Volume 66 No. 1, March 2003

Contents

This document is also available on the Reserve Bank's website (http://www.rbnz.govt.nz)

ISSN 1174-7943

Editor's Note

Central banks have a wide range of functions, generally including monetary policy, exchange rate policy, financial system surveillance, provision of settlement accounts to commercial banks and the issuance of notes and coins. At first sight, it might seem that some of these functions are quite disparate, with little in common. However, on closer examination, it can be seen that most of the functions of a central bank are interlinked and contribute to a common theme – that of macro-financial stability. Indeed, the promotion of macro-financial stability is the very raison d'etre of central banks, and this is no less true in the case of the Reserve Bank of New Zealand as for other central banks around the world.

We are tasked with the job of promoting stability in a number of ways – through monetary policy (to maintain stability in the general level of prices), through our supervision of the banking system (to maintain a sound and efficient financial system) and through the oversight of the payment system (again, to promote a robust and efficient financial system). As the issuer of notes and coins, the Bank seeks to provide the public with a secure and convenient means of payment, and one that broadly holds its value through time.

This issue of the *Bulletin* contains five articles. Although they cover a wide range of subject matter – including aspects of monetary policy, the payment system, financial markets and the history of money in New Zealand – they are linked by the common thread of stability. Each in their own way focuses on different elements of the Reserve Bank's task of helping to make the New Zealand financial system and wider economy a more certain and stable place to do business, to produce goods and services, to consume, to save and to invest.

The first article deals with an important element of the New Zealand monetary policy framework – the output gap. The output gap (the measure of the difference between the actual output of the economy over a particular period and the 'trend' output of the economy), as one of the core links between the real economy and inflation, is essential to monetary policy formulation and provides a useful way of thinking about inflationary pressure in the economy. It has long been a commonly used device at central banks to represent how "hot" or "cold" the economy is at any particular time and to forecast likely inflationary pressures. The output gap can also be a useful indicator of the volatility of activity in the economy – whether resources are alternating quickly or gradually between periods of substantial resource strain to periods of substantial resource abundance. The article discusses the output gap, its strengths and weaknesses, the various ways it can be measured, and how it fits into the monetary policy process at the Reserve Bank.

As noted above, a core aspect of the way the Reserve Bank promotes macro-financial stability is through the supervision of banks and oversight of the payment system. These roles recognise the importance of the financial system in the wider economy and the need for it to remain robust in the face of economic shocks. The robustness of New Zealand's financial system will be subject to additional scrutiny this year, given that New Zealand is scheduled to undergo an assessment by the International Monetary Fund under the Financial Sector Assessment Programme (FSAP). The FSAP is a relatively new surveillance and assessment programme developed and jointly managed by the International Monetary Fund (IMF) and World Bank. It is designed to assess the potential vulnerabilities in a country's financial system and to evaluate the adequacy of financial sector regulation and supervision, using international standards and codes as benchmarks, as well as a number of other analytical tools.

The second article in this issue of the *Bulletin* explains the FSAP and discusses the key elements within it. Later this year and in 2004, the *Bulletin* will include articles that draw from the FSAP and the work being undertaken by the Reserve Bank and other government agencies in preparation for it.

One of the key elements of the financial system is the payment system. In modern market-based economies, day-to-day activity involves many millions of transactions for goods, services and financial assets, the payment for which results in the transfer of money. For participants to have confidence in their ability to effect transactions and access their funds, it is important that the systems are efficient, reliable and secure. Payment mechanisms, however, may both be an origin and channel through which financial shocks can be transmitted across markets and national boundaries. Accordingly, robust payment systems are a core element in maintaining financial stability and it is in the private and public

interest to ensure that, in the event of a shock or disruption, any systemic impact is minimised.

The third article in the *Bulletin* considers current developments in the payment system arena. It reviews two major international payment system initiatives and the potential implications for New Zealand, and reports on the structure and operational changes occurring at the domestic level. The article explains the role of the Reserve Bank in the domestic payment system and comments on some of the issues and challenges looking ahead.

The financial system is more than just the banking and payment systems. It encompasses many other elements, including the financial markets, such as the money markets, foreign exchange market and swaps market. The Bank takes a close interest in financial markets, both because they are important to broader systemic stability and efficiency and also because of their relevance to monetary policy. The fourth of our articles deals with a new development in New Zealand's financial markets – the introduction last year of a new type of financial instrument – the Overnight Indexed Swap (OIS). This article is intended as a primer, explaining what the OIS is and how it is used by market participants to manage interest rate risks and to take a view on the direction of the Official Cash Rate (OCR). From the Bank's perspective, we are most interested in using OIS yields to derive estimates of market expectations of the OCR. This article also highlights developments in the New Zealand OIS market to date.

The final article in this issue of the *Bulletin* deals with a fundamental element of what central banks are all about – money. A central bank's stock in trade is money. This is no less true in New Zealand than in any other country. It is perhaps not surprising, therefore, that the Reserve Bank takes more than a passing interest in the historical development of notes and coins in New Zealand. The article summarises the legal history of notes and coins in New Zealand, beginning in the early days of colonisation and tracing the key developments through to the modern era. Although the focus of the article is on the development of the legal framework governing notes and coin, rather than other aspects of money, it also discusses some of the economic and social issues that shaped these legal developments.

I hope our readers enjoy this issue of the *Bulletin*, with all its variety of subject matter.

Geof Mortlock, Financial Stability Department
Reserve Bank of New Zealand
P O Box 2498, Wellington, New Zealand
Email mortlockg@rbnz.govt.nz
Telephone 64-4-471-3690
Facsimile 64-4-473-1209

ARTICLES

The output gap and its role in monetary policy decision-making

Florin Citu and James Twaddle, Economics Department[1]

Understanding the link between the real economy and inflation is essential to monetary policy formulation. In conventional macroeconomics, the concept of the output gap is an important component of that link. Used in this context, the output gap provides a useful way of thinking about inflationary pressure in the economy. This article discusses the output gap concept, its strengths and weaknesses, and how it fits into the monetary policy process at the Reserve Bank.

While the output gap is a useful device in assisting the understanding and forecasting of inflation developments, it does have weaknesses. The output gap is unobservable, and developing reliable estimates of it is a key weakness. A second is the possibility that the linkage between the real economy and inflation is not well represented by models or frameworks that use the output gap concept. Being alert to these weaknesses, the Reserve Bank looks at a range of other indicators of inflationary pressure when formulating monetary policy and uses judgement where appropriate.

1 Introduction

Monetary policy directed at maintaining low and stable inflation uses interest rates to lean against persistent inflationary and deflationary pressures. The changes that a central bank makes to interest rates take several quarters before they have their largest impact on inflation. This is because it takes time for people to react to the interest rate changes, and for peoples' reactions to affect inflation. These lags between interest rate changes and changes in inflation mean that a central bank needs to have a view on the inflationary pressures that are likely to prevail in the future so that they can decide the appropriate setting for interest rates today.

There are a number of factors that will influence inflation in the future, such as people's expectations of future inflation, exchange rate movements, wage developments, and import price changes. Empirically, one of the most important of these influences seems to be the state of the business cycle. When the economy is going through a period in which resources are underutilised there tends to be more disinflation pressure than inflation pressure. Conversely, when the economy is going through a period in which resources are heavily used, the balance of pressure tends to push inflation up.

Accordingly, to formulate the appropriate monetary policy today we need a measure of the state of the business cycle that shows the strain that current economic activity is exerting on resources. There are a number of indicators of such strain. For example, the number of job advertisements appearing in newspapers or the difficulty that businesses are having in finding appropriately qualified workers tell us about the strains in the labour market, and the amount of time machines are idle tells us about strains on equipment.

The output gap is an aggregate measure of resource strain in the economy. It has long been a device used at central banks to represent how "hot" or "cold" the economy is at any particular time and to forecast likely inflationary pressures. It can also be a useful indicator about the volatility of activity in the economy, whether resources are alternating quickly between periods of substantial resource strain to periods of substantial resource slack, or whether the economy is moving smoothly between moderate levels of resource strain and slack.

[1] We are grateful for many helpful comments from our colleagues at the Reserve Bank. Particular thanks go to David Archer and Geof Mortlock.

At the Reserve Bank, the output gap forms an important part of our framework for thinking about inflation developments. However, the output gap is not a perfect indicator of future inflationary pressures and we do not treat it as such. It cannot be directly measured, it only tells us about aggregate resource use, and its link with inflation is not always stable. Thus, we use the output gap with the appropriate degree of caution about the signals provided.

This article discusses a range of issues relating to the output gap and the role it plays in the Reserve Bank's approach to monetary policy formulation.[2] The following two sections discuss the output gap concept and the methods available for estimating the output gap. We then place the output gap in the context of policy-making at the Bank before reviewing our method for estimating the output gap. Section five covers weaknesses with the output gap for forecasting inflation. Section six discusses how judgement forms an important part of our application of the output gap concept.

2 The output gap concept

A matter of "hot or "cold?

Most observers of the economy can readily relate to the notion that, when an economy is operating at cyclical lows, prices are more likely to drift down, and vice versa. This is the economy-wide counterpart of the familiar story of tradespeople being prepared to shave prices when the next job is weeks away, but seeking a higher price to attend to your job when the waiting list is long.

One way to represent whether the economy is running "hot" or "cold" is to use the output gap. The output gap is the difference between actual output produced in the economy over a given period and the "normal" or "trend" level of output produced in the economy (often called "potential" output). Normal or trend output in this conception is the level of output that is consistent with stable inflation – i.e. the level of output produced when the economy is neither too hot nor too cold.[3] Trend output is not constant; it evolves with the economy's structural capacity to produce goods and services. However, there is no observable direct measure of trend output, nor do we know how trend output will develop in the future.

An alternative approach for gauging the temperature of the economy is to focus on the growth rate of output, comparing it with its trend growth rate. Sustained periods of above-trend growth can be associated with above-average inflation pressures, while sustained periods of below-trend growth can be associated with unusual disinflation pressures. Here also we have the problem of not knowing what the trend growth of the economy is, and how it will develop in the future. But there is a major difference between the two approaches, which is the source of both the relative strength and weakness of the output gap concept.

The output gap concept works in *levels* (of actual output and trend output), and so is influenced much more by the history of the components than is the growth approach. With the output gap, one might be saying: "the economy has been growing rapidly for a while, but it is coming out of a slack period and there are still underutilised resources, so there is no inflation threat at present". The validity of this statement depends crucially on whether previously-estimated normal rates of resource utilisation – or equivalently, normal or trend output – remain the valid reference point. By contrast, a focus on the *growth rate* would in the same circumstances suggest that, if the economy was coming out of a recession and growing above-trend, inflationary pressures would be intensifying, even if there were still machines standing idle and large numbers of employable people searching for jobs.

Consider the following scenario. Suppose that the economy has been through a "W" shaped growth period (a recession, a short burst of growth, a secondary lull, and then a recovery). Assessing the output gap in the recovery phase depends on estimates of the cumulative amount of slack in resource utilisation through the whole growth period, not just the current growth phase. In contrast, with a growth-focused

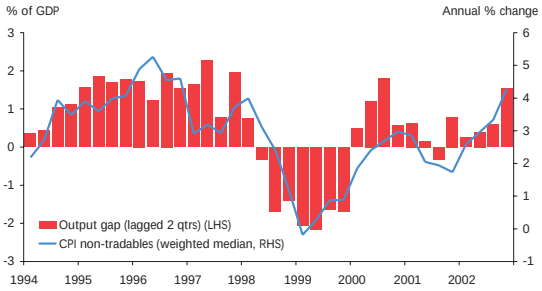
[2] An earlier Bulletin article looked at the output gap concept, how we estimate it, and issues relating to projecting future trend output (Conway and Hunt (1998)). Here, we focus more on how the output gap fits into the policy-making process. We will look at the use of the output gap in forecasting inflation but will not address issues around the optimal monetary policy response to the output gap.

[3] Some commentators draw a distinction between potential and trend output. For simplicity, we use the terms interchangeably here to mean the level of output consistent with stable inflation.

approach it does not matter how big or small was the short burst of growth that formed the middle of the W – the focus is purely on the current growth rate relative to trend. Therefore, when comparing the actual growth rate of the economy with its trend growth rate, there is a need to explicitly take into account the possibility that above-trend growth may be occurring as a result of spare capacity in the economy and therefore might not necessarily pose a threat to inflation.

The strength of the output gap concept is that the intensity of resource utilisation does seem to matter for inflation pressures, so the history of resource use is likely to be important. One can see this from Figure 1, which shows the Bank's estimate of the output gap and variations in the non-tradables component of CPI inflation (that component being closer to the idea of domestically-sourced inflation than the total CPI, and hence more closely linked to the output gap concept). There appears to be a relatively strong and broadly stable lagged relationship between the estimated output gap and inflation. Given this apparent connection, using the output gap as an indicator of future inflation is conceptually a better choice for monetary policy formulation than using growth rates.

Figure 1
Output gap and non-tradable CPI inflation



That's the strength. What about the weakness? The output gap approach relies on the ability to identify the normal productive capacity of the economy (through all stages of a business cycle and taking into account productivity changes) and to assess the extent to which, at any given point in time, there is currently spare capacity in the economy. As we go on to explain, reliably assessing trend output and spare capacity in the economy is easier said than done.

3 Approaches to estimating the output gap

We can categorise the estimation methods into three groups. The first group tries to infer trend output by looking at the path of actual output. The second group attempts to isolate the effects of structural and cyclical influences on output, using economic theory. And finally, survey data can be used to infer the extent of excess demand or supply in the economy.

An approach used in the early days of output gap estimation was to fit a linear trend to the output data, following from the thought that actual output cycles around a trend level that would be unlikely to vary significantly. This approach relies on the level of trend output, and the economy's capacity to produce goods and services, growing at a constant rate – ie it assumes away changes in typical productivity growth and technological developments, or changes to the composition of the economy, that could bring about significant and long-term changes to the trend growth rate in the economy. The danger of relying on this assumption was shown by the experience of the 1970s, when unexpected and unrecognised declines occurred in trend growth rates in industrial countries. Partly because of the linear trend used to extrapolate normal output, policy-makers believed that slower output growth rates implied that they were in a disinflationary period, and that loosening monetary policy would reduce unemployment and generate higher output growth without increasing in inflation. With the benefit of hindsight, we know that during this period resources were not as underutilised as had been thought, and that the easier monetary conditions lead to higher inflation.

Today, instead of presuming that the trend of output growth evolves in an unchanging manner, the standard technique is to approximate the evolution of output growth using flexible trends derived using "filters".[4] Like a sieve that lets fine grains through while retaining the larger ones, a filter aims to identify persistent movements in output while discarding the transitory or cyclical parts. A commonly used filter is the

[4] Filters are statistical techniques that decompose variables into permanent, cyclical, and sometimes noise components.

Hodrick-Prescott (HP) filter.[5] While some filters use only past historical output data to determine trend output, the HP filter looks at both past and future data.

Figure 2

Output, linear and flexible filters

(Chain-linked 1995/96 prices)

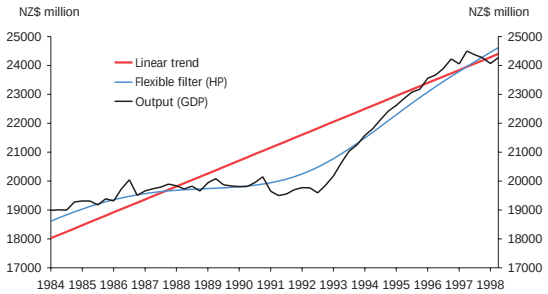


Figure 2 illustrates the difference between a linear trend and a flexible filter. In 1995/1996 actual output was below the linear trend estimate of trend output, indicating a negative output gap. At this same point in time actual output was above the flexible filter estimate of trend output, indicating a positive output gap. The linear trend fails to recognise the slowing in trend output growth in the late-1980s, a period when there was a lot of scrapping of plant and equipment and low labour force growth. By assuming the economy's capacity to produce goods and services grew at a constant rate through the early to mid-90s, the linear trend would suggest that there were plenty of underutilised resources, and that the economy could grow quickly without generating inflationary pressures. In fact, during the mid-90s a number of measures indicated resources were under strain, and inflation from the domestically-focused sectors of the economy was rising (ie there was a positive output gap).

Simple flexible filters only look at actual output data in determining trend output, so they only pick up changes in trend output when they have started to appear in actual output. Other filtering approaches make use of both flexible filters and information from economic theory and other indicators of resource strain in the economy. These methods are often called semi-structural methods because they make use of information about the economy's underlying structure. Semi-structural methods use, for example, the economic theory that suggests low utilisation of plant and machinery would coincide with a negative output gap to help estimate the output gap. The multivariate (MV) filter that we use for estimating trend output is a semi-structural method (the MV filter is covered in more depth in the next section).

Using even more economic theory are methods that seek to build up a view of how much the economy can produce without inflationary pressure by looking at the things that go into producing goods and services – labour, plant and machinery (capital), and the productivity of these inputs. A production function – an equation that links inputs like labour and plant and machinery to total output – is then used to translate the trend levels of these inputs into an estimate of trend output.

The production function approach has the benefit that it splits trend output developments into different components, such as labour force developments or additional investment in plant and machinery. However, although in theory this approach might pick up changes in the economy's ability to produce goods and services more readily than filtering approaches, this is not necessarily so. There are still key unobservable variables, such as businesses' target level of capacity utilisation, and future advances in technology. Moreover, the variables that are observable, such as plant and machinery, can also be difficult to measure. In practice, to estimate the unobservable variables, economists often extrapolate past trends as a gauge to possible future trends and often end up using the same filtering techniques discussed above for the different production function inputs.

The final approach to estimating potential output and the output gap is based on asking businesses how far away from "normal" is their utilisation of existing capacity. Survey responses are used to construct measures such as "capacity utilisation" that indicate the state of cyclical activity and how much strain resources are under. Commonly, these surveys ask businesses about their ability to expand production without additional cost, or how hard it is for firms to find the labour that they need.[6]

[5] See Hodrick and Prescott (1997).

[6] Examples in New Zealand include the NZIER's Quarterly Survey of Business Opinion series on capacity utilisation, and difficulty finding skilled and unskilled labour, and the ANZ job ads survey.

As with the previous methods of output gap estimation, survey-based measures of the output gap are also subject to a number of measurement difficulties. For example, different firms might interpret survey questions differently; only a small number of firms might respond to the surveys (making it difficult to reliably extrapolate the data for the economy as a whole); surveys are based largely on firms producing manufactured goods and do not necessarily capture other parts of the economy, etc. Thus, although survey measures provide a potentially useful source of information on the state of the economic cycle, they should not be interpreted as a definitive measure of the output gap.

With the "true" output gap unobservable, we must look at other properties of different output gap estimation methods to assess whether one output gap estimation method is better than others. Typically there are three ways to assess different estimation methods[7]:

- assessing the inflation forecasting ability of output gaps based on different estimation methods[8];
- assessing whether particular output gap estimates match business cycle regularities (eg length and amplitude of cycle); and
- assessing the extent to which output gap estimates derived from different methodologies are revised as more data become available.

None of these properties should be looked at to the exclusion of the others in deciding which output gap estimation method to use, given that they sometimes need to be traded off against each other. For example, an output gap from one method may prove to be good at forecasting inflation with the ex-post revised data, but may perform poorly if it were estimated on unrevised data available at the time the forecast had to be made.

The diversity of methods being used by central banks and others illustrates that there is far from total agreement about which method is best, and also that using a number of indicators of resource strain can help in understanding the state of activity in the economy. Some institutions, such as the OECD and European Union, use a production function as their main method for estimating the output. Other central banks, such as the Bank of Canada and the Reserve Bank of New Zealand, use semi-structural methods that rely on both filters and structural information about the economy.

4 How the output gap fits into the Reserve Bank policy-making process

The output gap in context

The output gap has its largest role in the Bank's policy-making process as an input into the Bank's economic projections, which form an important part of each *Monetary Policy Statement* and inform our Official Cash Rate (OCR) decision-making.

We use the Forecasting and Policy System (FPS) model to help develop our projections of future developments in the economy.[9] The output gap is an important input into FPS because in FPS it is the key way that domestic activity influences inflation. The output gap is linked to inflation by a Phillips curve. A Phillips curve is an economic relationship that relates inflation developments to how "hot" or "cold" the economy is. When the output gap is positive, the Phillips curve will translate that strain on resources into inflationary pressure, and when the output gap is negative into pressure drawing inflation down. The inflationary pressures coming from domestic activity are then combined with inflation coming from other sources captured in FPS, such as the exchange rate and inflation expectations, to generate an outlook for inflation.

Producing projections is more complicated than simply putting numbers into a computer-based model and allowing the computer to generate final results. Models are simplifications of an inherently complex economy, and only capture in an aggregate form some of the main relationships we think are at work, making judgement an integral feature

[7] Claus, Conway, and Scott (2000) use some of these techniques.

[8] If, as we discuss later in the article, the link from the output gap to inflation were to weaken, then looking at the inflation forecasting ability of different output gap estimation techniques may not be particularly useful.

[9] See Reserve Bank of New Zealand (1997) for a summary of FPS, Drew and Frith (1998) for how FPS is used to prepare projections.

of their use. There is a lot of information that cannot be captured by models, and the policy-making process recognises this by looking at a range of other information, such as inflation forecasts from alternative ways of thinking about the causes of inflation, information learnt from our business visits, and views about the balance of risks around a particular OCR decision.

How the Reserve Bank estimates the output gap[10]

Our main method for estimating the output gap uses the multivariate (MV) filter, a filter that is based around the common HP filter that we mentioned earlier. The HP filter determines trend output at a particular point by looking at past and future output in order to determine the persistent component. For example, if past and future output are low, then the filter will conclude that current trend output is low.

Because the filter uses both past and future data, there is a problem at the end of a sample period because there is no future data – something often referred to as the "end-point problem". In this situation the filter only uses past data. When the future data become available, the filter may have a different estimate of trend output for that point in time. Frustratingly, the end-of-sample estimates are the most important for monetary policy because these are the ones we use for forecasting inflation.

The MV filter differs from the HP filter because it makes use of information from other indicators of resource strain (it is 'semi-structural'). For example, we include information on firms' capacity utilisation, because when capacity utilisation is high it generally indicates that resources are under strain and that there is a positive output gap. Using similar intuition, we also include information from the labour market – when unemployment is low then firms' ability to expand production may be limited and existing employees may have to be induced by higher pay rates to work longer hours. The final piece of information we use to supplement the HP filter is inflation data. As we noted earlier, a positive output gap generally leads to inflation drifting up, so when inflation is high it can often indicate that we have been experiencing a positive output gap. If the link from these other indicators to the output gap is stable then the indicators can reduce the severity of the end-point problem because the information from these indicators does not tend to be revised.[11]

The last component of the MV filter is a constraint that is imposed so that estimates at the end of the sample are less likely to be revised because of the end-point problem. The constraint takes the form of a trend output growth assumption that the filter uses to help decide what trend output is. Aside from purely mitigating the end-point problem, the constraint is a tool for adding information not included in our filter into our trend output estimates. For example, if we were witnessing a large surge in immigrants coming to New Zealand, it is likely that they would add to our capacity to produce goods and services and reduce the strain on resources. In this example, we could change the constraint so that our trend output estimates better took account of the migration surge.

We have made some small changes to the MV filter since we began using it in 1997, the main one being an increase in the importance of the end-of-sample constraint. We have increased the importance of the constraint to further mitigate the end-point problem and to attach greater weight to our judgemental adjustments. However, actual output data remain the largest determinant of our trend output estimates through the HP filter component.

The MV filter produces the trend output estimate for the current period (ie the period prevailing at the time a set of forecasts is prepared). For the Bank's economic projections it is necessary to project a measure of trend output into the future. The MV filter is not used for this purpose because there is no future data to filter. Instead, a production function approach is used. We take FPS projections of labour and capital, combine them with a view on how productively they will be used in the future, and use a production function to form our projections of trend output.

[10] For a more detailed summary of the MV filter see Conway and Hunt (1998).

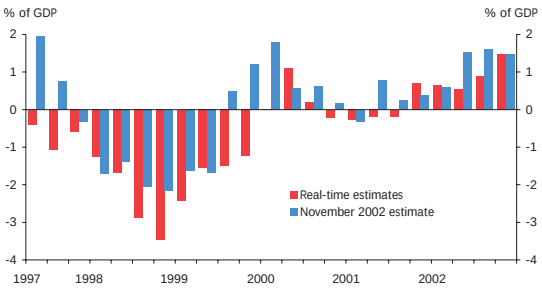
[11] Conway and Hunt (1998) show that the end-point problem is less pervasive in the MV filter relative to the HP filter because of the addition of the other indicators (the 'structural' information).

5 Weaknesses with using the output gap

Revisions to output gap estimates

With no "official" measure of the output gap, there is some uncertainty about how well our current output gap estimates represent the resource strains that the current level of activity is creating in the economy. Often in subsequent quarters, as we get more and better data, and as our understanding develops of how the economy is evolving, our output gap estimates are revised. Figure 3 illustrates the revisions that output gap estimates can undergo, plotting our output gap estimate from each *Monetary Policy Statement* (*MPS*) since we began using FPS, referred to as 'real-time' estimates, against our revised output gap estimates for that period from the November 2002 projection. There can be large differences between real-time and current best output gap estimates (eg in the second half of 1999 the estimates had different signs).

Figure 3
Output gap estimates



Output gap estimates can be revised for three reasons:

- Data revisions and lags. First-release output data are often revised in subsequent quarters as the statistical agency gets better estimates of what took place in the economy. In addition, first-release data are available only with a lag that forces us to make estimates of output for those quarters where we lack data.
- The end-point problem. Many filters use past and future output to determine trend output. At the end of the sample there is no future data, forcing them to look only at past data. Subsequently, when we get the future data and re-filter the output data, we may get a different estimate of trend output from that calculated using only the past data.
- Structural change and judgement. Erroneous output gap estimates can occur if the economy is changing in a way we do not know about – eg such as productivity growth rate changes brought about by technical innovation. Equally, the judgement we introduce into our output gap estimates may be incorrect and subsequently be revised.

The extent and source of revisions to real-time output gap estimates will depend on the estimation method. For example, structural methods are more susceptible to revisions that are caused by changes in the structure of the economy, while simple filters will be more susceptible to revisions caused by the end-point problem.

By giving the MV filter different vintages of data we can learn which sources of revisions – data lags, data revisions, or the end-point problem – are most important under the MV filter method that we use. Revisions because of data lags show up as the difference in output gap estimates made using the data available at a particular time and subsequent estimates made with first-release (but not final) output data. Similarly, revisions caused by the end-point problem will be the difference between output gap estimates made using the latest revised or final data available up until a particular time and estimates made using the whole span of output data.

Figure 4 plots the real-time MV filter output gap estimates at each point in time if we had been using the current version of the filter since late 1994, against the latest estimates.[12] Figure 5 decomposes the difference in estimates into data lags, data revisions, and the end-point problem.

[12] The series plotted are not exactly the same as those in figure 3 because of simplifying assumptions, the most of important of which are: (i) we ignore lags and revisions in the structural information, though revisions to this information are not likely to be a large cause of revisions to output gap estimates; (ii) no weight is given to the end-of-sample constraint because we do not know what we would have set it to if we had been using the MV filter in real-time over the whole of this period.

Figure 4
Real-time versus latest output gap estimates

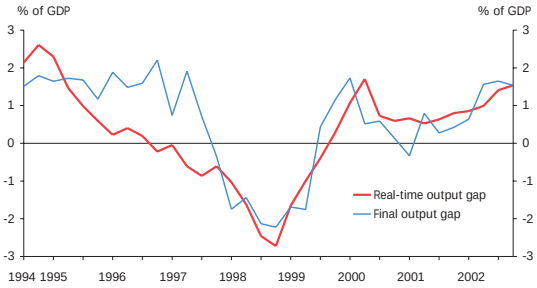
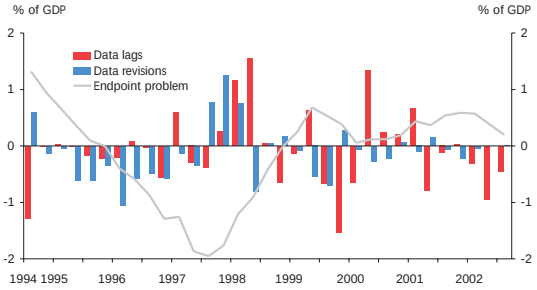


Figure 5
Contributors to revisions to output gap estimates



Through the earlier part of the sample, the end-point problem is a larger source of revisions than in the latter half of the sample. For the output gap estimates in the second half of the sample there is less future data, so those estimates are based more on past data. When more future data become available, the estimates in the latter half of the sample will be revised by more. A muted version of the same pattern is seen from data revisions.

Taking account of the fact that revisions from the end-point problem are likely to be understated in the second half of the sample, the end-point problem is a slightly larger cause of output gap revisions than data revisions or data lags, a result common to a wide range of filter-based techniques (Orphanides and Van Norden (2002)).[13]

Output gap revisions due to output data lags and revisions do not tend to be as persistent as those due to the end-point problem, though they are often as large (eg late 1997/early 1998). At times, these revisions tend to be offsetting, meaning that the output gap revision due to data revisions and lags in aggregate are likely to be smaller than their individual parts.

The decomposition referred to above uses the latest version of the MV filter, and assumes that the economy has not undergone any major structural change over the period. It gives us no estimate of the impact of structural change as a source of revisions. While, over the relatively stable mid to late-1990s, structural change is unlikely to have been a big issue, over periods of major economic evolution and reform, as in the 1970s and 1980s, structural change can impede reasonable estimates of the output gap.

Work with US and UK output gap estimates has suggested that poor real-time output gap estimates during the 1970s, largely because of the use of the linear trends we discussed earlier failing to detect a trend growth slowdown, may have contributed to the higher inflation that occurred over this period.[14] These results reinforce the point that, when there is large structural change, or major economic reforms, real-time output gap estimates are more susceptible to error.

The effects of structural change often take time to appear in official data, and therefore in output gap estimates. Sometimes in these situations policy-makers can detect the changes going on in the economy faster than output gap estimation techniques, and so by adding judgement they can improve output gap estimates. However, the judgemental adjustments of monetary policy-makers may also contribute to incorrect estimates of the output gap.

The link from output to inflation

Another potential risk in using the output gap for formulating monetary policy is that the relationship between the output gap and inflation probably changes over time. This problem has become more pronounced as central banks around the world have become more successful at controlling inflation.

[13] If we had used the end-of-sample constraint and set it to the average trend growth rate over 1994-2002, the revisions attributable to the end-point problem would have been reduced and revisions from other sources would have increased slightly. However, doing this would have introduced information not known in 'real-time'.

[14] See Orphanides (2001) for the US, and Nelson and Nikalov (2001) for the UK.

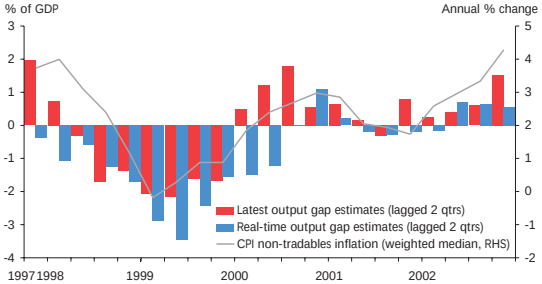
Throughout the 1990s, industrial countries have experienced very low variability in inflation rates, while the real economy – and hence the output gap – has continued to follow a conventional business cycle profile (albeit perhaps a little more damped than in earlier times).

We do not know whether such a change in the relative variability of inflation and the output gap would be associated with a fundamental breakdown in the relationship between the business cycle "temperature" and inflation, or instead the enhanced role of offsetting monetary policy actions. Another way of putting it is that we do not know whether the apparent change in the relationship reflects a decline in the inflation pressure associated with a given output gap, or whether the pressure remains in latent form.

Interestingly, there is mixed evidence in New Zealand of a weakened relationship between the output gap and inflation. Figure 1 suggested that over the 1990s there was a stable relationship between the output gap and inflation, and Claus (2000) finds that output gaps from different estimation techniques are still useful indicators of inflation.

The stable relationship between the output gap and inflation also holds if, instead of using our latest revised output gap estimates, we use our real-time, unrevised output gap estimates. Figure 6 shows that, while the link between real-time output gap estimates and inflation is not as strong as between our latest revised output gap estimates and inflation, there is a relatively strong relationship.

Figure 6
Output gap estimates and non-tradables CPI inflation

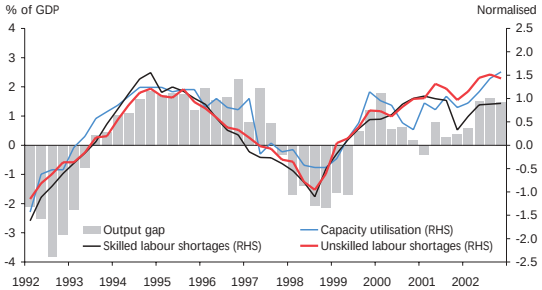


6 Uncertainty and the output gap

With the uncertainties that surround the output gap and the link from the output gap to inflation having the potential to give a misleading outlook for inflationary pressures, the Bank avoids using the output gap mechanistically. We look at a range of indictors of resource strain, such as capacity utilisation and labour shortages, rather than rely solely on our estimates of the output gap. In addition to providing other estimates of the output gap, these indicators can also help give a disaggregated picture of resource strain, which the output gap, as an aggregate measure, does not show. For example, other indicators can tell us whether a period of resource slack is primarily falling on labour or plant and machinery use. A number of the alternative indicators of resource strain are not revised, which provides a cross-check on our real-time, unrevised output gap estimates.

Since the early 1990s, a number of these indicators have generally followed similar patterns and so pointed to similar amounts of resource strain (figure 7), though on occasion the indicators have given conflicting messages (eg in 1997). When producing projections, these additional indicators of resource strain are compared to our output gap estimates and we can refine our output gap estimates using judgement if we feel the alternative indicators tell a more compelling story.

Figure 7
Indicators of resource strain



To more fully understand the implications of output gap uncertainty, we frequently run alternative scenarios that look at different output gap estimates. So, for example, if there was the risk that the output gap could be more positive than we had incorporated in our central scenario, we could put

the higher output gap estimate into our projections as an alternative scenario to see its implications for future output, inflation, interest rates, etc.

In the end, monetary policy decisions are far from being based solely on the estimated output gap; they take account of the balance of risks around the Bank's central view of the economy. For example, greater weight might be attached to the inflation signals provided by an estimate of the output gap if all other resource constraint indicators showed similar indications of strain, and less weight if these other indicators showed substantially different degrees of constraint. A very broad radar screen is used when assessing the many factors that can influence inflationary pressures.

7 Conclusions

The output gap is a conceptually useful way of thinking about the inflationary pressure coming from the domestic economy. It also appears to have broad empirical relevance. However, the output gap can be difficult to measure and reflects only aggregate resource pressures, which could readily lead to policy errors if the output gap were mechanically used as the sole indicator of inflation pressure. At the Bank, we use the output gap as only one of several inputs to the policy-making process. We look at a range of indicators, debate them, and are willing to exercise judgement when we feel it produces more plausible estimates of inflation pressure.

It is frequently noted that economics, and particularly monetary policy, is both an art and a science. Our use of the output gap shows both of these attributes; we estimate the output gap, but supplement our estimates with judgement where we feel the output gap has weaknesses.

References

Bank of Canada (2003), 'Indicators of Capacity and Inflation Pressures for Canada,' Bank of Canada Website: http://www.bankofcanada.ca/en/indinf.htm

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

Claus, I (2000), 'Is the output gap a useful indicator of inflation,' *Reserve Bank of New Zealand Discussion Paper* No. 05.

Conway, P, I Claus, and A Scott (2000), 'The output gap: measurement, comparisons, and assessment,' *Reserve Bank of New Zealand Research Paper* No. 44.

Conway, P and B Hunt (1998), 'Estimating the potential output of the New Zealand economy,' *Reserve Bank of New Zealand Bulletin* 61(3) (September) pp192-202.

Drew, A and M Frith (1998), "Forecasting at the Reserve Bank of New Zealand," *Reserve Bank of New Zealand Bulletin*, 61, 4, pp 317-27.

European Central Bank (2000), 'Potential output growth and output gaps: concept, uses and estimates', *European Central Bank Monthly Bulletin* (October) pp 24-31.

European Policy Committee (2001), 'Report on Potential Output and the Output Gap', *European Union* (October).

Hodrick, R and E Prescott, (1997), 'Post-war U.S. business cycles: An empirical investigation', *Journal of Money Credit and Banking*, Vol 29, no 1.

Nelson, E and K Nikolov (2002), 'UK inflation in the 1970s and 1980s: the role of output gap mismeasurement,' Bank of England Working Paper no.148.

Orphanides, A (2001), 'Monetary policy rules, macroeconomic stability and inflation: a view from the trenches,' Federal Reserve Board Finance and Economic Discussion Series, 2001-63.

Orphanides, A and S Van Norden (2002), 'The unreliability of output gap estimates in real time,' *Review of Economics and Statistics* 84(4) pp569-583.

Reserve Bank of New Zealand (1997), 'The Forecasting and Policy System: an introduction,' R*eserve Bank of New Zealand Bulletin* 60(3) pp 225-35.

Financial sector assessment programme

Geof Mortlock and Ian Woolford, Financial Stability Department

New Zealand is scheduled to undergo an assessment by the International Monetary Fund (IMF) later this year under the Financial Sector Assessment Programme (FSAP). The FSAP is a relatively new surveillance and assessment programme developed and jointly managed by the International Monetary Fund and World Bank. It is designed to assess the potential vulnerabilities in a country's financial system and to evaluate the adequacy of financial sector regulation and supervision, using international standards and codes as benchmarks, as well as a number of other analytical tools. There is an expectation that all IMF member countries will undergo an FSAP assessment periodically. New Zealand has volunteered to be assessed this year.

This article explains the FSAP and discusses the key elements within it. Later this year and in 2004, the *Bulletin* will include articles that draw from our experience of the FSAP and the work being undertaken by the Reserve Bank and other government agencies in preparation for it. Indeed, the article on the New Zealand payment system in this issue of the *Bulletin* is one of these, and makes considerable reference to FSAP-related work in the area of the payment system.

1 Introduction

Later this year, New Zealand's financial system will be assessed by a team of external assessors led by the International Monetary Fund (IMF).[1] This will be conducted under an IMF/World Bank surveillance programme – the Financial Sector Assessment Programme (FSAP). It will involve a comprehensive evaluation of the New Zealand financial system, including an assessment of how resilient the financial system is to economic shocks and the nature of financial sector regulation and supervision.

This article explains the objectives and structure of the FSAP and what it is likely to involve for New Zealand. Later in the year and next year, the *Bulletin* will contain articles that refer to, and draw from, various aspects of the FSAP evaluation of New Zealand. This article therefore lays the groundwork for those future articles and represents another step that the Bank is taking to place greater emphasis on, and give more prominence to, financial stability issues.

[1] Although a joint programme, the FSAP assessments of industrialised countries, such as New Zealand, are typically led by IMF staff, and the assessments of developing countries by World Bank staff. This reflects the relatively more developmental focus of FSAPs conducted in developing countries.

2 What is the FSAP?

The FSAP is a relatively new surveillance programme developed and led jointly by the IMF and World Bank. It was initiated in 1999 in the aftermath of the Asian Crisis as a mechanism to assess countries' financial systems, focusing particularly on the adequacy of their regulatory frameworks for promoting financial stability and assessing potential sources of vulnerability in their financial systems. In the latter respect, the FSAP seeks to assess how vulnerable a country's financial system might be to economic shocks, such as a major fall in the exchange rate, a large increase in interest rates, or a sharp and prolonged contraction in the economy.

The FSAP was developed in recognition that there are important and multi-faceted connections between a country's financial system and its economy. An unstable financial system can pose a major threat to economic stability. Equally, economic shocks can trigger or deepen a financial crisis. Moreover, as financial systems and economies of different countries are becoming increasingly interconnected, there is a growing risk that instability in one financial system may trigger or exacerbate instability in another. Ultimately, it is hoped that the FSAP, in combination with international standards and codes and a range of other international financial reforms, will encourage the development of more robust financial systems and reduce the risk of future financial instability and contagion.

Although the FSAP is not currently a mandatory programme for countries that are members of the IMF, there is a clear expectation that every member country will undergo an FSAP assessment approximately every five to seven years. In the period since its inception in 1999, more than 60 countries have undergone or are currently undergoing FSAP assessments (see box 1).

2.1 Assessment of financial sector regulation against international standards

A key component of the FSAP is the assessment of a country's regulatory framework as it relates to the financial sector, focusing – where relevant – on banking supervision, securities market regulation, supervision of insurance companies and

Box 1: Country participation in the FSAP

Just over one third of the 184 members of the IMF and World Bank had either completed an FSAP at the end of 2002, or were involved in an ongoing assessment.[2] Another 30 countries have indicated their intention to participate in the programme in the near future. There is a strong presumption by the IMF and World Bank Executive Boards – who are member country representatives – that all of their members will complete an FSAP over the next few years.

Table1 lists the 66 countries that have participated in the FSAP to date. (The asterisks denote that the assessment is currently in progress.) This group of countries broadly reflects the membership of the institutions themselves, with a mixture of developing countries, emerging market economies, and industrialised economies. To date, only one G7 country has completed an FSAP (Canada), but 3 others – Germany, Japan, and the United Kingdom – currently have one underway.

Table 1
Completed and ongoing FSAP participation as at December 2002

Argentina*	Ghana	Nigeria
Armenia	Guatemala	Peru
Bangladesh*	Honduras*	Philippines
Barbados	Hong Kong*	Poland
Bolivia*	Hungary	Russia*
Brazil*	Iceland	Senegal
Bulgaria	India	Singapore*
Cameroon	Iran	Slovak Republic
Canada	Ireland	Slovenia
Colombia	Israel	SouthAfrica
Costa Rica*	Japan*	Sri Lanka
Cote d'Ivoire*	Kazakhstan	Sweden
Croatia	Korea*	Switzerland
Czech Republic	Kyrgyz Republic*	Tunisia
Dominican Republic	Latvia	Uganda
Egypt	Lebanon	Ukraine*
El Salvador	Lithuania	United Arab Emirates
Estonia	Luxembourg	United Kingdom*
Finland	Malta*	Uruguay*
Gabon	Mauritius*	Yemen
Georgia	Mexico	Zambia*
Germany*	Morocco*	

Source: IMF

[2] See http://www.imf.org/external/country/index.htm for a complete list of IMF countries.

pension funds, payment systems, anti-money laundering frameworks, and the transparency arrangements applicable to monetary policy and financial sector regulation. Assessments are made by experts, either within the IMF or World Bank, or drawn from central banks and financial regulatory agencies.[3] Assessments are made against the relevant international standards and codes covering a wide range of elements within the financial system.

There are six international standards and codes that are regarded as core elements in the FSAP. These are:

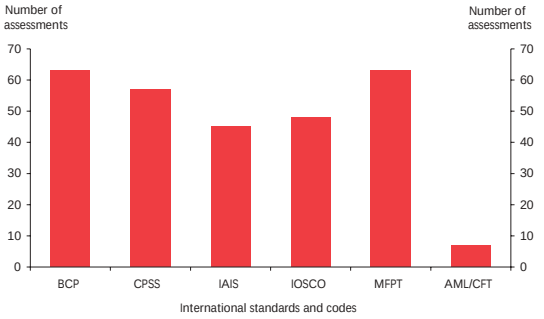
- the bank licensing and supervision principles developed by the international standard-setting body for banking supervision, the Basel Committee on Banking Supervision (the Core Principles for Effective Banking Supervision);
- the securities market regulation principles developed by the International Organisation of Securities Commissions (the Objectives and Principles of Securities Regulation);
- the payment system principles developed by the Committee on Payment and Settlement Systems, under the auspices of the Bank for International Settlements (the Core Principles for Systemically Important Payment Systems);
- the insurance regulatory principles developed by the International Association of Insurance Supervisors (the Insurance Core Principles);
- the anti-money laundering principles developed by the Financial Action Task Force (the Recommendations for Anti-Money Laundering and Combating Financing of Terrorism); and
- the transparency code for monetary and financial policies developed by the IMF (the Code of Good Practices on Transparency in Monetary and Financial Policies).

In addition to these core standards, some countries elect to undergo assessments in other aspects of financial sector regulation, such as:

- the OECD Corporate Governance Principles;
- World Bank Principles for Effective Insolvency and Creditors Rights;
- CPSS-IOSCO Recommendations for Securities Settlement System (RSSS); and
- International Accounting and Auditing Standards.

It is probable that New Zealand will complete most of the core standards and codes, but not the additional four. The determination of which standards and codes are included in the FSAP involves an assessment of the relevance of each standard and code for the given country, and the agreement of the authorities and the World Bank and IMF. Figure 1 demonstrates that not all 66 countries have completed all of the core standards and codes. The small amount of countries that have undertaken the anti-money laundering assessment to date reflects the fact that it is a relatively new standard.

Figure 1
Number of FSAP assessments of core international standards



In preparation for the FSAP, the Reserve Bank is currently completing comprehensive self-assessments of New Zealand's compliance with those international standards and codes for which the Bank has responsibility: those relating to banking supervision, the payment system and transparency. In addition, other government agencies, such as the Ministry of Economic Development and the Securities Commission, are completing self-assessments of the codes for which they have responsibility – particularly those relating to securities market regulation.

The process of self-assessment is an important element in preparing for the FSAP and provides a good opportunity for the regulatory agencies to "take stock" of New Zealand's regulatory arrangements and assess objectively how the

[3] The World Bank and IMF are not regulators *per* se, and so draw on outside experts in areas that require deep technical understanding – typically found in central banks and financial regulatory agencies. The outside experts sign confidentiality agreements as a part of their contracts with the World Bank and IMF.

arrangements currently in place compare to the principles set out in international standards and codes. This inevitably involves the identification of areas where New Zealand's regulatory arrangements differ from international standards and where there may be gaps in the regulatory framework, and whether these differences or gaps warrant further policy work or merely represent a conscious decision by the New Zealand authorities to do things differently from the approach specified in international standards and codes.

Updated versions of these self-assessments will be made available to the FSAP team to assist in their preparation for the FSAP. They will also provide a useful basis for "comparing notes" with the assessors and identifying points of difference between the self-assessments and the FSAP team's assessments.

The Bank plans to publish, either later this year or next year, summaries of its self-assessments against the international standards for which the Bank has responsibility. This will provide a useful opportunity to explain the areas in which the New Zealand regulatory frameworks depart from international standards and to discuss the rationale for these different approaches and the possible implications arising from them. We have made a start in this issue of the *Bulletin*, with the article on the New Zealand payment system.

2.2 Stress testing

As discussed earlier in this article, another important part of the FSAP is the assessment of the potential vulnerability of a country's economy and financial system to shocks, such as a sharp fall in the exchange rate, a large increase in interest rates, a contraction in real GDP, a fall in asset prices, or a combination of these types of shocks. Through the use of certain analytical techniques, such as stress tests, the FSAP assessment attempts to analyse the nature of the "fault lines" in the financial system, the damage to the financial system that may result from particular shocks, and the possible flow-on effects to the wider economy. The IMF will also probably assess the nature of New Zealand's broader external vulnerability, such as the potential for economic difficulties in Australia or Asia to destabilise the New Zealand economy and financial system.

The focus of stress tests is on the wider financial system, although in New Zealand, the main focus will be on the banking system, given its prominence in the financial system. In order to stress test the banking system, we will assess the impact of selected shocks on the largest banks operating in New Zealand. In preparation for the FSAP, the Bank has been working with a number of registered banks to develop a framework for stress testing the systemically important banks, using a range of simulated economic and financial shocks. This will not only be an important input into the FSAP, but will have wider benefits, by enriching our collective understanding of how resilient the core of the banking system is to economic shocks. If this exercise proves as useful as we hope it will be, some form of stress testing might become a regular component of the Bank's financial stability toolkit.

2.3 Assessment of the institutional capacity to respond to financial crises

The FSAP team is also likely to assess New Zealand's institutional capacity to respond to a range of financial crises, such as a bank failure situation, a liquidity crisis in the banking system, or a sudden capital withdrawal from the economy. In this context, the FSAP is likely to evaluate the legal framework for addressing these kinds of crises, the strategies developed (and under development) by the Reserve Bank and other relevant agencies for responding to crises, and the institutional capability in these areas.

In the case of banking, particular attention will be given to statutory and policy frameworks in place for responding to a bank distress or failure situation, particularly statutory management and lender of last resort powers. The Bank has been undertaking considerable work in these areas in recent years, as part of maintaining an ongoing capacity to respond to financial distress events if and when they arise. The FSAP will therefore provide a good opportunity for the Bank to exchange perspectives on crisis management issues with the FSAP team and to assess any advice or comments the team makes in relation to the crisis management arrangements in place and being developed.

2.4 Assessment of overall regulatory structure

In addition to the above areas, the FSAP usually involves an assessment of the overall regulatory framework for the financial sector. This varies from country to country, but usually includes the extent of coordination between regulatory agencies, the nature of their transparency, governance and accountability arrangements, the relative merits of a "mega-regulator" framework versus sectoral regulation, and the nature of cooperation between regulatory authorities.

The FSAP team will probably spend about two to three weeks making their assessments, and may conduct the assessments in one or two visits. At this stage, it seems likely that the main FSAP assessments will be made in the latter part of this year. The FSAP team will spend most of their time in New Zealand talking to the regulatory agencies (the Bank, Ministry of Economic Development, Securities Commission and Treasury), but may also meet with a number of other parties, including commercial banks, stockbrokers, audit firms, the Bankers' Association, the Financial Services Federation and the Stock Exchange, among others. They may also seek meetings with the Minister of Finance and other ministers with responsibilities in the financial sector. It is therefore likely to be a broad-ranging process, involving many different participants in, and overseers of, the financial system.

The FSAP results in the completion of a range of reports, including detailed written assessments of compliance with international standards and codes, a comprehensive report pulling together the complete FSAP assessment, and a summary report. Some of these reports must remain confidential to the authorities of the country and the IMF and World Bank, but there is an option for the summary report (which is itself usually quite comprehensive) to be publicly released, with the consent of the government of the country in question.[4] Any publicly released reports to emerge from the New Zealand FSAP assessment could be expected to be available in the first half of 2004.

[4] While many IMF and World Bank reports are able to be published with the joint agreement of the authorities and the IMF or World Bank, there are some which are not able to be published even if a country wishes to. The rationale for this is that the higher level of confidentiality encourages wider participation and franker discussions.

3 Why is New Zealand undergoing an FSAP?

As noted above, although the FSAP is not mandatory for IMF member countries, there is a strong expectation that all member countries will undergo an FSAP assessment. The more advanced economies, such as New Zealand, are under some pressure to volunteer for an FSAP sooner than later in order to show leadership to the less developed economies and to demonstrate that the FSAP is being applied fairly to all, and not just to the economies with known financial sector weakness. Having a broad mix of participation also assists the IMF and World Bank to continually refine the FSAP and improve their capacity to assess financial sector vulnerability.

New Zealand's participation in the FSAP is considered beneficial for a number of reasons:

- Participation in the FSAP is consistent with New Zealand's general stance at the IMF and in other international forums, where we have consistently argued the merits of strengthening financial systems, better understanding the causes and dynamics of financial crises, and enhancing the transparency of regulatory frameworks. Undergoing an FSAP demonstrates New Zealand's commitment to these principles and shows that we are willing to practise what we preach.
- Undergoing an FSAP assessment is consistent with New Zealand's undertakings in APEC, where Finance Ministers have endorsed the FSAP and agreed that all APEC economies should subscribe to the programme.
- The FSAP presents an opportunity for the relevant government agencies to enhance their collective understanding of the potential stress points in the financial system and whether existing policy frameworks are sufficient to respond to a financial crisis. Given that New Zealand has a high level of external debt and an open capital account, and in view of the extent of volatility in international financial markets in recent times, the FSAP can be viewed as a helpful framework within which to more comprehensively assess the nature of New Zealand's potential vulnerability.
- The FSAP provides an opportunity for the relevant government agencies to review the totality of the

financial sector regulatory framework and related issues in a more holistic way than has been done to date. It might also provide a timely opportunity to tap into international expertise in ways that may assist the domestic reform agenda in the financial sector area.

Overall, therefore, the FSAP presents New Zealand with a number of potential benefits. However, there are also some risks associated with the FSAP, including the potential for the assessments of the regulatory and supervisory frameworks in New Zealand being made in an inflexible manner, possibly resulting in harsher judgements about the adequacy of the regulatory arrangements than is warranted. This risk reflects the fact that, in some important respects, the New Zealand regulatory framework differs from the approach prescribed in international standards and codes, with the area of banking supervision being a good example. As we have noted previously in the *Bulletin*, although the New Zealand supervisory framework does depart from international standards in some respects, we are satisfied that the approach adopted in New Zealand has served New Zealand well, contributing to a sound and efficient financial system.

4 Conclusion

The FSAP assessment of the New Zealand financial system later this year will be the most comprehensive external assessment of the financial sector undertaken in New Zealand. It will involve the assessment of most of the significant components of the financial system, including the regulatory frameworks applicable to banks, securities markets and payment systems. It will involve a wide range of financial sector participants, including the regulatory agencies, the financial institutions, auditors and financial analysts. Although the FSAP will involve a great deal of work by many people, we are hopeful that it will provide a good opportunity to assess the New Zealand financial system in a more holistic manner than is normally the case, and that it will provide insights and perspectives that enable government, in liaison with the private sector, to continue to take appropriate further steps to maintain a sound and efficient financial system.

Recent developments in the payment system

Allison Stinson, Financial Stability Department, and Michael Wolyncewicz, Financial Services Group.

Payment systems have attracted increasing interest in recent years. They provide important linkages between different parts of the financial sector and support economic activity more generally. The weaknesses and risks in a payment system, however, can also pose a threat to financial stability. Accordingly, international and national initiatives to strengthen financial infrastructures have included the payment and settlement 'plumbing' of the financial system. This article outlines key developments occurring internationally and domestically in the payment system arena, including measures affecting the Bank's operational and oversight activities.

1 Introduction

In modern market-based economies, day-to-day activity involves many millions of transactions for goods, services and financial assets, the payment for which results in the transfer of money. In New Zealand, a total of around $35 billion is processed through domestic payment systems on average every business day, equivalent to approximately 30 per cent of the country's annual gross domestic product. This includes payments, large and small, by financial institutions, government, companies and individuals.

The payment system comprises those entities, instruments, rules and procedures which enable financial institutions, businesses and individuals to transfer money from one to another. For participants to have confidence in their ability to effect transactions and access their funds, it is important that the systems are efficient, reliable and secure. Payment mechanisms, however, may both be an origin and channel through which financial shocks can be transmitted across markets and national boundaries. Accordingly, robust payment systems are a core element in maintaining financial stability and it is in the private and public interest to ensure that, in the event of a shock or disruption, any systemic impact is minimised.

Due to the risks a payment system can pose to financial stability, the Reserve Bank's primary interest in the payment system is in its safety and resilience. In particular, the Bank has sought to reduce payment system risk and improve management of the remaining risks. International developments have also focused on measures that aim to promote sound and efficient payment systems.

In addition, technology can have a major influence on payment systems. Changing technology has enabled new financial instruments to be created as well as presenting new ways for financial business to be conducted. Electronic mechanisms, for instance, have enabled financial transactions to be cleared and settled more quickly and efficiently, and have contributed to a higher level of connectivity and financial market integration.

In New Zealand, cash continues to be important for low value transactions and, while there has been little consumer interest in electronic money, there has been a marked shift in recent years from paper-based payment instruments and channels to card and electronic instruments. The majority of New Zealand's non-cash payments, by value and volume, are now conducted electronically, with the high value wholesale payment systems used for the settlement of financial market transactions being fully electronic.

This article considers current developments in the payment system arena. First, it reviews two major international payment system initiatives and the potential implications for New Zealand. Second, we report on the structure and operational changes occurring at the domestic level. Third, the role of the Reserve Bank in the domestic payment system is outlined, together with some specific oversight measures underway. Finally, we comment on some of the issues and challenges looking ahead.

2 International developments

2.1 International standards

Internationally recognised standards for payment systems and securities settlement systems have been developed as part of renewed efforts in recent years aimed at strengthening the global financial architecture and reducing systemic risk.[1] The financial crises in Asian and other emerging economies in the late 1990s were the catalyst for much of the recent international financial stability work, but Y2k concerns and the September 11 2001 terrorist attacks in New York further reinforced the importance of robust arrangements that are able to continue to operate during and after unexpected events.

Two sets of standards – the "Core Principles for Systemically Important Payment Systems", issued by the Committee on Payment and Settlement Systems (CPSS)[2], and "Recommendations for securities settlement systems", issued jointly by the CPSS and Technical Committee of the International Organisation of Securities Commissions (IOSCO)[3] – both finalised in 2001, set out high level principles, guidelines and best practices relating to the design, operation and governance of payment and settlement systems. Both sets update and extend earlier standards and both have safe and efficient systems as the underlying public policy objective.

A third international standard relevant to the payment system is the "Code of good practices on transparency in monetary and financial policies". This code was developed in 1999 by the International Monetary Fund (IMF) to encourage greater transparency of policy frameworks by central banks and other financial sector regulatory agencies.

The standards have been well received by the international payments community and have gone a long way towards meeting their aim of establishing universal principles applicable to a wide range of systems and circumstances.

The CPSS Core Principles comprise ten standards covering legal, financial (credit and liquidity) and operational risk, and risk management, efficiency, access and governance considerations. There are also four recommended responsibilities for central banks.[4] Systemically important payment systems, which are described as systems that are capable of triggering disruptions or transmitting shocks across the financial system,[5] are expected to conform to all ten principles.

The CPSS/IOSCO Recommendations set out parallel standards for the owners, operators and overseers of securities settlement systems,[6] while the payment system aspects of the IMF Transparency Code mainly deal with the transparency and internal governance practices of the agency responsible for overseeing the payment system.[7]

To promote the use of the standards, the IMF and World Bank have developed a surveillance program known as the Financial Sector Assessment Program (FSAP). The FSAP aims to assess countries' financial systems, focussing particularly on the adequacy of their regulatory frameworks for promoting financial system stability and assessing potential sources of vulnerability. In the case of the payment system assessment, the primary focus is on assessing the level of national observance with the CPSS standards and using the findings to make an overall assessment of the risks and vulnerabilities of the country's payment infrastructure, identifying and recommending areas of reform.

New Zealand is scheduled to undergo an FSAP assessment later this year.[8] Preparation for the assessment is underway, with the Reserve Bank undertaking self-assessments of the New Zealand oversight arrangements and key payment systems against the CPSS principles. Sections 4.3 - 4.4 in this article present some initial findings.

---

1 See box 1 for a description of the types of risks that can arise in payment and settlement systems.

2 CPSS is a forum of central bank payment and settlement system experts that meets under the auspices of the Bank for International Settlements.

3 IOSCO, in turn, is a worldwide organisation of securities regulators, including the NZ Securities Commission.

4 Box 2 sets out the CPSS Core Principles and central bank responsibilities.

5 CPSS (2001b) paragraph 6.6

6 CPSS/IOSCO (2001) pages 4-6

7 IMF (1999).

8 Mortlock and Woolford (2003)

2.2 CLS Bank

A second international initiative, the Continuous Linked Settlement (CLS) system, aims to reduce the risk associated with foreign exchange transactions.

With average daily turnover of around US$1,200 billion,[9] the foreign exchange market is a major potential source of settlement risk and, more significantly, systemic risk. Foreign exchange settlement risk arises due to the time lag between the execution of a foreign exchange transaction and its confirmed settlement, and consists of both credit and liquidity risks.

The risk gained worldwide attention following the closure of a small German bank, Bankhaus Herstatt, in 1974, when time zone differences meant some counterparties to the bank had paid away one side of their foreign exchange transactions with the bank but were exposed to the full value of the other side.

Since the Bankhaus Herstatt collapse, the international community has worked to better understand and measure the risks involved and to develop measures, such as the CLS initiative and international standards for cross-border multi-currency arrangements, to reduce and contain the risks.

CLS is an initiative by more than 60 international commercial banks expressly designed to reduce foreign exchange settlement risk. CLS Bank acts as a global intermediary in the settlement of foreign exchange transactions. It uses a type of payment-versus-payment facility, settling both sides of a foreign exchange deal simultaneously, by linking the real time gross settlement (RTGS) systems of the currencies involved. This eliminates the risk of one side being paid but not the other.

Although the system settles each trade individually on a gross basis, each settlement member pays the net difference between what it receives in each currency and what it pays out, thereby reducing the liquidity requirements of the system and participants. Settlement occurs during a five hour, real time settlement window (three hours for the Asia/Pacific region) of the overlapping business hours of the participating RTGS systems, providing CLS settlement with the finality and certainty of these systems.

After several years of development and a number of delays, CLS Bank started live operations in September last year, processing actual foreign exchange trades through the system in seven major currencies (the Australian, Canadian and US dollars, British pound, euro, Swiss franc and Japanese yen). By mid-February, the gross value of trades settled had grown to around US$600 billion per day. The volumes and values are expected to grow steadily as more settlement banks and currencies join the system.

Most of the major banks in the world are CLS members, including the parents of several New Zealand registered banks. Four more currencies (the Danish and Norwegian krone, Swedish krona and Singapore dollar) are due to join the system later this year, and work is also underway to facilitate the entry of the New Zealand and Hong Kong dollars. The local implications of the New Zealand dollar joining the system are discussed in section 3.4 of this article.

The reduction in settlement risk, however, is not without cost. With CLS Bank likely to become a central international facility, increased operational risk arises, related to the level of concentration and interdependencies. By linking the real time payment systems of participating currencies together through CLS Bank, the payment-versus-payment mechanism creates stronger links than previously between national payment systems, with a consequential increase in vulnerability to disruptions and increased importance of robust contingency arrangements.

CLS members' intra-day liquidity management is also likely to be more challenging due to the tight deadlines for payments, and, in many cases, including New Zealand, the deadlines are outside normal business hours.

Central bank oversight of the system has sought to ensure the CLS arrangements are robust and efficient. A particular concern has been the risk of cross-border knock-on effects resulting from problems or delays in one national payment system. Careful attention has been given to the contingency arrangements in place.

CLS Bank is based in New York and subject to banking supervision by the US Federal Reserve. Prior to commencing live trading, CLS Bank required authorisation from the Federal Reserve to begin operations. This involved detailed scrutiny of the bank's risk management and contingency planning

[9] BIS, 2002

arrangements, assessing in particular the system's compliance with international standards.

For the bank's ongoing operations, the Federal Reserve Board, supported by the Federal Reserve Bank of New York, is the lead overseer, in consultation with the central banks of the currencies settled by the bank.

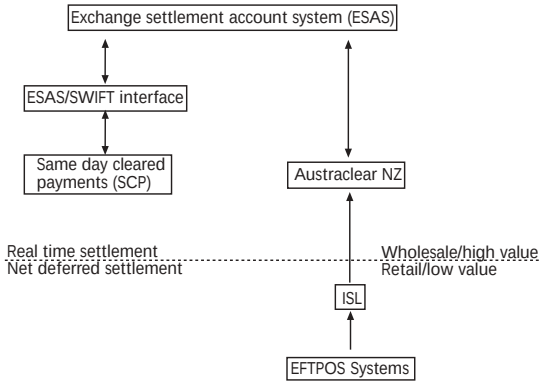
3 New Zealand developments

3.1 System overview

At the centre of the New Zealand payment system is the Exchange Settlement Account System (ESAS). ESAS is owned and operated by the Reserve Bank and provides final real time settlement to account holders (all of which are currently registered banks) across exchange settlement accounts at the Bank.

Two interfaces connect to ESAS, passing instructions for settlement: the Austraclear New Zealand system (AustraclearNZ), which is used for processing securities and funds transfers, and the ESAS/SWIFT interface, which carries instructions directly into ESAS from the Same Day Cleared Payment service (SCP). SCP is used by banks for high-value inter-bank and customer transactions, notably the New Zealand dollar leg of foreign exchange transactions. Instructions received from the systems are settled by ESAS on a real time gross transaction-by-transaction basis throughout the day.

Figure 1
New Zealand payment system



Cheques, ATM transactions, direct debits, electronic credits, and telephone and internet banking transactions are processed by the Interchange and Settlement Limited (ISL) system. ISL interchanges payment instructions among participants in a batched process each day. The net value of each day's transactions between each pair of participants is calculated and settled at the end of the ESAS day across exchange settlement accounts at the Reserve Bank via AustraclearNZ.

Two EFTPOS systems process domestic credit card and debit card transactions. These systems have some real time elements, but inter-bank positions are settled, together with the ISL transactions, on a net end-of-day basis through ESAS.

The retail systems (ISL and EFTPOS) typically handle low value, high volume payment instructions. These systems process the vast majority of payments made through the New Zealand payment system by number (estimated to total over 3 million per day) and account for around 10 per cent of the total value processed.

Payments through the wholesale systems tend to be high in value but much lower in number. The wholesale part of the payment system accounts for over $30 billion of the daily value of transactions but less than 1 per cent (around 3,000 on average) of the total number of daily transactions processed each day through the domestic infrastructure.

The last two years have seen some notable developments in the structure and operations of the domestic payment system, with some quite significant changes planned to occur over the medium term. Some of the more important developments are discussed below.

3.2 Decommissioning of SRM and introduction of the ESAS-SWIFT interface

In October 2001, the banking industry decommissioned the Settlement Request Manager (SRM) system, which had been used to monitor and manage liquidity and payment transactions prior to settlement. At the same time, the Reserve Bank introduced the ESAS/SWIFT interface. As part of the changeover, the Bank took over the arrangements which allow SCP participants to pass SWIFT messages amongst themselves with a copy being sent to ESAS for settlement. Enhancements were also made to ESAS to allow that system to replicate the liquidity monitoring functionality available in SRM.

Decommissioning SRM and introducing the ESAS/SWIFT interface simplified the payment system infrastructure. The changes averted the need for a potentially costly upgrade of SRM and delivered a reduction to the overall costs of processing RTGS transactions. In addition, the new interface between ESAS and SWIFT provides functionality required for the settlement of foreign exchange transactions in a CLS environment.

3.3 Austraclear New Zealand system

In our December 2000 *Bulletin* article we referred to negotiations underway between the Reserve Bank and Austraclear Limited regarding the proposed relinquishment by the Bank of the license to operate AustraclearNZ. At the time, the Bank also intended to separate the ESAS functionality completely from that required to operate the AustraclearNZ system, so that ESAS could operate on a "stand alone" basis. Currently, the two systems operate off a common operating platform and shared software.

In March 2001, negotiations for the relinquishment of the operating licence for AustraclearNZ came to an end, with the Bank and Austraclear Limited unable to agree the terms for relinquishment. At the same time, Austraclear Limited and its new parent, SFE Corporation Limited, gave notice that they would cease to provide software support and development services for the AustraclearNZ and ESAS systems from the end of 2002. Datacom Systems (Wellington) Limited now provides these services to the Bank.

The Reserve Bank is one of the few central banks that provide depository and settlement services for wholesale financial markets. Typically these services are provided by public companies or entities which are owned by institutions that actively transact in financial markets.

The Bank does not regard the provision of depository services to be a core central bank activity, but has undertaken to continue to be the operator of the AustraclearNZ system and to keep the system supported until an acceptable new system and system operator offers comparable services to the New Zealand market. A replacement system would be expected to allow open access on competitive terms, be legally, financially and operationally robust, and be acceptable to market participants.

However, the provision of ESAS and exchange settlement accounts to financial institutions is considered to be a core central bank activity and the Bank expects to continue to provide ESAS services for the foreseeable future.

The AustraclearNZ system has operated since 1990 and ESAS since 1998. The systems continue to be functionally sound and secure, but the technology base is now some years old and no longer state of the art. During the first half of 2003, the Bank and Datacom intend to undertake a feasibility study to assess the cost, risk and time implications of implementing an upgrade of some of the software underlying those systems. This is expected to be conducted in consultation with users of the system.

3.4 CLS Bank and the New Zealand dollar

With RTGS systems now well established in New Zealand, the main area of wholesale market risk that has still to be addressed is foreign exchange settlement risk. As noted above, this risk arises as the result of timing differences between the paying and receiving of foreign currency transactions, due to time zone and settlement system differences, and can pose substantial risks to parties actively engaged in foreign currency markets.

A survey by the Bank in 2000 on foreign exchange settlement risk[10] indicated that the foreign exchange settlement exposures of New Zealand banks active in the foreign exchange market are potentially very large and can last for an extended period. In some cases, individual bank exposures exceeded that bank's total capital for several hours each day. Foreign exchange settlements were spread over 20 currencies, though they were principally in US and NZ dollars where the time zone differences can be up to 18 hours.

Key among the measures being adopted to better manage and reduce this risk is a joint project by the Reserve Bank and major banks to facilitate the entry of the New Zealand dollar to CLS Bank, possibly as early as 2004, and to ensure the industry is ready for the changes involved. In-principle endorsement of the New Zealand dollar by CLS Bank as an eligible currency in CLS has been received.

[10] Rodgers (2001)

Specific criteria to be satisfied for CLS inclusion include a well designed and reliable national RTGS system with overlapping hours with CLS Bank, a robust legal framework, particularly with respect to payment finality, and an effective domestic money market with adequate liquidity providers.

The development of an interface between SWIFT and ESAS, noted earlier, and now in place, provides the functionality to connect CLS Bank and ESAS. Other required system changes to ESAS are relatively minor. Later this year, for instance, the Reserve Bank expects to merge the interim and final end-of-day processes so that ESAS is available continuously from the start of its day at 9am until the close of its day, currently at 8.40am the following business day.

Other requirements to achieve CLS readiness include resolution of legal matters and possible liquidity enhancements. For the former, the Reserve Bank has proposed changes to existing legislation to provide greater certainty over the legal status and finality of payments made within designated payment systems in a winding up or statutory management situation (outlined in section 4.2 of this article).

To address liquidity concerns, the Reserve Bank has agreed to an industry request to amend certain processing rules within ESAS in order to increase the efficiency of the payment process in ESAS and to positively influence system liquidity. The Bank is planning for the introduction of what is known as Auto-Offset and Top-Down Looping to replace the current strict application of First-In First-Out (FIFO) processing of payment instructions queued for settlement. Auto-Offset allows payments between two payers in ESAS to be settled simultaneously. Unlike FIFO, Top-Down Looping allows instructions to be settled ahead of another instruction that has been authorised at an earlier time but is unable to be settled.

There will also need to be changes in the hours the banks operate their ESAS accounts. CLS transactions will generally be processed between 5pm and 11pm (New Zealand time) depending on the operation of daylight saving in both New Zealand and Europe. In addition, there will likely be a consequential impact on the hours that the AustraclearNZ system will be available for settlement of securities transactions. This reflects the interdependency between funding (via foreign exchange transactions) and securities purchases, and the high proportion of securities market settlements that involve offshore investors. The Reserve Bank has started a consultation process in order to determine what impact CLS will have on the AustraclearNZ hours of availability.

The intention is to advance the major elements sufficiently to enable a formal decision on entry of the New Zealand dollar to CLS, and likely timing, to be made in the near term.

4 Payment system oversight

4.1 Reserve Bank objectives

The Reserve Bank has both an oversight and operational role in the payment system. The operational activities include the operation of ESAS, including the ESAS/SWIFT interface, and AustraclearNZ, managing the banknote and coin issue in New Zealand and providing exchange settlement accounts to financial institutions.

The Bank's payment system oversight role is closely related to its responsibilities arising from its bank supervision role. Both aim to promote the maintenance of a sound and efficient financial system. Accordingly, the Bank focuses on the prudential and systemic aspects of the payment infrastructure, particularly the identification, reduction and management of payment system risks. Matters relating to competition and pricing of proprietary systems are subject to the same general competition policy and consumer protection laws as for other industries.

The Bank's principal oversight objectives in relation to the payment system have been in place for some years and are to:

- ensure that payment system risks are reduced to acceptable levels, and are managed appropriately by system participants;
- ensure that the payments system can continue to operate without disruption in the event of the sudden withdrawal of a participant from the system, or following other types of financial crisis, or following natural disasters, etc;
- encourage movement towards delivery-versus-payment

arrangements in all financial markets, especially with respect to high value transactions;

- help ensure that the status of payments is certain at all times, and, in particular, that the legal environment supports "finality" and "irrevocability" in payment instructions;
- encourage banks and others to offer efficient, reliable and relevant payments services to their customers; and
- maintain an open, flexible and competitive system, and ensure that no unwarranted entry or operational barriers exist.

These overlap to a significant degree with the CPSS Core Principles. The six objectives, supplemented more recently by the Core Principles, are used by the Bank to guide its thinking and policy stance on new initiatives and enhancements in payment systems. The approach to date has been to make progress through a combination of co-operation and consultation with the industry and through the Bank's ownership and operation of ESAS and AustraclearNZ.

Progress on a number of the objectives has been achieved. A significant reduction in domestic credit risk and greater certainty occurred with the introduction of RTGS in 1998 and delivery-versus-payment in AustraclearNZ. Legislation on netting and payments finality, passed in 1999, clarified the legal status and enforceability of defined netting arrangements, and ensured greater certainty with regard to payments finality.

More recently, work by the banking industry, in collaboration with the Reserve Bank, is well advanced on strengthening the failure-to-settle arrangements in the ISL retail payment system. The work aims to clarify and update the legal, financial and operational arrangements to apply should a system participant fail to meet their payment obligations, and will give greater certainty, in the event of disruption, to the treatment of payments in the system.

A project is also underway on the requirements for the New Zealand dollar to enter the CLS arrangements to reduce foreign exchange settlement risk, and legislative changes to formalise the Bank's oversight responsibilities are currently being considered by Parliament.

4.2 Oversight legislation

In overseeing the payment system, the Bank has operated under an indirect mandate to date, derived from its legislative responsibility to advise on financial sector policy and to promote the maintenance of a sound and efficient financial system.

To improve the transparency of its oversight, a formal authority for overseeing the payment system has been included in the Reserve Bank of New Zealand Amendment Bill presently before Parliament. A new part, Part VB - Oversight of the payment system, has been introduced, formally setting out the Bank's payment system objectives and powers.

If enacted in their present form, the provisions in Part VB will give the Bank explicit powers aimed at promoting the robustness of the payment system and maintaining a sound and efficient financial system. This systemic focus is consistent with the Bank's statutory responsibilities relating to the registration and prudential supervision of banks. The proposed powers, however, are more limited than those for the supervision of banks and do not, for instance, include regulation-making or direct intervention powers.

Payment systems are defined in the Bill as systems used for the interchange, clearance or settlement of financial transactions. This is a relatively broad definition that aims to be robust over time and unaffected by changing technology and organisational arrangements.

Formal information collection and publication powers have been included to promote public understanding of the payment system and to build on market disciplines to maintain and strengthen payment system risk management and infrastructure arrangements and, in particular, to be able to highlight areas of specific concern. Safeguards concerning the use of the information have also been proposed, together with audit and offence provisions.

The provisions essentially codify the existing arrangements. No major change to the Bank's mode or method of oversight is anticipated.

In addition, a second new part, providing for the designation of payment systems, has been submitted for inclusion in the Bill. The proposed provisions aim to provide a mechanism

to remove legal uncertainties associated with transactions effected through payment systems, particularly those associated with the settlement of foreign exchange transactions (involving cross-border flows and jurisdictions) and the netting arrangements in payment systems. As currently drafted, designation would provide finality for the settlement of instructions and payments that are effected through a designated system, and make netting under the rules of a designated system valid and enforceable in the event of insolvency.

The designation provisions are proposals at this stage and subject to the formal legislative process.

4.3 Compliance with the Core Principles

The CPSS Core Principles focus on 'systemically important payment systems'. While many payment systems in a country may be important to their users and for the smooth flow of payments, the considerations used to determine if a payment system is systemically important centre on the value and nature of the payments processed by the system, and notably whether the system:

- is the only payment system in the country, or the principal system in terms of aggregate value of payments;
- handles mainly payments of high individual value; or
- is used for the settlement of financial market transactions or for the settlement of other payment systems.[11]

The two payment systems operated by the Reserve Bank, ESAS and AustraclearNZ, both meet the above criteria. ESAS is the core payment system in New Zealand in terms of the aggregate value of payments and settlement finality, while AustraclearNZ handles mainly wholesale high value payments, and is used for the settlement of financial market transactions and for the settlement of other payment systems.

SCP also handles high value payments. However, it is more in the nature of an intermediate facility, using the existing SWIFT and ESAS infrastructure to effect payment between participants. Nevertheless, the Bank sees value in all system owners and operators assessing their systems against international standards, either independently of, or in collaboration with, the Bank and to use the findings as a guide for future enhancements.

Self-assessments by the Bank of the two systems it operates indicate a high level of compliance with the CPSS principles.

Core Principle I aims to minimise legal risk. It specifies that the legal framework should be well defined, setting out the rights and obligations, in normal and adverse circumstances, of each party involved, and that the rules and procedures of a system should be enforceable and their consequences predictable.

New Zealand has a well established general legal framework, encompassing contracts, banking, insolvency, and since 1999, netting and payments finality. System-specific terms and conditions relating to ESAS and AustraclearNZ and the rights and obligations of the parties involved are set out and agreed in a formal contract with participants. New Zealand law applies. Additional legislation is proposed (outlined above) to give greater certainty to the law relating to payment finality.

Core Principles II and III deal with financial risks (credit and liquidity risks) in a system. They require that participants have a clear understanding of the risks they run as members of the system, and that there are appropriate incentives and means to contain and manage the risks.

The rules and procedures for ESAS and AustraclearNZ are comprehensive, up to date and publicly available.[12] The responsibilities and obligations of participants and system operator are clearly defined. The rules cover settlement and irrevocability of payments and day-to-day arrangements, as well as failure-to-settle and other abnormal events. The financial risks to participants are low. Both systems provide real time gross settlement, with inter-bank settlement across Reserve Bank accounts. Participants have access to real time information on their account balance and payment flows, and liquidity requirements are managed via a formal repurchase facility provided by the Bank.

Core Principles IV, V and VI consider the settlement process, its timeliness and certainty. Settling payments promptly using

[11] CPSS (2001b), paragraph 6.9.

[12] www.rbnz.govt.nz/payment/

low risk assets reduces the risks to which participants are exposed.

The minimum suggested standard for final settlement is for settlement to occur not later than the end of the day of value, with a goal that at least one system provides real time final settlement during the day of value. Both ESAS and AustraclearNZ provide settlement for payments on a continuous, real time basis throughout the business day and the settlements are final and irrevocable. This exceeds the Core Principle IV minimum standard and meets current best practice.

The settlement asset used by both systems is account balances at the Reserve Bank, satisfying the preferred asset recommendation under *Core Principle VI*. Central bank claims are preferred for risk minimisation reasons as they carry no significant credit or liquidity risks and are acceptable to all participants. ESAS settles payment instructions by debiting and crediting participants' accounts at the Reserve Bank. Similarly, settlement between AustraclearNZ participant banks is in central bank money across Reserve Bank accounts. Settlement between non-bank participants of AustraclearNZ that are customers of the same bank occurs across AustraclearNZ system accounts.

Core Principle V concerns settlement risk in a multilateral netting system (where settlement occurs on a net basis among several participants, typically at the end of the day) and aims to ensure the system can withstand the failure of the largest participant. If a participant in this type of system fails to settle its obligations, the other participants can be exposed to large and unexpected risks, which may result in systemic shocks if not contained.

The standard does not apply to RTGS systems, such as ESAS and AustraclearNZ. AustraclearNZ, however, provides for multilateral netting as a contingency arrangement, to be used when real time gross settlement is not available. Should multilateral netting be required, the AustraclearNZ rules set out the netting and settlement arrangements to apply (including loss sharing procedures). The arrangements are legally sound and designed to spread any loss equitably, based on participants' activity levels, in order for the system to be robust to the failure of the largest participant.

Operational risk is addressed by *Core Principle VII*. The standard requires a system to have a high degree of integrity and operational reliability, including effective backup and contingency arrangements.

ESAS and AustraclearNZ have proven operating records, with very low levels of downtime, and the systems are operated by trained and knowledgeable staff. Backup and contingency arrangements have been developed by the Bank in consultation with participants. The arrangements are documented and tested regularly. However, the technology of the systems is ageing, and a project is underway to review the medium-term options for updating or replacing the system.

Core Principle VIII, dealing with system efficiency, is probably the most subjective of the ten principles to assess, involving a balance between minimising resource costs and maximising safety. An extremely safe but costly system may, for example, result in users preferring other less costly but riskier systems.

By international standards, ESAS and AustraclearNZ look to be cost effective, reliable and practical for users, and the systems are well accepted and used by participants. Transparent pricing methodologies are applied. Indirect costs, such as the cost of acceptable securities for the liquidity facility, are more difficult to assess. To minimise the indirect liquidity costs, funds received are immediately reusable and parameters in the ESAS liquidity mechanism allow participants a high degree of flexibility and choice.

Core Principle IX addresses access and competitive aspects. It calls for the criteria for participation to be objective, open and publicly disclosed and for any restrictions to be based on appropriate risk criteria. This formulation recognises that the efficiency benefits from an open competitive system may need to be balanced with the potential risk of new participants.

The participation criteria for both ESAS and AustraclearNZ are publicly available and aim to facilitate access for institutions providing financial services where there is a business demand or need for settlement at a wholesale level. System rules and procedures provide for the entry of participants and for the withdrawal, suspension or termination of membership.

The final *Core Principle, X*, considers a system's governance arrangements, particularly the relationships between stakeholders, and the incentives and accountabilities for management.

In the two Bank systems, clear structures and accountabilities are in place, reporting to the Deputy Governor of the Bank. System performance is closely monitored and regular external audits are conducted. Information on the systems is available and up to date, and users are consulted on, and advised of, decisions affecting the operation of the systems. AustraclearNZ user group meetings are held six monthly.

An internal assessment of the AustraclearNZ System against the 19 CPSS/IOSCO securities settlement systems recommendations is also underway. The preliminary assessment indicates a high level of compliance but not full compliance. Of note, the system does not currently meet recommendation 16 on international communication procedures and standards. A full assessment is planned over the coming year and the results will be used to guide the Bank's decisions on future system developments and priorities.

4.4 Central bank responsibilities and the Core Principles

The Core Principles report also identified four specific payment system responsibilities for central banks. Central banks are considered to have a leading public policy role because of their interest in financial stability, their role in providing settlement accounts for payment system participants and their reliance on functioning money markets for implementing monetary policy.

Responsibility A focuses on the transparency of the central bank's oversight role and policies.

To date, the Reserve Bank has described its objectives and role in the payment system in official publications, such as articles in the Bank *Bulletin*, information on its website, and press releases on significant developments. More recently, legislation has been introduced, but not yet enacted, to formalise the Bank's oversight mandate and powers (outlined in section 4.2). We have chosen not to differentiate between systemically important payment systems and other system-wide payment systems. While the major measures of the past few years have tended to focus on the design and operation of the high value wholesale systems, other measures, such as the netting legislation and system consultations, apply across the board.

Responsibility B seeks to ensure the systems a central bank operates comply with the Core Principles or that an action plan is in place to achieve compliance within a reasonable time period.

The Bank believes the two systems it operates achieve a high level of compliance with the ten principles. Where a clear assessment can be made (such as for Core Principles IV and VI), the compliance is full. Assessing compliance with the other principles is more subjective and requires judgement, and the planned FSAP should provide independent guidance on this.

Responsibility C extends the central bank's role to include overseeing compliance of other systems with the Core Principles. While the designers and operators of systems bear the primary responsibility for compliance, Responsibility C focuses on the central bank's oversight – the effectiveness of the oversight framework, the tools and actions.

In the Reserve Bank's case, action is underway to replace the current indirect regime with an explicit statutory authority and power to oversee payment systems. The planned information collection and disclosure powers will give the Bank a formal mechanism to review and highlight areas of concern, and encourage actions to remedy deficiencies. However, the Bank will not have the authority to impose regulatory requirements on payment system operators.

The final central bank responsibility, *Responsibility D,* calls for cooperation among the authorities that have an interest in financial stability. Complementary payment system oversight, supervision of banks and market surveillance is considered to be particularly important.

In New Zealand, a Financial Regulators' Co-ordination Group, comprising representatives from the Bank, the Securities Commission, Registrar of Companies and Government Actuary, meets regularly to share information and discuss current and planned developments. The Bank also participates in regular meetings with regional central banks on national and international developments in payment

systems and contributes to payment system discussions on an ad hoc basis with other overseas authorities.

Notwithstanding the above, there will invariably be scope for improvement in the design and operation of the existing payment systems and in the Bank's oversight, due in part to technological and other developments and to advances in our understanding of the risks and of international best practice. The FSAP assessment by external reviewers later this year, for instance, is expected to extend the self-assessments conducted by the Bank and should contribute to a broader understanding of the strengths and weaknesses of our payment system.

5 Future developments and challenges

There is a full work agenda on payment system issues for the Reserve Bank and payments industry. In the coming year, new legislation concerning the payment system is expected to be passed, an FSAP review against international standards conducted, and a decision made regarding the New Zealand dollar and CLS. Operational changes are also expected, and international anti-money laundering requirements may put additional obligations on the payment system.

Overlaying the known agenda are dynamic markets and technologies and the implications these may have for the structure and mode of payments and their systems. Technology improvements have the potential to contribute to the reduction of risks, and open the way for innovation, greater choice and improved efficiency. They can also shift and transform the existing risks. Understanding the implications of changes is critical. Increasing cross-border links, for instance, will test legal frameworks and lead to a greater level of standardisation and integration among systems and markets.

It is certain the payments infrastructure will continue to develop and evolve. The Reserve Bank, for its part, will continue to monitor developments and, together with the industry, seek measures to encourage the development of robust systems that function smoothly and effectively and are able to absorb and manage shocks.

Box 1
Financial system risks in payment and settlement systems[13]

Credit risk: the risk that a counterparty will not settle an obligation for full value either when due or at any time thereafter.

Custodian risk: the risk of loss of securities held in custody due to the insolvency, negligence or fraudulent action of a custodian or of a sub-custodian.

Foreign exchange settlement risk: the risk that one party to a foreign exchange transaction will pay the currency it sold but not receive the currency it bought.

Legal risk: the risk of loss because of the unexpected application of a law or regulation or because a contract cannot be enforced.

Liquidity risk: the risk that a counterparty will not settle an obligation for full value when due, although it may be able to do so at some time in the future.

Operational risk: the risk that deficiencies in systems or internal controls could result in unexpected losses and cause or exacerbate credit and liquidity risks.

Systemic risk: the risk that the failure of one participant in a transfer system, or in financial markets generally, to meet its required obligations, or a disruption in the system itself, could cause other participants or financial institutions to be unable to meet their obligations when due. Such a failure could cause significant liquidity or credit problems and, as a result, could threaten the stability of the system or of financial markets.

[13] Derived from CPSS (2001a)

Box 2
Core Principles for Systemically Important Payment Systems[14]

The Core Principles and central bank responsibilities

Public policy objectives: safety and efficiency in systemically important payment systems.

Core Principles for systemically important payment systems

I The system should have a well-founded legal basis under all relevant jurisdictions.

II The system's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks they incur through participation in it.

III The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and which provide appropriate incentives to manage and contain those risks.

IV* The system should provide prompt final settlement on the day of value, preferably during the day and at a minimum at the end of the day.

V* A system in which multilateral netting takes place should, at a minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participants with the largest single settlement obligation.

VI Assets used for settlement should preferably be a claim on the central bank; where other assets are used, they should carry little or no credit risk and little or no liquidity risk.

VII The system should ensure a high degree of security and operational reliability and should have contingency arrangements for timely completion of daily processing.

VIII The system should provide a means of making payments which is practical for its users and efficient for the economy.

IX The system should have objective and publicly disclosed criteria for participation, which permit fair and open access.

X The system's governance arrangements should be effective, accountable and transparent.

* Systems should seek to exceed the minima included in these two Core Principles.

Responsibilities of the central bank in applying the Core Principles

A The central bank should define clearly its payment system objectives and should disclose publicly its role and major policies with respect to systemically important payment systems.

B The central bank should ensure that the systems it operates comply with the Core Principles.

C The central bank should oversee compliance with the Core Principles by systems it does not operate and it should have the ability to carry out this oversight.

D The central bank, in promoting payment system safety and efficiency through the Core Principles, should cooperate with other central banks and with any other relevant domestic or foreign authorities.

[14] CPSS (2001b).

References

Bank for International Settlements (2002), "Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity 2001", March 2002.

CLS Bank, www.cls-group.com

Committee on Payment and Settlement Systems (2001a), "A glossary of terms used in payments and settlement systems", Bank for International Settlements, January 2001.

Committee on Payment and Settlement Systems (2001b), "Core Principles for Systemically Important Payment Systems", Bank for International Settlements, January 2001.

Committee on Payment and Settlement Systems and Technical Committee of the International Organization of Securities Commissions (2001), "Recommendations for securities settlement systems", Bank for International Settlements, November 2001.

Goodlet, C (2001), 'Core Principles for Systemically Important Payment Systems and Their Application in Canada', *Bank of Canada Review*, Spring 2001, pp 19-31.

International Monetary Fund (1999), "The Code of Good Practices in Transparency on Monetary and Financial Policies: Declaration of Principles", September 1999, and Supporting Documents, July 2000.

International Monetary Fund and The World Bank (2002), "Financial Sector Assessment Program – Experience with the Assessment of Systemically Important Payment Systems", *Joint Staff Report*, April 19, 2002.

Ledingham, P, A Rodgers and A Stinson (2000), 'Recent developments in the payment system', *Reserve Bank of New Zealand Bulletin*, Vol 63, No 4, pp 4-11.

Mortlock, G and I Woolford (2003), 'Financial sector assessment program', *Reserve Bank of New Zealand Bulletin*, Vol. 66, No 1.

Rodgers, A (2001), 'Foreign exchange settlement risk survey', *Reserve Bank of New Zealand Bulletin*, Vol 64, No 4, pp 36-43.

Introducing overnight indexed swaps

Wai Kin Choy, Financial Stability Department[1]

Last year, a new type of financial instrument – the Overnight Indexed Swap (OIS) – was introduced to New Zealand. This article is intended as a primer, explaining what the OIS is and how it is used by market participants to manage interest rate risks and to take a view on the direction of the Official Cash Rate (OCR). From the Bank's perspective, we are most interested in using OIS yields to derive estimates of market expectations of the OCR. This article also highlights developments in the New Zealand OIS market to date.

1 Introduction

In February 2002, market participants began to trade Overnight Indexed Swaps (OIS) for the first time in New Zealand. OIS contracts have become one of the fastest growing – and in some countries, the most widely traded – derivative instruments globally since they were first introduced in the early to mid-1990s. For example, OIS turnover in Australia has grown quickly since the introduction of the instrument in October 1999, with the amount traded in the year to June 2002 more than doubling the corresponding figure a year earlier.[2]

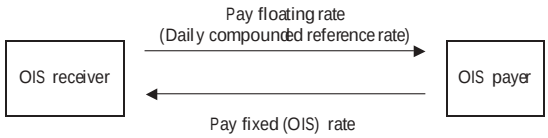
This article explains the OIS instrument and reviews their early development in the New Zealand market.

2 What an Overnight Indexed Swap is and how it is used

An interest rate swap is an agreement between two parties to exchange, or "swap", for an agreed time period, a series of fixed interest rate payments for a series of variable (or floating) interest rate payments (or vice versa).[3] An Overnight Indexed Swap is a special type of interest rate swap in two respects. First, OIS contracts involve the exchange of obligations for relatively short periods – for example, from one week up to around one year – whereas standard interest rate swap contracts run for longer periods – for example, from one to 30 years. Second, the floating reference rate in the OIS is the *overnight* rate, whereas the floating rate for most interest rate swaps is generally set less frequently, with reference to a quarterly or semi-annual interest rate. A simple diagrammatic representation of an OIS is given in figure 1.

In an OIS transaction, the counterparties agree to exchange the difference between the interest accrued on the fixed (OIS) rate and the compounded floating amount at the conclusion of the contract.[4]

Figure 1
An overnight indexed swap



OIS as a risk management tool

The OIS allows financial institutions and companies to manage some of their interest rate risks better by matching the maturity of their assets and liabilities. While other

[1] The author thanks Kelly Eckhold and Michael Reddell for their extensive comments on this article. The author also thanks Grant Barnes, Michael Gordon, William Hill, Sean Keane, Leo Krippner, and Gareth Williams for ongoing discussions on the topic. Data used to produce charts in this article were provided by Commonwealth Bank of Australia, Credit Suisse First Boston, Fixed Interest Securities, Prebon Yamane and the Reserve Bank of Australia.

[2] AFMA (2002). *2002 Australian Financial Markets Report – Overview*, Australian Financial Markets Association. http://www.afma.com.au/afma/pdf/2002afmr_overview.pdf

[3] For a more detailed discussion of interest rate swaps, see Hawkesby, C (1999). 'A primer on derivatives markets', *Reserve Bank of New Zealand Bulletin*, Vol 62, No 2, 24-43. http://www.rbnz.govt.nz/research/bulletin/1997_2001/1999Jun62_2Hawkesby.pdf

[4] There is no exchange of any principal amount although the contract has an associated notional principal amount from which the interest payments are calculated.

financial instruments already available in the market, such as bank bills and bank bill futures, can protect against unexpected movements in short-term interest rates, the OIS helps protect against unfavourable movements in the *overnight* rate, which can move significantly even within periods as short as three months. While almost every firm or financial institution will have a positive (negative) cash balance, for which it faces the risk that the overnight cash rate will fall (rise), the OIS is likely to be used more actively by institutions operating in the wholesale financial markets.

To illustrate how an OIS can be used to manage interest rate exposures, imagine a bank that seeks to raise money by issuing three-month bank bills to enable it to on-lend the money on an overnight basis to its customers. On the one hand, the bank's customers are paying a floating overnight interest rate, which can rise and fall. On the other hand, the bank is paying a (three-month) fixed interest rate to its lenders. If market interest rates fall by a sufficiently large amount, the bank will lose money, since it is continuing to pay a (higher) fixed interest rate while receiving a (lower) floating interest rate.

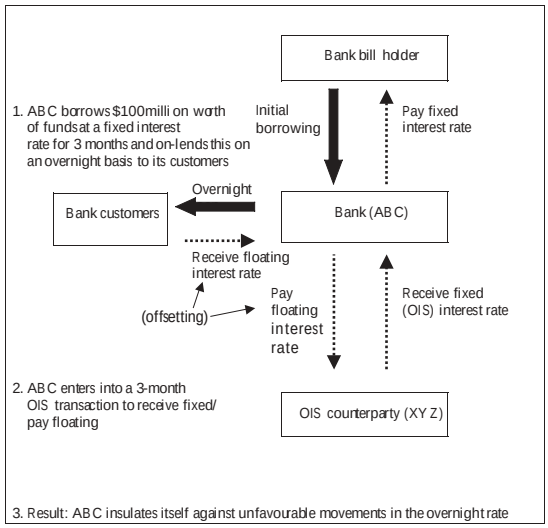
To insulate itself against a fall in the overnight interest rate, the bank has two options. First, the bank could choose instead to take a series of overnight loans and pay the floating overnight rate. In this case, the floating rate payments received from the customer and the floating interest rate paid to the lender will rise and fall together – the bank has successfully protected itself against adverse movements in the overnight interest rate. However, this would be inefficient and entail considerable transaction costs, as for a three month period, the borrower would have to renew up to 70 overnight loans. Furthermore, banks generally find it cheaper and more secure to raise money by borrowing for the whole three month period, for example by issuing three-month bank bills, compared to say, taking overnight loans.

Another option is for the bank to borrow cash for the whole three month period (agreeing to pay a fixed interest rate) and simultaneously enter into an OIS transaction to exchange a fixed rate obligation for a floating rate obligation. The floating payments paid in the OIS contract cancel out the floating payments received from the bank's customers. While both options result in the bank successfully insulating itself against unfavourable movements in the overnight interest rate, the second option is considerably more attractive because it involves only one derivative transaction, rather than a succession of overnight loans, and it allows the bank to have access to cheaper funding than otherwise.

As a specific example, consider a bank (ABC Ltd) that has raised $100 million worth of funds from issuing three month bank bills (see figure 2). Under the bank bill transaction, ABC agrees to pay the bank bill holder a fixed interest rate. But given that ABC is exposed to potential unfavourable changes in the overnight interest rate that it receives from its customers, ABC decides to enter into a three-month OIS transaction on the notional amount of $100 million with another OIS counterparty (XYZ Ltd). Under the OIS transaction, ABC (as the OIS receiver) receives a fixed interest rate and pays the sequence of overnight rates that occur over the three-month period, while XYZ (as the OIS payer) receives floating and pays fixed. From ABC's perspective, the floating leg of the OIS transaction effectively offsets the floating interest rate payments received from the customers. As a result, ABC has successfully insulated itself against adverse movements in the overnight interest rate.

An OIS allows an investor to lock in longer-term investment rates without committing to leave their money with one particular borrower for the whole term of the investment. For example, a standard way of investing at the current three

Figure 2
Protecting against unfavourable movements in the overnight interest rate



month rate is to take a three month deposit, leaving the investor with the risk that the deposit taker will default before the deposit matures.

Another way of achieving the same investment rate is for the investor to renew a sequence of overnight deposits – potentially with any number of borrowers – and simultaneously receive fixed/pay floating for three months with an OIS. Under this approach, the investor faces much less credit risk, since it can, in principle, consider on a daily basis (as the overnight loan matures) whether to withdraw its cash from one bank and reinvest at another bank. Furthermore, under the OIS, the three month exposure is only to the net difference in interest rate payments, whereas under the standard investment, the whole principal amount is at risk. The lower credit risk implied in turn requires the contract participants to allocate a relatively small proportion of their credit limits to the contract. Since this second approach involves some transaction costs, the OIS is particularly well suited to situations where the concerns over potential default risks, which are difficult to quantify, are regarded as quite large.

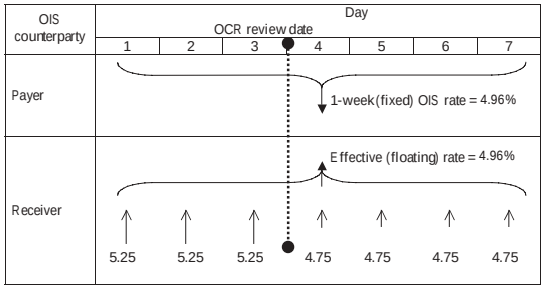
Taking a view on policy rates

OISs are also a convenient tool for expressing a view on the future direction of official interest rates, such as the Official Cash Rate (OCR). For example, a bank that has a relatively strong expectation that the cash rate will increase, can pay the fixed OIS rate now and receive the (floating) actual cash rate over the period of the swap. The main advantage for using the OIS for this purpose, as opposed to other money market instruments or derivatives, is that the OIS is directly linked to the cash rate (however defined), which is the rate most directly tied to changes in official monetary policy settings. Therefore, expectations of a rate rise or cut can be directly exploited. In technical terms, this means the *basis risk* of an OIS contract (the risk that the movement in the policy rate will not be reflected in the contract rate) is very low. This is especially the case in New Zealand, as the reference rate is the OCR itself, rather than the traded market cash rate.

Because the OCR almost always remains the same between scheduled OCR review dates,[5] if an OIS contract expires before the next OCR announcement date, the OIS rate should equal the current OCR.[6] In contrast, if the term of an OIS contract does encompass an OCR announcement date, market participants may expect the OCR to be altered on the date, in which case the quoted OIS rate should be different from the current OCR.

To give a simple (though unrealistic) numerical example for a one-week OIS, let's suppose the OCR at the outset is 5.25 per cent, and market participants know with certainty that the OCR will be cut by 50 basis points at a review scheduled for three days into the transaction (see figure 3). Since this combination of OCR outcomes gives an effective expected floating rate of 4.96 per cent,[7] the quoted OIS rate at the outset should also be 4.96 per cent.

Figure 3
One week OIS (encompassing an OCR announcement date)



In reality, market participants can never be *certain* what the OCR will be after a review date. However, they will have some *expectation* of where it is likely to be. Since the observed OIS rate should equal the currently expected OCR over the life of the contract, one can deduce the market's implicit expectation of the OCR. In the example in figure 3, if the observed one-week OIS rate had been 5.05 per cent (instead of 4.96 per cent), the "average" market expectation of the OCR following the scheduled review in three days' time would have been 4.90 per cent (rather than 4.75 per cent). Put differently, and since the Bank tends to move the

[5] The one exception to date was the 50 basis point cut to the OCR on 19 September 2001, in the wake of the 11 September 2001 terrorist attacks.

[6] Adjusted for compounding effects.

[7] In simple terms, (3/7 x 5.25) + (4/7 x 4.75).

OCR in multiples of 25 basis points, the implied probability of a 50 basis point cut would have been 70 per cent (rather than 100 per cent). If the "average" market expectation for what will happen at the upcoming OCR review changes, so should the observed one week OIS rate.[8]

Although it is possible to derive the "average" market expectation, it is difficult and often impossible to derive the distribution of expectations. To illustrate, in the last example it is possible that *all* market participants put the chances of a 50 basis point cut at 70 per cent, or that 70 per cent of market participants fully expect a 50 basis point cut, while the other 30 per cent expect the OCR to be unchanged. There are obviously many other combinations of interest rate, probabilities and proportions of the market that could be consistent with an "average" expectation of 4.90 per cent for the OCR.

3 A developing New Zealand OIS market

Given the popularity of the OIS around the world, in particular in the Australian market, a number of Australian investment banks and fixed-income brokers introduced the OIS into New Zealand markets in February 2002. The New Zealand OIS market is still in its early stage of development. Unlike the more mature bank bill or Forward Rate Agreement (FRA) markets, there are no formal price-making arrangements in the OIS market.[9] A range of onshore and offshore counterparties can be contacted for quotes, although they only have to do so on a "best efforts" basis. The majority of OIS deals (between 65 and 75 per cent) are currently transacted via one of the two main fixed-income brokers, with the balance dealt directly between the interbank players. Trades between banks and their institutional clients are almost non-existent at this stage.

At present, a couple of offshore investment banks (operating from Australia) dominate the market, and domestic commercial banks are not particularly active. This means the market is not as liquid as it might be. This can be expected to improve over time as domestic banks (with large exposures to New Zealand interest rates) become more active.

Activity in the OIS market has been reasonably steady since its inception in February 2002, with average monthly traded volumes estimated to be around $1.5 billion. Market sources suggest that turnover in the OIS market is between only five and ten percent of the turnover in the more established FRA and bank bill futures market. However, traded volumes in OIS seen around certain OCR announcement dates – where there have been particularly marked divergences of view on the direction of the OCR (for example, as with the March and August 2002 *Monetary Policy Statements* and ahead of the January 2003 OCR *Review*) – have been noticeably higher, exceeding $3.5 billion. This suggests that, to date, a majority of OIS trades in New Zealand have been made for taking a view on the direction and magnitude of changes in the OCR. This is consistent with the fact that the market is currently dominated by wholesale investment banks, rather than companies and commercial banks with an interest in hedging.[10]

The bulk of the contracts traded have been concentrated in relatively short maturities, with around 60 per cent in maturities out to three months. An exception to this pattern was in August 2002, when most of the deals were in the four to six month maturities, because that was the horizon where there was the greatest divergence in views among market participants on the future track of the OCR after the August *Monetary Policy Statement*.

---

[8] This procedure can be applied to infer market expectations for longer horizons, although more iterations would be required. For an illustration of one technique the Bank uses to derive OCR expectations at various horizons from observed bank bill rates, see Krippner, L (2002). "Extracting expectations of New Zealand's Official Cash Rate from the bank-risk yield curve", *Reserve Bank of New Zealand Discussion Paper* 2002/01. http://www.rbnz.govt.nz/research/discusspapers/dp02_01.pdf

For a preliminary analysis of how OCR expectations can be derived from OIS rates in New Zealand, see Choy, W K (2003). "The New Zealand Overnight Indexed Swap Market: An Introduction", Paper presented at the 7th New Zealand Finance Colloquium, Massey University, Palmerston North, February 2003.

[9] A formal price-making arrangement is said to exist for a particular financial instrument when there are players (known as price-makers) who agree to quote bid and offer prices for a typical transaction size for each security. These price-makers are obligated to deal at these quoted rates if the customer so wishes.

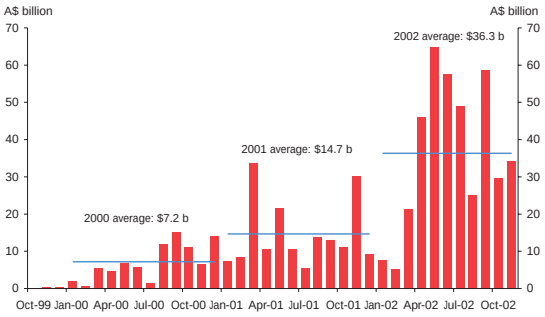
[10] If there were a large proportion of non-financial companies participating in the OIS market, most trades would be undertaken to hedge underlying exposures (rather than taking views on policy rates), and hence one would expect to see relatively more stable traded volumes.

The OIS market in Australia

A possible guide to the future development of the OIS market in New Zealand is to look across the Tasman. The Australian OIS market began in October 1999 and there has been a noticeable rise in the level of activity in the market through to 2002. For example, according to Australian Financial Markets Association (AFMA, 2002) data, average monthly turnover in the Australian OIS market rose by around 130 per cent from $42.3 billion in the year to June 2001 to $97.0 billion in the year to June 2002. This makes the OIS the fastest growing Australian money market instrument, though still not the dominant one. Although figure 4 below shows the estimates from only a subset of the market, market contacts indicate that the pattern is nevertheless indicative of the aggregate market's pace of growth.

Market contacts report that a number of market participants now commonly use OISs to manage interest rate risks, as distinct from taking a view on policy rates. This is quite a contrast to New Zealand at present and reflects the much more developed state of the Australian OIS market.

Figure 4
OIS Activity in Australia (estimated monthly turnover)



How accurate are OIS rates in predicting policy rates in Australia?

Given that the Australian OIS market has been around longer, it is worth examining how accurate OIS rates are in predicting policy rates in Australia, compared with the more developed bank bill market. Table 1 below summarises the forecast errors over various forecast horizons for both the Australian bank bill and OIS markets since January 2000. The means represent the average difference between the implicit "expected" cash rate, derived from the relevant bank bill or OIS rates (in the first, second, etc month ahead), and the actual cash rate in each of those future months. A positive forecast error implies that the bank bill or OIS rates "over-predicted" the future cash rate.

Four points are worth noting here. First, it is clear that the forecast errors have tended to be positive on average, showing that markets have on average over-predicted the RBA cash rate through time. Since it is unlikely that markets should have a consistently biased forecast of the cash rate, it is more likely that this systematic error reflects a *term premium*, compensating investors for things such as credit risk or basis risk.[12] If a term premium does in fact exist, we need to adjust down market rates in order to obtain unbiased estimates of the true underlying OCR expectations. Put differently, without allowing for a (positive) term premium, estimates of underlying OCR expectations are likely to be

Table 1
Forecasting errors in Australian bank bill and OIS markets (in basis points)[11]

	Australian bank bill		Australian OIS	
Horizon (months)	Mean	Standard deviation	Mean	Standard deviation
1	8.5	6.4	0.3	5.8
2	8.9	14.3	1.2	13.6
3	11.5	22.5	3.6	20.0
4	14.2	26.4	6.5	26.4
5	20.7	36.1	12.9	35.7
6	25.4	46.5	20.6	45.5

Sources: RBA, Prebon Yamane, RBNZ calculations

[11] The data used to calculate these forecast errors only go to the beginning of December 2002.

[12] For more details, see Krippner, L and M Gordon (2001), 'Market expectations of the official cash rate', *Reserve Bank of New Zealand Bulletin*, Vol 64, No 2, 25-39. http://www.rbnz.govt.nz/research/bulletin/1997_2001/2001jun64_2KrippnerGordon.pdf

overstated. Therefore, a good term premium estimate is key to obtaining precise estimates of OCR expectations.[13]

Second, average forecast errors are generally larger for longer-horizon expectations. In other words, interest rates implied by longer-horizon contracts (bank bills or OIS) on average have tended to overestimate future interest rates to a larger extent than shorter-maturity contracts. This suggests that estimates of the term premium should also increase with time. For example, for a six-month "prediction", a larger adjustment will be required than for a one-month "prediction".

Third, average forecast errors for Australian cash rate expectations derived from OIS rates have been substantially smaller than those derived from bank bill rates, particularly for shorter horizons. A relatively higher term premium for bank bill rates reflects the relatively higher basis risk and credit risk inherent in a bank bill compared to an OIS contract. This finding is consistent with market participants' sense that OISs are likely to provide the "cleanest" market-based measure of cash rate expectations. The potentially more precise forecast of cash rate expectations in turn is why the Bank and other market participants are seeking to monitor the OIS market in New Zealand more closely.

Finally (and unsurprisingly), the standard deviations show that the range of forecast errors has been much greater over longer horizons.

4 Concluding remarks and future work

The New Zealand dollar Overnight Indexed Swap market began in February 2002. Although turnover in the OIS market is still relatively low compared to that in other money market instruments, our market contacts suggest that general interest in the market is picking up. To the extent that the development of offshore OIS markets is any guide, the OIS market in New Zealand is likely to become increasingly important to domestic market participants. OIS rates are widely regarded as providing the "cleanest" market-based measure of cash rate expectations because of the smaller term premium embedded in OIS yields. The superiority of OIS rates in this respect is likely to be reinforced as the New Zealand OIS market becomes more liquid and more actively used by a wider range of market participants. However, more data are required before we can formally estimate a term premium for New Zealand OIS yields.

[13] There is ongoing work at the Bank in this area. In addition to the studies already mentioned, see also Gordon, M (2003). "Kalman filter estimates of time-varying term premia for New Zealand and Australia", Paper presented at the 7th New Zealand Finance Colloquium, Massey University, Palmerston North, February 2003.

The legal history of money in New Zealand

Ken Matthews, Financial Stability Department

A central bank's stock in trade is money. This is no less true in New Zealand than in any other country. It is perhaps not surprising, therefore, that the Reserve Bank takes more than a passing interest in the historical development of notes and coins in New Zealand.

This article summaries the legal history of money in New Zealand, beginning in the early days of colonisation and tracing the key developments through to the modern era. Although the focus of the article is on the development of the legal framework governing notes and coin, rather than other aspects of money, it also discusses some of the economic and social issues that shaped these legal developments.

The history of money law in New Zealand is an example of how an emerging country developed an area of law necessary for the state to function, and how those laws were influenced by social and economic factors. In this article, we look at five key periods in the history of money in New Zealand:

- The period of legal uncertainty (1840 to 1844)
- Experimentation (1844 to 1861)
- Privately issued money (1861 to 1893)
- Periods of financial stress (1893 to 1933)
- Nationalisation of the currency (1933 to the present)

1 Introduction

The legal history of money in New Zealand from 1840 to the present time demonstrates the evolution over time of the laws connected with a commodity that every successful sovereign state must have – an acceptable means of exchange and store of value. The evolution of laws in New Zealand relating to money was affected by many factors. These included the effects of laws imported from the colonial power, the practical necessity of developing a local currency, the impact of economic events in New Zealand and worldwide, and experimentation. As well as being an interesting story in itself, the history of money law in New Zealand is an example of how a new country developed an area of law necessary for the state to function, and how those laws were influenced by social and economic factors, and changing views on currency theory.

This article provides a brief summary of the key stages in the development of the legal framework relating to money in New Zealand. Section 2 discusses the legal uncertainty surrounding the development of money in New Zealand from the time the Treaty of Waitangi was signed, in 1840, to 1844. Section 3 traverses the period from 1844 to 1861, when the authorities launched a number of initiatives to foster the development of a viable local means of payment and store of value. Section 4 describes the period between 1861 and 1893, when privately issued money, backed by legal authority, came into use. Section 5 covers the period from 1893 to 1933, when a series of adverse economic and political circumstances forced the government to intervene and use its legal powers to underwrite fully the private money issuers. Section 6 discusses the period from 1933, when the issuance of currency in New Zealand became a state monopoly and its transition to a pure fiat currency (with no convertibility to precious metals or other currency) was achieved. Section 7 draws some conclusions.

2 Legal uncertainty

Key events:

1840 British and foreign gold and silver coins in circulation under an uncertain legal basis.

1840 Union Bank of Australia begins issuing banknotes in New Zealand (under English law).

1844 Ordinance for facilitating proceedings by and against a certain Joint Stock Bank Company, called the Union Bank of Australia and for other purposes therein mentioned. Required that notes issued in New Zealand by the Union Bank be redeemable in specie (specie = gold and silver coin and bullion) and denominated as at least 1 Pound. (Union Bank evolved into the ANZ Bank in 1955.)

At the time of the signing of the Treaty of Waitangi there was no legal, or even commonly accepted, currency in New Zealand. The value of coins in circulation depended largely on their gold or silver content. Coins in circulation, that had mainly been brought to New Zealand by whalers and traders, included English, Spanish, American, Dutch, Portuguese and French coins. Following the signing of the Treaty there was still no provision for a separate or distinctive coinage, although British coins were assumed to be legal currency.[1] The applicability of English law (including law about coinage and currency) seemed to remain legally uncertain for a considerable time after the signing of the Treaty.

In the years immediately following the signing of the Treaty, the colonial government was hampered by practical and financial difficulties. The mechanics of state were rudimentary, the government's effective powers very limited, and there was no reliable source of income for the government. One of the problems was the lack of sufficient currency.

> *The experience of the Government during the first few years after the proclamation of British Sovereignty bore ample testimony to the difficulties arising from the lack of banking facilities and a sufficient currency.*[2]

A serious shortage of coins developed in New Zealand in the early 1840s. Consequently, foreign coins continued to circulate in New Zealand until the late 1840s; a situation that the colonial government was forced to accept.[3] Foreign coins were officially listed and recognised in government records. There were more Spanish coins in circulation than there were coins from Britain or New South Wales.[4] Official despatches reveal that, while successive governors officially recognised foreign gold and silver coins, no action was taken to obtain the consent of the imperial authorities to these coins being proclaimed as legal tender in New Zealand. (Legal tender is a legally defined means of settling a debt. A creditor is not obliged to accept legal tender, but cannot further pursue the debt if the offer of legal tender is refused.)

The first bank established in New Zealand, a branch of the Union Bank of Australia (an English company formed in 1837), began issuing notes under English law from a shed at Petone, near Wellington, in March 1840.[5]

The colonial government's first legal move in relation to money was an Ordinance[6] in 1844 that introduced some regulation applicable to the Union Bank, requiring notes to be redeemable in specie and that the minimum denomination of notes be one pound.

3 Experimentation

Key events:

1844 *Ordinance to authorise the governor of New Zealand to issue debentures and to make the same legal tender.* Issue of New Zealand government debentures in small denominations – declaration that these are legal tender – disallowance of ordinance by imperial authorities in 1845.

1847 *Ordinance to authorise establishment of a Colonial Bank of Issue by the government of New Zealand, to make and issue a paper currency, and to prohibit*

---

1 R P Hargreaves *From beads to banknotes* (McIndoe, 1972) ₱27.

2 H D Bedford, *History and practice of banking in NZ* (unpub Univ of NZ thesis, 1915) ₱58.

3 A Sutherland *Numismatic History of New Zealand* (NZ Numismatic Society, 1941) ₱56.

4 Sutherland, above, ₱57.

5 S J Butlin *Australia and New Zealand Bank* (Longmans, 1961) ₱154.

6 Union Bank of Australia Ordinance 1844 7Vict Private 1.

the making and issuing of paper money by private individuals. This established the Colonial Bank of Issue (CBI), whose notes were legal tender and redeemable – CBI was granted a monopoly over note issue from 1852, when the issuing rights of Union Bank were withdrawn under the Ordinance.

1856 *New Zealand Colonial Bank of Issue Winding-Up Act.* This disestablished the CBI and provided for redemption of its banknotes.

1856 *Paper Currency Act.* This authorised the Union Bank to issue notes that were redeemable (in coin), and authorised banks incorporated by royal charter in England and approved by the governor of New Zealand to issue redeemable (method undefined) banknotes. (The Oriental Bank was approved in 1857, but ceased operations in 1861.)

1858 *English Laws Act.* This retrospectively applied the laws of England as existing on 14 January 1840, including the Coinage Act 1816 (UK), which resulted in British coins being retrospectively legal tender in New Zealand, eliminating legal uncertainty.

When Governor FitzRoy arrived in 1843, he had to deal with a financial crisis. The colonial government was deep in debt, the civil service had not been paid for six months, FitzRoy was not able to draw bills on the British Treasury, there was no ability to levy taxes, and the supply of money in circulation was inadequate. An innovative solution was needed.

The shortage of coins and the parlous financial state of the colonial government caused Governor FitzRoy to try the issue of government debentures in small denominations. An Ordinance[7] to allow issue of the debentures and to declare them legal tender was passed by the Legislative Council in 1844. The issue of debentures was begun immediately, although the Ordinance required the Queen's assent to become law, because it was a government, rather than a private, Ordinance. The issue failed to achieve public confidence because the debentures were printed on poor quality paper, they were easily forgeable, were not backed by gold and there were doubts about their legality.[8] The debentures traded at a discount to their face value, and in most cases were only accepted as payment because there was no other alternative means of exchange available. The Ordinance was disallowed by the imperial government in 1845 because of, in the words of the Colonial Secretary, an "*assumption by the local legislature of a power which they did not really possess*".[9] The debentures were withdrawn from circulation.

FitzRoy has been both criticised and praised for his actions. Criticised, because it appears he was aware of the probable illegality of his actions, and deliberately delayed seeking imperial approval for the Ordinance to provide time for the debentures to be issued. Praised, because his actions, although legally dubious, saved the colonial government from financial and political collapse.[10]

FitzRoy did not dispatch the Debentures Ordinance to London for approval until four months after it was approved by the Legislative Council. It took a further 16 months for the Ordinance to reach London, be considered by the British authorities, and the reply disallowing the Ordinance to be returned to New Zealand. It has been suggested that FitzRoy knew that the Ordinance would probably be disallowed, and deliberately relied on the slowness of communications to allow time for the debentures to be issued and circulated in New Zealand.[11] FitzRoy was aware that the issuing of the government debentures was probably beyond his powers. He had instructions from London that no government paper currency was to be issued without British Treasury approval.[12] In New Zealand, the practical demands of the situation meant that legal correctness had to be overlooked.

Despite being sent home in official disgrace for failing in his colonial administration duties, it was recognised in unofficial circles that FitzRoy's expedient actions had prevented a potential financial and political disaster. At the time of his departure, the citizens of Auckland presented him with an address that complimented him on his financial actions, and

7 Debentures Ordinance 1844 7Vict 4.

8 R P Hargreaves *From beads to banknotes* (McIndoe, 1972) p40.

9 Hargreaves, above, p44.

10 Hargreaves, above, p44.

11 Hargreaves, above, p44.

12 A Sutherland *Numismatic History of New Zealand* (NZ Numismatic Society, 1941) p309.

others in New Zealand and London wrote letters of support. It has even been suggested that the legally dubious measures he took were the only practical way to maintain the fragile British institutions in New Zealand and to enable the colonial government to continue to assert British sovereignty over New Zealand.[13] FitzRoy also pioneered the concept of a paper currency that was backed, not by specie, but solely by legal authority. It was not until the 20th century that such currency came into general usage.

FitzRoy was replaced as Governor by George Grey at the end of 1845. Soon after his arrival, Grey published the disallowance of the Debenture Ordinance. Unfortunately, Grey caused a public panic by not also announcing how the debentures were to be redeemed, and he was forced to make a subsequent statement a couple of days later that the Colonial Government would pay out in a combination of specie and new debentures sanctioned by London. However, the problem of a lack of sufficient currency remained, so another solution was required.

This solution was to be a state-owned bank with a monopoly on note issue. The idea of a state-owned bank of issue was not Grey's, but originated from the Colonial Office in London, and was embodied in the Bank Charter Act 1844 (UK). The concept was that a mixed coin-paper currency should be made to operate in the same way as a coin-only currency. The paper currency would not be used to enlarge the amount of money in circulation, but would just be a substitute for coin. Thus, notes could only be issued if fully backed by gold and silver coin deposited in the issuing bank. Grey had specie shipped to New Zealand to form such a deposit. In addition, New Zealand was considered an ideal place to test new currency theories because there were no vested commercial interests that would be affected (except the Union Bank).[14]

The Colonial Bank of Issue (CBI) was established by an Ordinance[15] in 1847 that subsequently gained the Queen's assent. The objective was to establish a stable currency in New Zealand. The CBI was given a monopoly over note issue from 1852, when the right of the Union Bank to issue notes was withdrawn. The Union Bank responded by not paying out CBI notes that it took in, but presented them each day to the CBI for redemption in gold. This caused some strained relations between the Union Bank and the government.[16]

The CBI was an innovative institution for its time, being a type of very early central bank, which was only tried in other countries many years later. However, the CBI had only a brief existence. There was little public confidence in its notes. The public had bad memories of FitzRoy's debentures, and some considered the measure as a dangerous experiment. Those who owned, or wished to own, private banks resented the monopoly on note issue given to the CBI.

In 1854 a Committee of the House of Representatives reported that "*The existence of any Government issuing its own paper exclusively is injurious to free commercial enterprise*."[17] The New Zealand Parliament passed an Act[18] in 1856 winding up the CBI.

The principal reason why both the government debentures and the CBI ultimately failed appears to be a lack of confidence in the colonial government by the settler population. The public was suspicious of the government's initiatives. The early colonial governments commanded much less general respect, and had much less effective powers, than is the case with government today. In the mid-19th century it was not seen as the role of the government to involve itself with commercial activities that would compete with or limit private enterprise. There was also a powerful lobby for private enterprise, including within Parliament itself. Attempts by the British authorities to impose their will on New Zealand also caused some resentment. With the abandonment of attempts to impose government solutions in the area of currency, the way was now open for private enterprise to take over the issue of paper money in New Zealand. Parliament merely had to provide the legal environment necessary to ensure that a sufficient and legally sound currency was available.

---

13 Sutherland, above, p309.

14 R P Hargreaves *From beads to banknotes* (McIndoe, 1972) p55.

15 Paper Currency Ordinance 1847 10Vict 16.

16 Hargreaves, above p57.

17 Hargreaves, above, p60.

18 New Zealand Colonial Bank of Issue Winding-Up Act 1856.

The Paper Currency Act 1856 allowed the Union Bank to resume issuing notes, and opened up the possibility of banks incorporated by royal charter in England also to issue notes. The coinage situation was clarified by the English Laws Act 1858 that extended the laws of England, including the Coinage Act 1816 (UK), to New Zealand, thus retrospectively giving undoubted legality to the use of British coins in New Zealand.

In 1840, the British Treasury had drawn up some regulations, including provisions about the issue of bank notes, that were to apply to banking companies incorporated in the colonies.[19] These regulations were amended in 1846, but were not adopted in New Zealand until 1851 by an Ordinance.[20] However, because of the establishment of the CBI, the provisions relating to bank notes were not included.

During the 1850s and 1860s, there were some private issues of paper currency. This was possible because the Paper Currency Ordinance 1847 and the Paper Currency Act 1856 defined bank notes as being payable on demand. The private issues were not payable on demand and so avoided any legal restriction. They were issued in places where there was usually a shortage of legal bank notes, particularly in the South Island. However, their practical and economic importance was of little significance.

4 Privately issued money

Key events:

1861 *The New Zealand Bank Act.* This established the Bank of New Zealand with the right to issue redeemable (in specie) banknotes.

1861 *Bank of New South Wales Act*. This established the Bank of New South Wales in New Zealand with the right to issue redeemable (in specie) banknotes (changed name to Westpac Banking Corporation in 1982).

1864 The Bank of Australasia (incorporated by royal charter) began issuing redeemable banknotes in terms of the Paper Currency Act 1856 (evolved into ANZ Bank in 1955).

1873 *National Bank of New Zealand (Ltd) Act.* This established the National Bank of New Zealand with the right to issue redeemable (in specie) banknotes.

1874 *Colonial Bank of New Zealand Act*. This established the Colonial Bank of New Zealand with the right to issue redeemable (in specie) banknotes (absorbed into BNZ in 1895).

Following the abolition of the Colonial Bank of Issue, the Paper Currency Act 1856 was only a partial solution to the need for a sufficient volume of publicly acceptable paper currency to be circulated. In addition to the Union Bank, the Oriental Bank (incorporated by royal charter) was the only other bank approved by the colonial government to issue notes under the Paper Currency Act, but it ceased business in 1861.

There were clearly commercial opportunities for further banks to be established in New Zealand to compete with the Union Bank. The discovery of gold in the 1860s gave a big boost to the New Zealand economy. Banks that began operations in New Zealand between 1861 and 1874 and operated successfully comprised the Bank of New Zealand, Bank of New South Wales, National Bank of New Zealand and Colonial Bank of New Zealand (with the Commercial Bank of Australia being a latecomer in 1913). The promoters of each of these banks were able to persuade the New Zealand Parliament to pass a private Act[21] specific to each bank, authorising their operation, including the issue of notes by these banks. The wording of the legislation was similar in each case. For example, The New Zealand Bank Act 1861 (establishing the Bank of New Zealand) says:[22]

> *"It shall be lawful for the said Corporation to make issue and circulate at or from any city town or place…any bank notes or bills for one pound or five pounds sterling or for any greater sum…but not for any fractional part*

[19] G R Hawke *The Evolution of New Zealand Currency* (Victoria University of Wellington) 1984, p9.

[20] Bank Charters Ordinance 1851 14Vict 14.

[21] The New Zealand Bank Act 1861, Bank of New South Wales Act 1861, National Bank of New Zealand (Ltd) Act 1873, Colonial Bank of New Zealand Act 1874, Commercial Bank of New Zealand (Ltd) Act 1913.

[22] The New Zealand Bank Act 1861, s V & s VI.

of a pound… . All such notes shall bear date at the city town or place…issued and…in all cases be payable in specie to bearer on demand…"

The use of the term "pounds sterling" indicates that the currency was not a distinctive New Zealand currency but was the currency of England authorised for circulation in New Zealand. The prohibition on fractional notes was so that small value notes did not become an alternative to coins. The issue of coins remained a lucrative monopoly of the British Crown.

There were also three other banks established in 1863-64 by private Acts[23] of Parliament that issued bank notes, namely, Bank of Otago, Commercial Bank of New Zealand and Bank of Auckland. However, each of these banks failed after a short time, and the note issues of each were of limited and short-term significance.[24]

Another bank of interest was a Bank of Aotearoa associated with the Maori King Movement during the 1880s. It is not clear that it ever properly functioned, and it certainly did not operate in the non-Maori economy. Fragmentary records exist, including some printed bank notes.[25]

As banks were privately owned, the notes were private money, and only as good as the creditworthiness of the banks that had issued the notes. However, the notes issued by the surviving authorised banks (that from 1864 included notes issued by the Bank of Australasia under the Paper Currency Act 1856) gained public acceptance.

In contrast to the public distrust of the government, the public seemed to have trust in the institutions of private enterprise. Notes issued by the privately owned banks provided a period of currency stability. There were powerful influences that favoured private enterprise over government. Parliaments of the time were dominated by men who were involved in commerce and used Parliament to assist commercial interests. Private Acts of Parliament that helped establish commercial enterprises were relatively common in the 19th century.

There was also one attempt by a provincial council (ie regional government) to issue its own paper currency. The Southland Provincial Council had undertaken public works that it needed to finance, and was unable to obtain loans from any bank. In 1864, the Southland Executive ordered the printing in Dunedin of large numbers of "Southland Treasury Notes". The notes were printed with the royal arms and as being "Payable at the Treasury, Invercargill". The printing was done with the knowledge of the Provincial Executive, although not officially approved by the Provincial Council, and the printing was kept secret from the Southland public.

However, the *Otago Daily Times* broke the story, describing the notes as a "*palpable fraud*" and as "*utterly useless*", and urged the Provincial Council not to issue the notes.[26] With the notes suspect as to their worth and legal standing even before they were issued, the Southland Provincial Council had to abandon its attempt to issue its own currency. The eventual bankruptcy of the Province of Southland forced a reunion with Otago in 1870.

5 Financial stresses

Key events:

1893 *Bank Note Issue Act.* This required that the notes of all existing banks be redeemable in gold, and enabled the government to declare an individual bank's notes to be legal tender.

1895 Under the provisions of the Bank Note Issue Act the notes of the BNZ were declared legal tender when BNZ encountered financial difficulties

1897 *Coinage Act 1870 (UK)* applied to New Zealand by Proclamation. This prohibited the circulation of coins other than those struck by the Royal Mint and applied the coinage laws of England to New Zealand.

1913 *Commercial Bank of Australia (Ltd) Act.* This established the Commercial Bank of Australia with the right to issue redeemable (in gold) banknotes (absorbed by Westpac Banking Corporation in 1982).

[23] Bank of Otago Act 1863, Commercial Bank of New Zealand Act 1864, Bank of Auckland Act 1864.

[24] R P Hargreaves *From beads to banknotes* (McIndoe, 1972) p111.

[25] G R Hawke *The Evolution of New Zealand Trading Banks mostly until 1934* (Victoria University of Wellington, 1984) p8.

[26] R P Hargreaves *From beads to banknotes* (McIndoe, 1972) p76.

1914 *Banking Amendment Act*. This ended redeemability in gold and enabled all bank notes of authorised banks to be declared legal tender – immediately implemented because of WW1.

The 1890s was a period of economic depression in New Zealand and elsewhere. In the early part of this decade, the banks operating in New Zealand, particularly the Bank of New Zealand, were in financial difficulties. According to Sinclair[27], the banking crisis was caused by the banks supporting speculative ventures in real property, the price of which fell. Bedford saw three main causes for the crisis:[28]

> *"1. The Public Works and Immigration Policy inaugurated by Sir Julius Vogel.*
>
> *2. The pressure unceasingly exerted on the banks by the public to depart from legitimate banking in order to secure more liberal accommodation.*
>
> *3. The competition of the numerous Loan Companies."*

Bedford comments that, from the beginning of settlement, the colonists wanted more loans from the banks than the banks were prepared to give, such loans being required to finance the development of infrastructure. The government was borrowing beyond its available means of repayment, relying on exploitation of the latent wealth of the colony to make future repayments. The banks, taking their lead from the government, did the same.[29] Unfortunately, the means of repayment did not eventuate as readily as anticipated.

The government's response to the banking crisis was the Bank Note Issue Act 1893 that required the notes of all banks to be redeemable in gold, so maintaining public confidence in the notes.[30] In addition, the Act enabled the government to declare an individual bank's notes to be legal tender. The Act stated:[31]

> *"[A]ll notes payable on demand…by any bank…shall be payable in gold… [B]y Proclamation…the notes payable on demand by any bank therein named…shall be everywhere within the said colony a good and legal tender of money…"*

The Bank of New Zealand's troubles continued, and in June 1894 the bank informed the government that unless the state came to its aid it would have to close its doors.[32] The government acted quickly and put a Bill[33] through its three stages in a night so that the bank could open the next day with a government guarantee of its capital. "*The banks were 'consulted' to the extent that they were summoned during the dinner adjournment of Parliament to hear the substance of a bill which the government proposed to pass through all stages forthwith*".[34]

In 1895, the notes of the Bank of New Zealand were declared legal tender when the bank was again near to collapse. These government policy measures succeeded in saving the bank.

The Banking Amendment Act of 1914 enabled the government to end redeemability in gold and declare all privately issued bank notes in circulation to be legal tender. With the onset of World War 1, the Act was invoked to maintain financial stability.

Redemption of bank notes in gold was referred to as the "gold standard". New Zealand adopted the gold standard about the same time as Britain, and like Britain, suspended it at the beginning of World War 1. However, in a sign of the growing independence of New Zealand, the gold standard was not reinstituted in New Zealand after the war, although it was in Britain. The retreat from the gold standard reflected a change in thinking about currency. Gold coins were no longer to form the basis of the currency, with this role being taken over by paper currency that had legal tender status.[35]

In the area of coinage, the Coinage Act 1870 (UK) was made applicable to New Zealand in 1897. The effect of this was

---

27 K Sinclair *Open Account* (Whitcombe & Tombs, 1961) p126

28 H D Bedford, *History and practice of banking in NZ* (unpub Univ of NZ thesis, 1915) p160.

29 Bedford, above, p163-171.

30 R P Hargreaves *From beads to banknotes* (McIndoe, 1972) p2127.

31 Bank Note Issue Act 1893, s 3 & s 5.

32 K Sinclair *Open Account* (Whitcombe & Tombs, 1961) p126.

33 Bank of New Zealand Share Guarantee Act 1894.

34 S J Butlin *Australia and New Zealand Bank* (Longmans, 1961) p312.

35 G R Hawke *The Evolution of New Zealand Currency* (Victoria University of Wellington, 1984) p16.

to limit legal tender coins to those struck by the Royal Mint, and to regulate the types of coins that could be circulated.[36]

6 Nationalisation of the currency

Key events:

1933 *Coinage Act.* This provided for a distinctive New Zealand coinage and the removal of legal tender status for British coins.

1933 *Reserve Bank of New Zealand Act.* This established the RBNZ with monopoly powers of note and coin issue – notes and coins to be legal tender, redeemable (in legal tender coin) and convertible (into Sterling).

1938 *Sterling Exchange Suspension Notice.* This was a regulation issued under the RBNZ Amendment Act 1936. The convertibility requirement was dropped.

1964 *Reserve Bank of New Zealand Act.* Legal tender notes to be issued solely by the Reserve Bank.

1964 *Decimal Currency Act.* This provided for decimal currency as legal tender and for the removal of redeemability of bank notes – coins to be issued by the Minister of Finance with notes continuing to be issued by the Reserve Bank. It came into force in 1967.

1989 *Reserve Bank of New Zealand Act.* This provided for legal tender notes and coins to be issued solely by the Reserve Bank.

The initial nationalisation of the currency in the 1930s was driven by two main causes: economic factors and a growing feeling that New Zealand had matured to the point that it should now have its own distinct currency.

New Zealand was the last major part of the British Empire to introduce its own distinctive coinage. Canada did so in 1858, Australia in 1910 and South Africa in 1923. Until the 1930s there was no popular demand for a New Zealand coinage. However, the economic difficulties of the 1930s created circumstances that made a distinct New Zealand coinage an economic necessity. Relative changes in exchange rates resulted in an inflow of Australian coins and an outflow of British coins. It was estimated that, by 1931, 40 per cent of the coins in circulation in New Zealand were Australian coins, despite these coins not being legal tender in New Zealand. Another advantage of a New Zealand coinage was that if New Zealand minted its own coins it would be able to receive the full profit from this process, instead of this going to the British Government.[37]

Despite the abolition of the Colonial Bank of Issue in 1856, the idea of a state monopoly over note issue remained a constant political theme. There were various attempts in Parliament to revive the concept. The issue was debated in 1871 and 1881; a private Bill was unsuccessful in 1886; a Parliamentary Committee of the Legislative Council considered the question in 1910; a government Bill was introduced in 1911 but lapsed with the defeat of the government in elections the following year. By the early 1930s the idea had come to be widely accepted as a necessity, as the economic depression deepened.[38]

By this time, the banks that were issuing their own notes were not particularly concerned about losing their right of note issue. They claimed that the issuing of notes was so heavily taxed that it was unprofitable. What they were concerned about was the proposal that they would be compulsorily required to sell their stocks of gold to the government at a price determined by the government. The banks' resistance crumbled when the government threatened to repeal the legal tender status of outstanding private bank notes, which could have had serious consequences for the banks.

The creation of a state monopoly on the issuing of bank notes was fuelled by a public perception that the banks were exploiting the nation. Hawke states that:[39]

> "*By 1934 the trading banks were widely distrusted, suspected of causing or at least intensifying the*

[36] A Sutherland *Numismatic History of New Zealand* (NZ Numismatic Society, 1941) p259.

[37] R P Hargreaves *From beads to banknotes* (McIndoe, 1972) p141.

[38] Hargreaves, above, p162.

[39] G R Hawke *Between Governments and Banks* (Government Printer, 1973) p25.

Depression. And there were various acts of the banks during the Depression which attracted valid criticism, especially from the Government. It was in this context that the proposed Reserve Bank was debated."

The Coinage Act 1933 replaced British coins as legal tender with distinctive New Zealand coins. The Reserve Bank of New Zealand Act 1933, which established the Reserve Bank, provided that the Reserve Bank (which was initially privately owned) would have a monopoly on the issue of notes in New Zealand. From that time, the currency in use became New Zealand pounds, rather than pounds sterling issued in New Zealand. The Reserve Bank of New Zealand Act 1933 stated that:[40]

"*(T)he Reserve Bank shall have the right to issue bank-notes in New Zealand, and thereupon the authority of every other bank to issue bank-notes in New Zealand…shall cease and determine… . (T)he banks shall redeem their outstanding notes only in Reserve Bank notes or in subsidiary coin… . On presentation…of notes of the Bank,…it shall be the duty of the Bank…to give in exchange for such notes sterling for immediate delivery in London… The tender of a note of the Bank, expressed to be payable on demand shall be a legal tender.*"

The primary duty given to the new Reserve Bank by the Act was to maintain the stability of the value of its bank notes and to exercise control over monetary policy towards that end. Although this legislation provided that the Reserve Bank's notes could be converted into pounds sterling on demand, this conversion provision was ended in 1938 and any effective redeemability was lost.

The Reserve Bank of New Zealand Act 1964 restated the Reserve Bank's right to be the sole issuer of legal tender notes. The Decimal Currency Act 1964 established the legal basis for decimal currency and provided that the Minister of Finance would issue legal tender coins.

Decimal currency was first considered in 1933 when a committee of government officials was appointed to investigate whether, in view of the creation of a distinctive New Zealand currency at the time, it was opportune to decimalise the new currency. It concluded that, with an economic depression occurring, the conversion costs would be too high. In 1957 another committee was formed to look at the issue, and this committee reported that it agreed in principle that a change to decimal currency was desirable. The Government announced in 1963 that the change-over would occur in 1967.

The reasons for the change were economic – savings in time and resources and increased efficiency in many areas, which were ongoing benefits. The only significant disadvantages were the cost of the conversion and the need for public education – both of which were temporary factors.

In 1967, when the Decimal Currency Act 1964 came into force, even nominal redeemability of bank notes was removed. The Reserve Bank no longer "promised to pay", as the notes were only printed with words indicating that they were "legal tender".

The most recent development occurred with the Reserve Bank of New Zealand Act 1989 which states that[41] "*The Bank shall have the sole right to issue bank notes and coins in New Zealand… . Every bank note issued…under this Act shall be legal tender… .*"

7 Conclusions

The legal history of money in New Zealand from 1840 can be divided into successive chronological periods, each with its own characteristics and influences. The development of money law also illustrates themes, some of which are specific to money law and some of which are more general in nature.

For the first few years after the colonial government was established, its practical ability to govern was limited by a lack of the mechanics of state and financial difficulties. Another issue was the lack of legal certainty that applied – ie to what extent did the laws of England apply in New Zealand and what was the legal basis for the application of such laws. The colonial government was also hampered by its remoteness from Britain and the slow speed of communications. Consequently the government was forced to rely to a significant extent on legal expediency in the area of currency during the early days of the colony.

[40] Reserve Bank of New Zealand Act 1933, s 15, s 16 & s 20.

[41] Reserve Bank of New Zealand Act 1989, s 25 & s 27.

As the colony developed, commercial enterprise grew, necessitating that commercial laws needed to be developed. New Zealand was an ideal environment for experimentation and innovative currency legislation because there were no existing entrenched commercial interests to oppose new ideas. The issue of inconvertible government debentures as currency and the establishment of a state-owned bank to have a monopoly on note issue, can be seen as either failures, because both were superseded by other solutions, or as successes that temporarily carried the colony though difficult times until more acceptable solutions were found.

The ultimate unacceptability of the government debentures and bank of issue can be attributed to the settler population having little confidence in the abilities of the colonial government to solve commercial problems. The role of the government was much more limited, and confidence in government effectiveness less than it is today.

By contrast the settler population preferred to trust private institutions rather than government institutions. The notes issued by private banks gained widespread acceptance, and were seen as being on a sounder economic footing than government issued currency.

There were also private interests that promoted private enterprise over government intervention. Parliament in the 19th century frequently acted to assist private commercial interests, as many parliamentarians were active in commercial enterprise and used their position to limit government competition. Some members of Parliament had obvious and widespread conflicts of interest between their public and private interests.

By the end of the 19th century economic policies were beginning to be implemented through legislation. The way the government dealt with the banking crisis of the 1890s was to impose its will on banks through legislation, unilaterally changing the legal status of the private money issued by the banks. Public policy at this time also started to diverge from that of Britain, as evidenced by the different line that the New Zealand government took to the gold standard.

In the late 19th and early 20th centuries there was a growing sense of nationalism. This started to have an impact on legislation in the currency area. This growing sense of nationhood, combined with economic developments, led to legislation to establish a distinctive New Zealand currency and to the formation of a central bank with a currency monopoly.

A successful currency system is an essential element of a successful sovereign state. The laws about money in New Zealand have evolved to meet this need, reflecting the commercial forces of the time and the influence of social and political issues.

Speech

Making sense of a rising exchange rate

An address by Dr Alan Bollard, Governor, Reserve Bank of New Zealand, to the Canterbury Employers' Chamber of Commerce

24 January 2003

My subject today is "Making sense of a rising exchange rate". The exchange rate has risen sharply over the last year or so, and has become the stuff of media headlines in ways not seen for some time, and the concern of exporters which I acknowledge. I'm going to sketch out our broad interpretation of what has been going on, and outline for you something of the way that the Reserve Bank thinks about the exchange rate in making monetary policy.

For several years, of course, the New Zealand dollar fell quite sharply. It settled at levels that, against almost any yardstick, were too low to be sustained. That is so whether measured against the US dollar or in effective (trade-weighted) terms. Little more than two years ago, our dollar was trading at only 39 US cents - 30 per cent below the average for the whole of the last 10 years. Even in trade-weighted terms, our exchange rate spent most of 2001 almost 15 per cent below its 10 year average.

When New Zealanders think about our exchange rate, we tend to think about what is going on here. In fact, that is only half (or less) of the story. The exchange rate is the price of our money in terms of other countries' currencies, so what is happening in other countries, and what investors are thinking about opportunities elsewhere, matters greatly.

In the long run - and, if you are a struggling exporter, that can be a very long time -exchange rates reflect long-term actual economic fundamentals: things to do with the underlying competitiveness of our economy and its firms. If our productivity performance outstrips that of other countries, our exchange rate will tend to rise. If our inflation rate is consistently higher than those of other countries, our nominal exchange rate will tend to fall. And so on. But that is for the long run.

In the shorter-term it is largely a matter of making sense of fluctuations in the demand for funds and in the willingness of the world's savers and investors to supply them. The demand for investors' funds (loosely, the state of the current account of the balance of payments) does not tend to shift very quickly. Instead, changes in the attitudes and perceptions of financial market participants - changes in their willingness to supply funds - tend to be behind most exchange rate changes. To be concrete, in which country and in which sorts of assets do they think that returns will be greatest? Those perceptions and attitudes can be well-founded, or out of line with reality for a number of years. At times, they can shift quickly.

In an ideal world, perhaps, the exchange rate would move simply to reflect actual economic fundamentals - both long-term factors such as structural changes in our relative productivity performance, and medium-term differences in economic cycles. The exchange rate would provide accurate signals to producers, and act as a buffer to temporary pressures. In fact, exchange rates are more volatile than this. Sometimes the moves prove to be well-grounded in economic fundamentals, but by no means always. And exchange rates (like share prices) fluctuate more than the underlying economic fundamentals. New Zealand's exchange rate is a little more variable than most, partly because our economic fundamentals are more variable than those in larger and less commodity-dependent countries. So when it comes to exchange rates we live in an imperfect world - less than ideal, but in my judgement (and we have done a lot of work in this area over the years) still better than the alternatives realistically on offer.

Turning back to our own experience in recent years, the framework I outlined a moment ago does help make sense, broadly speaking, of the exchange rate movements in the last few years. For several years, investors globally were taking a gigantic punt on events in the United States, the leader of the "new economy". They convinced themselves that the United States offered the best returns - the economy was growing rapidly, corporate profits were expected to get ever better, and share prices rose seemingly inexorably.

The enthusiasm of international investors to hold US dollar assets outstripped the American economy's need for those funds. Unsurprisingly, the US dollar rose sharply, to levels too high to be sustained for very long. And it rose against almost every other currency. Even with our OCR at 6.5 per cent through much of 2000, investors just weren't that interested in New Zealand - high tech equity markets were where the good returns were expected. Despite a stellar economic growth performance in the 1990s, markets were just as uninterested in Australia. Both our currency and Australia's fell further than most.

For us, the fall in the exchange rate was something of a mixed blessing. That is perhaps always the case. A falling exchange rate does tend to be good for producers - firms and farmers in Canterbury for example - but it is bad for consumers. It tends to feel better in the countryside than in the cities. It makes our wages look less attractive to prospective skilled migrants, but our beachside houses also appear cheaper to those wealthy foreigners looking for an Antipodean holiday home, and so on. From a macroeconomic perspective, how we feel about these departures from "equilibrium" (and our best assessment of that equilibrium level is somewhere in the range of 54-60 on the trade-weighted index) depends a lot on what else is going on. In this case, the low exchange rate happened to provide a timely buffer when the world economy slowed down sharply: for exporters of manufactured goods and services, in particular, it provided an offset to the impact of the sharp slowdown in world economic activity. But for a variety of reasons, our economic growth proved so robust that New Zealand was one of only a small number of countries that needed to raise interest rates quite a bit last year to help keep medium-term inflation pressures in check. The exchange rate had become too low for too long to really be helpful.

And eventually, as these things do, the exchange rate began to correct - although no one could really reliably predict when this correction would get under way. In trade-weighted terms, our exchange rate has now risen by around 20 per cent since the end of 2001; one of the largest twelve-monthly changes that we have seen in the 18 years since the exchange rate was floated. It is important to put this in context though: even after a striking 30 per cent rise against the US dollar, that exchange rate is still only now around its average level for the last 10 years. On a trade-weighted basis, the exchange rate is now only a few per cent above its long-term average.

As I noted earlier, changes in investors' attitudes and expectations tend to be the main prompts for substantial exchange rate moves. How did those attitudes change last year?

For investors, the US "miracle" has turned sour. Share prices have fallen for three consecutive years, and even US interest rates are unattractively low by international standards. America's need to attract foreign capital - its huge current account deficit - remains as strong as ever. But when the US is no longer flavour of the decade, there was only one way for the US dollar to go. Down. That adjustment was both inevitable (eventually) and healthy.

Pretty much every country in the developed world has seen its currency rise in value against the US dollar. But our currency has appreciated more than most in the last year. While on average, the currency has only returned to more normal levels, against the Australian dollar it has risen to levels that are not far off record highs. While many New Zealanders have been trying to make sense of our currency's sharp rise, many commentators across the Tasman have been grappling with the question of why the Australian dollar has risen so little against other currencies so far. Indeed, in one recent global survey in which financial market commentators were asked which currency was likely to rise most this year, the Australian dollar was the overwhelming favourite.

Two things seem to explain much of the New Zealand dollar's sharp rise. First, our economy has performed very well - indeed, surprisingly well in the last year or so. New Zealand is one of the few developed countries where economic forecasts were revised up last year. Amid a rather gloomy world outlook, investors have been attracted to favourable growth surprises. And second, it was a year when solid secure fixed income returns seemed to come back into focus among the investor community. Moody's now rate New Zealand as AAA, and of course New Zealanders' appetite for debt has meant we have long had interest rates that have been somewhat above those of most developed countries. Two of the other strongest currencies last year

were the Norwegian krone and the South African rand, both economies with higher interest rates than those in New Zealand.

At the margin, the fact that our current account deficit has been smaller than usual may also have contributed - the world has been keen to put money here at just the time when we've needed a bit less than usual. The US, of course, scored poorly all round: it has had a high and widening current account deficit, low interest rates, and a continued disappointing growth outlook.

But what of the rise against the Australian dollar? First, we've had higher interest rates than Australia (and the gap has increased somewhat) in a period when secure fixed income returns have been particularly attractive. Second, validly or otherwise, markets have taken the view that the New Zealand economy is growing more robustly than Australia's at present (the drought, fires, and all that). And third, when both the New Zealand and Australian dollars are rising or falling, our currency has often gone a little further than theirs: perhaps something to do with our smaller size and less-liquid markets.

It is not my main topic today but can I make just a few quick observations about interest rates. First, our interest rates are currently low by our historical standards (lower than they were when the exchange rate was falling, and only lower than this on three occasions in the last 20 years). Even after adjusting for inflation, interest rates are lower than they have been for most of that time. Second, while the Reserve Bank's monetary policy has a big influence over the level of short-term interest rates over short periods of time, the average or normal level of interest rates over periods of years is mainly determined by New Zealanders' willingness to save and appetite to borrow. For reasons that are not fully understood, over the years New Zealanders have continued to have a higher appetite for debt, at any particular level of interest rates, than do citizens of most other countries we typically compare ourselves with. Only when that changes will our interest rates settle, on average, around the level of those in other countries.

I want to turn now to outline something of how we think about the exchange rate in setting monetary policy.

In setting the Official Cash Rate, we are always very conscious of exchange rate changes, and how those developments will affect the outlook for growth and inflation a little down the track. Those effects have changed through time. For example, not just in New Zealand but internationally, prices seem to be less responsive to exchange rate movements than they were 15 years ago. Suppliers seem to be absorbing more of the impact of cyclical fluctuations in the exchange rate. And as an increasing proportion of our exports are moving up the value-chain, our firms are getting a little more pricing power themselves, and hence are less immediately exposed to the effects of exchange rate fluctuations. And, of course, access to sophisticated financial derivatives gives many firms some breathing space to adjust to changes in the exchange rate. But as a trading nation, exchange rate fluctuations will always be a big influence on the short-term economic outlook, and monetary policy. A rising exchange rate has a very real impact on exporting firms, and those supplying them - here in Christchurch and throughout the country. And it does so particularly when individual cross-rates move rather differently, for reasons that have nothing to do with events in New Zealand: for example, a firm which is sourcing inputs from Australia and exporting to the United States.

What else is going on at the same time also matters critically. Sometimes an exchange rate change will helpfully offset some other development here or abroad, but by no mean always. Making these assessments is very far from being a mechanical or mechanistic exercise. Formal models and estimates of 'equilibrium' exchange rates help, and we use them extensively. But they only take us so far. A lot of wisdom, and experience, and informed judgement has to be brought to bear - and a willingness to acknowledge our mistakes and reassess at the next regular review.

And, of course, we had a review of the OCR just yesterday, when we had to work through exactly those sorts of judgements, making sense of the unexpectedly strong rise in the exchange rate since the November Monetary Policy Statement. We put a great deal of effort into understanding both what might have driven the exchange rate, and into assessing what impact the rise might have. We concluded that the recent rise in the exchange rate, if sustained, will dampen economic activity looking ahead - at least as

compared to what we were expecting in November. At the same time, we noted that domestic spending appears to have been more robust than we had anticipated - that means that the economy has still been growing strongly. Household spending appears to have remained high, and house sales and construction activity have been very buoyant. It is important to remember that the starting point has been one of quite intense pressure on resources - many of you, for example, are no doubt among the firms who report that they are finding it very hard to get good staff. For the moment, it is appropriate to leave the OCR unchanged, but the balance of risks has shifted. We will need to look closely at the data over the next few months, for evidence that points to reduced pressure on resources and medium-term inflation. If that evidence emerges, and if the exchange rate remains at around current levels, or even rises further, there may be scope for a cut in the OCR later in the year.

Some prices are already falling as a direct result of the rising exchange rate. That, in itself, would not prompt us to adjust monetary policy - any more than the sharp rises in prices in 2000 and 2001 after the substantial exchange rate fall led us to adjust the OCR in response. We focus on the more sustained impact of exchange rate changes; the effects on economic activity and medium-term inflation pressures. Short-term changes in prices can affect people's expectations about inflation, but it has usually been sensible for us to "look through" these effects. If we did not, we would typically be over-reacting, and pushing interest rates around more than medium-term considerations would warrant - and that might even exacerbate exchange rate fluctuations over time.

Some, of course, would suggest that we should be more active and should adjust the OCR, not just to offset the dampening impact of the exchange rate, but to try actively to reverse, or slow, the rate of increase in the exchange rate. In this case, of course, it is important to remember that the exchange rate has simply recovered to more normal levels, pricing New Zealand assets and products more sensibly, albeit adjusting more quickly than is comfortable. And more generally, we need to be very cautious. We would be the first to acknowledge that monetary policy affects exchange rates, but modest changes in interest rates only rarely do so in a stable and predictable manner over periods that matter to people in the real economy. Understanding, after the event, what has driven the exchange rate is one thing, but reliably forecasting it, or using monetary policy to influence it, is quite another.

What we constantly do, however, is to look behind developments in the exchange rate. We want to understand as well as we can what has been going on and why, and we continually test our reasoning and judgements to ensure that our monetary policy decisions are not unnecessarily exacerbating exchange rate changes. This prudent and sensible approach has in fact been written into our mandate - the Policy Targets Agreement with the Minister of Finance - since 1999. It keeps our focus on medium-term price stability, but requires us to ensure that in pursuing that medium-term goal we avoid unnecessary instability in output, interest and exchange rate. There are no simple answers as to how to apply these provisions to our policymaking; to know just what is "unnecessary", not just right now, but over the medium-term. Sometimes, an OCR rise will exacerbate pressure on the exchange rate, but rises in both will be a necessary response to pressures on output and inflation. At other times, there will be scope for trade-offs, but there are rarely easy or reliable ones.

For us, those choices might come more sharply into focus if we were to see another sharp rise in the exchange rate this year. You will note that I have not said much today about what I think might happen to the exchange rate in the coming year. And that is for a very good reason. However much we can understand, after the event, what has driven the exchange rate, neither economists and central bankers (nor anyone else) has a great track record forecasting exchange rates. And that is especially so when the exchange rate is no longer well away from sustainable long-term levels. Most observers do expect some further rise in our exchange rate, mainly because the US dollar is widely expected to fall further. But a year is a long time in financial markets, and much can change over that time in investors' attitudes to likely returns both here and in other countries.

I would emphasise in closing that the Reserve Bank will never be complacent about the sorts of exchange rate swings we have seen in recent years. We are limited in what we can do to prevent or moderate them, but we recognise the impact they have both on you as business people, and on consumers

up and down the country. As I noted at the start of this address, if New Zealand can achieve a superior long-run economic performance that will lead to a trend increase in the exchange rate, but quite marked fluctuations around that trend will be an uncomfortable fact of life for us all. While keeping the goal of medium-term price stability constantly in view, the Reserve Bank will always be asking whether, and how, our decisions and comments can best avoid undue and unnecessary volatility in the economic environment we face - not just today, but over the full course of the economic cycle. The fact that some volatility is inevitable is no excuse for simply being oblivious to it. You cannot be, and we are not either.

RESERVE BANK DISCUSSION PAPERS

This section sets out the abstracts of recently issued Reserve Bank Discussion Papers. The Discussion Papers are available on the Reserve Bank web site and can be obtained in hard copy on request from the Reserve Bank.

DP2002/07

Currency unions and gravity models revisited

By Christie Smith, November 2002

Gravity models have been shown to be fairly effective in modelling bilateral trading patterns, explaining more than 50 per cent of the variation in trade. This paper examines bilateral trade patterns using a data set provided by Rose and van Wincoop (2001). Rose (2000) has suggested that forming a currency union has a dramatic effect on the volume of intra-union trade. A number of econometric issues are identified with respect to this claim. There is some evidence that Rose's (2000) empirical results are not entirely robust to the sample of countries used, and to the estimation method. In particular, some of the regressors may be endogenous, which casts doubt on the magnitude of the parameter estimates.

DP2002/08

Currency Unions and Trade: Variations on Themes by Rose and Persson

By Dr Peter Kenen, December 2002

Using a gravity equation, Andrew Rose finds that currency-union countries trade more intensively with each other than do other country pairs, and others report the same result. Using a nonparametric test, however, Persson finds that trade flows between currency-union countries are not significantly different in size from other bilateral trade flows. Using another way to identify a currency-union country, this paper reproduces Persson's result but also produces an anomaly. When Rose's gravity equation is re-estimated using the data set furnished by the alternative definition of a currency-union country, Rose's result survives, although the currency-union effect is smaller than the effect he reported initially.

DP2003/01

Financial deregulation and household indebtedness

By Leslie Hull, January 2003

Low saving rates and high indebtedness are characteristics of the household sector in many developed countries. As in other countries, financial deregulation has contributed to increased household indebtedness in New Zealand. This paper discusses several aspects of the linkages between deregulation and household consumption decisions. It begins with an overview of the financial sector reforms and a discussion of how the reforms affected households' access to credit. Secondly, the effect of a change in house prices on consumption is measured. Given that New Zealanders hold about 80 per cent of their wealth in housing, changes in house prices have the potential to materially affect household consumption decisions. Also, there is evidence that the effect of changes in housing wealth on consumption is stronger in the period after deregulation. Thirdly, the role of the household sector in the current account is discussed as banks have increasingly been borrowing overseas to fund household borrowing. The results indicate that the household sector's net overseas surplus declined by at least $7 billion over the last decade. Finally, the ability of the household sector to weather an economic downturn is considered. Highly leveraged households are more vulnerable in times of stress, and their debt servicing capabilities might deteriorate when interest rates rise. Also, deterioration in household balance sheets could negatively impact the financial sector.

For the record: recent press releases

Reserve Bank coinage warning

16 January 2003

The Reserve Bank today advised the public that some older 20 cent coins are temporarily causing confusion among some shoppers.

Corporate Affairs Manager Paul Jackman said "In the weeks preceding Christmas demand for cash throughout New Zealand was exceptionally high and to meet that demand the Reserve Bank released a very large volume of coinage. Included were some twenty cent coins that were minted thirteen years ago and then not used until now. These coins were stored undisturbed for over a decade in the Reserve Bank's vaults until they were issued during December 2002.

"It appears that some of these coins, while in storage, over time discoloured slightly from lack of use and the Reserve Bank has now received three reports of people confusing these cupro-nickel coins for two dollar aluminium-bronze coins.

"These twenty cent coins have a very faint yellow colouring near the rims, and it is that which seems to be causing the difficulty. The discoloured twenty cent coins feature a Maori carving, as opposed to a kiwi, and are dated 1990. About 2.5 million of these coins were issued, there being in total about 143 million twenty cent coins in circulation.

"As the coins get used, bouncing around in pockets and purses, the tarnish should wear off, solving the problem. However, in the meantime if people are unsure, they should look closely at the design of the coins and the numbers indicating value.

"The Reserve Bank regrets this confusion and will be reviewing its procedures in relation to holding non-issued coins for long periods of time," Mr Jackman concluded.

OCR unchanged at 5.75 per cent

23 January 2003

The Reserve Bank today left the Official Cash Rate unchanged at 5.75 per cent.

Governor Alan Bollard said "A key development since November has been a further sharp rise in the New Zealand dollar against all major currencies. If sustained, we expect the higher exchange rate to dampen future economic activity and, hence, medium-term inflation pressures.

"However, current domestic economic activity appears to be more robust than we anticipated, as reflected in indicators of household spending and construction sector activity. The latest estimates suggest that domestic inflationary pressure has continued, offsetting a fall in imported inflation. As expected, overall CPI inflation has remained towards the upper end of the 1 to 3 per cent target band for inflation on average over the medium term.

"For the moment, it is appropriate to leave the OCR unchanged, reflecting the strong growth in the New Zealand economy. However, the balance of risks around the future path of interest rates has shifted. If the exchange rate remains at around present levels or appreciates further, and if the evidence points to reduced pressures on resources and medium-term inflation, then there may be scope for a cut in the OCR later in the year," Dr Bollard concluded.

The next OCR announcement comes with the release of the Monetary Policy Statement on 6 March 2003.

RBNZ responds to currency concerns

24 January 2003

The Reserve Bank today explained how exchange rate movements impact on monetary policy. This follows calls from exporters for the Reserve Bank to consider their needs when making interest-rate decisions.

Speaking to the Canterbury Employers' Chamber of Commerce, Reserve Bank Governor Alan Bollard said that the Reserve Bank acknowledged the concerns of exporters in the face of the rising exchange rate, especially relative to the Australian dollar, and the speed and unpredictability of that appreciation.

Explaining the currency appreciation, Dr Bollard said "Our economy has performed very well – indeed, surprisingly well in the last year or so. New Zealand is one of the few developed countries where economic forecasts were revised up last year. Amid a rather gloomy world outlook, investors have been attracted to favourable growth surprises. And … it was a year when solid, secure, fixed-income returns seemed to come back into focus among the investor community.

"Validly or otherwise, markets have taken the view that the New Zealand economy is growing more robustly than Australia's at present," and "For investors, the US "miracle" has turned sour. … When the US is no longer flavour of the decade, there was only one way for the US dollar to go."

On how exchange rate movements affect monetary policy decisions, Dr Bollard said the Bank was required to deliver price stability and to avoid unnecessary instability in output, interest rates and the exchange rate, though achieving this was not simple.

"Sometimes, an OCR rise will exacerbate pressure on the exchange rate, but rises in both will be a necessary response to pressures on output and inflation. At other times, there will be scope for trade-offs, but there are rarely easy or reliable ones."

Commenting on the interest rate decision earlier this week, Dr Bollard said the appreciating exchange rate, if sustained, would dampen economic activity, though at the same time "Domestic spending appears to have been more robust than we had anticipated – that means that the economy has still been growing strongly."

Dr Bollard said that the Reserve Bank would be looking closely "for evidence that points to reduced pressure on resources and medium-term inflation. If that evidence emerges, and if the exchange rate remains at around current levels, or even rises further, there may be scope for a cut in the OCR later in the year."

New bank registered

3 February 2003

The Reserve Bank today announced that it had registered Leviathan Limited as a bank.

This bank intends to change its name to St George Bank New Zealand Limited, and operate using the trading name "Superbank".

This registration brings the total number of registered banks in New Zealand to 18.

Reserve Bank Board Appointment

13 February 2003

Press Release by New Zealand Government at 13 Feb 2003 10:38.

Rt Hon Ted Thomas, DCNZM, QC, has been appointed a non-executive director of the Reserve Bank for a term of five years from the beginning of next month.

He succeeds Bill Wilson, whose term expired on 1 February.

Ted Thomas has a long and distinguished career as a member of the Judiciary. In 2001 he was awarded the New Zealand Order of Merit for his services as a Court of Appeal Judge.

Since retiring from the bench, Justice Thomas has continued to be active in legal research, most recently as a Visiting Fellow in the Law Programme at the Research School of Social Sciences in Canberra, Australia.

Other RBNZ non-executive directors are: Paul Baines; Hugh Fletcher; John Goulter; Arthur Grimes; Alison Paterson; and Ruth Richardson. Non-executive directors are paid fees of $15,000 a year.

RBNZ leaves OCR unchanged

6 March 2003

The Reserve Bank has decided to leave the Official Cash Rate at 5.75 per cent.

Speaking at the release of the Reserve Bank's March 2003 *Monetary Policy Statement* Reserve Bank Governor Alan

Bollard said "On 23 January 2003, we stated that 'If the exchange rate remains at around present levels or appreciates further, and if the evidence points to reduced pressures on resources and medium-term inflation, then there may be scope for a cut in the OCR later in the year.'

"Today's decision reflects that fact that the two-part criterion described above has not yet been fully met. The exchange rate has indeed appreciated further, but, so far, evidence of reduced inflation pressures has not been forthcoming.

"The domestic economy has been more robust than we thought. Rapid population growth, rising employment and the earlier strength in the export sector have fuelled strong household consumption and supported higher residential investment and housing market activity. Capacity utilisation is high and demand for labour is strong. Consequently, inflation in industries serving the domestic economy is relatively high at around 4 per cent.

"Thus the stronger currency and the stronger domestic economy continue to pull inflationary pressures in opposite directions. CPI inflation is projected to fall over the next few quarters, reflecting the impact of the exchange rate on import prices, and to settle comfortably within the target range over the medium term. However, we do not yet have sufficient certainty about this medium-term path of inflation to warrant a cut in interest rates now.

"This assessment could change over the months ahead and the Bank will be carefully watching economic developments. As we said earlier, when we see reduced pressure on resources and medium-term inflation, then there may be scope for a cut in the OCR later in the year,' Dr Bollard 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

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 Discussion Papers

2002

DP2002/01	Extracting expectations of New Zealand's Official Cash Rate from the bank-risk yield curve Leo Krippner
DP2002/02	Modelling the long-run real effective exchange rate of the New Zealand Dollar Ronald MacDonald
DP2002/03	Monetary policy and inflation forecasting with and without the output gap Weshah Razzak
DP2002/04	Extracting market expectations from option prices: an application to over-the-counter New Zealand dollar options Aron Gereben
DP2002/05	Foreign-owned banks: Implication for New Zealand's financial stability Leslie Hull
DP2002/06	Estimating a Taylor Rule for New Zealand with a time-varying neutral real rate L Christopher Plantier and Dean Scrimgeour
DP2002/07	Currency unions and gravity models revisited Christie Smith
DP2002/08	Currency unions and Trade: Variations on Themes by Rose and Persson Dr Peter Kenen

2003

DP2003/01	Financial deregulation and household indebtedness Leslie Hull

Full lists of Discussion Paper series are available from Administration, Economics Department. Lists of the Working Papers and the Research Notes can also be obtained from the Economics Department.

Pamphlets

Available from the Knowledge Centre

Explaining Currency - New Zealand's bank notes and coins
This Is The Reserve Bank
Monetary Policy over the Business Cycle
The Impact of Monetary Policy on Growth
Your Bank's dIsclosure statement — What's in it for you?

For information please contact:

Knowledge Centre
Knowledge Services Group
Reserve Bank of New Zealand
2 The Terrace
P O Box 2498
WELLINGTON
Phone (04) 4722-029

Articles and speeches in recent issues of the Reserve Bank Bulletin

Vol. 64 No. 4, December 2001
Articles
International capital flows, external debt, and New Zealand financial stability
Trends in foreign exchange trading
Foreign exchange settlement risk survey
The current state of New Zealand monetary union research
Policy lessons on promoting financial stability

Speeches
Monetary policy in interesting times

Vol 65 No. 1, March 2002
Articles
The Taylor Rule and its relevance to New Zealand monetary policy
Exchange rate strategies for small open developed economies such as New Zealand
The Reserve Bank's external communications
Managing human resources - a central bank perspective
Extracting market expectations from option prices
Polymer bank notes - the New Zealand experience

Speeches
Inflation targeting 14 years on
An indebted people

Vol 65, No. 2, June 2002
Articles
The role of the Reserve Bank's macro model in the formation of interest rate projections
Corporate governance in the financial sector
Developments in the New Zealand banking industry
Developments in credit markets over two decades

Vol 65, No. 3, September 2002
Articles
An optimal inflation target for New Zealand: lessons from the literature
Recent developments in New Zealand's financial stability
Strengthening market disciplines in the financial sector
Results of Bulletin readers' survey

Vol 65, No. 4, December 2002
Articles
The Reserve Bank's forecasting performance
Managing New Zealand's foreign reserves
Corporate behaviour and the balance of payments

Speech
The evolution of monetary policy in New Zealand