 70 per cent of our annual disposable income. In the bigger developed countries, that ratio averages around 270 per cent – even after the fall in international share prices last year. Even allowing for the inevitable problems in putting together such cross-country comparisons, and for the possibility that international share prices still have some further adjustment to do, that is a large – and sobering – difference. Put another way, the debt of the household sector in New Zealand is very much

Household net financial wealth to income ratios

| Per cent | 1990 | 1995 | 2001 | 1990-2001 change | 1995-2001 change |
|---|---|---|---|---|---|
| US | 261.8 | 304.7 | 333.0 | 71.2 | 28.3 |
| Japan | 260.3 | 283.8 | 356.9 | 96.6 | 73.1 |
| Germany | 130.8 | 140.4 | 150.0 | 19.2 | 9.6 |
| France | 130.6 | 184.7 | 264.4 | 133.8 | 79.7 |
| UK | 211.8 | 291.2 | 333.2 | 121.4 | 42.0 |
| Italy | 196.3 | 217.1 | 250.0 | 53.7 | 32.9 |
| G6 | 198.6 | 237.0 | 281.3 | 82.7 | 44.3 |
| Australia | 253.0 | 218.4 | 266.0 | 13.0 | 47.6 |
| New Zealand | 102.7 | 108.6 | 70.4 | - 32.3 | - 38.1 |

Source: OECD, national sources, and UBS Warburg. 2001 data are forecast, except for NZ, which are 2000 actuals.

higher, relative to the sector's financial assets, than in many other developed countries.

Unlike most developed countries, in New Zealand houses make up the overwhelming bulk of our relatively modest net wealth. Of course, we all have to live somewhere, but especially in a low inflation environment, houses do not offer a high investment return – either to most of us as owner-occupiers or to those holding investment properties (although I acknowledge the incentives created by the present tax regime). It is perhaps worth noting that New Zealand home ownership is no longer particularly high by developed world standards and, although getting consistent data over time is not easy, may even be slipping down the international rankings. I suspect this may surprise some people, as we tend to see ourselves as a nation of home-owners tending the quarter acre plot. It isn't obvious that we are building a disproportionate number of houses either, but perhaps – by default as much as by design – we are rather too keen on having a house as the principal asset in our investment portfolios. What we haven't done is built up or maintained holdings of other income-earning assets.

Later this year, the Retirement Commissioner will release a report based on a fairly comprehensive survey of New Zealand household wealth. While I have not seen the report of course, it will undoubtedly add a great deal to our understanding of household balance sheets. I suspect that underlying the aggregate figures – and by that I mean the household sector as a whole – some disturbing figures could emerge about just how low the wealth and savings of even the middle-aged middle income sections of our society are.

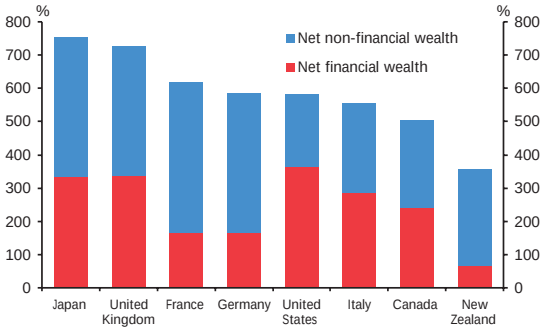
What still isn't so clear isn*why* we have cut our savings rate to such a low level.

Part of it, of course, is simply that we could. In many developed countries following financial deregulation, households have run debt levels up quite substantially. Refinancing, and drawing down the equity in one's house, has become much easier – with revolving mortgage facilities, people can and do now "put the groceries on the mortgage". Banks have, at times, marketed this opportunity aggressively. I can recall one innovative television advertisement that encouraged home-owners to "put the boat on the house", and illustrated the message by depicting a boat balanced on the roof of the house. The wisdom of following their advice literally, or financially, was for the householder to determine! But whatever the wisdom, households went on a borrowing spree – we estimate that household borrowing increased by $45 billion during the 1990s alone, from 57 per cent of disposable income in 1990 to 110 per cent in 2000, and that despite loud complaints from some about the high real interest rates on such borrowing.

Perhaps a little paradoxically, lower inflation also facilitated the increase in debt. When inflation was high, high nominal interest rates meant that bank limits on debt servicing as a share of income cut in very quickly. Given the way mortgages are structured, lower inflation, and the lower interest rates which come with it, have allowed individuals to borrow more than they could in high inflation periods.

As we've highlighted in a number of our *Monetary Policy Statements*, household debt-to-income ratios now seem to be fairly similar to those in, say, the United States and the United Kingdom. But post-deregulation adjustment to international norms isn't enough of an explanation. The difference between New Zealand and most other developed countries is that we do not have as many assets as householders in other developed countries do. Basically, we have borrowed to finance consumption or relatively unproductive investments.

Figure 5
Household net wealth as a percentage of disposable income
(2000 data, 1999 for Japan and Italy)




Source: OECD and Reserve Bank of New Zealand

More work is needed in this area, but my own sense of what has gone on is relatively prosaic. Our incomes haven't been growing as rapidly as those in other comparable countries. But the range of goods and services available to us has

Average investment as a percentage of GDP 1988-1999

| Country | Residential Investment % | Investment excluding residential % |
|---|---|---|
| Finland | 5.0 | 15.9 |
| Netherlands | 5.8 | 15.8 |
| Denmark | 3.9 | 15.2 |
| US | 4.0 | 14.6 |
| Italy | 5.0 | 14.5 |
| New Zealand | 4.9 | 14.3 |
| UK | 3.4 | 14.4 |
| Australia | 4.9 | 18.3 |
| Canada | 5.6 | 13.5 |
| AVERAGE | 4.7 | 15.2 |

Source: OECD Quarterly National Accounts

increased dramatically, as we have liberalised and as other countries have grown – indeed, it is often commented just how good the services available in New Zealand now are. If our tastes (our demand for goods and services) are increasing faster than our income, savings inevitably fall. We were able to finance the difference between our low level of savings and our average level of investment expenditure by accessing the savings which foreigners made. Over the years, those differences have added up to large numbers.

## What does it all mean?

What should we make of all this?

As I noted at the outset, the more indebted we are – as individuals and in aggregate – the less resilient to adverse economic shocks we are, and the higher the potential vulnerability. Without automatically presuming that there are problems, central bankers thinking about potential risks to financial stability should be prodding and probing when financing patterns in the economy look very different from international norms, or when structures and stocks change rapidly in a relatively short space of time. The changes in New Zealand debt levels over the last 15 years have been very marked and have taken us increasingly away from international norms.

In recent years, and particularly following the Asian crisis, the Reserve Bank has been devoting more attention to thinking about potential risks, both economic and financial. Internationally, we have seen numerous financial crises over the last decade or so. Part of our work in this area has highlighted the encouraging features that differentiate New Zealand from the crisis countries, a point I will come back to in a moment.

It is worth noting that, since capital account liberalisation 18 years ago, the country's increasingly large external financing requirement has been met remarkably smoothly through a variety of international crises and changing domestic economic and financial conditions. But the perennial question concerns what sort of shocks or emerging points of vulnerability should we be alert to. If things turned against us, where might the pressure points in the economy and the financial system be?

In essence, there is one big New Zealand imbalance that manifests itself in two – connected – ways. First, our household sector balance sheets appear to be very out of line with the international norm. And second, we are very dependent on *foreign* capital, with a large share of that in the form of *debt* finance. Let's remind ourselves of the connection.

Households do not, of course, typically borrow directly from overseas. Instead, they borrow from domestic banks. But that bank lending has to be financed somehow. Some of it is effectively financed by New Zealanders selling their holdings in New Zealand listed companies: we've seen a lot of that in the last 12-18 months as a low exchange rate has made many New Zealand companies appear very cheap to foreign buyers. But the household demand for credit has substantially exceeded the rise in the bank deposits of New Zealanders. As a result, much of the household borrowing has ultimately been financed by banks' borrowing from overseas. New Zealand banks now rely more heavily on overseas borrowing than banks in any other developed

country – roughly a third of the total assets of the banking system are now funded by borrowing overseas, though not all of this funding is used to make loans to the household sector. Or measured another way, of the total increase in banks' balance sheets during the nineties, roughly a third has been financed from offshore.

Of course, the average borrower isn't even aware of this (and need not be) – she goes to the bank on the corner and finances her house without realising from where the funds are sourced. Financial intermediaries do their job very well, bringing together domestic borrowers and often-foreign providers of funds.

Interestingly, individual loan-to-valuation ratios appear to be relatively conservative (and bank balance sheets are in very good shape in New Zealand), but I wonder how sustainable existing property prices would be if households ever decided to try to adjust their savings patterns, bringing their holdings of assets more into line with the international mainstream – looking to buy more shares, or to invest more in small and medium-sized businesses, for example.

Think, for example, of a large number of "baby boomers" realising that they really do not have enough income-generating assets to support a good lifestyle in retirement, and foregoing the next move up to a bigger house. In aggregate, the effects could be large. Think also of the impact on consumption spending, and the demand facing large parts of the business sector, if the household savings rate were to move back to 10 per cent of disposable income over a relatively short period of time. And of the possible implications then for the quality of bank loan books – built up at times when demand has been strong.

We all hope that the imbalances resolve themselves gradually and without undue disruption. And there are some encouraging signs. Having run up debt over the 1990s (in particular), credit growth rates are now much lower than they were in the mid-1990s. And the lack of house price inflation in recent years is a salutary reminder of what life should be like in a low inflation environment. Perhaps households may be beginning to stand back and consider their overall balance sheets. This certainly seems to be the sector of the economy that needs to think about how well placed it would be to absorb a shock – a large drop in house prices, the loss of a job, and so on – and indeed the assets required to support a good quality of life in retirement.

Nonetheless, we cannot be complacent. Lending to households continues to grow faster than incomes are rising. And the current account position itself, although improving in the last couple of years, is not overly encouraging given the strength of New Zealand's export prices recently and the fact that most commentators, ourselves included, believe that our exchange rate is substantially undervalued. Unless the current account deficit stays below around 4 per cent of GDP or we achieve a rather faster rate of economic growth than we have managed in recent decades, the ratio of net foreign capital to GDP will continue to increase from already unusually high levels. Resolving imbalances, even "naturally" if borrowers voluntarily come to the conclusion that they are over-extended, can be painful, and it seems to be in the nature of life that adjustments of this sort don't always occur easily or smoothly. Often they seem to require some sort of external prompt or trigger.

Browsing in a second-hand bookshop recently, one of my colleagues came across the following salutary observation from a New Zealand commentator writing in 1886:

> 'I fear it is of no use writing against excessive borrowing. The disease must run its course and no one will rejoice more than the writer if a certain cure is found for it. There are reckless lenders as well as reckless borrowers and the two must share the difficulties and troubles which may be in store for them in the future.'[7]

One obvious area of risk is that those who are providing the finance from abroad may reassess their willingness to go on doing so. A sharply increased cost of overseas finance, for example, could dramatically alter the situation facing many New Zealand households.

The external finance we now use takes a variety of forms: some short-term and some long-term; some debt and some equity; some in New Zealand dollars and some in foreign currency. The conventional wisdom is that the risk of financial instability tends to increase as the proportion of short-term

[7] Carter, C R, *An Historical Sketch of New Zealand Loans and Other Matters Connected Therewith from 1853 to 1886*, London, 1886.

liabilities increases, as the proportion of debt increases relative to equity, and the greater the proportion of liabilities denominated in foreign currency.

Of course, these are simple rules of thumb not immutable laws of nature. They do not always hold. For example, it is clear that much of the apparently short-term debt owed by the New Zealand private sector is owed by foreign-owned subsidiaries to their overseas parents, and is quite unlikely to be called up at short notice.

Sometimes, long-term debt can create less vulnerability than equity: an investor's equity stake could be short-term in nature, while long-term debt holdings might be part of an overall relationship between highly-integrated foreign parent companies and local subsidiaries. Even if the underlying equity investment itself is a long-term one – and it can often be difficult to off-load large or controlling interests quickly – equity holders may move to hedge themselves against currency risk if they fear that the exchange rate is vulnerable to a fall. That sort of selling could exacerbate any pressures on the exchange rate.

Foreign currency borrowing is generally held to be much riskier than domestic currency borrowing, and most of the private sector's external debt is denominated in foreign currencies. But at the same time, the overwhelming majority of that foreign-currency debt is hedged back to New Zealand dollars (by contrast, most heavily indebted developing countries are unable to raise foreign funding in their own currencies). That meant that our banks and corporates got through the sharp fall in the exchange rate during the late 1990s – a fall which saw the New Zealand dollar fall against the US dollar by some 45 per cent from peak to trough – almost entirely unscathed.

But the very fact that so much of the debt is hedged raises further questions. If New Zealand residents are not directly exposed to foreign currency exchange rate risk, who is taking the risk? If we can effectively borrow from abroad in New Zealand dollars, someone must be willing to lend in New Zealand dollars – someone, most likely, without a strong "natural" interest in holding New Zealand dollar assets. Unfortunately, we cannot be sure who these holders are, what drives them, or what might make them reconsider their willingness to be exposed to a relatively small peripheral currency.

Financial systems and currencies can become illiquid quite quickly. Once investors begin to doubt the safety of the assets which they have tied up in a financial system or specific currency, they may want to liquidate them quickly – the more so when, as in New Zealand's case, we feature in few of the international "benchmarks" that shape where portfolio managers place the bulk of their funds. There are considerable advantages in maintaining an independent currency and free movement of private capital, but it does mean that stability relies to an important extent on maintaining the confidence of market participants in the currency and the financial system.

An unusual feature of New Zealand's offshore financing is that such a large proportion of the financing now takes the form of hedged foreign currency financing undertaken by a relatively small number of banks. The ability of those banks to continue tapping the international markets, and to continue effectively hedging the foreign currency risks, is clearly a point of vulnerability. That is likely to be closely linked not only to their own financial health, but also to the financial health of the small number of overseas parents.

Under some circumstances, all this could become much more difficult. For example, even shocks outside the control of the borrowing bank or its overseas parent, such as a slip in New Zealand's credit rating (or indeed, in Australia's rating, given the dominant role of Australian banks in New Zealand), could trigger a reappraisal of the risks inherent in dealing in the New Zealand market. Below certain ratings thresholds it can be impossible to tap financial markets.

## Concluding remarks

Clearly there are risks in being as heavily dependent on foreign savers as the New Zealand private sector has become. Heavy reliance on foreign capital is something New Zealand shares with many of the countries that have experienced exchange rate or banking system crises in recent years. But fortunately New Zealand differs from these countries in many respects, and our points of vulnerability – and it is no more

than heightened vulnerability – appear to be rather specific to New Zealand.

We have had a floating exchange rate for 17 years. That has made borrowers appropriately cautious in ensuring that their borrowings are well hedged, and can help the economy adjust to adverse economic shocks. Unusually among heavily indebted countries, we are readily able to tap international capital markets in our own local currency. We have a sound macroeconomic policy framework, a government committed to running fiscal surpluses, and a relatively low level of government debt. We do not have a large bubble in asset prices just waiting to burst. Our banks are well-capitalised and well managed, and have very low levels of non-performing loans by international standards. There is a good level of high-quality disclosure about the financial position of banks and the government. And yet the very fact that imbalances of the sort I have highlighted in this speech can emerge, even against the backdrop of what appears to be such a sound well-designed policy framework, is part of what makes our situation quite unusual – and hard to know just how things will work out from here. Other countries have not been this way before.

Can I say unambiguously, however, that I am not predicting some sort of financial crisis for New Zealand. Yes, it appears that quite substantial adjustment in household balance sheets will be needed over time, and that will begin to reduce the levels of external indebtedness. We all hope that that adjustment will occur gradually, voluntarily, and against the background of favourable international circumstances. That seems by far the most likely outcome. But the message of this speech has been simply that when the ratios are as stretched as they have become in New Zealand, we are more vulnerable if things go wrong – and that is something which firms, households, the government, and a central bank focused on financial stability need to be aware of. All that underscores the importance of a sound macroeconomic framework for fiscal and monetary policy, and of robust and well-managed banks. For us at the Reserve Bank, it also highlights the need for continual monitoring of the nature of the risks and the ways in which demand for finance, and the terms on which it is available, are changing.

I have not devoted any time today to the question of what *more* public policy could or should do about this picture. Those are issues for another day.

# For the record: recent press releases

## New bank registered
29 November 2001

The Reserve Bank today announced that it had registered New Zealand Post Financial Services Limited as a bank, which allows it to test its systems and procedures in anticipation of opening for business early next year.

New Zealand Post Financial Services Limited has previously announced that it intends to operate under the name "Kiwibank".

Reserve Bank Deputy Governor Rod Carr commented: "This registration is unusual, in that it is the first in many years in which a new bank is being created from scratch. In recent years all other registrations have been by existing overseas banks or financial institutions that already had proven infrastructures.

"For this reason, registration is taking place in two stages. Initially, New Zealand Post Financial Services Limited (Kiwibank) will be registered as a bank, but only for the purpose of testing its systems and procedures. Thus, during this testing phase, it will undertake a series of real transactions, including making settlements with other banks, but it will not be opening its doors to the public. Registration in this way is necessary for these test transactions to be lawful.

"Once these tests are successfully completed, and other relevant conditions satisfied, New Zealand Post Financial Services Limited (Kiwibank) will then be able to begin business with the public," Dr Carr concluded.

This registration brings the total number of registered banks in New Zealand to 17.

## OCR unchanged at 4.75 per cent
23 January 2002

The Reserve Bank today left the Official Cash Rate unchanged at 4.75 per cent.

Reserve Bank Governor Don Brash commented: "This decision reflects a balancing of risks between a domestic economy that seems rather more buoyant than we expected at the time of the November 2001 *Monetary Policy Statement* and continuing weakness offshore.

"As expected in November, growth in the economies of our trading partners has continued to be sluggish. Notwithstanding a widespread expectation that a global recovery is imminent, there remains a material risk that the situation could deteriorate further. The outlook in Japan is of particular concern. Commodity prices for New Zealand's exports have fallen quite substantially, and rather earlier than expected.

"However, domestically, a combination of factors suggests that activity is currently running quite strongly. Consumer spending appears more buoyant than expected previously, and indications are that business investment is also holding up better than expected. The housing market has strengthened in recent months, and the labour market continues to be relatively tight. As foreshadowed in November, CPI inflation for the year to March 2002 is likely to be well above 2 per cent, which would become a concern if any resultant increase in inflation expectations were reflected in price and wage setting behaviour.

"These factors are pushing inflation in opposite directions. In the weeks and months ahead, the Bank will be watching closely to detect which set of pressures is beginning to predominate," Dr Brash concluded.

## Kiwibank's registration completed
4 February 2002

The Reserve Bank today announced that Kiwibank Limited is now permitted to open its doors as a registered bank.

Reserve Bank Deputy Governor Rod Carr commented: "Kiwibank's initial registration, on 29 November 2001, only allowed it to test its systems and procedures in anticipation of opening for business later on. Registration was required to make these tests transactions lawful.

"The Reserve Bank required this two-stage process because Kiwibank is being created from scratch. In recent years all other bank registrations have been by existing overseas banks or financial institutions that already had proven infrastructures.

"These tests have been completed, and other relevant conditions satisfied, and, as a result, in terms of its registration as a bank, Kiwibank Limited is now permitted to do business with the public," Dr Carr concluded.

A total of 17 banks are now registered in New Zealand.

## Reserve Bank rejects claim that Kiwibank received special treatment for registration

4 February 2002

The Reserve Bank today rejected the suggestion, made by ACT leader Richard Prebble, that the registration of Kiwibank involved any special treatment.

Reserve Bank Head of Financial System Oversight Peter Ledingham said: "The decision to register the bank was based on the criteria set out in the Reserve Bank Act, and Kiwibank was treated no differently from any other application. No political pressure has been applied.

"Kiwibank will comfortably meet the minimum capital requirements set by the Reserve Bank when it commences business, and it will be required to continue to meet them on an ongoing basis," Mr Ledingham concluded.

## OCR increased to 5 per cent

20 March 2002

The Reserve Bank today increased the Official Cash Rate from 4.75 per cent to 5 per cent.

Reserve Bank Governor Don Brash recalled "In the last few months of 2001, the OCR was reduced by 100 basis points because we were concerned about the deflationary risks arising from a very weak world economy.

"Since our last *Statement*, the New Zealand economy has been stronger than we expected. Indeed, the economy is already operating at close to full capacity, and indications are that pressures will grow further in the absence of some increase in interest rates.

"Both consumer and business confidence have bounced back to pre-11 September levels. After a brief pause in October, retail spending has been strong. Visitor arrivals have recovered quickly. Turnover in the housing market has been high, and residential investment has surged. In recent months there has been a sharp turnaround in net migration.

"The risks to the global economy also look less threatening. Economic activity in the United States has picked up more quickly than most observers expected late last year, and the Australian economy looks robust.

"Nevertheless, the global economy is still not particularly strong. It seems likely that on average our trading partners will grow only moderately this year, and significant risks remain. The Japanese economy continues to have major difficulties, the US recovery could stumble over the high level of debt already accumulated, and global equity markets remain vulnerable to further weakness.

"Even after today's decision, monetary conditions remain stimulatory. Today's increase in the OCR simply represents some withdrawal of monetary stimulus, much of which was put in place as insurance against risks which have now receded. At the moment it seems likely that there will need to be some further reduction in monetary stimulus over the months ahead," Dr Brash concluded.

# Publications

Many Reserve Bank publications are available for download free of charge from the Reserve Bank website, www.rbnz.govt.nz

## Publications - no charge

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| ANNUAL REPORT | Published in October of each year |
| MONETARY POLICY STATEMENT | Published quarterly. A statement from the Bank on the conduct of monetary policy. First copy free, subsequent copies $12.00. |

THE REAL STORY - SAVING AND INVESTING NOW THAT INFLATION IS UNDER CONTROL

## Recent Reserve Bank Research Papers

**Research Paper No. 44.**

*The output gap: measurement, comparisons and assessment*, June 2000

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## Recent Reserve Bank Discussion Papers

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APEC Finance Minister's forum — role and work programme

*Speeches*
The fall of the New Zealand dollar: why has it happened, and what does it mean?
Institutional frameworks for inflation targeting

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The Reserve Bank's submission to the Minister of Finance on the Monetary Policy Review
Reserve Bank Non-Executive Directors' Committee Response to the Svensson Report
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